MANUAL OF HOME-MAKING

Van Rensselaer
Rose - Canon

THE RURAL MANUALS

A MANUAL OF HOME-MAKING

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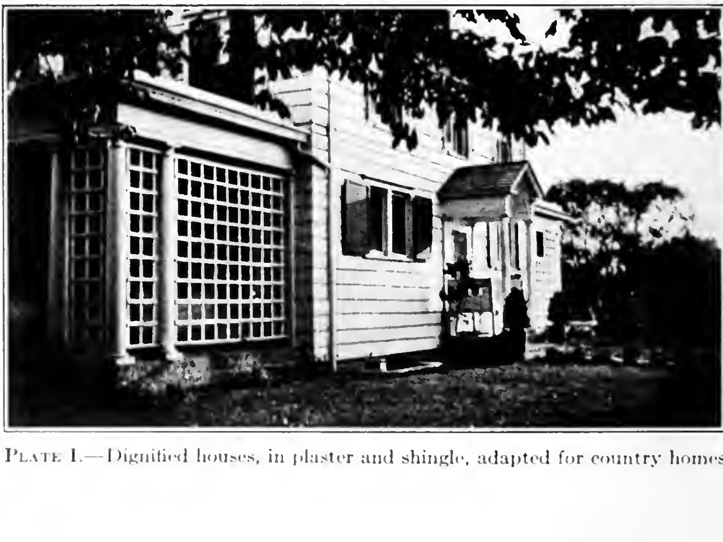

PLATE I.—Dignified houses, in plaster and shingle, adapted for country homes

A
MANUAL OF HOME-MAKING

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STATEMENT BY THE EDITOR

Herein is brought together a collection of precepts and advice on the setting up and management of a home. The book is written and compiled primarily for those women who are managing households, not for those who are teaching or who are students in the class-room. It has been the purpose to bring together from many reliable sources the guiding rules to be followed in making the home a place where the family can live a thrifty and joyous life. It is compiled by those who understand the subject and the situation.

Chapters on hygiene and sanitation were prepared by the authors, but space would not allow of their inclusion. This is a source of much regret, but the omission allowed a fuller treatment to be retained in the remaining chapters.

The book is intended primarily for rural conditions. The country home should receive as careful and considerate attention as the farm itself. The home is inseparable from the farm. Yet, as the principles and practices of home-making are the same in country and town, the book should actually meet the needs of a wide range of people.

The Editor is glad to add a book in his series on the work and welfare of women, and he hopes it will not be the last. The woman's work and the man's work together make the welfare of any people secure.

L. H. BAILEY.

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A MANUAL OF HOME-MAKING

A MANUAL OF HOME-MAKING

PART I

THE HOUSE AND ITS FURNISHINGS

CHAPTER I

THE MODERN HOUSE

BY HELEN BINKERD YOUNG

A SOUND house plan is fundamental to the economics of the home. A common impulse toward rational living has made it necessary to simplify the paraphernalia of existence; to eliminate useless tasks and trappings and to arrange the remaining necessities into an orderly scheme of household life. The arrangement of the modern house is a direct expression of this point of view. The snug, compact dwellings of the present day are eloquent records of the scientific trend in home-making.

Theoretically, the administration of a household under conservation methods implies a perfect dwelling—one in which there is an exact adjustment between the worker and the workplace; where there is no friction between the housekeeping and the house structure; where the interior space and equipment fit perfectly the operations of the home. The gap that exists between an effective scheme of work and a poor arrangement of space represents a permanent element of inconvenience or waste; hence the value of a well-considered floor plan.

The comfort demanded by modern standards of living has brought into the erection of the house many new materials, many new trades and a great deal of fixed equipment in the way of heating, plumbing, and lighting systems, hardwood floors, and various types of built-in closets and furniture. The modern house is accordingly a different and a more costly product than the dwellings of our fathers. This increase in the cost of a cubic foot of the house of to-day, together with the necessity to build, heat, and maintain the home economically, has had a marked effect on the size, shape, and arrangement of dwellings. Small housekeeping units, square floor plans, small halls, condensed stair arrangements, compact kitchens, grouped chimneys, and grouped window treatments are the natural results of straightforward planning to meet modern conditions. Intensive housekeeping and intensive house-planning are the tendency of the times.

ARRANGEMENT OF THE HOUSE

The plan of the house must be above all a direct and businesslike arrangement. Every foot of space must be made to count, must contribute either to the smoothness of the housework or to the effectiveness of the whole interior. There should be no waste nor stagnant space, no idle nor undefined areas.

The organization of the floor plan should fit the organization of home activities. The three phases of daily life—work, play, and sleep—suggest three divisions of space in the arrangement of a dwelling, the living-rooms forming one group, the working parts another, and the sleeping-rooms another. Each of these space groups is distinct in use, in arrangement, and in the character of its furnishings.

Communication between these parts is provided by means of hall and stairs; in fact the starting point of any plan is a study of its circulation or passage. The hall may, therefore, be considered as the kernel of the plan, the distributing center of space.

The arrangement of the living-rooms should be generous in feeling. To this end, wide doorways, groups of windows, and long vistas both indoors and out are essential. One large unit for general family use and two or three smaller ones usually comprise the living area of the modest house. Some variety in the size, shape, and direction of the rooms is desirable in the design of the living space. Combinations of oblong rooms of different sizes placed at right angles to each other, or of oblong and square rooms of different dimensions, make a more interesting and more furnishable arrangement than a succession of square rooms, which tend to repeat each other in character and use. Generous window groups on long or important walls and arrangements of single windows or pairs on short or unimportant walls furnish a variety of outlook and lighting that is bound to give life and animation to the whole interior.

In general the living-rooms in temperate climates should occupy southerly exposures—south, southeast, and southwest—unless such an arrangement is contradicted by the direction of the view, prevailing winds, or other conditions of the site. An east dining-room is especially to be desired, since the morning sun on the breakfast table starts the day off cheerily. Living-rooms southerly and working parts northerly make a good complementary arrangement for using to advantage the four exposures of a free-standing house.

Further discussion of the working arrangements, such as kitchen, pantry, laundry, and the like, may be found on pages 99 to 119.

The sleeping-rooms must above all be private in location. That means that each room must be entered directly from a hall, not from another room. In a two-story house the privacy of the sleeping-rooms is automatically assured by placing them on the second floor. In a one-story arrangement a small bedroom-hall must be deliberately provided in addition to the entrance-hall.

The relative advantages of a one-floor or two-floor arrangement for a private dwelling depend on a number of factors. In general, the two-story house and the real bungalow, which has all the rooms arranged on a single floor, are climatic expressions of housing for widely different localities. Each is so normal for its own conditions that it becomes the prevalent type of that place. The informal spread-out plan of the bungalow is normal for warm climates, where yard and grounds form part of the daily life for a large part of the year and where the buildings may be lightly constructed without cellars and without heating systems. But when a dwelling must be arranged for year-round comfort in a locality of extreme heat and cold, the supposed economy of a one-floor arrangement, unless kept very small and compact, loses all point and de-

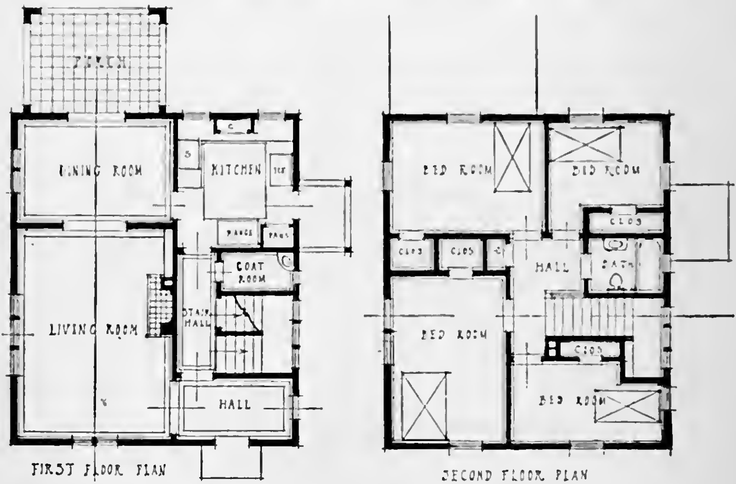

Fig. 1.—Floor plans of a small house. The first floor plan shows a desirable spaciousness of living area and adaptability of working parts. The second floor plan shows an arrangement of four bedrooms, closets, and bath developed from a central hall.

feats its own end. Large cellar and roof areas, the need for weather-tight construction and for an effective heating plant soon eat up the supposed economy of cost.

There is, however, something to be said for the simpler housekeeping of the one-floor arrangement. The ease with which a servantless household may be comfortably maintained when all the living arrangements are on a single floor, is responsible for the popularity of various forms of apartments, flats, two-family dwellings, and even cottages with bedrooms on the first floor. Most of these are, however, rented dwelling-places and must not be confused with the type of house that it is desirable to build and own as a permanent home.

The three arrangements shown in the accompanying illustrations are typical examples of houses planned for modern conditions.

In Fig. 1 are shown both floor plans of a small house 26 by

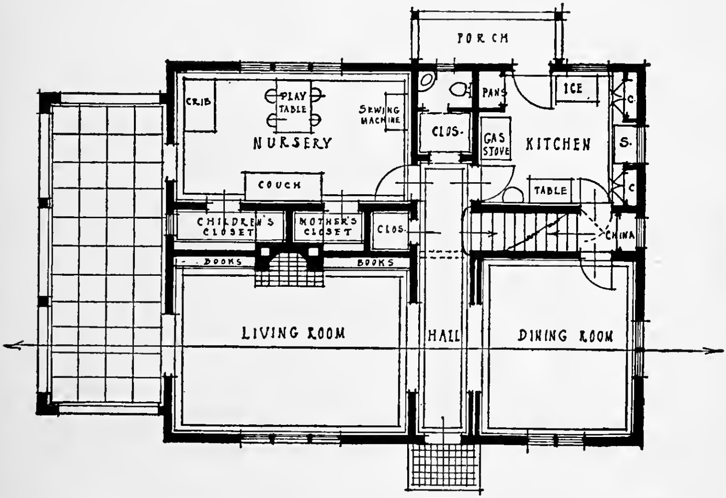

Fig. 2.—The first floor plan of a suburban house designed for the accomodation of a family with little children.

30 feet. Here the spaciousness of the living area and the adaptability of the working parts may be instantly noted. The contrast in the size and shape of living- and dining-rooms, together with the long vista through both rooms and porch to the yard beyond, form a pleasing development of the space. The stairway is screened from the front door and is arranged in a separate stair-hall which serves also as passage to the coat-room and the kitchen. Such an arrangement greatly assists smooth and noiseless housekeeping. The second-floor plan shows an arrangement of four rooms, closets, and bath developed from a central hall.

In Fig. 2 is shown the first-floor plan of a suburban house designed for the accommodation of a family with little children.

The panel of space across the front, comprising living-room, hall, and dining-room, is supplemented by a similar arrangement of rooms in the rear, in the form of nursery and kitchen. The front of the house can thus be kept in order while

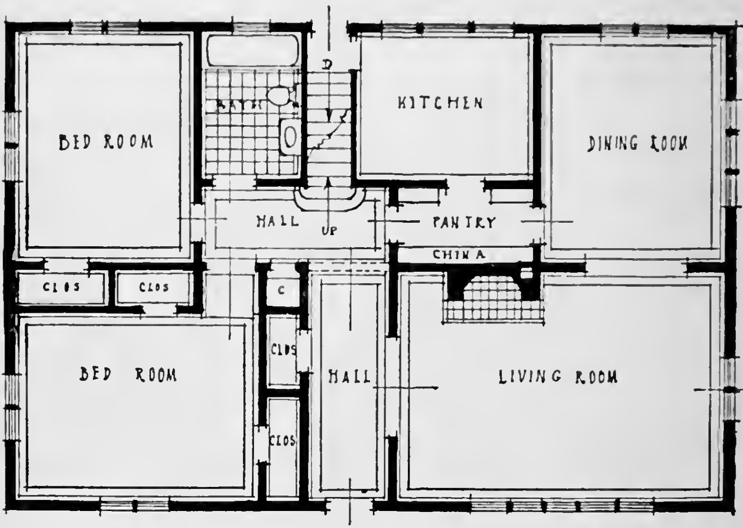

FIG. 3.—A typical arrangement of all rooms on one floor. The living-rooms and kitchen are grouped snugly together, and the bedrooms are grouped and arranged to open from a retired hall.

the rear part is in use. The nursery is so located that it can be watched by the worker in the kitchen, and the stairs are very accessible. With such an arrangement properly equipped, a mother could do her own work without exhaustion or loss of time. The children's lunch could be served in the nursery and the mother's couch and sewing materials would always be ready. The nursery could later be transformed into a study-room or library, or in case of illness into a downstairs bedroom, since toilet facilities are at hand. The house also adjusts itself to hired help.

A typical arrangement of all rooms on one floor is shown in Fig. 3. The living-rooms and kitchen are grouped snugly together, and the bedrooms are grouped and arranged to open from a retired hall. Such a plan is suitable for a one-floor cottage arrangement in temperate climates. Another one-floor arrangement is shown in Fig. 4.

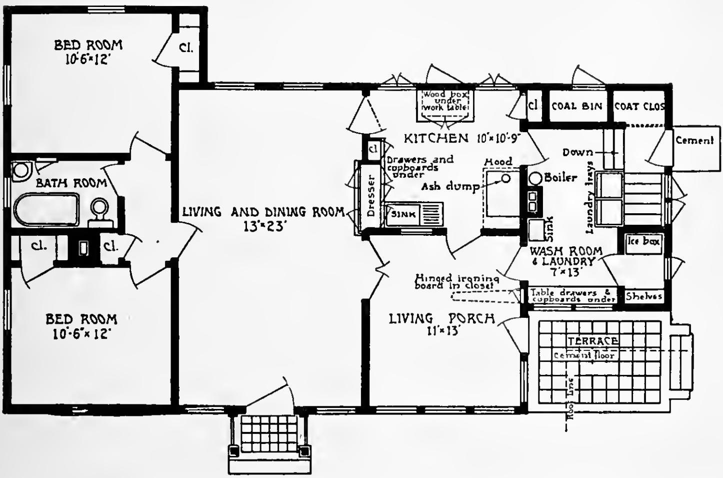

Fig. 4.—A small farmhouse arranged on a single floor, with a cellar beneath for the furnace and for vegetable storage.

THE FARMHOUSE *

No building can be discussed intelligently apart from its surroundings. The best placing of the farmhouse depends on the location of the barns and other outbuildings. The relation of these buildings to one another and to such considerations as sunlight, view, roadways, and garden should be carefully studied. Obviously, a general farm scheme that unites into one workable system lands, barns, and dwelling is the wisest beginning for the development of any property. Each improvement will then take its place in the final scheme, and

* The remainder of this chapter is taken from Cornell Reading-Course for the Farm Home, Bull. 39.

permanent economy will result. Owners of either old or new farmsteads will profit by adhering to a simple and direct working plan for the farm grounds. The farmhouse is merely one unit of the whole farmstead.

The practical value of a working plan can hardly be overestimated. The haphazard farm groups commonly seen bear eloquent testimony to the futility of developing property without plan. Failure to plan involves waste of money and labor; it means a continuous process of tearing down, reconstructing, and makeshift. Under all circumstances, hit-and-miss methods of work have proved unfailingly wasteful. Organized farming and organized housekeeping are the present tendency, and to this end an organized arrangement is necessary. A well-planned farmstead is more economical, more orderly, more beautiful, and more salable than one which, like Topsy, "just growed."

FARMHOUSE PLANNING

A farmhouse is more difficult to plan than either a city or a suburban dwelling, because it must provide for so many needs. The city or the suburban house is merely a home; it is supplemented by an outside place of business and by outside markets. The farmhouse, on the other hand, must be not only a home, but also the business center and to a limited extent the store and the market. This means that, planned as compactly as may be, a farmhouse is necessarily larger in floor area than a suburban house for the same family need be. Much thought and planning are, therefore, required in order to arrange this larger area in such a manner that wasteful methods of work will be avoided.

Traditional types.

It may truly be said that the problem of the American farmhouse is still unsolved. For the building of new appropriate farm dwellings, there is almost no precedent to guide one. Most of the rural houses now standing are failures as farmhouses because they were not planned for farm conditions. In fact, many of them were not planned at all. They were merely built, and built in about the following fashion: an outer shell was constructed and roofed over, the inside was divided into rooms, and somewhere a kitchen was attached. If the house became too small, more rooms were added to fit the growing needs of the family. With each addition to the house, the kitchen retreated to the rear of the structure, where, by its very distance from the living-rooms, it confined the housewife to her post of duty. As the family decreased in numbers and helpers became few, the front part of the house was closed and home life was centered within the radius of the kitchen and its activities.

Such of these old structures as are soundly built are worth replanning and equipping with running water, electric light, sound floors, and a good heating system. Alteration should be undertaken only after the complete project has been worked out on paper.

In Fig. 5 is illustrated a rambling plan of the traditional farmhouse of the upright-and-wing type previously described. The original and the remodeled arrangement are shown in A and B, respectively. The main faults of the old plan, A, are two: first, the plan is deficient in correctly located hall space; second, the distance from the kitchen to the front of the house is too great. Since a person must pass through one room in order to reach another, the whole floor virtually becomes a passageway. This condition destroys privacy, interrupts work, and entails much extra cleaning. The correct amount of hall area placed in the heart of the plan would give separate entrance to each room and would save the whole house. Hall space should be regarded as the developer of the plan. If the plan is compactly arranged and the hall centrally placed, great service may be obtained from even a small allowance of hall space. The presence of five, six, or seven doors in a room indicates poor hall-planning, and therefore poor house-planning. It is well to remember that the number of doors in a room diminishes in proportion to the excellence of the plan.

In plan B there is introduced enough central hall area to give direct access to each of the rooms. The kitchen is placed

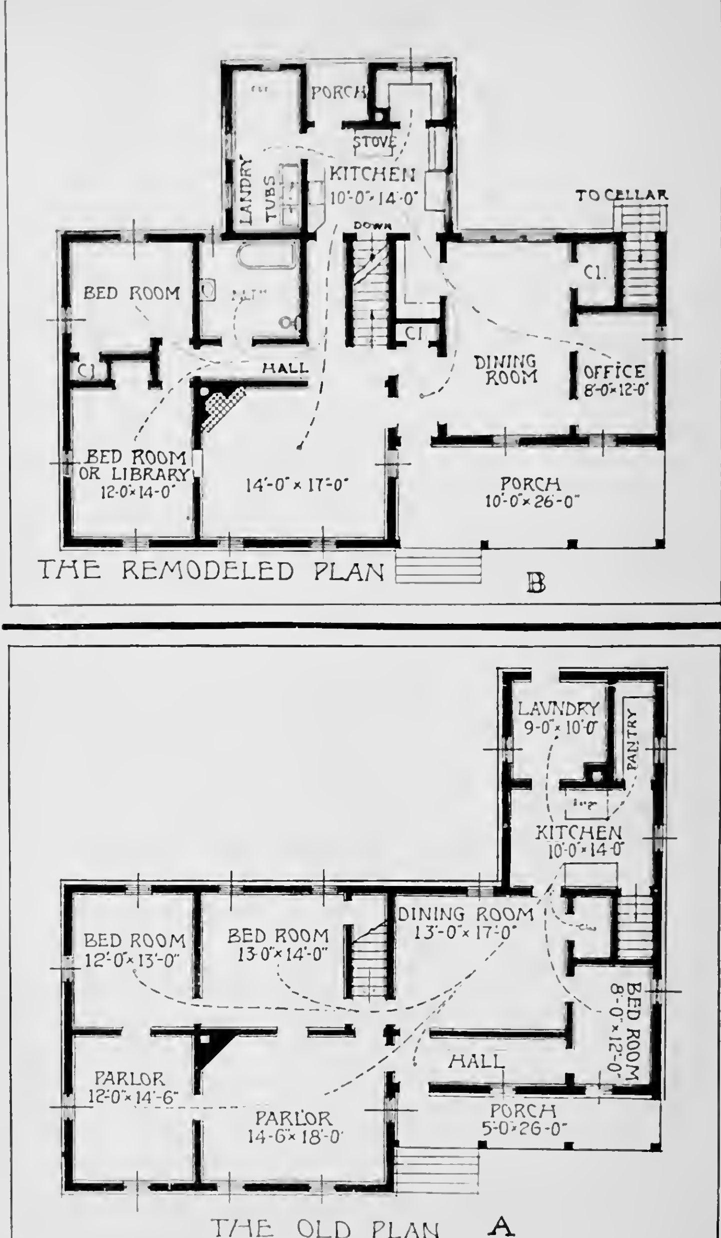

Fig. 5.—A remodeled farmhouse, to illustrate step-saving.

centrally at the rear of this hallway. This brings the kitchen nearer the living rooms and shortens all working distances. If the distances from the center of the kitchen to the center of each room in plans A and B are computed, it is found that the remodeled plan saves an average distance of fifteen feet a round trip over the old plan.

In the remodeled plan, such modern improvements as heat, light, and running water have been added; closets also have been provided. The whole plan is now arranged so as to encourage wholesome living.

Under the old plan the house contained two cellars, one under the square upright and one under the kitchen, with an unexcavated area under the dining-room. A long journey was thereby involved in going from one excavated part to the other. The new plan simplified this difficulty by excavating under the dining-room wing.

A study of new types.

Attention must now be focused on more economical arrangements. The plan of any building is based primarily on its needs. Broadly speaking, family life makes three demands on a house plan: that it shall provide living area, working area, and sleeping area. The living area includes such parts as sitting-room, dining-room, library, office, and porch; the working area includes kitchen, pantry, laundry, hall, and stairs; the sleeping area includes bedrooms and bath. It is the function of a good plan to organize these three elements into a compact arrangement, allowing each requirement an area to itself. Spaciousness must be expressed in the living area, compactness in the working area, and privacy in the sleeping area.

The farm cottage shown in Figs. 6 and 7 aptly illustrates these principles. Here is a compact plan with its three areas clearly defined. In the living area a feeling of spaciousness is obtained by the use of wide doorways and groups of windows through which vistas are seen indoors and out. No interior, however small in actual dimensions, need appear cramped if long vistas are planned for. Good interior design is also evident in Fig. 6. It is indicated by the balanced arrangement of the structural parts of each room. On the rear wall of the living-room is seen a central fireplace flanked by broad doorways of equal width, while the front wall opposite expands into a generous bay window centrally placed, with built-in

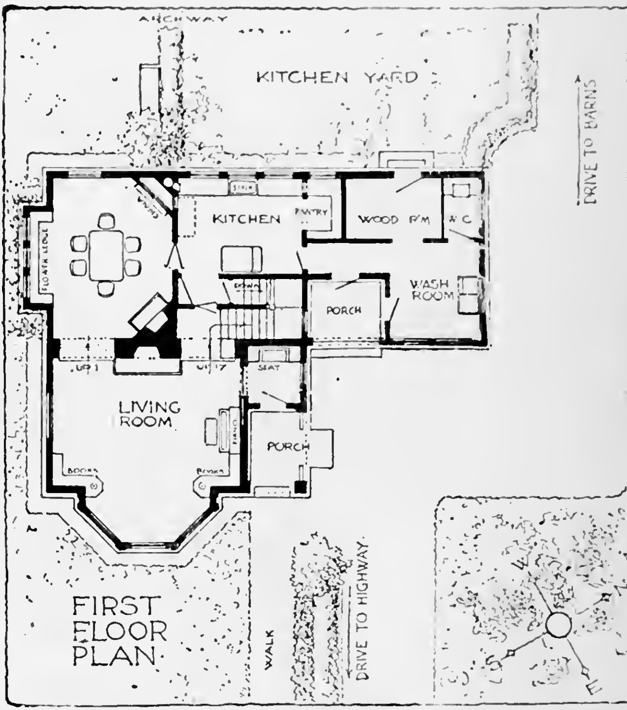

FIG. 6.—First floor plan, showing living area and working area.

bookshelves to right and left. These features so unite as to make of the living-room a composition at once so dignified, so orderly, and so effective that little furniture is needed to complete it. In the dining-room, balanced design is expressed by the long flower-box, the bay window, and by the central door on the opposite wall, flanked by diagonal corner features of equal width. In general, diagonal corners should be avoided except where they are a practical necessity or where they are deliberately used for reasons of design, as in Fig. 8.

Of the working area (Fig. 6), the kitchen, pantry, and stairs

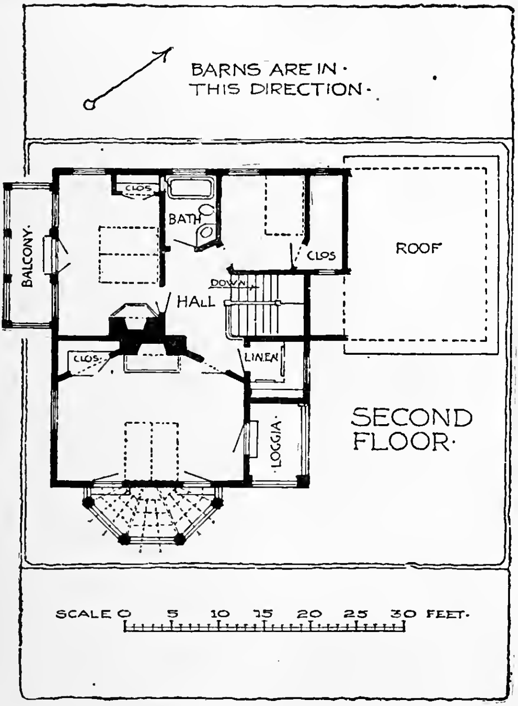

FIG. 7.—Second floor plan, showing sleeping area.

are the parts most constantly used by the woman of the house. Hence they are compactly grouped and are placed next to the living space. Woodroom and washroom are of intermittent use to the housewife but of constant use to the farmer. Consequently they are placed away from the living rooms in the direction of driveway and barns.

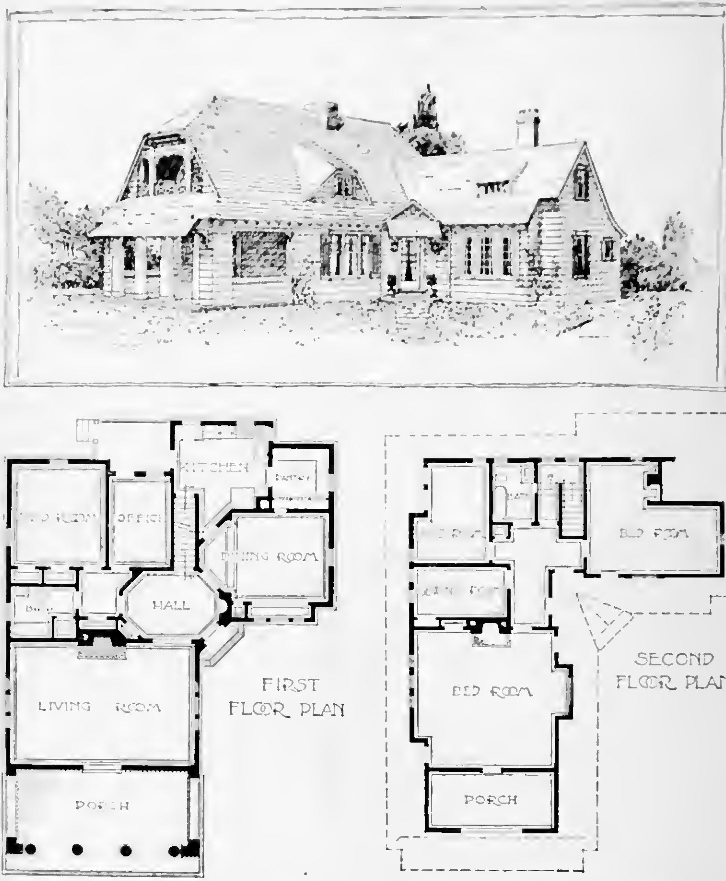

Fig. 8.—A farmhouse plan, showing diagonal corners used deliberately for purpose of design.

The sleeping area provides one bathroom and three bedrooms, each of the latter with its closet. Their position on the second floor renders them quiet and private.

Briefly stated, economy of plan is expressed in the grouped

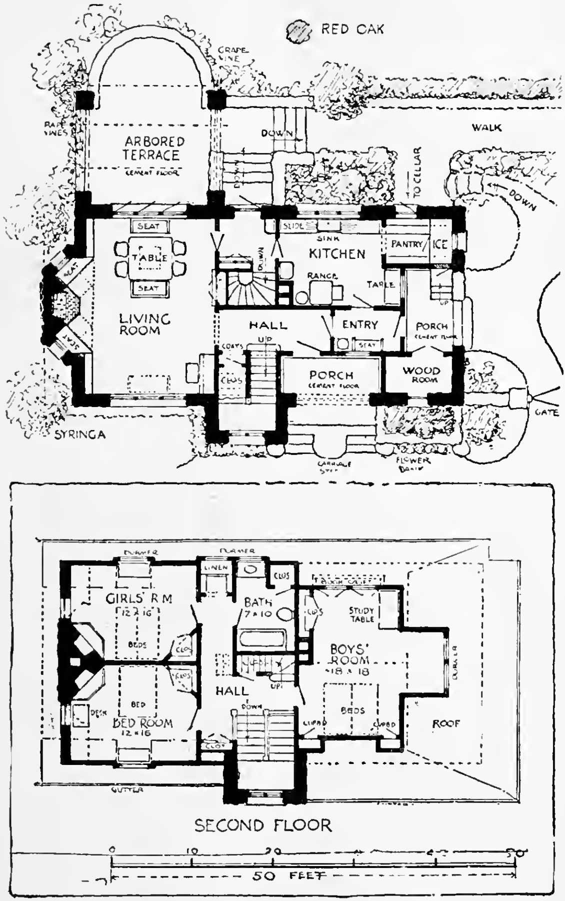

Fig. 9.—Plan showing simplicity of living area and completeness of working area.

chimney arrangement, in the condensed hall and stair arrangement, and in the small kitchen. The kitchen arrangement is weak, however, in some respects. It has only one outside wall and is therefore lacking in cross-ventilation. Moreover, the position of the door between dining-room and kitchen, being in line with the kitchen range, would surely prove a nuisance from considerations of sight, sound, and smell. It is unfortunate, too, that the path of travel from the rear to the front of the house leads through the kitchen.

In Fig. 9 is represented another well-planned farmhouse. It is characterized chiefly by the simplicity of the living area and by the completeness of the working area. Each area occupies about one-half of the floor plan.

The living area is unique and spacious. Instead of two separate rooms, each of which would be small, living-room and dining-room are combined into one large apartment. A group of three glass doors connects this generous living-room with an unusual porch arrangement, called on the plan an "arbored terrace." This terrace, which is cement-paved under foot and vine-covered overhead, is in reality an open-air continuation of the living-room, which adds materially to the comfort of the family in summer. Here meals may be served while sunlight and garden are enjoyed. The position of window groups on both ends of the large room creates a long, unbroken vista, so that all the living space is appreciated all the time.

Centrally placed on the long outer wall of the living-room is a fireplace alcove, or inglenook. This feature increases the actual width of the room and provides two outdoor vistas in new directions. Inglenooks, however, should be used with great reserve unless they are generous in width and develop naturally on the plan. Many times the excellence of an entire plan is sacrificed to the use of a feature of this nature.

The completeness of the working area is best appreciated by observing that each kind of work has its allotted place. The kitchen is intended for cooking; the pantry, for food storage; the pass pantry, for dishes; the woodroom, for fuel; the hall and stairs, for passage; the two recessed porches gather entrance to the house in a common passage that serves all rooms.

The kitchen arrangement shown in Fig. 9 excels that in Fig. 6 in at least three particulars. The introduction of a pass

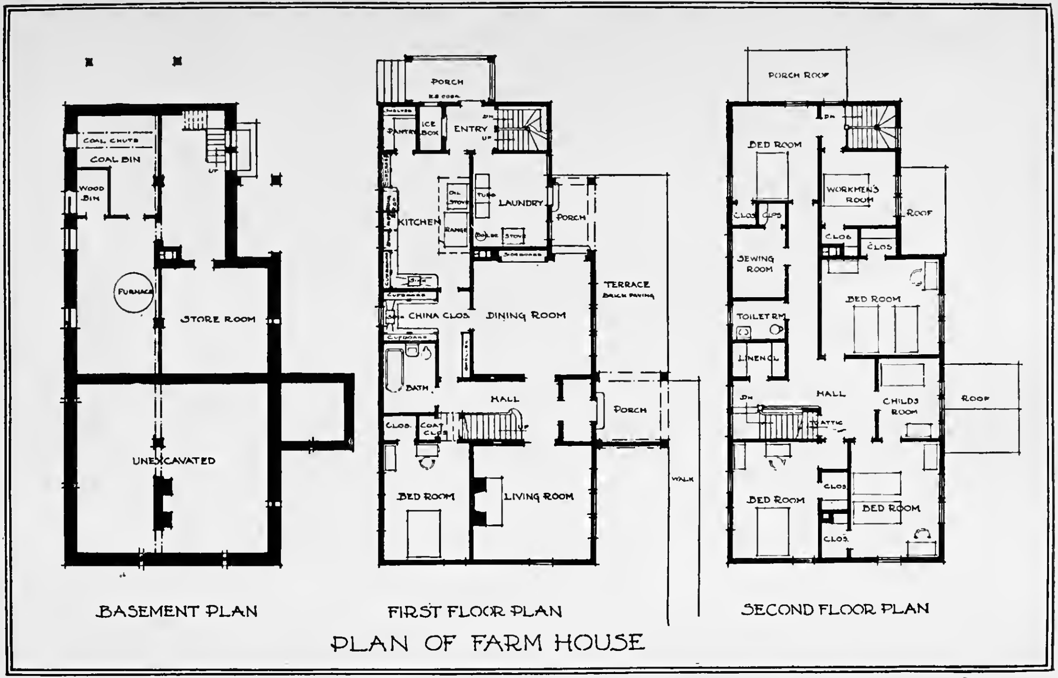

Fig. 10.—Plan showing well-organized arrangement.

pantry serves to seclude the kitchen from the living-room; good cross-ventilation takes place between the windows over table and sink; and the path of travel from the rear porch to the front of the house does not cross the kitchen.

In this house the laundry is located in the basement, which stands out of ground on the kitchen corner. An outside door enters the cellar on grade level.

The bedroom plan is compact, private, light, and airy.

Other plans may be analyzed in a similar manner, the strength and the weakness of various arrangements noted, and a sense of good planning acquired. The larger farmhouse shown in Fig. 10 has been inserted for personal study on the part of the readers. It represents a well-organized arrangement with a new feature introduced in the rear—a hired man's room with separate stairs leading to it. The dignified, simple, and well-designed exterior shown in Plate I, upper figure, will stimulate the imagination and serve to make the plan more realistic.

It must not be supposed that the plans shown in Figs. 6, 8, and 9 are perfect in every respect. No business office is included and they contain fewer bedrooms than farmhouses of the past have provided. It must be remembered that each of these houses was designed for a particular family and for a particular farm site, as all successful houses should be. Consequently they are not intended as models to be copied, but as illustrations of the principles of house-planning. If the principles of planning are understood they may be applied, whether to new work or to alterations.

In general, an intricate or confused plan is always a poor one; the more carefully an arrangement is studied, the simpler it should become. Briefly stated, the final test of a good plan is its extreme simplicity. Starting at the main entrance, one should be able to proceed mentally through the plan with ease and comprehension. For the most part the walls should be in continuous, straight lines and should show an absence of jogs, angles, and diagonal corners. Windows may be grouped or single, but should be disposed in an orderly manner with relation both to interior and to exterior appearance.

The plans shown are a reasonable protest against the old wasteful types of farm dwellings. Study of these plans will serve to show in what respects the modern rural house should differ from former arrangements. A living-room now combines the unused parlor and the overused sitting-room for general family life; an office where the farmer's business is transacted is provided in a place convenient to roadway and barn, but outside the path of housework travel; the kitchen arrangement is compact and well organized; the downstairs bedrooms open, not from other rooms, but from a private hall, thus insuring quiet and privacy (Figs. 5 and 8); a bathroom is provided on either the first or the second floor, according to water pressure; if possible all the bedrooms are provided with windows on two sides; the large hall with open stairs has given way to a more condensed arrangement; a generous porch or uncovered terrace is placed where it either commands the best view or is most useful during the day; the family hearth has literally returned in the living-room fireplace; and the whole plan is so arranged that the rooms lived in most are the sunniest.

A dwelling combining the above features is illustrated in Fig. 11. Wisely studied and frankly arranged, without a foot of waste room, this structure represents a type of farmhouse that is economical to build, to heat, and to work. The stairs for the whole house are contained in one vertical shaft; the hall is reduced to a small area; an office is placed near the roadway and away from the housewife's work, which is accommodated in a dining-room and kitchen combination; a man's room is provided at the extreme end of the plan, away from the family; a washroom is on the line of travel between the back porch and the dining-room; and a spacious living-room, with fireplace and window groups, is located on a desirable corner. On the second floor, the stairs land centrally in a square hall, which gives direct entrance to each of the four bedrooms and to the bathroom; the bedrooms are provided with good closets; light and ventilation are everywhere abundant.

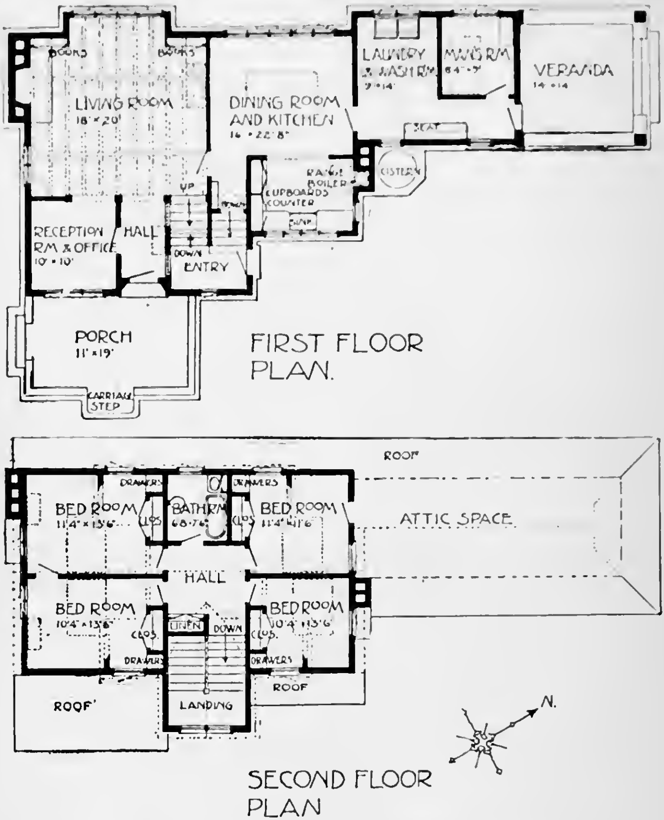

Fig. 11.—A house planned for farm life and farm conditions.

Modern improvements.

The class of conveniences known as modern improvements—meaning thereby plumbing, heating, and lighting systems, the installation of mechanical power to be used for pumps, washing machines, mangles, vacuum cleaners, and the like—may properly be discussed only by experts who have special knowledge of them. The practical aspect of most of these improvements has been widely discussed in books and pamphlets, so that any householder may become informed before installing such improvements in the home.

EXTERIOR DESIGN (PLATES I AND II)

In order to be a success, a country house must be in harmony with its environment. It should appear to have grown on its site, and to be a normal expression of human life in natural surroundings. The house should be in tune with the color and the contour of the landscape. Farm lands which are for the most part flat or rolling, produce contours which are strongly horizontal. Architecture that is appropriate to such landscape should in general be low, broad, and snug. Tall narrow structures are necessary in cities where land is costly and are appropriate in rugged, cliffy countries where nature is replete with vertical surfaces; but they are inappropriate when standing free on a flat site.

Color scheme.

The setting of a rural house presupposes such natural scenery as is composed of trees, shrubs, lawns, gardens, hills, rocks, and streams. The color effect of the house must be in harmony with this setting. Such colors as white, cream, grays, soft greens, and browns of various shades will always harmonize with nature. Red is bold unless partially screened by planting. The use of brick is about the only reason for introducing a red color scheme. Brick walls are broken in mass by jointing and relieved by contrast at the openings, whereas a wooden house painted red is distressing. When field stone, concrete, cement, or brick is used, the color scheme is spontaneous, being produced by the color of the materials selected; when wood is employed, however, a surface color effect is applied by means of stain or paint. This color scheme should be neither too dull nor too bright. Cold grays and drabs are about as cheerless as red is aggressive. In general, when choosing paint from samples, it is wise to select a color that is somewhat softer than the effect desired. A small piece of gay color which looks interesting in the hand, appears glaring and bold when covering an entire house. Likewise, a cold, dead color appears cheerless when used in mass.

The chief factor to be avoided in painting houses is an effect of patchiness. For example, in the case of a porch post or column, the cap and the base should not be painted one color and the shaft another. The whole porch should be one idea. Cornices, brackets, and moldings should not be picked out by color, as light and shade interpret them sufficiently. Useless bric-a-brac and ornament that cannot be removed should be subdued as much as possible in the color scheme.

Looked at as a picture, the windows and doors of a house should appear as decorative accents, contrasting with the background of wall. Windows especially are the eyes that give expression to the architectural face of the dwelling. With walls of a light color the windows naturally form a dark contrast; but if the walls are dark or dull in effect, the windows may be enlivened by painting the sash a lighter or brighter color and the blinds a clear shade of green, yellow-brown, or other harmonious color. Doorways and entrances should have dignified recognition in the color scheme.

General proportion.

The effectiveness of a house in the landscape depends not at all on ornament, but on its structural shape and the color produced through the use of building materials. Refined proportions, simple roof lines, and interesting but not violent contrasts between roof, walls, and openings, together with the character and arrangement of windows and doors, are the elements that combine to make of a country house an example of true rural architecture.

It has been previously stated that the mass-proportion of a house in the open country should be low and broad rather than tall and narrow. This feeling of proportion depends not so much on the actual height of the house from ground to gable, as on the position of the eaves or the cornice line. When the eaves line is low, the effect of the house is low; hence the value of long roof lines in obtaining good proportions. If the roof rafters are brought down to the level of the second floor, a sound, practical, and attractive structure usually results. It is desirable to include the porch under such a roof whenever possible, since this simplifies the roofing system of the house and unites house and porch into one contained design. While long roof lines and recessed porches are not always desirable, they have their charm and place.

Low eaves and a long roof line usually fit a farmhouse plan very conveniently because such a treatment brings a smaller second-floor plan than first-floor plan. This is exactly the farmhouse requirement. The rooms under the roof may be lighted and ventilated by means of generous dormers or gables.

It is commonly supposed that bedrooms located under a sloping roof must necessarily be low and hot. This is not true. The fact that some bedrooms so located have been stuffy does not argue that all bedrooms need to be so; it implies rather that there has been no cross-ventilation or that the windows were placed so low as to leave a pocket of hot air confined near the ceiling. An outlet for the hot air should be furnished by windows placed high in the room. If the roof pitch and dormer windows are studied to fit the height of the second-floor rooms, a full second story with high or full-length windows may be commodiously arranged under a long roof, and the low parts may be used for closets.

Structural elements.

The windows of a dwelling, whether grouped or single, should be similar in style and should show some kind of orderly arrangement. In general, unity of design is preserved if the tops of all windows on a floor are kept on the same level. Variations in window heights will thus occur between the floor level and the sill. Oval windows, diamond-shaped windows, and other fancy forms should be avoided. A miscellaneous collection of windows jotted at different points over a building robs it of dignity and composure. Window blinds and small panes have a certain decorative value from the outside.

No country house is complete without a generous porch or other feature that will form a center for outdoor family life. A vine-covered arbor, a paved spot, or merely a shaded stretch of lawn near the house may be made fully as livable as the usual porch. The usual type of American porch, a covered platform attached to the house, built high and dry, inclosed by a railing, and reached by steps, has artificially confined outdoor life to the house apart from yard and garden. If comfort and beauty are both to be served, neither porch nor garden should be sacrificed; they should rather be arranged adjacently so that the lawn adjoins the porch and the vistas down the garden paths are continuous with the main vistas from the porch, or are related to views from the important windows of the house. In other words, house and grounds should be planned as one continuous design, using as a connecting link the porch.

The chief difficulty with a united porch and garden scheme arises from the usual difference in height between the porch floor and the yard level. These two levels may be brought near together either by setting the house low on the ground and building areas around the cellar windows (Plate I), or by raising a flat, graded terrace to within a step or two of the porch floor. Both these schemes are frequently and successfully practiced, and in no way prevent light and air from entering the cellar.

In order to be commodious, a porch should be room-shaped, rather than long and narrow. A porch 10 to 12 feet wide and 14 to 20 feet long will give greater comfort than one 6 to 8 feet wide and extending around two sides of the house. Furthermore, a rectangular porch will not darken so much of the interior as will one extending along the full length of the house. If the porch occupies a sunny position, it may be shaded and embowered by screening with latticework, over which vines may be allowed to grow. A cement or brick floor is desirable for porch use.

If an upstairs sleeping-porch is planned, the railing should be built solidly from the floor for 2 or 3 feet, and the open part above should be provided with window sash and awnings in

PLATE II.—Appropriate types of architecture for a suburban or country home.

order that storms and early morning light may be excluded. This arrangement can be made comfortable for year-round use.

Outside entrance doors should be sheltered by a hood on brackets, by a portico, or by a porch (Fig. 12). It is usually desirable to separate the living-porch from the main entrance.

Fig. 12.—A modest farm cottage of good design.

Here, if anywhere, a little genuine design should be afforded. A portal is an intimate feature and should express dignity, hospitality, and beauty to all who enter. A natural-finish oak door with plate glass panel can hardly be considered appropriate for a decorative doorway, because it is out of keeping, both in material and color, with the remainder of the exterior.

COST OF BUILDING

The actual cost of building a given house is determined largely by local conditions. The cost of labor, the cost of materials used, the distance of the new building from the base of supplies, and the amount of hauling involved, are items that vary with every enterprise. Thus no fixed price may be quoted as to the cost of a given building, the year round and in all localities. The reading public should, therefore, place no faith in the building figures quoted in popular magazines. They are misleading in the extreme; for they usually represent either a set of conditions which have not been fully told or which are so unusual that they may not be duplicated. In general it may safely be said that a modest house of usual construction may be built for considerably less money by rural than by city labor.

One way of estimating the probable cost of a new house is to compare it with another dwelling recently built in the locality. If the size and cost of the house already built are known, one may compute the average cost a cubic foot by dividing the total cost by the number of cubic feet that the house contains. If the house that is planned is to be of better grade than the one figured on, it will cost more a cubic foot; if it is simpler, it will cost less. A rough estimate may thus be reached before the work is undertaken or is figured out by the contractor.

With present standards of building it is likely that in no locality can a house with modern improvements be erected for less than sixteen cents a cubic foot, and that a modest house need not exceed twenty-four cents a cubic foot unless fireproof construction is used. An average cost of about eighteen cents a cubic foot is probably fair for most country districts.

Much has been said and written about the present high cost of building. It is true that a house of a given size to-day often costs twice as much as one of the same size would have cost twenty-five years ago; but this advance is due not alone to the increased cost of labor and material, but also to similar types of dwellings not being compared. A house equipped with heat, running water, hardwood floors, many closets, and frequently with electric light and built-in furniture is compared with a mere weather-proof structure built with single floors, no closets, and few or no modern improvements. Many more trades and much more equipment than formerly now go into the building of a comfortable house. It is the amount and the kind of equipment that increases the cost; a house 30 by 40 feet may be made to cost $3,000 or $10,000, according to the beauty and finish of interior woodwork, floors, and walls, the amount of plumbing, the number and kind of fixtures selected, or the kind of heating plant installed.

SUGGESTIONS FOR MAKING ALTERATIONS

Any person who expects to make alterations in a house should begin to ponder improvements a long time in advance. The first step should be an accurately measured record of the present floor plans, drawn at a scale of one-quarter inch to the foot. The exact size and position of walls, openings, closets, chimneys, or other existing features should be located on these drawings, which may then be studied by comparing them with other good plans found in books and magazines. Tissue paper or tracing paper may then be placed over the drawings and alteration sketches freely made. A dozen arrangements may thus be tried on paper, hung on the wall, and considered at leisure. These plans should be supplemented by a building-book in which one may keep measurements, written data, and new ideas as they occur. In this book, clippings may be pasted and sketches may be freely made. These plans and this book correspond in a rude way to the architect's drawings and specifications, and will serve to crystallize the alterations into definite form.

Generations of building experience have shown that successful results must be based on definite instructions. No man's memory should be trusted for measurements or other information, and verbal directions should not be given to workmen. Building operations are exceedingly definite; walls and openings when in place cannot be moved one inch in order to suit a piece of furniture or to make way for an altered notion. All these experimental ideas should be worked out on paper.

As the owner studies over alteration problems, the best arrangement will at length take shape in his own mind. An intelligible home-made drawing and an explicit written list of his requirements may then be put in shape, so that the carpenter or contractor can make a fairly accurate estimate of the cost before work is begun. In order to obtain the best results, the owner should read up, in reliable books, such subjects as waterworks and heating systems and should freely investigate catalogues of equipment.

When the contemplated alterations are extensive and therefore costly, or when a new house must be built, the work should by all means be turned over to a good architect. Forceful arrangement and good design require trained experience; an attempt to get along without such professional help is false economy. It is the architect's daily business to put building requirements into buildable shape. Practical construction is the basis of his design. Moreover, he is acquainted with all the short cuts whereby efficient results may be obtained quickly and permanently.

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CHAPTER II

HOME FURNISHING

By Annette J. Warner

The home represents the most intimate environment of the individual. No matter how unconscious of their surroundings persons may seem, their tastes and ideas are affected by the things with which they live continually. Such being the case, the woman who makes it her task to provide for her family significant surroundings, thereby adds to the ordinary experiences of life a real factor of education and enjoyment.

Any rules or discussion on furnishing the home must necessarily be very general, and cannot be conclusive in deciding individual problems. The most that can be done is to review such features and considerations as enter into all questions of home furnishing, hoping thereby to point the way to the solution of the individual problem.

Even in the hands of an experienced person, matters of home furnishing and of decoration require a slow and thoughtful study. There are no shortcuts. No matter how long it takes to make a decision in furnishing, the time spent in so doing is insignificant when compared to the duration of the result. On account of this permanence of furnishings, also, an interior cannot afford to record passing fads, shams and imitations, but should rather express lasting, sincere, and dignified ideas.

The furnishings of the house should be consistent in character with the structural interior. Beamed ceilings, rough plaster walls, and sturdy woodwork are appropriate in a home of the Craftsman style. Such an interior would be a suitable background for mission furniture; it would be incongruous in a house of Colonial style, or as a setting for mahogany furniture.

The house should appear as though it were planned throughout by one person for one locality, one family, one purse. If the house is in a southern latitude, comfort is expressed by large spaces, long vistas, shadows, cool colors, light drapery, few and light-weight rugs and light furniture. If the house is in a northern climate or is used chiefly in winter, comfort is expressed by a large fireplace, warm colorings, large rugs, heavier and richer drapery, and some upholstered furniture. In the city house, space and light are luxuries that must be conserved by every possible means. In the country there are fewer limitations of this sort, but there are varying conditions in the environment of country houses that should influence their treatment.

In general, simplicity of treatment in finish and furnishing preserves the dignity of the house and is always in good taste. An interior should also be fitted to its use in every part, should appear consistent, genuine, and harmonious throughout. The environment can thus be made to typify the qualities to which a family aspires.

STRUCTURAL CONSIDERATION OF ROOMS

Size

The old ideal for a room was the largest, "squarest" room possible for every use—for a family room, bedroom, or kitchen. Changed conditions of living and the increased cost of labor and building material have reduced the size of the modern house. According to the varied nature of their use, it is evident that rooms should vary in size and in shape.

Living-room.

The living-room for the family should be the largest room in the house, since it serves a greater variety of purposes and a larger number of persons than any other room. The restful effect of an appearance of ample space is one of its charms. Sacrifice of spaciousness in other parts of the house may well be made in order to provide a spacious living-room. The actual size for a living-room is a matter allowing great variation, but rooms varying from 14 to 16 feet in width and from 18 to 24 feet in length suggest good sizes.

Dining-room.

The dining-room is also a gathering place for all the members of the family. It, however, has but one center and serves only one function. It may, therefore, well be considerably smaller than the living-room. For the comfortable serving of the meals, at least three feet should be allowed between the edge of the table and the sideboard or any other furniture in the room.

Kitchen.

The kitchen should be small and compact in arrangement and should not contain a foot of unnecessary space. A good size for a kitchen in which the work is done by one person is estimated to be from 100 to 150 square feet of space (page 102).

Bedrooms.

The bedroom of the modern house may be relatively small because the convenience of built-in closets, of lighter types of furniture, and of bathrooms makes a large size unnecessary. In a bedroom, after sufficient space has been allowed for purposes of ventilation, sleeping, dressing, and storage of clothes, convenience is better served by compactness than by size.

Halls.

Halls are used to give direct access to all parts of the house. After this purpose has been accomplished, space may appropriately be economized here in a home of moderate size.

Shape and proportion

Simple rectangular shapes for rooms are the natural outcome of building conditions. Any extension or projection should be a coherent structural feature and should be used only to satisfy a need in the function of the room. A chimney seat, a recess necessitated by a dormer window, an ingle nook when it works out naturally on plan, are often reasonable features. A bay-window built to add space or to improve the lighting conditions of a room, if well designed may furnish an interesting decorative

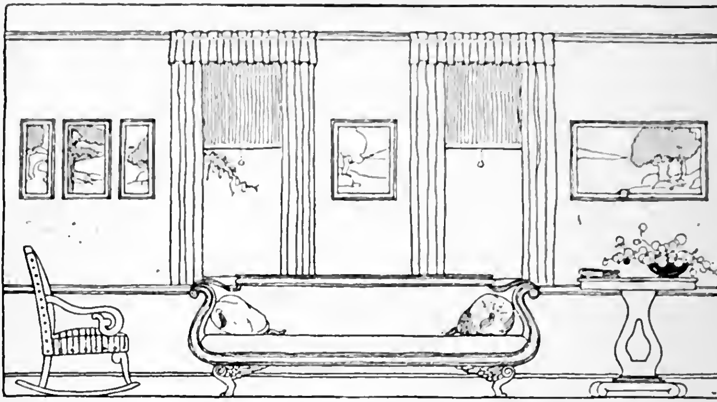


FIG. 13.—A typical low room in an old-fashioned cottage, showing how even a good horizontal arrangement of lines and furnishings decreases the apparent height of the room.

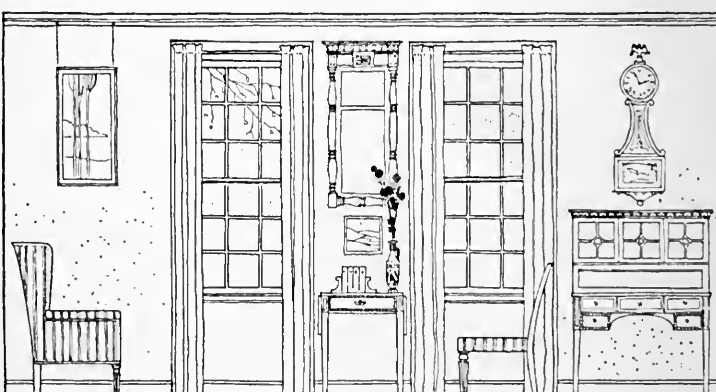


FIG. 14.—The same type of low room as in Fig. 13, showing how a vertical arrangement of lines and furnishings tends to increase the apparent height of the room.

feature both inside and outside the house. No excrescences or protuberances should be built merely for the sake of original or ornate effect.

An oblong is in general a more pleasing shape for a room than is a square. A pleasing relation between the three dimensions—length, breadth, and height—should if possible be maintained. A room that is very long is not easily adapted to general uses and is lacking in an effect of intimacy. A room that is too high is wasteful of unused space, is hard to heat, and is unfriendly in appearance. In a room in which all the dimensions are equal or nearly equal, the shape is obvious at once; nothing is left to the imagination, and the result is stupid and uninteresting. However, a square may sometimes be the most convenient and economical shape for a room. For a small dining-room with a square or round dining table, a square may be both a convenient and a fitting shape. An oblong in which one dimension is perceptibly longer is much more pleasing than one in which there is a doubt as to comparative dimensions. An excellent proportion for an average room is one in which the width is more than half and less than two-thirds the length.

In a house of moderate cost and size, it is not always possible to plan so that each room is of ideal proportion. Persons must often live in homes which they themselves have not built. In such cases there are many devices by which the apparent proportion may be improved.

Devices for changing apparent proportion (Figs. 13–16).

The eye naturally tends to follow any continuous line. By establishing lines in any particular direction, therefore, that direction is emphasized at the expense of the others.

Rooms that are too high may be made to appear lower by introducing strong horizontal lines, for example:

1. By bringing the ceiling color down on the side wall. This is successful only when the ceiling color is happily related in hue and value to the side wall, and when its width corresponds to the width of a moderate border 10 inches or 12 inches, in a room of ordinary dimensions, say 14 feet by 16 feet by 9 feet.

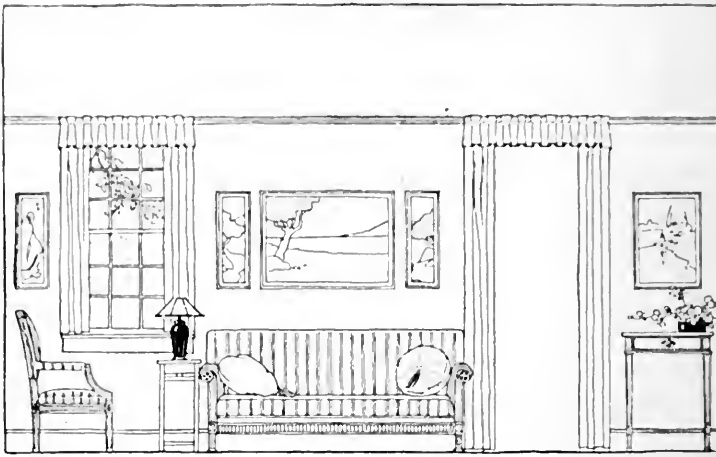


FIG. 15.—A tall room of the late nineteenth century type showing a placing of picture molding and a selection and arrangement of furnishings that tend to decrease the apparent height of the room. Wall coverings of such dignified pattern and harmonious color as are shown in Plate V, may sometimes be used above the molding with decorative effect. Note the relation of the shapes of the pictures to the spaces.

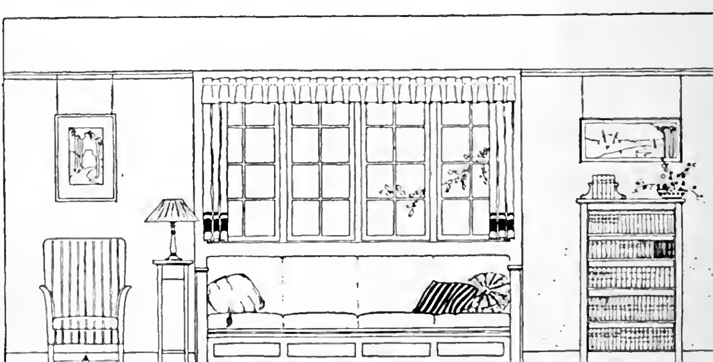


FIG. 16.—A typical modern living-room in which a group of casements and a built-in seat dominate the furnishing effect.

2. By using a molding at the intersection of side wall and ceiling, and by making the picture-molding continuous with the top of doors or windows.

3. By a wainscot or dado, the top of which is on a level with the window-sills.

4. By using a valance in the window drapery, if this is consistent with the style of the room and the other furnishings, and by hanging all draperies so that the width of the opening is emphasized.

5. By using furniture in which the horizontal lines dominate, such as long low bookcases, davenports, sideboards, or tables.

6. By using pictures which are horizontal oblongs in shape, or by grouping several smaller pictures so that either the lower or upper edges of their frames will establish continuous horizontal lines.

Rooms that are too low may be made to appear higher by emphasizing the vertical lines, for example:

1. By placing the picture-molding at the ceiling, leaving the sidewall undivided.

2. By using vertically striped wall paper. Stripes should always be of nearly the same color or value in order to be unobtrusive.

3. By using as long draperies as are consistent with the use and structure of the room, and by hanging these in straight folds and so arranging them as to make the openings high and narrow in effect.

4. By the use of tall and narrow bookshelves, cabinets, and other furniture.

5. By the use of pictures that are vertical oblongs, or by grouping the pictures with each other or with pieces of furniture so that the vertical is emphasized.

In a room that is square or is too short an oblong, emphasis may be given to one dimension, for example:

1. By opening up a vista through a door or window, or by planning interesting features in the furnishings in order to emphasize the long axis of the room. A mirror may perform

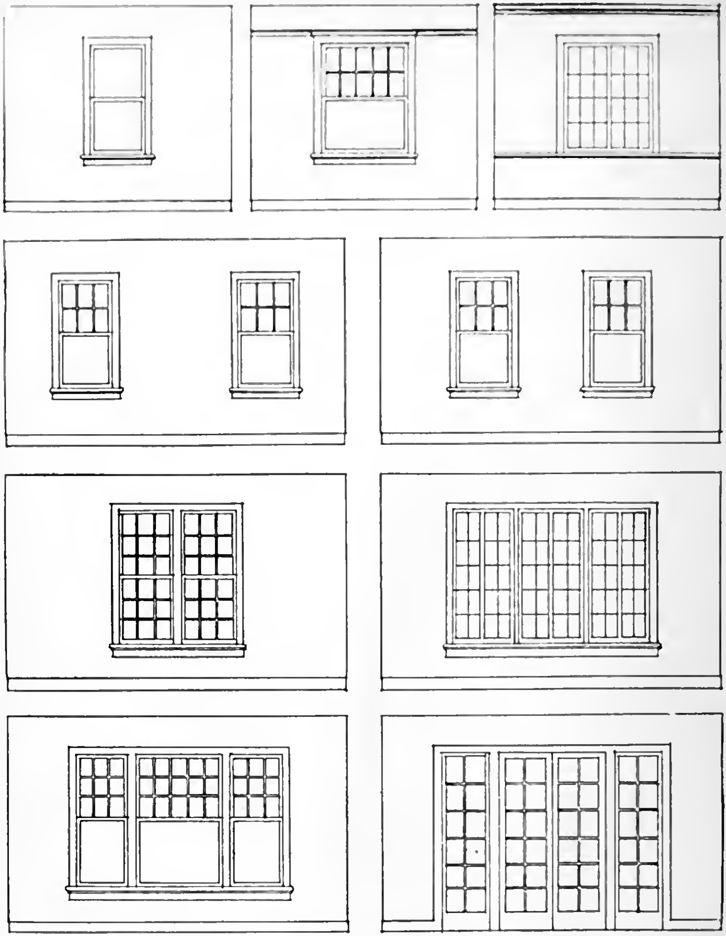


FIG. 17.—A study of windows in relation to the adjoining wall space. First group: A single window in the middle of a short wall: a small double-hung window of bald design; a generous double-hung window with pleasing wall space around it; an interesting and well-placed casement. Second group: Two separate windows in a generous wall space: a good arrangement both for distribution of light and for the placing of furniture; a poor arrangement both for lighting and for furnishing. Third and fourth groups: Pairs and groups of windows in a generous wall space: a fair arrangement for a pair of double-hung windows, providing good light and good wall space; an interesting group of casements, dominating the wall space and furnishing abundant light; a pleasing group of double-hung windows; a pleasing arrangement of French windows. The use of moldings in any case must be related to the proportion of the room and the structural line of the openings.

a valuable office in adding to the apparent length of a room. The French have understood this and have increased the apparent size of dance-hall and dining-room by the skillful use of many mirrors.

2. By placing the long dimension of a rug in the direction to be emphasized. If the room is sufficiently large and the other conditions warrant it, two narrow rugs so placed as to emphasize the length of the room may be used.

3. By placing the long pieces of furniture in the direction to be emphasized. Seats or shelves may sometimes be built in.

In rooms that are too long, the apparent width should be increased and the apparent length diminished by every device possible, for example:

1. By placing openings or important structural features centrally on the long sides, thus breaking the length of the room into two or more furnishing centers.

2. By using more than one rug, placed with the long edges parallel to the short side of the room, in order to break up the space and establish lines across the room.

3. By placing the long pieces of furniture or by grouping furniture so that the width rather than the length of the room is emphasized.

Location of windows and doors (Figs. 17, 18).

The location, style, and proportion of windows and doors are structural considerations that affect every interior. The amount and shapes of the remaining wall spaces after windows and doors have been placed define the possibilities of the furnishing scheme. It is, therefore, important to arrange windows and doors in such a way as to leave usable wall spaces. These spaces should be so pleasing in shape and proportion that the bare room is in itself a design. Many doors in a room are an evidence of poor planning. While there is no rule about windows, an amount of window area equal to about one-fourth the floor area will in general be found a reasonable guide.

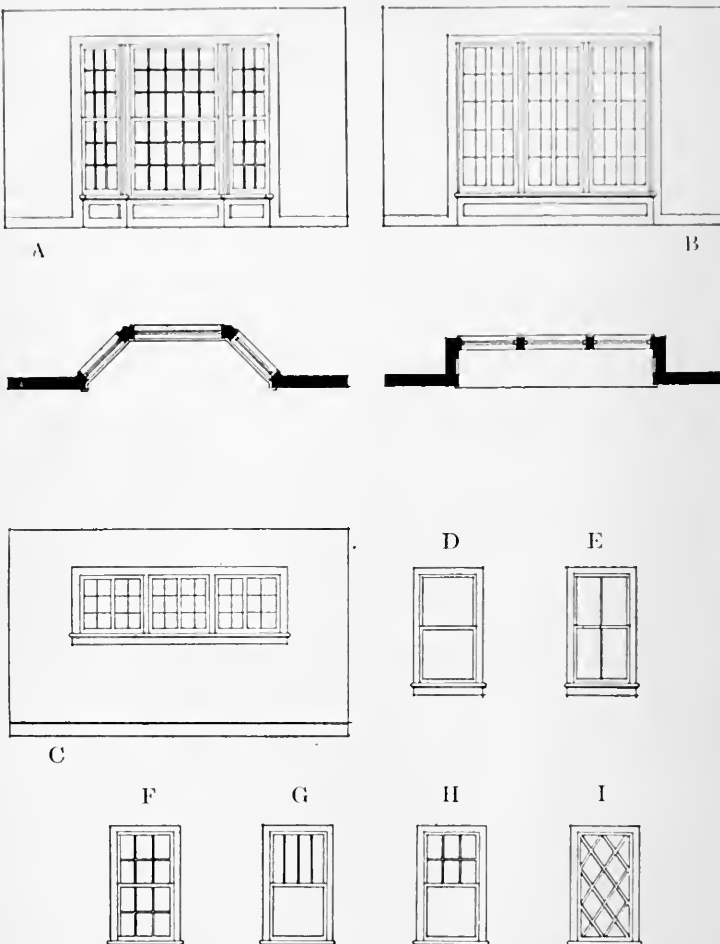


FIG. 18.—A–B: Two types of bay windows. C: A well-placed group of high casements. D–I: A study of six windows showing how the appearance of the window is affected by the division of the glass.

Structural surfaces.

The structural surfaces of the room are walls, ceiling, and floor.

Walls include plaster walls, windows, doors, and trim.

Plaster walls.

The usual finish for the walls of a dwelling is plaster. Plaster may be rough or smooth. It may be left in the natural color, painted, or papered.

1. Rough plaster: The irregularities in rough, or sand-finished, plaster produce an effect of texture that makes such a wall an attractive background. The natural color of rough plaster varies according to the color of the sand used in mixing it. Sometimes it is a pure gray, sometimes it is tinged with soft tones of warm color. Powdered color may be mixed with the plaster when it is wet, if the mason is sufficiently experienced to handle it. Rough plaster should be applied by a skillful workman in order to produce a uniform effect. Rough plaster is rather harsh in texture and is not suitable in all rooms or with all woods. It is more akin to hard woods like oak, waxed or stained, than to mahogany or satinwood or painted woods. It is incongruous with delicate or very luxurious hangings. It is better in family rooms than in bedrooms or small rooms in which hands come often in contact with the wall. If rough plaster is spotted or discolored, it is not so easy to clean as smooth plaster. If the discoloration is only on the surface, it may be removed by pumice stone.

If it is desired to change the color of rough plastered walls, oil paint is a very good medium; a coat of glue-size applied before the paint will facilitate the work and will economize the amount of paint.

2. Smooth plaster: Walls finished in smooth plaster present an even flat surface, not so interesting as the rough plaster, but with many advantages. It is easier to apply and is easily cleaned. Smooth plaster should be painted or papered, since its glaring white surface is a trying element in almost any color scheme.

3. Smooth plaster painted (oil color or water color): Paint has an advantage over paper in that any subtlety of tint or tone may be obtained through skillful mixing. In general, in the use of house paint, white will lighten any color and black will darken any color; but in the case of the yellows, since black paint tends to develop green shades in them, dark brown paint should be substituted for the black. Oil color is more durable than water color. Although oil paint is more expensive in the beginning than water color, it is more economical in the end for use in rooms that are constantly occupied, or on parts of walls that are subject to the frequent contact of hands or furniture, such as schoolrooms, nurseries, kitchens, or corridors.

Oil color sometimes has a disagreeable shine. This may be avoided by adding turpentine or by flat finishing (pouncing with a broad flat bristle brush). Oil colors may be obtained already mixed, but they frequently vary from sample. A better plan is to buy the ingredients and have them mixed only a short time before using. Different surfaces require different proportions of paint, oil, turpentine, and the like. An even tone throughout the room is always safe, but a very attractive effect may be obtained by an uneven tone. For example, the walls might be painted a gray blue and stippled with a gray green. Such treatment produces an effect of atmosphere suggesting space. It should never be attempted except by an experienced painter. Oil color is easily cleaned by washing with soap and water.

Water color, or calcimine, has the advantage of being inexpensive, and less skill is required in applying it. Water color may be applied over other surfaces, such as paper, beaverboard, or calcimine, but wall paper should not be put on over calcimine as it is likely to strip off. Water color walls cannot be washed but can be easily freshened by the application of a second coat. Water color is the most common treatment for ceilings even though the side walls may be painted or papered.

4. Paper or textiles: Smooth plastered walls are often covered with paper or a textile; this treatment is effective in many furnishing schemes and is especially adaptable in old houses.

Wainscots.

Wainscoting treatments formed by chair-rail or paneling of various heights suggest a variety of decorative effects which are appropriate for important rooms, such as living-room, dining-room, and hall. A paneled treatment of wood or of moldings and plaster is dignified and effective, provided the wall and window spaces will accommodate themselves to such an arrangement. Obviously, panelled treatments can be studied only in relation to the individual room.

Trim of walls.

The trim of the room may be thought of as part of the wall or as a frame for an opening. If the room is small or the openings many and not well placed, the trim should be subordinated to the wall treatment. But if the room is of good size and the windows and doors are well proportioned and well placed, the trim will bear more emphasis.

Except in fireproof houses, a certain amount of woodwork is needed to cover the bony joints of construction and to complete the finish of the room. The same kind of wood and the same finish should be used throughout the room, with the possible exception of the floor. Since the woodwork furnishes both a structural and a decorative element in the room, its choice should be considered from both standpoints. The trim covering the joints and framing doors and windows, should be wide enough to look adequate for this service, but not so heavy nor so ornate as to be obtrusive in the part it plays in the background of the room. A good width for the trim for the openings in average rooms is between 3½ and 5 inches. Hard woods finished to show their character are excellent if the grain is not too conspicuous. Quartered oak with its modest grain and possibilities of finish is very fitting for the woodwork of a room in which oak furniture is to be used.

Other woods, such as hard pine and cypress, are susceptible to treatment that makes them very effective. Woods of an inconspicuous grain, or cut so that the grain does not obtrude itself, should be chosen for trim. A wood with a bold swirling grain or with strong contrasts of light and dark is a poor choice for interior work, for it is too restless and insistent to take its place quietly in any decorative scheme. Fortunately, the item of expense is a protection against the use of woods so aggressive in color as mahogany, curly birch, and the like. Such woods should be reserved for furniture.

The woodwork should play a definite part in the decorative scheme of the room, harmonizing with the walls both in character and color. If the harmony cannot be secured by transparent stains, the woodwork should be painted. In fact, in many old or ready-made houses, paint for woodwork is the only means of securing a harmonious interior.

Filler, stain, thin shellac, and wax are commonly used to secure the transparent finish desirable for hard woods. Woods with large or open grain, such as oak, chestnut, cypress, and pine, require a filler to make a smooth even surface. This filler may be kept the same color as the wood, or it may be stained darker, or a very light whitish filler may be used. The effect of this filler is to tone, to modify, or to emphasize the natural markings of the wood. Woods with a close inconspicuous grain, such as maple and birch, do not require a filler, but can be toned by staining. Wax is a more pleasing finish for hardwoods than is varnish, which should be used only on bathroom floors or other places where durability is perhaps more important than appearance. The soft dull finish of a waxed surface is more appropriate to wood than the glaring shiny finish of varnish.

Paint is an opaque finish used to cover woods having an unpleasant or no visible grain. Such woods as soft pine, white wood, and cypress are good foundations for painted woodwork. By means of paint, any woodwork can be adjusted in color to its surroundings. This flexibility of paint in relation to color schemes is a strong recommendation in its favor for both old and new work and for all types of rooms.

Doors.

Doors of good pattern in various woods may be obtained ready-made in standard sizes. They should be of the same general finish as the trim and other woodwork. Doors of uniform height on each floor contribute to unity of effect. The width may be varied for convenience.

Mantelpieces, cornices, and picture-moldings.

Any wood used in connection with such features as fireplaces should be consistent in character and finish with the other trim of the room. The mantel should be planned with and for the room, not purchased ready-made and grafted upon it. Likewise any tile or brick facings used in the fireplace should harmonize in texture and color with the entire decorative scheme.

A cornice of wood like the trim may mark the intersection of ceiling and side wall and should of course be finished like the other woodwork. A picture-molding marking this intersection is an effective finish for low rooms or those of ordinary height. A picture-molding so placed should be heavier than one lower on the wall. In some cases, a second molding may be used on the wall some distance below the one at the ceiling. This second molding then becomes the picture-rail.

Ceiling.

The treatment of the ceiling should harmonize with the finish of the walls and woodwork. Ordinarily the ceilings in dwellings are finished with plaster. This lends itself through the use of calcimine (water color paints), to any color scheme. Paper is a less desirable finish for ceilings. If it must be used, as sometimes happens in old houses where the ceiling has cracked or become discolored, a plain tone should be chosen. If a ceiling is cracked, canvas or burlap may be put over the old plaster and then paint or calcimine applied to it.

Beamed ceilings produce an interesting structural and decorative effect. The beams should preferably be finished like the other woodwork in the room. If peculiar problems are presented by the woodwork, the finish of the beams may be considered only in relation to the ceiling. Beamed ceilings are often found in houses of early colonial architecture. They are also a feature of the new Craftsman houses. In the first case they would usually be painted, since most of the woodwork is painted; in the latter, they would be finished like the oak or similar woods generally used.

Ceilings of wood, except in sheathed or paneled rooms, are likely to look heavy and oppressive. In summer cottages and in some parts of the country, rooms sheathed and ceiled in yellow pine or cypress are often finished in the natural color and varnished. Paint is the only antidote and should be used on the ceiling at least, after "cutting" the varnish. White metal ceilings are in line with the progress toward fireproof construction. They cannot as yet be obtained in pleasing pattern except for very large rooms, and even here their construction is unpleasantly obtrusive.

Floors.

Floors are made to be walked upon and are subject to hard usage. They should, therefore, be durable. Floors cannot be easily changed; therefore they should be permanent in material and finish. Since they contribute to the color scheme of the room, they should be finished accordingly. Floors continuous in color as far as the eye can see have a unifying effect. Wood is the material most used for floors. Wood that is hard, of inconspicuous grain, and responsive to color treatment should be chosen. Well selected oak is probably the best. Maple and birch are very durable, but light in color; hard pine is also possible and relatively inexpensive. The matter of color and finish can be regulated to some extent to suit the character of wood selected and the color scheme of the room.

Hardwood floors should in general be finished like hardwood trim, except that caution should be observed in attempting dark stains, because all floors through usage tend to wear back to the natural color of the wood. Since all wood floors tend to darken in time, the rather light appearance of a new floor should be endured with patience. If after a period of time the tone of the floor still appears too light, it is easier to darken it slightly than to remove a dark mussy stain. Furthermore, rugs can always be relied on to remedy the color effect of the bare floor.

Softwood floors of pine, such as are often found in old houses, can be finished by filling the spaces between the boards with either a standard or home-made crack-filler and then applying two or more coats of good hard paint, such as the ordinary deck paint. Some housekeepers have had success with a crack-filler made of flour paste into which a pulp of damp newspaper is beaten. Under all conditions, however, a painted floor is a compromise and will require frequent renewals.

COLOR

Color is more potent in creating the atmosphere of a house or room than is any other influence. Harmonious color will cover a multitude of sins in design, while no amount of good design will atone for discordant color.

Color produces a distinct reaction on the human system; it is cheering, depressing, irritating, or restful, as the case may be. It is, therefore, of primary importance to understand the right use of color in the home. Since the question of color is involved in the finish of walls and of woodwork, it is the first factor to be considered in the treatment of an interior.

Color has three generally recognizable characteristics: First, that quality that gives it its general or popular name and distinguishes it from other colors—as red from green, or yellow-reds from purple-reds, yellow-greens from blue-greens, and the like. This quality is named by the scientists, hue. Hues, or colors, may in general be classed as warm or cool. Yellow, orange, red, and colors strongly tinged with these, connected as they are with ideas of sun and fire and blood, are the warm colors. Blue, green, and violet, and colors strongly tinged with these, associated in thought with cold and distant things like ice, the sky, the woods, and purple hills, are the cool colors.

A second characteristic or quality of color is the strength or brilliancy, termed by the scientists, chroma or intensity. By this quality, a strong or bright color is distinguished from a soft, dulled, or grayed color, as the red in the upper from the red in the under side of an autumn leaf.

The third characteristic or quality is that which distinguishes light from dark colors, termed by the scientists, value. A popular term for light colors is tint; for dark colors, shade.

Recognized influences of color

Hue.

Colors in which there is a suggestion of yellow or orange or red, the warm colors, such as tones of tan or buff or old gold or brown or yellow-green, or the "warm grays," such as taupe or "sand" or "mode" colors, are likely to produce a warmth of atmosphere that makes them in general agreeable to live with. These colors are likely also to harmonize with the woodwork in the average house and to furnish a becoming background for the usual wood and willow furniture.

Red or reddish colors are too aggressive and insistent to be used in large quantities. Red also tends to diminish the apparent size of a room.

Yellow and yellowish colors are in general light, bright, and cheerful in effect.

Blue or bluish colors, while they tend to increase the apparent size of a room, are inclined to absorb the light and to be forbidding if used in large quantities.

Green, which is a mixture of yellow and blue, and greenish colors are in general quiet and restful in effect without being depressing.

Violet is the color characteristic of mystery and shadow and royalty, and should be avoided or used with great discrimination in a home.

In general, colors composed of two or more colors, whether of paint, of dye, or the interweaving of colored threads in a fabric, are more interesting, more refined, and more atmospheric in effect than the very evident reds and yellows and blues.

Intensity or chroma.

Strong or bright colors are not appropriate for use in large masses, such as wall or floor coverings, because they are too insistent and aggressive and they do not easily harmonize with the furnishings in the average home. These strong colors may be used in small masses, such as a bouquet of flowers, books, or a textile, to add a note of interest or to accent a color scheme.

Dulled or grayed colors are in general appropriate to use in large masses, such as wall or floor coverings, because they are restful in effect and keep their place as background. A greater variety of these grayed colors may be used harmoniously in the same room than would be possible with a combination of bright colors.

Value.

Light colors in general tend to increase the apparent size of a room, to make a room seem lighter, and to produce an effect of daintiness, of cleanliness, and of cheer; they also are more luminous and, therefore, very effective in artificial light. Used to excess, or inappropriately, light color may produce an effect of bareness or aloofness.

Dark colors in general tend to diminish the apparent size of a room, to produce an effect of dignity or richness. Colors that are too dark are likely to be oppressive or to produce an effect of gloom or dinginess, and are very difficult to illuminate by night. Middle values, that is, colors that are about halfway between the extremes of light and dark, are in general more appropriate for the furnishings in living-rooms. Strong contrasts in light and dark, such as light woodwork with dark walls, or dark woodwork with light walls, dark figures on a light ground, or the opposite, produce a distracting and unrestful effect.

Considerations governing color selection

From the foregoing discussion it follows that:

1. Southerly rooms with a superabundance of light and sunshine need in general cool and dark colors to temper the light.

2. Northerly rooms with no sunshine and too little light need in general light, yellowish colors to introduce a feeling of cheer and sunshine.

3. Rooms that are comfortably lighted and sufficiently sunny are open to a variety of color treatments.

4. Rooms that are over-large and yet are comfortably lighted may be given a more friendly aspect by the use of warm colors that are medium dark.

5. In rooms that are too small and yet are comfortably lighted, a feeling of space can be suggested by the use of light or bluish colors.

6. In rooms in which the woodwork is already finished and cannot be changed, the color scheme is within limits predetermined. From it walls and furnishings must take their cue.

7. Rooms that are comfortably large and light and with no hampering conditions are open to a variety of color treatments.

8. The living-room adapted to many uses and many persons should be more dignified and impersonal in color scheme than the other rooms of the house. It should be more neutral in its general scheme in order to be adaptable to a greater variety of coloring in the smaller areas. Books, pictures, an open fire, flower arrangements, and other changing and accidental conditions inevitably bring many touches of brilliant and varying color into the living-room.

9. A dining-room devoted to good cheer and used only for short periods admits a livelier treatment. Sometimes dishes that have a decided color may well give the keynote to the color scheme.

10. Since the bedroom is for sleep and rest, even though it is for personal use and allows a larger margin for individual preference than do other rooms, nothing should take precedence over those qualifications that fit it for its purpose. The white bed, white towels, and light furniture characteristic of the daintiness desirable in bedrooms, call for lighter colorings than do the family rooms. For bedrooms used also for both study and sitting-room, compromises must be made. The white bed is no longer suitable; the bedroom takes on the functions and, therefore, should assume the appearance of a living-room as far as possible.

11. Since the bathroom should appear, as well as be, immaculate, all white or white with other light colors is most suitable. White with yellow for a bathroom on the north side

PLATE III.—Left: A group of furnishings showing an uncrowded arrangement and an unobtrusive background. Right: A similar group showing how an obtrusive background and a crowded arrangement may obliterate the effect of even well-selected furnishings.

of a house, white and blue or white and green for a sunny bathroom, are good.

12. For the kitchen, light colors are cheerful and cleanly in appearance. They have the added value of so diffusing the light both by day and by night that there need be no dark corners to work in.

It follows from all these manifest influences of color, that the rooms to be treated should be examined as to exposure, lighting, size, proportion, and use before determining the color scheme.

Color for the whole interior

A uniform coloring for the walls of a series of connecting rooms contributes to unity of effect. A sufficient variety in effect may be secured by varying the color or pattern of draperies and other furnishings in the different rooms.

It seldom happens that all the rooms on a floor have the same exposure, or the same amount of light or the same use. Every need may be considered and yet a friendly harmony obtained by the use of closely related colors that may range from light to dark in value and through a series of related hues.

The parts of the room as a background

The ceiling, the side wall, and the floor form the background of the room against which all the furnishings and the occupants of the room are seen. Like the frame of a picture, the background should be subordinate in color as well as in amount of detail. This limitation, far from minimizing the importance of the background, gives it an added distinction, and demands for it the most careful consideration. The function of the background is to serve. While not obtruding itself, it should through its color supply a pervading influence that may be felt like an atmosphere. This province of the background is best filled, as has been said in the discussion of color, by subdued warm colors, not too dark, that harmonize with the more usual types of furnishings and methods of lighting. (See Plate III.)

Ceiling, side walls, and floor are parts of one whole. They should, therefore, be keyed to the same color. This important point has often been disregarded. The ceilings have been made white, the floors constructed of any convenient wood without reference to its color; the color of the walls has been chosen without reference to either floor or ceiling. In the distribution of color values in the background, the old analogy, often repeated, holds good: the side walls of a room correspond in value to the middle distance in a landscape; the ceiling corresponds to the sky which is lightest of the three; the floor to the ground, which is the darkest. This is not a mere fancy. A very dark ceiling or sky is threatening and oppressive in effect. The dark tones of the ground contribute to an effect of stability and support that are fundamental in a serviceable floor.

Walls and trim.

The wall color, being most in evidence as a background, covering a greater area than either ceiling or floor and serving as the connecting link between these, should be the determining factor in the selection of the color scheme and naturally would be decided first. The color of the wall should be selected after a diagnosis of such considerations as location, size, lighting and use of the room, and the recognized influence of color already discussed (pages 46 and 47). The color of ceiling, floor, and woodwork would then be chosen in relation to it.

If the color of the trim, which is really a part of the wall, has been determined first, the color of the wall should be related to it. Golden oak, cypress, and mahogany furniture limit the choice of the wall color to tones closely related to that of the wood. If a householder is already supplied with furniture of a decided character or color, the choice of color scheme is limited in the same way. The furniture in such a case will determine the color of the walls.

Woodwork painted to match the wall color increases the apparent size of the room; it also renders less conspicuous irregularities and poor design in doors and windows. Usually the woodwork may well be made a tone lighter or a tone darker than the wall. Paint for the woodwork in bedrooms or any room with a light color scheme should be toned; a cream or ivory tone is usually more gracious than a dead white.

If it is necessary to finish the woodwork before the wall color can be known, a neutral color is the only safe choice.

Ceiling.

While the ceiling should be keyed to the color of the side wall, this should be done very carefully, since any light ceiling will absorb some color from the side wall. The ordinary method of lighting a room by windows placed in the side wall obviates to a considerable degree the effect of a white ceiling. The light strikes the side wall directly, leaving the ceiling inevitably much darker than white. This should be kept in mind in selecting the tint for the ceiling, lest it be too dark for the effective lighting of the room; and it should not be forgotten when a ceiling color is extended to the side wall. In such a case the color that comes on a side wall should be several tones darker in order to appear of the same tone as the ceiling color.

Floors.

It is more difficult to regulate the color of wood floors than that of ceiling or side wall, because while it is desirable to relate the color of the floor to the side wall, there is a distinct limit to the range of color in wood floors. Floors are often too light in value, but for practical reasons this cannot always be avoided. Whatever has to be accepted in the color of the floor, however, may fortunately be corrected by a good choice of rugs.

PATTERN (PLATES IV, V)

An exhaustive discussion of pattern would involve the whole theory and practice of design, but the usual mistakes of the home-maker in choosing wall paper, drapery, upholstery, and rugs may be avoided by an understanding of what constitutes good pattern and the kind of pattern appropriate for different uses. On account of the constant influx of novelty goods that tend to bewilder and confuse the purchaser, a fund of common sense and a determination not to be sidetracked by passing fads are necessary in order to make a wise selection.

Characteristics of good pattern

The motifs employed for patterns are of two kinds: (1) abstract or geometric forms which are simply harmonious shapes so repeated as to make a pleasing pattern; for example, the Greek key pattern; (2) concrete or nature forms "conventionalized," or adapted to their use as pattern; for example, the French fleur-de-lis.

The distinction of a design depends not on the origin of the motif, but on its decorative treatment and color. The effectiveness of a pattern as an element in house furnishing depends on its adaptability in color and design to the service it is to render in the room for which it is selected. A fabric with less intrinsic merit than another in pattern and color may be the better choice in some instances, by reason of its happier relation to the other furnishings in the room. By far the greater number of motifs are taken from nature. Any nature motif must be conventionalized, or adapted to its use as pattern, by changing its form, size, or color, and arranging it in an orderly way, keeping in mind not its origin from nature, but its purpose as decoration. Any pretense at naturalistic modeling or shading should be very formal in character. That it is pattern and not picture should never be lost sight of in judging a design for a flat surface. Medallions, scrolls without beginning or end, baskets of flowers or fruits, fluttering ribbons and bowknots, are all absurd substitutes for real design.

The figures in a design are parts of one whole and should be connected or related in some way. Widely separated motifs tempt the eye to jump from one spot to another and provoke one to count rows, and mentally rearrange the pattern. All effect of restfulness is thereby lost. Patterns that cover the ground well are in general better for furnishings than scattered spots. Some patterns that would be objectionable on a flat wall, however, may be used acceptably in drapery, since the fullness of the folds rearranges the design.

One of the characteristics of a good design is its appropriateness to the material in which it is developed. Patterns may be

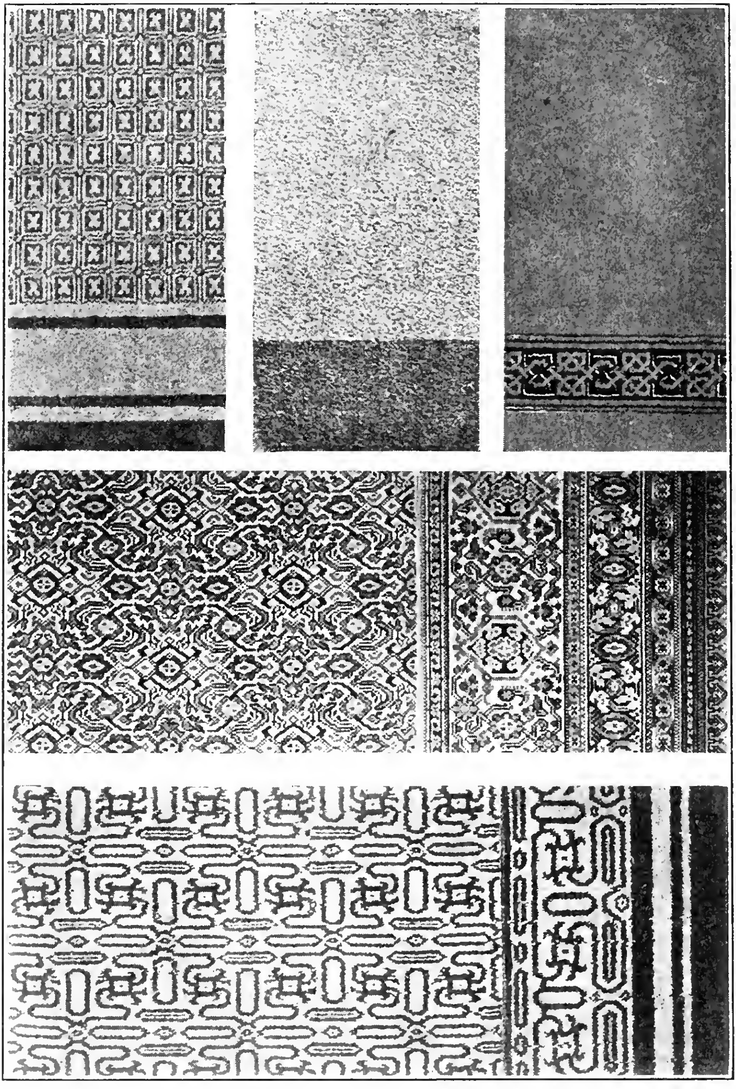


Plate IV.—Types of rugs with suitable pattern, developed in line and in mass, in self tones and in contrasting and vari-colored effects.

woven, embroidered, or printed—stenciled, stamped, or stained—on a fabric. The pattern may appropriately declare the material in which it is developed. Woven patterns should preferably suggest warp and woof. The design in a rag carpet, for example, naturally appears in stripes made by the woof, which is much more prominent than the finer threads of the warp. There is a great variety of patterns appropriate to printed wall papers that may be selected in preference to those that imitate leather or burlap or silk or oilcloth.

A pattern may be expressed in lines alone on a background of another color, or it may be in masses or spots that are lighter or darker or different in color from the background. In such patterns the shapes rather than the details are important. Sometimes the pattern is of masses that are broken up by a variety of detail and color.

Pattern as used for walls and floors

Walls and floors are flat solid surfaces. Their effectiveness and comeliness depend on this structural fact and this must be borne in mind in the selection of pattern for them. Any variation of surface would impair the function of wall or floor. Any suggestion by the pattern of such defects is manifestly out of place. Wall patterns of trellises and vines, of realistic flowers or fruit or landscape, of simulated columns, or of panels made of pictured moldings should, therefore, be avoided. For the same reasons, realistic flowers and animals are out of place in pattern. The more realistic these motifs are, the poorer is the design. Because the effect of solidity in walls and floor must be maintained, the pattern should seem very flat.

Since both walls and floor are backgrounds, the pattern should be unobtrusive in color and design. Fantastic ornament, violent color, or strong contrasts of any sort are out of place in a background.

Since walls are upright surfaces, stripes, if inconspicuous, figures in which the vertical dominates or that are so arranged as to give an up-and-down rather than a crosswise or diagonal movement, are good types for wall pattern.

Floors are horizontal surfaces that are viewed from every direction. The pattern on the floor should, therefore, be effective from any angle. Geometric or very conventional patterns equally good from every point of view are the best choice for floor coverings.

SELECTION OF FURNISHINGS

Wall coverings

A textile may be used to cover smooth plastered walls. All sorts of materials that give the desired effect, from the cheapest to the most expensive, have been employed for this purpose. Canvas, burlap, grasscloth, and other weaves of pleasing texture are effective when appropriately used. None of these, however, compares with paper in popularity as a wall covering. Paper is comparatively inexpensive, is easily hung, is made in an immense variety of colorings and pattern and a wide variety of textures. Wall paper has an advantage over paint in that the exact effect may be known before it is purchased, by experimenting with a roll of it in the very room and light in which it is to be used. If there is cause for doubt, a plain paper should be selected for walls. There are many plain papers of good color from which to choose. The oatmeal textures probably offer the most desirable and satisfactory coloring among the inexpensive papers. The silk-fibered papers, while more expensive, compensate in color and quality for the greater investment of money.

Another safe choice in paper is one nearly plain in effect but the surface of which is broken by dots or dashes or splashes or other slight variations that give a little "bloom" or vibration of color. Paper with stripes that are not too wide or of too conspicuous contrast are good, especially in low rooms. A plain paper sometimes shows up too conspicuously the unevenness in old walls. In such a case a paper with a small conventional figure, or one with a self-toned foliage pattern is better. A paper with a good pattern may be very effective in a hall or corridor or a room with few or no pictures and plain draperies. It helps to furnish the room. A large-figured paper in a small room is out of scale and makes the room look smaller.

A figured wall-paper may be used as a frieze in a large room. Such a frieze is generally more effective than one of the stock border patterns, and is more easily adapted in width to varied requirements. A figured frieze is often a decorative finish above a high paneled wainscot.

A border of unobtrusive pattern and color may serve on occasion to define an edge or emphasize a direction. But the idea that every room must have a border because fashion so decrees is absurd and unreasonable. Festoons of flowers and conspicuous ornament of any sort that tend to draw the eyes upward unpleasantly is out of place. In rooms of ordinary height, borders should generally be omitted. They are the offspring of the traditional cornice whose original office was to make the division between ceiling and side wall. A picture-molding placed at this intersection is an excellent finish in a low room or one of ordinary height. If the room is too high, the ceiling color may be brought down on the side wall and the picture-molding placed at the intersection of ceiling and wall colors.

Hangings for windows and doors (Figs. 19–23)

Hangings are useful to temper the light, to obstruct an unpleasing view, to preserve privacy, and to furnish a decorative effect. Door draperies are used for the temporary separation of rooms or for decorative effect.

The types of window hangings are shades, curtains, and valances.

The purpose of a shade is to regulate light and to secure privacy; therefore, a shade should always be opaque. A glare of color in a room through a shade of intense hue is sometimes more trying than a flood of sunshine. Shades, being next to the window, affect the exterior color scheme of the house and should be chosen with this in mind. Shades need not on that account be at variance with the interior coloring of the house, for a neutral tone may be chosen that will not violate any color

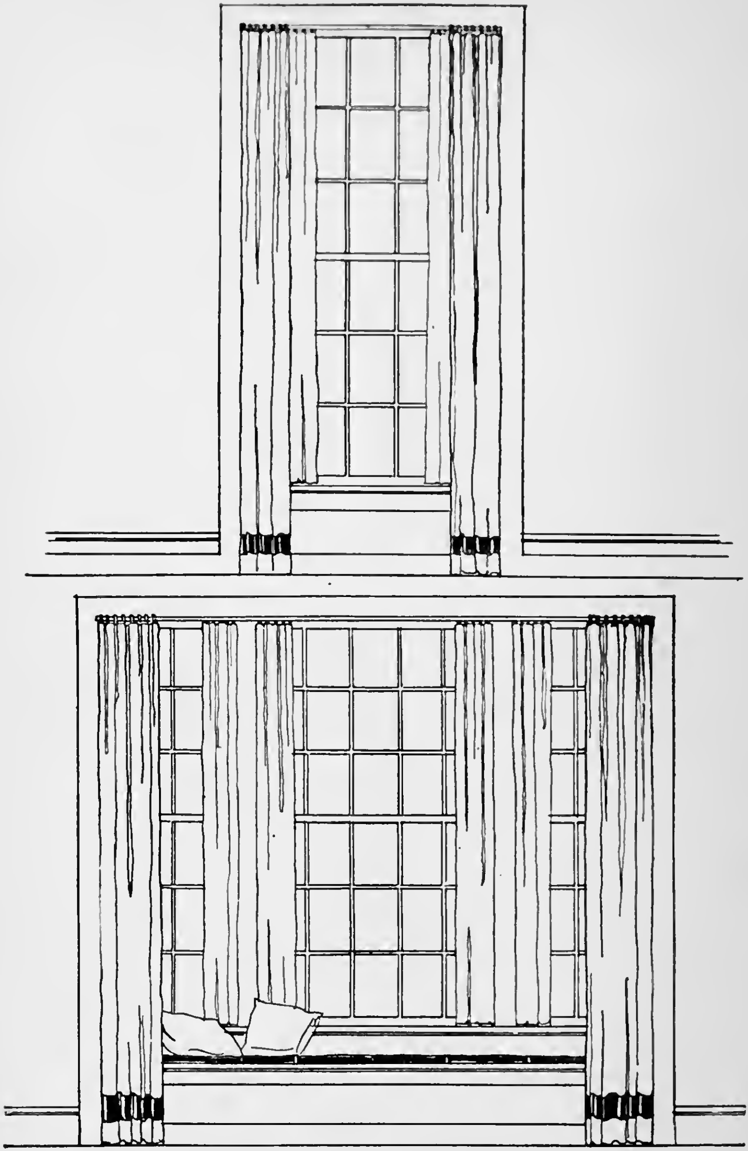


FIG. 19.—A method of hanging two sets of curtains in recessed windows.

scheme, or double-faced shades may be used. These are only a little more expensive and may, if necessary, be colored to order. In buying for a permanent home, it is economy to select shades of a good quality.

Shades should be hung inside the trim as near the glass as possible without interfering with the operation of the window. If this is not possible, the shades should be hung near the inner edge of the casing or window trim. Shades may be hung so as to pull up from the bottom instead of down from the top. There are also fixtures which make it possible to adjust the shade so that it may cover any portion of the window at any time. These adjustable shades are particularly desirable for schoolroom windows exposed to direct sunlight for a large part of the day, for kitchen windows on the south side of the house, and for windows in any sunny workroom.

Besides shades and blinds that shut out the light, the windows of most rooms need draperies to soften the hard lines of glass and wood, to temper the light, to veil a view, to complete the background of the room, and to add a decorative note in color or pattern.

Each room presents an individual problem in curtains. Harmony, simplicity, and suitability are the guiding thoughts in the solution. Taste is more effective than money. With the modern ideas of the home as a place in which lives are to be lived, of rooms rationally furnished for everyday use, windows swathed in festoons of draperies, sweeping the floor, harboring dust, inviting germs, and excluding the air, have no place. The much trimmed, festooned and lambrequined draperies are not now much in use; their return should never be allowed. However rich the material used for draperies may be, they should be simply made and so hung as to fall in straight folds. In a case of doubt, the simplest solution of the problem of window draperies should be accepted.

The choice in material ranges from filmy nets, transparent gauzes, scrim, and muslin through soft silk and cotton fabrics, linens and coarse canvas weaves, brocades, damask, and tapestry, velvets and velours; in color and design from one un-

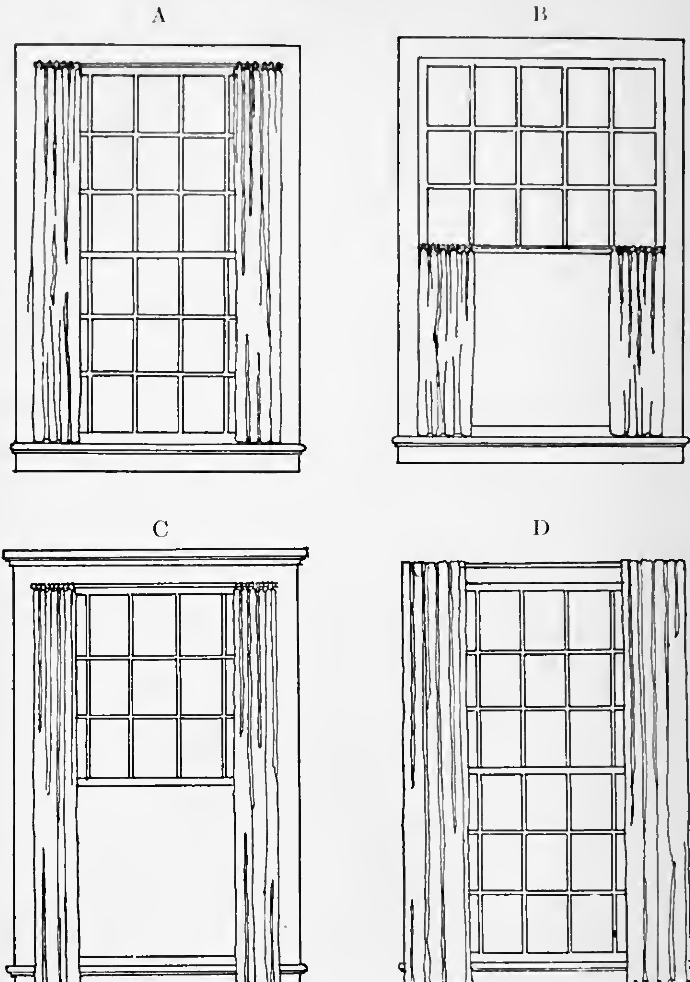


Fig. 20.—Four methods of curtaining a double-hung window: A, straight curtains hung within the window trim. B, a half, or sash, curtain often used for privacy. C, an inconsistent way of hanging drapery, which could be remedied by raising the rod, and extending it to the length of the top molding. D, a method of hanging curtains to cover an ugly trim or to widen the window in effect.

broken neutral tone to the most complex variation of hues and patterns; in price from a few cents to many dollars a yard. Any fabric may be used, provided it is suitable. Effects in design, color, texture, and pattern that harmonize with the room and its furnishings are the distinguishing characteristics of the most tasteful selections of hangings, rather than rich and costly materials.

Scrim, colored chintzes, cretonnes or any other dainty washable material is appropriate for a bedroom. Bright or gaily-figured hangings may be used in rooms devoted to good cheer and occupied for only short periods, such as a dining-room or a porch sitting-room. Patterns and colors that are entertaining in a tea-room might be unbearable in a living-room. For rooms in constant use, or for rooms that should be reposeful in their influence, such as a library, a living-room, or a study, near-neutral colors and unobtrusive patterns are essential.

A city dwelling, close to the street and overshadowed by other buildings, a country house situated on a hilltop, or in a valley, or by the sea, or in a setting of open fields or gardens surrounded by trees and shrubbery, present different problems in window treatment. Velvets, damasks, and handsome linen are appropriate for the city house, and the greater formality and reserve which are its natural characteristics. An effect of freshness is in keeping with the environment of the country home. Cretonnes, chintzes, and printed linen with brighter coloring than would be appropriate in the city home, are in harmony with the birds and flowers and outdoor country. Simple curtains of unbleached cotton for the small-paned cottage window with its ledge of flowering plants suggest the charm of the little house across the sea. For the house used only in summer, curtains should of course be of washable materials.

The lighting of the room is an important consideration in selection of window draperies, If the room is poorly lighted, thin draperies light in value, tending toward yellow—the most luminous color—will be the most effective choice, provided it is consistent with the color of the walls. If the room is too light

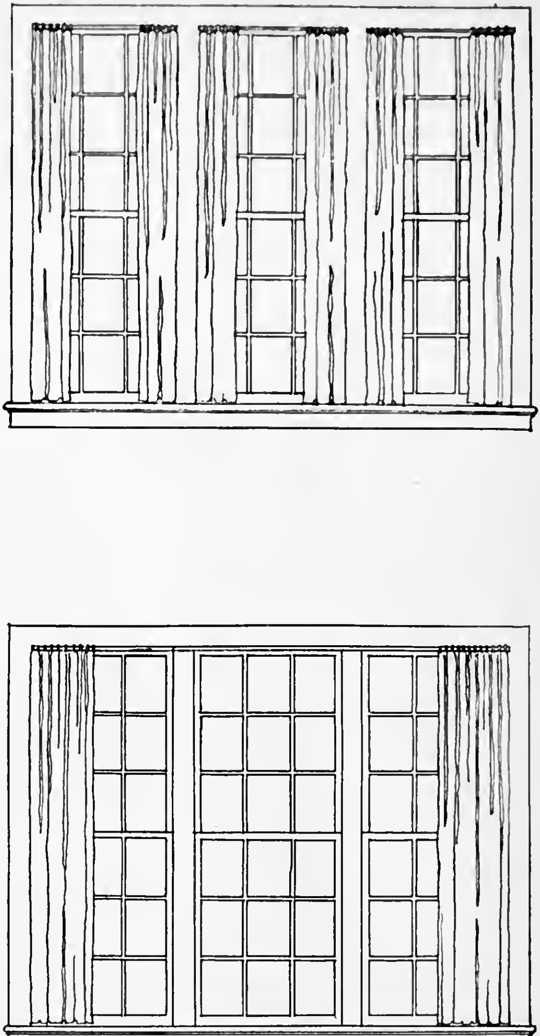


FIG. 21.—Two methods of curtaining a group of windows.

and sunny, darker and cooler colors and heavier fabrics should be used. Curtain material should never be chosen without hanging a large sample in the window of the room in which it is to be used, because the color effect is frequently quite different under transmitted light. Material with a black thread is likely to look dull and dingy; a fabric woven with blue and yellow threads becomes green when seen against the light. The effect of artificial light on the draperies should also be considered, since colors change surprisingly from their daytime effects.

Valance is the term used for a short drapery hung at the top of the window. It should preferably extend across the entire curtain space, or in emergency cover only that space between the curtains. Valances are decoratively useful in furnishing a continuation in color and line between curtains that hang too far apart, or in emphasizing the shape of the window. They may serve as a decorative connecting link between the outside curtains at a group of windows, making it possible to dispense with other drapery in the group. Valances emphasize the horizontal in a room.

Portières, or door draperies, sometimes serve in place of doors in the openings between rooms where only a temporary separation is required. They may serve also to soften the lines of the trim, to cover an expanse of objectionable wood in the doors, or to add a decorative note of color or pattern. There is a wide variety of fabrics to choose from. Generally a heavy fabric hangs better and seems more appropriate in a doorway than a light one, and a double-faced material is simpler to make up. Manifestly, skeleton draperies composed of cords and tassels, strings of beads and shells, are an absurd substitute for a useful drapery. Door draperies may continue the color of the walls, or, like the window drapery, may be of a contrasting color. If the rooms connected by the opening require different color treatment, the portière may be made double. The same considerations regarding pattern that guide the selection of window hangings are applicable to door drapery.

Color and pattern.

Color is of first importance in the decorative effect of window-hangings. White curtains may be appropriate in a room with white woodwork, white ceiling, and light walls, for they are in such case in harmony with the general color scheme, but they are not appropriate for rooms of darker color. Window-hangings should generally harmonize in hue with the walls of the room. If the hangings are of exactly the same color as the side wall, the result is likely to be monotonous. But if the room is small, the openings many, and the other furnishings in strong color contrast to the walls, a close match in color between walls and draperies may produce a most restful effect. If the walls are plain and not covered with pictures and other objects that attract undue attention, the draperies may be stronger in color and more pronounced in pattern, constituting the strong decorative note in the room. In general, provided the colors are harmonious and the pattern not too pronounced, it is safe to use striped or figured draperies with plain walls, and plain draperies with walls that have a pattern. Figured draperies may be used effectively with striped wall covering. The best designs for drapery, as for wall covering, are those that cover the ground and present no violent contrast in color or pattern.

Window draperies may contribute largely to the color effects described in rooms of different exposure, or of different localities. The warmth and light contained in soft tones of yellow and orange can be counted on to counteract a feeling of cold and gloom. Darker and cooler colors may be used when there is much sun or heat.

Texture.

Texture affects the adaptability of the hangings. Texture is the quality of material made known to us originally, as its name signifies, through touch, but by experience is equally recognizable through sight. Words used to describe textures are accordingly descriptive of feeling, such as rough, smooth, hard, soft, velvety, silky, crêpy, coarse, fine, firm, loose. Burlap, for example, is rough and coarse compared with India silk. Tightly woven linen is firm and hard in effect. Velvets and velours are soft. Burlap, monk's cloth, canvas, and similar textures are appropriate in rooms finished in rough plaster with oak woodwork and mission furniture. Silk and satin or mercerized fabrics are more appropriately used with wood of such grain or texture as mahogany or satinwood or with painted wood. Variations in texture produced by different weaves, patterns, or colorings may give even inexpensive materials so distinguished a quality as to make them appropriate for use in very dignified surroundings. Some of the designs from priceless tapestries in European museums have been printed on linen and may thus be enjoyed at moderate cost.

Treatment as to number in one window.

Ordinarily one pair of curtains is sufficient to answer the purpose of a window drapery. Especially in rooms with few or very small windows, swathing with drapery should be avoided since it produces a stuffy effect. Casement cloth, many of the heavy nets, and sunfast materials, cretonnes, chintzes, and printed linens are very effective when used as single hangings. It is sometimes necessary to think of curtains as screens to shut out the public or a disagreeable view. Curtains may be so chosen as to perform this service and yet admit light. Sash curtains hung across the lower half of the window are the most natural answer to this problem. They are often useful in a bathroom or kitchen.

Two sets of curtains are sometimes required for practical or decorative reasons. For example, in windows near a street, one set of curtains may shut out the gaze of passers-by while admitting the light, and the other serve as a screen in the evening and a decorative note at all times. In recessed windows, such as are found in brick or stone houses, or in a bay window or a group of windows, thin curtains may be used next the glass, and heavier draperies harmoniously related to the side wall may be hung on the trim and drawn to shut off the recess or the whole window group when desired.

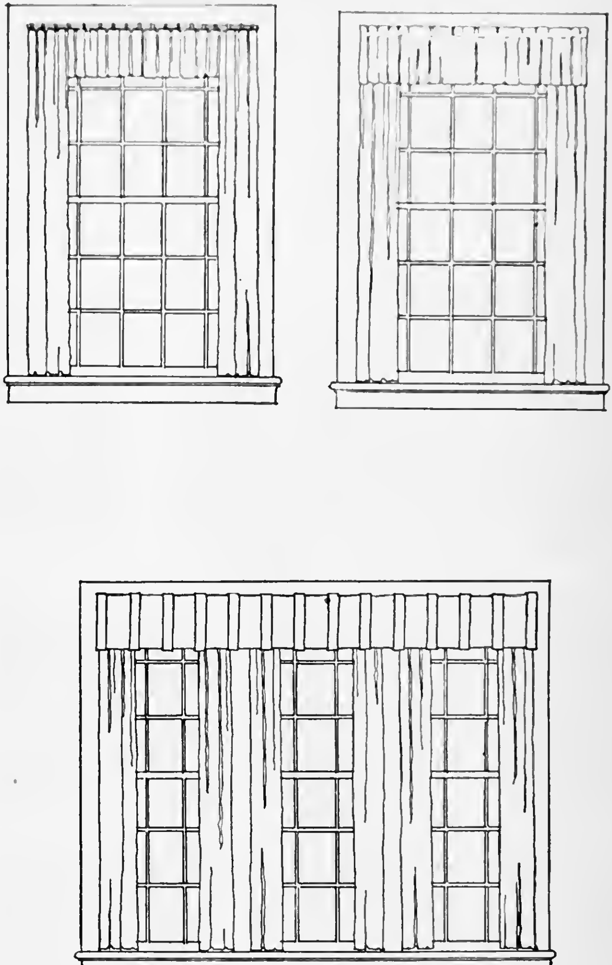
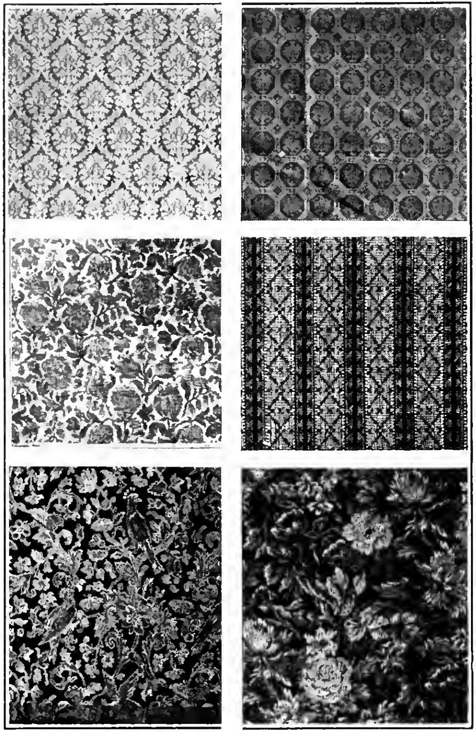


Fig. 22.—Three arrangements of valance and curtain, the first being the least desirable.



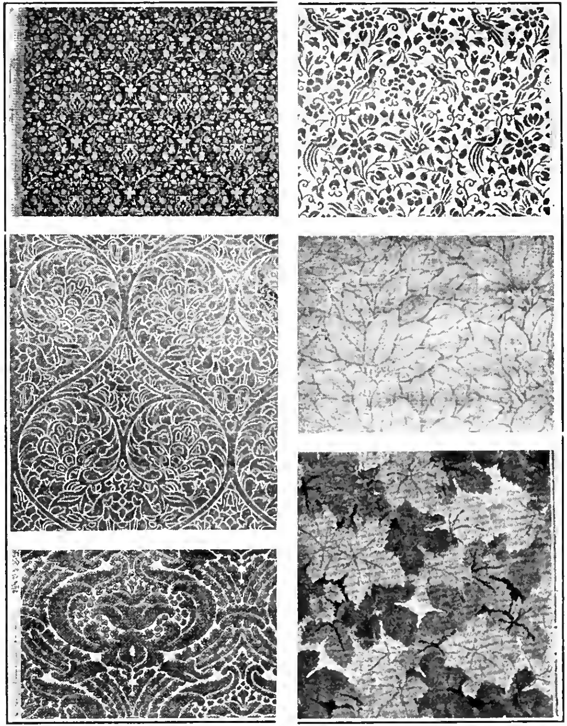


PLATE V.—Left: Types of textile pattern that may be used for upholstery or hangings. Right: Types of excellent design for entire walls or friezes when pattern is needed for decorative effect.

If two sets of curtains are used, one pair is hung next the glass. These are called glass, or sometimes sash, curtains. As the function of these is to cut out the view but admit the light, they should be of thin material, such as net, plain lace, scrim, gauze, thin silk, mercerized cotton, sunfast fabric, or casement cloth. Such an inner curtain should be consistent in texture with the outer drapery; for example, with velvet or silk or any rich material, net of good quality or possibly marquisette is a good choice. With linen or cretonne, scrim is better. With cretonne or similar patterned hangings, the inner curtains should match the ground in tone; white, if the ground is white, cream or ecru if the ground is of that color; otherwise, one is likely to look faded or discolored. In thin materials, too coarse a mesh should be avoided on account of shrinking; an even weave is more easily made up and hangs better. These glass curtains soften the glare and are a protection for the heavier window draperies. They are always in evidence on the outside of a house and should be selected with this in mind. If all the glass curtains in the house are alike, or if in the city those in the front of the house are alike, a pleasing unity of effect from the outside is conserved.

The over, or outer, pair of curtains which is in more direct relation with the walls of the room may be made of any of the heavy materials already mentioned. This over-drapery may be used to regulate the light during the day, and, by shutting out the outside world, to give an effect of intimacy at night. At any time it may furnish a decorative note in the room.

Hanging of draperies.

If the woodwork of the room has been so selected and finished as to make of it a structural decorative feature, it should bear somewhat the same relation to the draperies as a picture-frame to a picture, outlining and defining that which is inclosed. In this case the draperies, if there is only one set, should preferably be hung inside the trim; if there are two sets, the outside one would probably need to be hung on the trim, but should be kept as near the inner edge as possible.

Varying types of window construction require different methods of hanging draperies. Often in the case of ready-made dwellings, the wood is so disturbing in color or finish, or the size and placing of the various openings in the room are so unfortunate that it is necessary to cover the trim in order to produce a good result. If all the windows in the room are of the same size and the same kind and placed on the same level, the problem is simple.

If there are two sets of curtains, the problem is varied only by the sort of fixtures used. The question is more complex when there are several varieties of windows in the room, with doors requiring draperies besides. The most important or dominant opening should in general indicate the treatment.

Casement or French windows that open out are compliant to the same treatment and arrangement of draperies as double-hung windows. If casement windows open in, only one set of curtains can be managed easily. These may be hung directly on the windows, and be confined by rods with rings at both top and bottom. If a second set of draperies is used with such windows, the rod from which they are suspended must reach from the outer edge of the trim or even beyond this edge so as to free the curtains when the window is opened.

Draperies should always hang straight; fashion should never be allowed to be a determining factor. When curtains are looped back, disturbing lines at variance with the structural features of the room are produced and simplicity is lost. If it is desirable to draw curtains back, the folds may still hang straight.

Curtains just long enough to escape the sill are appropriate in most cases but if for any reason they must be hung to cover the trim, they should cover sill and apron as well. Sometimes when the design of the window contains a paneled space below, long curtains just escaping the floor are more consistent with the type of window than those of sill length.

Valances hung between curtains are appropriate only when these curtains are not to be drawn; in such cases they should be of the same fullness and should hang in the same sort of

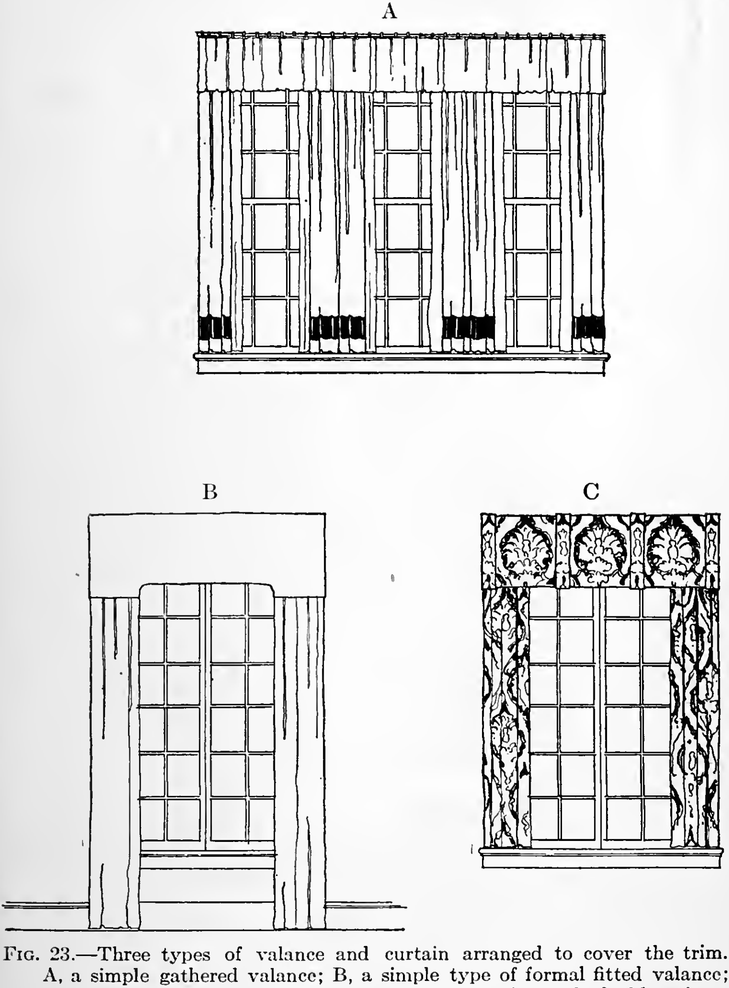


FIG. 23.—Three types of valance and curtain arranged to cover the trim. A, a simple gathered valance; B, a simple type of formal fitted valance; C, a type of valance in which the figure governs the method of hanging.

folds as the curtain. Valances should preferably be extended across the whole window and should hang on a separate rod in order not to interfere with the independent adjustment of the curtains. The valance usually hangs from the same height as the curtain; but in the case of a window with a transom, the valance may, if the construction of the window allows, hang from the top of the transom and fall only far enough to cover comfortably the top of the curtains.

Portières are hung in the same general way as curtains; sometimes on the trim but more often between the door jambs.

Measuring draperies for windows and doors.

The space to be covered by the drapery should be measured accurately. Every measurement should be taken with a yardstick or four-foot rule. A tape-measure is liable to stretch. A diagram of the window should be made and the measurements indicated upon this.

Length.

The space that the curtain is to cover from the top of the heading to the bottom of the hem when finished should be determined. An allowance of 5 or 6 inches should be left for "crawl" and for the making up of any unlined curtain that is to have a shirred heading, a run for the rod, and a 2-inch hem at the bottom. If the curtains are to be washed frequently, and especially if they are of material with a coarse mesh, more should be allowed for shrinkage. This extra length may be disposed of by making three thicknesses in the hem. If sewed by hand, the hem can be ripped easily and rehemmed after washing. If there is no heading, only 4 inches need be allowed for making. In estimating the quantity of material, allowance must be made for the "repeat" of the pattern in matching the design. Sometimes when there is a large design and considerable waste, the parts cut out can be used in the valance. If the pattern has a figure conspicuous in size or shape or color, the drapery should be planned so that this figure comes at the same distance from the top in both curtains of one window and preferably in all the windows in the room. The drop in different patterns varies from a few inches to several feet and is an important consideration in measuring and cutting figured materials.

Materials suitable for window drapery come in many widths, from 31 inches to 52 inches or even 72 inches. For windows of average width, 50-inch material may be used to good advantage if pattern and texture permit, by cutting it in two lengthwise and making both curtains in the pair from one length of drapery.

Width.

Window drapery should, theoretically, be sufficiently wide to cover comfortably the whole window even if it is seldom necessary to do this. The width of the whole space plus from one-third to one-half the space to be covered, according to the thickness of the material, furnishes an agreeable fullness. When the curtains are purely decorative, as is sometimes the case with the outer drapery, or when only one pair is used with a valance in a group of windows, less fullness may be sufficient.

Lining.

If the curtains are to be lined, allowance should be made for the heading at the top and, ordinarily, for 2 inches to be turned up at the bottom, that is, as much for making as in the unlined curtain.

If the curtains are to be finished with a gimp or fringe, 1 inch is enough to allow for making, since in this case the lining should come nearly to the edge.

For the lining, the same length should be allowed as for the curtain, minus the width of the heading. If the material is heavy, more must be allowed for the lining, since the outside is likely to sag. If the outside is considerably heavier than the lining, or if there is a difference in the elasticity of the two materials, the curtains should be sewed only at the top and allowed to hang for two or three weeks before finishing. Fifty-inch sateen suitable for lining curtains is to be found in the upholstery departments.

Valances.

The ordinary valance of cretonne or thin material is gathered or plaited and made with a heading. Such valances vary from 12 to 18 inches in vertical length, according to the size of the window and the type of room, whether a bedroom or a living-room. For short casement windows or for a bedroom, a valance not more than 8 inches wide is sometimes very effective. The width of the window space to be covered plus from one-third to one-half its width should allow sufficient fullness for the valance. If the valance is to be plaited, the length necessary for each plait should be multiplied by the number of plaits and added to the length of the rod, plus 2 inches for making. For the heading, to the length of the finished valance should be added the same allowance as for curtains, 4 inches for the heading and run at the top, 1½ inches for the hem at the bottom. For a gathered valance in a window 3 feet wide, one width of 52-inch material will allow sufficient fullness. For a flat valance, the vertical width of the valance is measured at the widest part, and 2 inches added for making. For the horizontal length of such a valance, the width of the window space to be covered is measured, or, in the case of a curved rod, the length of the rod, and 2 inches added for making. If there are plaits or pipes in such a valance, the amount required for each one must be calculated, and this added to the length of the valance.

Portières.

For portières hung from a pole by rings, the space to be covered by the hanging finished is that from the bottom of the pole to within 2 inches of the floor. This space is required in the interest both of cleanliness and appearance. For portières with a run for the rod, with or without heading, allowance must be made as for curtains. Portières often require lining, in which case 3 inches in addition to the length when finished should be allowed. Some materials "crawl" in use, but most fabrics that are used for portières are heavy and tend to sag.

Making draperies.

Curtains.

Before cutting, the material should be studied carefully to see whether there is any up and down, right and wrong side, or matching of figures to be considered.

When possible one should cut by thread. In the case of some cheap printed goods, this is not practicable, but such curtains are likely to hang askew after they have been laundered.

In making curtains, a large table that one can walk around should be used.

Glass curtains and any curtains made of thin textiles or unlined may be finished at the top (1) with a hem or casing for the rod, (2) with a heading and a run for the rod below the hem, (3) with a hem and rings sewed on to the edge of the curtain or with rings sewed on to the line of the hem so that they are invisible. Curtains that are hung on rings are more easily moved back and forth; but if the curtains need frequent laundering, the rings may be troublesome.

Twice the diameter of the rod, or more, should be allowed for the width of the run or casing, to provide for shrinking and the easy adjustment of the curtains.

Thin curtains are better gathered or shirred.

Ample width for a heading in limp material is 1½ inches; if the heading is wider, the folds lop over in an untidy way. Two inches is not too wide a heading if the curtains are of a firm material that stands up well.

For full length curtains for large windows, 3 inches is a good width for the hem at the bottom. For glass curtains or curtains of thin material, 2 inches is sufficient. The hem may be turned in its full width, thus making three thicknesses of material. In any case this gives firmness and weight that makes the curtain hang well, and in the case of washable curtains furnishes an opportunity to counteract the effect of shrinkage. Hemstitching or fagoting is an excellent finish for scrim or marquisette, and it gives a touch of distinction to the curtain.

Curtains of chintz and some other materials may be turned up on the right side, and an edge of gimp or a narrow fringe may be sewed on. Attractive edgings for chintz are obtainable, and when chintz curtains are used in living or other family rooms, these gimps make an effective finish. In this case, the width of the gimp is enough to allow at the bottom for making. In general, the hemstitching or other finish of a curtain begins at the top of the inside of the curtain and continues across the lower edge. There is no reason why it should not be continued up the outside edge, thus making the edges reversible.

Lined curtains.

Many materials used for the outer window drapery should be lined, especially for windows subjected to the heat and glare of the sun. Lining is often desirable even when there are glass curtains, both for the protection of the material, if this is expensive or likely to fade, and for the effect in the room. Some fabrics are much more effective when lined; others are much handsomer unlined. The pattern in cretonne, for example, comes out much better when there is no lining, while in printed linens the pattern is often almost obliterated and the ground looks dense and dull if made up without a lining.

If the curtain to be lined has a heading, this should generally be made by turning over the outside material at the top, especially if the heading is likely to fall over, or is of plaits which are intended to turn over.

When curtains are to be lined, they should be placed face down on the table. After cutting off the selvage, which is otherwise likely to draw, the edges are turned in and basted down. The lining should be basted on to the outside first at the top, then across the curtain at frequent intervals throughout the length of the curtain. The edges of the lining are then turned in and basted to the outside, letting the edge of the lining come to about $^1/_{16}$ inch from the edge of the outside. The curtain is finished at the top, and if it is of heavy material, allowed to hang for three weeks or more before finishing either the sides or the bottom.

Valances.

The ordinary valance of cretonne or thin material is gathered or plaited and made with a heading. Gathered valances are made in the same way as gathered curtains. For plaited valances, the box plait is generally used. The plaits may be very near together or at some distance apart. The width of plaits and spaces must be carefully estimated, and if the plaits are a wide distance apart, this spacing must be determined with great accuracy. In figured material, the figure often indicates the best spacing. The plaits may be taken up like a tuck, basted carefully, pressed to produce the boxplait, the basting ripped out, and the valance allowed to hang free from the rod. The casing for the rod is stitched to the back at the base of the heading. The casing should be so wide that the outline of the rod is not visible on the right side; or a flat tape may be sewed on at the base of the heading and hooks attached to this. Plaited valances are more formal and finished in appearance than gathered or shirred valances. They should be measured accurately, sewed firmly, pressed well, and hung straight.

The shaped valance made over buckram and with interlining is suitable for the richest material, such as velvet, velour, or damask, and for the most stately rooms. When such materials are used, a professional can generally be employed to make them up; therefore, only the simplest type of flat valance will be described here. A simple shape should be chosen with few or no curves. A pattern is cut from heavy paper and fitted carefully to the window over the rod or other fixture to which it is to be fastened. The heavy cotton or canvas lining is then cut. Canvas is better than buckram, because the latter is likely to crack or become limp in damp weather. The canvas form is laid on the table and the lining basted carefully on it, a little tighter from left to right than the canvas, if the valance is to go on a curved rod. The lining is laid on the goods on a table. If the fabric is figured, the pattern should be studied carefully, to be sure that the figures come in the right place. The goods should be cut 1 inch larger all around than the lining. In basting the outside to the stiffened lining, it should be as much looser than the canvas as the lining is tighter, in order that the valance may fit well around the curve of the rod.

Such a valance may be finished by a gimp or cord or other slight finish. It may be hung from a $^3/_4$-inch board fastened to the top of the trim, and projecting 3 or 4 inches from the wall. The shaped valance is seldom required for home-made curtains.

Portières.

Draperies for doors are made in the same general way as those for windows. They are often of heavy material and are sometimes lined. The purpose of the lining is often to furnish a contrasting hanging for the room on the other side. When the rod is fastened to the door jamb as high as possible, the run for the hanging may conveniently be made at the top. If a heading is desired, the rod should be placed lower. When portières are hung on the outside of the trim, a heading may be used or not.

Portières may be hung by rings, or by hooks. A French heading, with French hooks, may be used on a portière that is to be hung on the trim. The French heading is made by taking up three tucks or plaits which may be $^3/_4$ inch in depth, or more if the material is heavy. The plaits should be stitched across $2\frac{1}{2}$ or 3 inches from the top. The French hook is attached at the bottom of the heading. The hook then fastens into the ring which fits the rod.

Floor coverings

Only modern rugs of domestic or foreign manufacture will be considered here, as the choice Oriental rugs are not within the compass of the average purse and the ability to select these wisely is acquired only by long study and experience.

The functions of either a carpet or rug are to protect the floor, to obviate noise, to give warmth in both fact and effect, and to add a decorative note to the room. To protect the floor in much-used rooms, rugs should cover the larger part of the floor.

If a number of small rugs are used, they should be placed where the wear is greatest—on lines of travel, before a fireplace, a lounge, a bed, or a dresser. The term carpet will be used in this connection to designate a fabric that covers the floor completely; the term rug, for a fabric not completely covering the floor.

Carpets.

Carpets are not so popular at the present time as rugs; but with the home-maker, fashion should not enter into the consideration. A carpet with small figures or none, covering the entire floor, tends to make a room look larger, and to unify the color scheme; it contributes to the warmth and quiet of a room, and in an old or cold house may serve to offset a poor floor. A perfectly plain carpet usually called "filling" may be obtained in ingrain and other weaves to cover the entire floor and serve as a background for rugs. With a vacuum cleaner it should be entirely possible to use carpets and be hygienic.

Rugs.

Rugs serve all the purposes of a carpet and are in general much more easily cared for and more adaptable decoratively. Even a large rug, when rolled on a pole, can be easily moved in and out for cleaning. For temporary homes, rugs are a wiser investment than carpets because they are more easily adjusted to different floor spaces.

Color, as in other furnishings, is the first point to consider in the selection of a rug. The rug preferably should be of about the same value as the floor, so that it may tone with it, making no severe or obtrusive contrast. In the case of a floor that is too light but that may not be darkened, the lesser of two evils is to compromise by choosing a rug considerably darker than the floor. The floor is the base of the room, the foundation on which the furniture rests, the background against which it is seen. Colors relatively dark contribute to an effect of solidity. In must be continually repeated that neutral effects serve best as backgrounds. The safest coloring perhaps is the one similar or analogous to the prevailing color of the walls; but a complementary or contrasting color, if sufficiently neutralized and if repeated elsewhere in the room, may be used with excellent effect. A plain rug with a self-toned border is in general a good choice.

If the rug is to be subjected to very hard wear, a pattern will make the wear less evident. A rug with an unobtrusive pattern, preferably with small geometric figures that "read" from every direction, or a very conventional nature motif with no strong contrasts in value, is likely to keep its place as a background better than a rug with large pattern, medallions, or intricate ostentatious border. Such rugs assert themselves at the expense of the other furnishings and tend to make the room seem crowded. Realistic flowers or animals, trees or houses, are out of place in pattern.

The best size and proportion for rugs is determined by the room and its furnishings. In the average room, a relatively large rug proportioned to the size and shape of the room is a satisfactory choice. Between two and three feet, or in a very large room even a wider margin, of bare floor may be left on each edge; the rug thus answers every purpose of a rug, clears the furniture, and is easily cared for. The size, number, and placing of rugs should be studied in relation to the other furnishings of the room, since they play an important part in the whole design.

There is a wide variety of textures and weaves on the market. It is impossible to suggest with any definiteness, the weave or manufacture to buy. The texture or quality should above all be appropriate to the room in which it is to be used; a rag rug may be the best choice for a bedroom or even for a living-room in a simply furnished country house. Heavy Wilton or Axminsters or velvets with deep pile are too suggestive of luxury to be used in modern simple homes. Since rugs are always to be walked upon, they should above all be durable. A reliable dealer who handles standard makes of rugs should be selected, and his judgment trusted as to the wearing qualities of his goods.

Linoleum.

For hard and continuous wear, such as on the floors of kitchens, passages, and dining-rooms, on farms or for large families, linoleum makes a very satisfactory covering. A good quality of linoleum is about as durable as wood. Its pliability, elasticity, and quietness especially recommend it for rooms in which there is much walking or standing. Since it comes in wide lengths, a linoleum floor has practically no seams or joints to catch the dirt and can, therefore, be considered a very sanitary material. Battleship linoleum, plain brown in color, often tones in acceptably with woodwork and furniture. A few other good plain colors are procurable. For the kitchen, a modest inlaid or a granite pattern is by many considered more cleanly in appearance. A similar choice of pattern in light colors is also appropriate for bathrooms.

A good grade of linoleum is not cheap, but its lasting qualities repay the initial expense. Cheap grades are not in the long run a good investment.

A linoleum floor should be laid by the firm from whom it is purchased. The inconvenience attendant on the proper laying of a linoleum floor must be borne patiently, because it must be kept in the form of loose pieces until it has adjusted itself to the flatness of the floor, the temperature of the room, and the space which it is to fill.

Since the marks made by furniture show up badly on a new linoleum, the pressure of heavy pieces should be relieved by little blocks under the legs while the linoleum is new; but as the surface becomes harder through care and exposure, it will be found to stand better the necessary wear.

Cork carpet.

Cork carpet, a floor covering similar to linoleum in wearing qualities, but with more of a surface texture, can be obtained in a number of plain tones. Like linoleum it can be used pleasingly even in living-rooms as a background for rugs.

Wood-veneer carpet.

A wood-veneer carpet of inconspicuous pattern laid over an old floor is also a very durable and satisfactory background for rugs. Japanese matting of fine weave, though light in color can be made to take the place of a bare wood floor especially in bedrooms or rooms where white or light painted wood is used.

Ingrain filling.

Ingrain filling or other plain carpets may also be used as a background for rugs in the absence of a good wood floor.

FURNITURE (Plates VI–IX and Figs. 24–29).

Furniture is perhaps the most distinctive of all the movable furnishings of the home. Well-made furniture is very durable and should, therefore, be selected with the care which permanence calls for. Furniture of reliable workmanship and made from choice material is rarely cheap, but is the best investment in the end. If the family purse is limited, it is better to buy at the start the few essential pieces and to add to these from time to time. No article of furniture should be purchased unless a need for it exists, and then the one that will best fill that need should be sought for until it is found. At the time of purchase, each article should be judged on its intrinsic merits and its adaptability to the need and place that it is to fill.

The fundamental considerations in the selection of furniture are three: the function or use of the article selected; its construction and design; and its relation to the room and other furnishings.

Function.

The usefulness of a piece of furniture is paramount to every other consideration. For example, a chair of whatever materials constructed, is made to sit in. If it does not answer this use comfortably, it is utterly unworthy as a seat. In its simplest form a chair has a seat, legs, and back, but it is often developed into forms with arms, rungs, rockers, and upholstery as well.

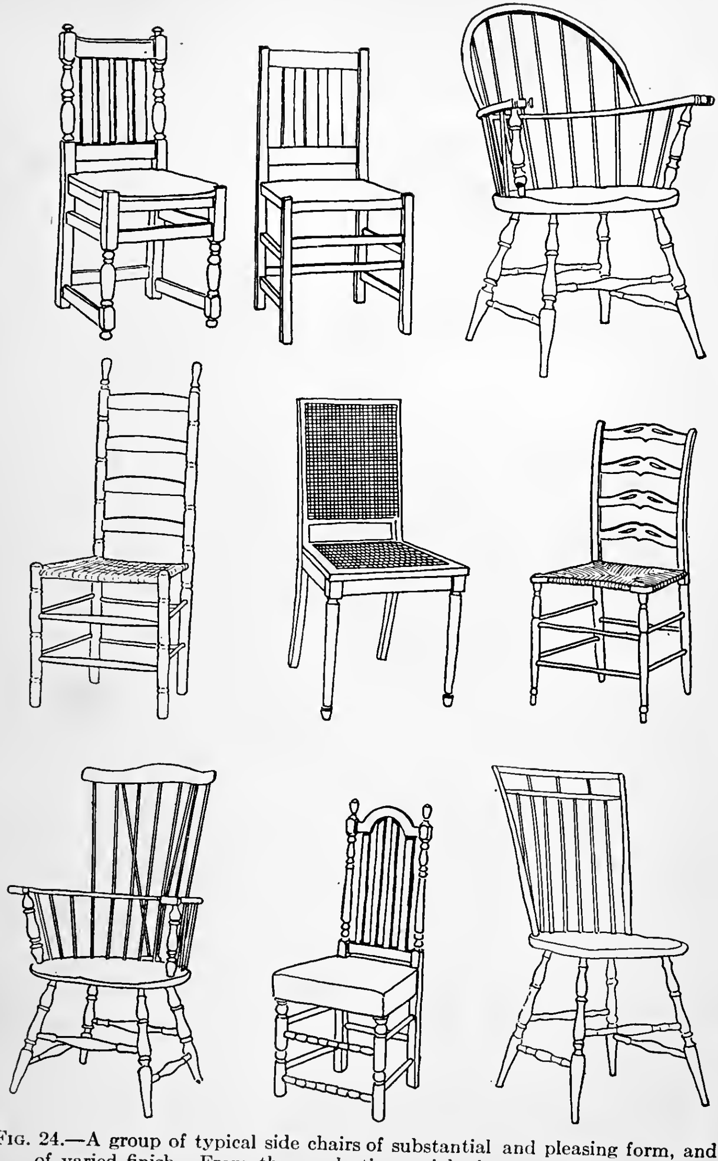


Fig. 24.—A group of typical side chairs of substantial and pleasing form, and of varied finish. From these, selections might be made for dining-room, living-room, or hall.

FIG. 25.—Four good table forms for use in dining-room or library.

Even the most elementary type should afford a seat wide enough to accommodate the body comfortably, should have legs of a height that allow the feet of the occupant to rest easily upon the floor, and a back that accords with the curve of the spine. These requirements would seem so obvious as not to need mention, were it not so rare to find them all combined in one chair. Since the adult members of a single family may vary greatly in height,

PLATE VI.—Good types of desks and sideboards.

size, and proportion, no exact rule as to the measurements of chairs can be formulated. In general, however, the seat of an ordinary straight chair should measure from 15 to 20 inches across the front and may be usually 2 or 3 inches narrower at the back. In height the seat may be from 15 to 20 inches from the floor, inclining slightly backwards. The lower the seat, the greater should be its depth; and conversely, the higher the seat, the more shallow its depth. The height of the back from the seat may vary from 12 to 30 inches. Arms should be of a height to support the arm of the occupant comfortably—about 10 inches usually from the seat. Rails or slats or bannisters in the chair-back should be tested with reference to the ribs and shoulder-blades of the user. Rungs are usually added for strength, but a well-made chair may be quite adequate to its purpose without them.

The varying purposes for which chairs are used are another element in the decision. A sewing chair, a slipper chair, and a nursery rocker are preferably low. A short-backed chair is convenient for a dressing-table or for the kitchen. A chair for lounging may be as deep and high-backed and as luxuriously upholstered as the user fancies. No chair is good that is not comfortable in service.

With a table also, the first thought of the buyer should be its use. A dining-table, a table for the library, a sewing-table, a table for bedroom, hall, or kitchen, each has a special service to render and should be chosen with that service in mind. Every table, however, should be stable.

A bureau, a chest, a sideboard, or any container should be thought of in terms of the storage space afforded and facility of access to that space; doors should open and shut easily; drawers should run smoothly.

Construction and design.

The first requirements in construction are strength and durability. These are essential elements also for efficient service. Good furniture must be sincerely built from honest material, should be designed for a definite purpose, and should avoid

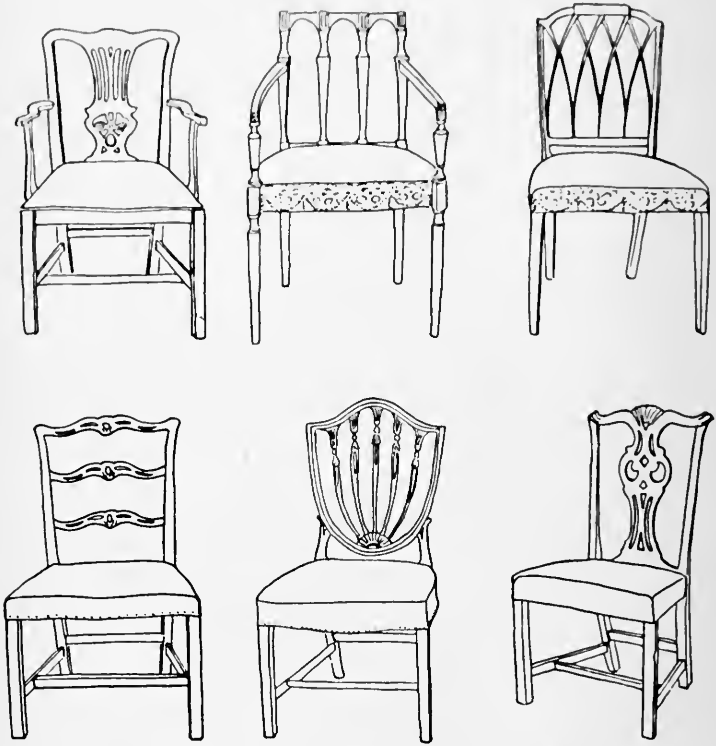


FIG. 26.—Types of Colonial chairs, usually developed in mahogany or cherry, which may be found in good reproductions. 1, 4 and 6, Chippendale; 2 and 3, Sheraton; 5, Hepplewhite.

superfluous ornament and shiny varnished finishes. The construction of furniture should be evident; that is, the necessary upright and horizontal elements should not be distorted by curves and ornament that impair the function of the members. Variations in contour, such as low flowing curves, should accord with the main outlines. Of all the necessary pieces of furniture, chairs and seats are the freest in form and may deviate farthest from straight-line design. Curved lines and rolling contours adjust themselves easily to the human form and are usually more comfortable than the rigid lines of straight chairs. This does not imply, however, that fantastic shapes are justifiable.

Since no piece of furniture is stronger than its weakest joint, it is important to observe that all joints be strong and genuine even though hidden. The legitimate use of screws, wedges, and glue has brought about such sound and inconspicuous joinery that there is no longer any excuse for wobbly, insecure furniture. In general, the tendency of modern furniture design is toward easily movable forms such as metal beds, closets instead of wardrobes, and various types of reed and willow furniture.

The parts of which furniture is composed should seem reasonable for the function which they are to perform. The legs of chairs and tables should not be heavy enough for porch posts like those in some pieces of mission furniture, nor should they be frail and "ladylike" as in the case of the little gilt parlor chair.

The woods most used in modern furniture are ash, oak, mahogany, walnut, and other woods finished to imitate these, also pine and whitewood for painted pieces. Bird's-eye maple and curly birch, being sport growths, should not be used as a structural furniture wood. Of these woods, oak is heavy, durable, susceptible to color modifications, easily kept in good condition, of a sturdy character, appropriate to everyday conditions, and not too expensive. Mahogany is durable, but needs much care, is too "dressy" in appearance for the stress of modern daily life, and is not so adaptable, except in its browner tones, to usual color schemes. Contrary to the usual belief, there is no intrinsic merit in the fact that a piece of modern furniture is called mahogany. Many of the best looking pieces are only birch stained red, or if made of the genuine wood are often less attractive than their birch substitutes. Only in antique pieces, valuable because they are good and not because they are old, and in modern copies or adaptations of fine design and finish, is the real sentiment and beauty of mahogany preserved. In general, oak is the most representative wood for modern furni-

FIG. 27.—Comfortable arm-chairs for general use.

ture, just as black walnut was the typical wood in our mothers' day and mahogany in the day of our grandmothers.

The finish of all woods should be soft and dull, rubbed, not varnished. A shiny polish is often used to hide blemishes in the wood and is of a nature pertaining more to metals and to glass than to wood.

PLATE VII.—Types of furniture ugly in proportion, erratic in line, over-decorated in finish, that should be avoided.

There is much good painted or enameled furniture. It lends itself to charming and unusual color schemes. This finish is especially appropriate with the light clean effects so suitable in bedrooms in country homes, and in rooms with painted trim.

Willow, because of its elasticity, is an excellent material for seats, but not appropriate for tables, desks, beds and other furniture forms in which firmness and smoothness are essential qualities. Though not so durable as wood, willow is light in weight, has unlimited color possibilities, and fits satisfactorily into many varying types of furnishings. The simple designs are always the best.

Upholstery.

Well-disposed springs and padding add much to the comfort of a lounge or chair, and a textile covering may contribute most attractive notes to the color scheme of a room. Upholstered chairs with a well-built frame that is frankly evident, are the best choice. Fat-looking, dimpled, padded, buttoned, and fringed upholstery should be avoided. Too often it covers weak construction. Upholstery furnishes a good opportunity to amalgamate the various colors in a room, such as the contrasting colors of walls and hangings, or to emphasize one of these, or to introduce new colors that will enliven an otherwise monotonous room, or to distribute the color interests when there is too much color massed on one side of a room, as sometimes results from a series of door and window draperies.

For ordinary home use, plain, striped, or figured fabrics are more appropriate than leather, which finds its best use in offices and men's lounging rooms.

A slenderly built chair should not be upholstered in a large figured, strong-colored fabric. A chair or any other furniture may be excellent in design with no decoration. Any decoration should be an integral part of the whole design, an outgrowth of the construction, a refinement of the proportions, or an emphasis of an essential element by a bit of enrichment.

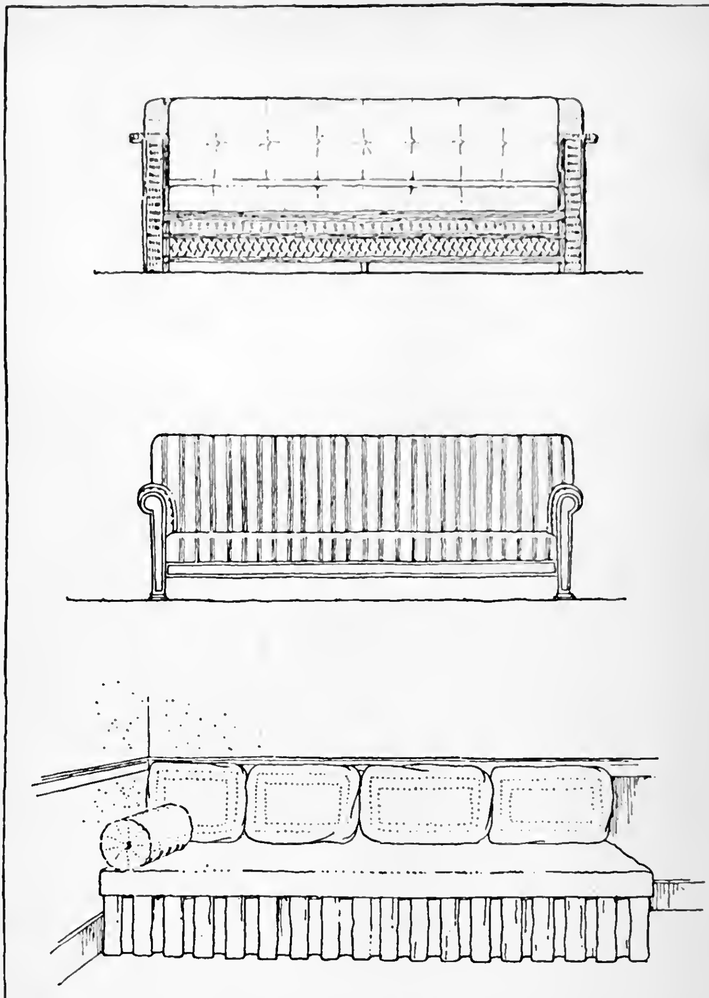


FIG. 28.—Three good forms of couches. Top, a willow davenport, comfortable, reasonable in price, and easily moved. Center, a type of upholstered davenport exceedingly comfortable but likely to be costly. Bottom, an inexpensive box-couch arrangement that may be made both comfortable and attractive by the use of good springs, upholstery, and cushions.

Fig. 29.—Typical small tables of good form and finish from which a suitable selection might be made for various types of living-room, bedroom, or porch.

Relation to other furnishings.

To secure a homogeneous result in house furnishing, the fitness of each purchase should be thought of in relation to the room in which it is to go and in relation to the other furnishings of that room. As has been previously pointed out, the proportion of furniture has a notable effect on the apparent proportion of the room: very large pieces of furniture seem to crowd a small room; very small pieces, unless grouped, appear dwarfed in a large room.

Furniture should be selected of a material that will harmonize with the woodwork. Oak is the best choice for a room finished in oak or in the woods finished in a color similar to oak, as ash, chestnut, or even cypress. The modern market produces such a wide range of design in oak furniture of different finishes and prices as to make an appropriate choice for such a room comparatively simple.

Mahogany or painted or willow furniture affiliates better than does oak with painted woodwork, especially if painted in ivory or white or light tones. Oak and mahogany are so at variance in character and texture that they will not mix. Willow and painted furniture affording great variety in form and color will fit well together.

Pictures

Contrary to the usual belief, pictures are not indispensable in a well-furnished room. If the wall spaces are not too large and bare, if the walls are paneled or have an interesting covering, or if the draperies in the room are noticeably decorative in color or pattern, pictures may be superfluous.

However, if, as often happens in rooms with plain walls, a problem is presented by large empty spaces, a wise use of good pictures presents a solution. Such pictures being steady companions should be selected for their intrinsic worth of subject, color, and composition. Good photographs in brown or gray tones of most of the world's masterpieces may be obtained for a reasonable price. Some good color prints from both old and new masters are also available. Even a group of magazine

PLATE VIII.—A few excellent types of mirrors and foot-stools that are both serviceable and decorative.

prints, similar in size and harmonious in color, may be a worthy contribution to the decorative scheme of the room. These are far better than amateur efforts with paints or crayon.

A good picture deserves a good frame. The frame serves to protect the picture and to enhance its appearance, but should never be so large, ornate or obtrusive as to assert itself at the expense of the picture. A frame for a mirror may appropriately be more decorative; the controlling thought in selecting such a frame is its fitness to the wall and other furnishings. The width, style, and color of the frame must be suited to the picture. Light pictures, like etchings and many water colors, look best framed in light, delicate moldings, with or without a mat, as the case may require. Photographs in gray or brown tones stand a heavier, darker frame toned to accord with the picture. Colored pictures often look well in gilt frames, but the gilt should be dulled and, like the frame of wood, should be toned to harmonize with the picture. If the frame alone does not sufficiently isolate the picture, a mat of harmonizing color may be used. Strong contrasts between frame, mat, and picture, such as is frequently seen in photograph or engraving surrounded by a white mat and black frame, should be avoided; they are too assertive to take a place in any color scheme.

The size and proportion of pictures should be adjusted to the wall spaces; a tall picture in a vertical space, a broad picture in a horizontal space, or a combination of these so arranged as to form groups of pleasing proportions. Pictures rectangular in shape harmonize better with the structural masses than round or oval pictures. Strong contrasts of color and value between wall and picture tend to destroy the harmony between the picture and its setting. Dark pictures on a light wall, light pictures on a dark wall, assert themselves unduly. The general tone of the picture should be related to that of the wall.

A few general points should be remembered in the hanging of pictures. They should be hung flat against the wall, not tilted out from it; they should be fastened securely to the wall or suspended from the picture-molding by two parallel vertical wires. The height of the pictures should be related to the level of the eye, and in general either the tops or bottoms of the frames should be at the same distance from the floor, unless a picture appears better hung in relation to some piece of furniture, such as a desk or bookcase. Pictures are often hung too high.

Other furnishing accessories

While some small furnishings have a distinct use and may introduce the one decorative note needed to complete the scheme, safety lies in restraint. These small things should be selected with as much care as the larger furnishings. The lesson of sacrificing heirlooms, mistaken purchases, and even misfit gifts for the sake of the unity of the whole scheme should be early learned. Constructive forms with lines that are slightly curved for the sake of grace while the general direction of support or economic outline is kept, are pleasing. Whatever is added by way of ornament must follow or fit, not conceal, this structural shape. Masses of decoration applied without regard to the form, cheapen the appearance and confuse the intent of the object.

In the choosing of a clock, a clearly marked dial and a supporting case of pleasing contour and form are the essential considerations. The general design will vary according as the clock is intended to stand on the mantel or the floor or to be affixed to the wall.

The real function of a vase is to serve as a container for flowers. The design of the vase should, therefore, anticipate the flower, though it may be so distinguished in color and form as to be by itself a decorative note in a room. The color or decoration on the vase should not attempt to compete with the flower.

Lamps are indispensable to comfort, whether oil, gas, or electricity is used for illumination, and are one of the most decorative and intimate features in a furnishing scheme. Three elements enter into the design of lamps; the light, its shade, and its support. The support should both be and appear adequate for its use and should harmonize both in size and shape with the shade. Broad bases or heavy bowls give stability to the design of a lamp. Metal and pottery are eminently suitable materials for lamp standards. The height of the lamp and the flare of the shade should be related to the space that is to be lighted. Tall lamps with broad flaring shades illuminate a large circle, while low lamps and snug shades confine the light to small areas (Fig. 30).

In general, warm or yellowish tones for shades are more genial and more in keeping with the idea of light than are cool colors; they are also more becoming. Paper or parchment and

Fig. 30.—Good types of lamps with substantial bases and attractive shades that are serviceable in use.

fabrics are less stiff in material and more flexible in color scheme than are glass and metal for shades. Complex shapes and millinery treatment for shades should be avoided.

The waste-basket serves a humble but important use. It should be so made as to stand firmly, conceal its contents, and be unobtrusive in color and design.

Sofa pillows are valuable if they are useful. Plain or figured materials of agreeable texture, harmonizing with the general coloring of the room, are more decorative than those elaborately made.

The much-abused tidy has in a few cases a real use in protecting the backs of upholstered chairs from the hair; it should be trim in outline, of washable material, of inconspicuous color, and fastened securely in place.

Mere curiosities should be kept in a closed cabinet or a museum.

ARRANGEMENT OF FURNISHINGS (FIGS. 31–33)

The character of every room should be obvious at the moment of entrance. It should be immediately evident whether the room in question is used for a family gathering room, for literary or social pursuits, a playroom, or a workroom. All parts of the room should contribute to this simple and sustained impression. It is for the moment a complete picture in which no one object compels undue attention because of conspicuous size, color, or decoration. Unity is the whole idea.

The contents of the room should show first of all, orderliness of arrangement. The distribution of the furnishings should be adjusted to the structural lines of the room; rugs parallel with the walls of the room, draperies hanging in straight folds in rectangular openings, tables, couches, bookcases, beds, bureaus, and dressers following and fitting the available wall spaces. Pictures, single or grouped, arranged with direct relation to the furniture and to a continuous line of a given height, table runners and books straight with the library table, square lunch cloths and doilies straight with the edges of the dining-table,—all are manifestations of order in arrangement. Diagonal lines introduced by curtains looped back, rugs askew on the floor, furniture placed across the corners, or at oblique angles to the wall, pictures hanging in steps, set at defiance the rectangular lines of the room and disturb the sense of order.

The furnishings of the room should be so arranged as not to crowd all the interest on one or two walls, leaving the other parts of the room empty and dead. Instead, the interest should be distributed throughout the room by a balanced arrangement. For example, heavy features, such as a fireplace on one side of the room, may be balanced by a long davenport on the opposite side, with bookcase, table, and desk occupying end positions.

The next step is to consider the arrangement of furnishings from the standpoint of convenience and use. The comfort of a room depends on the grouping of the pieces that are to be used

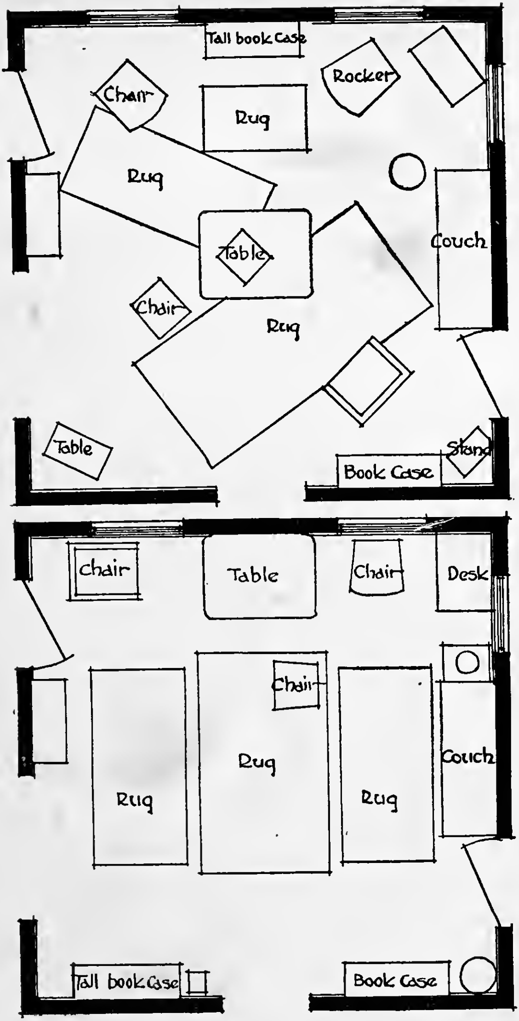


FIG. 31.—Top, a typical square living-room showing an erratic but not unusual arrangement of rugs and furniture. Bottom, the same room arranged in a reasonable and orderly way.

together. Thus a generous living-room may provide a hearth center, a reading center, a music center, and a sewing center if the furnishings are properly grouped; or, in the case of a bedroom, a bed, night table, and lamp might form one group, with dresser, chair, and closet in another.

The arrangement of the furnishings depends very greatly on the location of windows and doors. The good light necessary for reading, writing, or sewing puts a premium on the positions near the windows, for, while theoretically it is possible to see in all parts of a comfortably lighted room, the direct light from a window is the best for all kinds of close work. The furniture grouping must, therefore, adjust itself to this requirement. Desks arranged with a good light from the left side, the principal reading seats within comfortable distance from the windows, and adequate lamps or lighting fixtures provided where most needed, insure satisfaction in this respect.

Care should also be taken to arrange furniture groups away from drafts and paths of travel. Bookcases, cabinets, and the like, may occupy odd bits of wall in locations where it is not comfortable to sit.

Just as the form of a chair may be less rectangular than other pieces of furniture, so its position in the furnishing scheme is more free. The very use of chairs implies that they cannot in general occupy fixed positions, with the exception perhaps of an occasional upholstered or straight-backed chair. This flexibility of chair arrangements introduces enough variety to keep the room from looking stiff. Nothing in the room is so insignificant as to escape the need of thoughtful placing; vases, clocks, lamps, and pictures, all are elements in the scheme.

Arrangement, however, is as much concerned with the elimination of superfluous features as with the proper disposal of the essentials. Souvenirs, trinkets, and family photographs, no matter what their personal significance, cheapen the effect and lessen the dignity of rooms intended for general use. A room is a good design only when nothing can be added and nothing can be taken away without marring its completeness.

CHARACTER OF ROOMS EXPRESSED BY FURNISHINGS

The hall, living-room, dining-room, and library, if there is one, represent one group of interests, and may be considered to form the social, recreative, or living area of the house. The general character of these rooms should be spacious and decorative in effect. Though each unit of this group should have its own distinctive character, these living-rooms, on account of their interrelation and common use, should show some harmony in color and treatment.

The hall is the threshold of the house. It serves as an introduction. This first impression should be one of welcome and dignity and, above all, of order. Good light, genial colors on the walls and floor, a sense of free space for the passage of persons, an ample provision for the necessary wraps and umbrellas in a tidy and concealed form, are the essential characteristics of a well-considered hall, regardless of its size. If a regular coat closet is not provided in the hall, a generous rod with coat hangers arranged in an angle behind curtain or screen is far neater and more satisfactory than some form of mongrel hat rack exposed to view.

The movable furnishings necessary to equip the hall of a dwelling for its use are very few, a rug on the floor, carpet on the stairs, a chair or seat, a well-lighted mirror, a clock perhaps, and a small stand with drawers for gloves, time-tables, pad and pencil, and other incidentals. Decorative touches may be introduced by a figured wall paper, a potted plant, or a spray of flowers.

The character of the modern living-room should unite the dignity of the old-fashioned parlor and the genuine homely qualities of the old-time sitting-room. The large living-room of the modern house is an attempt to amalgamate into a single space the interests formerly represented by separate rooms, such as reception-room, music-room, parlor, sitting-room, and library. Its character should accordingly represent dignity, hospitality, comfort, and recreation. This room must be general not personal, in its decoration and furnishing. Walls and

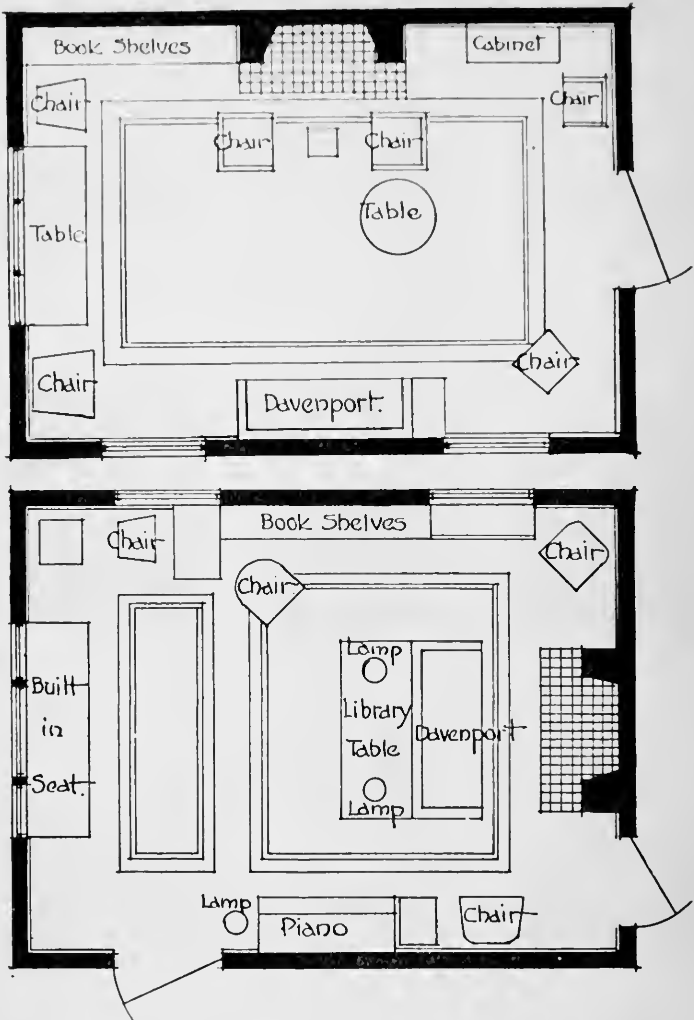


FIG. 32.—Top, a room showing the effect in furnishing of one large rug, a fireplace in the center of one long inside wall, and the other furnishings well related to these. Bottom, a room showing a good arrangement of two rugs; a fireplace in the short inside wall, and the furniture well arranged in occupational centers.

PLATE IX.—Simple and serviceable types of bedroom furniture that may be developed in different woods suitable for rooms with varying finish..

rugs sufficiently neutral in color to form a good background, harmonious furnishings adjusted to the space and suitably arranged for the interests to be accommodated, and a method of comfortable lighting both by day and by night are the essential considerations. The position of such structural pieces as the fireplace and the location of the windows give the cue to the general arrangement for the room.

The selection of the furnishings in each case will depend on whether the main interests of the household are youthful or mature, studious or musical, industrial or social.

One or two large rugs are more appropriate for the living-room than a number of small ones. Small rugs in a living-room are an aggravation, because of the tendency to slip about, turn up at the corners, and give a scrappy appearance to a floor.

In general, a typical living-room for general family use should include a fireplace, some form of lounge, bookshelves, a generous table with lamp, a place to write, and plenty of comfortable chairs. A piano or victrola, a sewing-table, small or folding tables that can be moved around to serve a cup of tea or for games and the like, may also be needed. Added to these are a number of small furnishings that should be thoughtfully selected to complete the comfort of the occupants as the room is used. Footstools or hassocks, a dictionary-stand, lamps and candlesticks, a waste-basket, a neat wood-box or basket, a few pillows, a vase or two for flowers, a clock, are all worthy adjuncts to the family room. A place should also be provided for the quick disposal of transient paraphernalia, such as father's newspaper, mother's mending, and the children's toys.

The artificial lighting of the room should be adjusted to the spaces that are used at night. A general diffusion of light over the whole space can be provided most simply by some central form of ceiling light. In addition to this, lamps will be needed for reading or close work. The soft light of candles or the open fire are sufficient when the room is used only for conversation.

The character of a dining-room should above all be cheerful. Eastern windows admitting the morning sun, light colors on the walls, plants or flowers, are a real aid to good digestion.

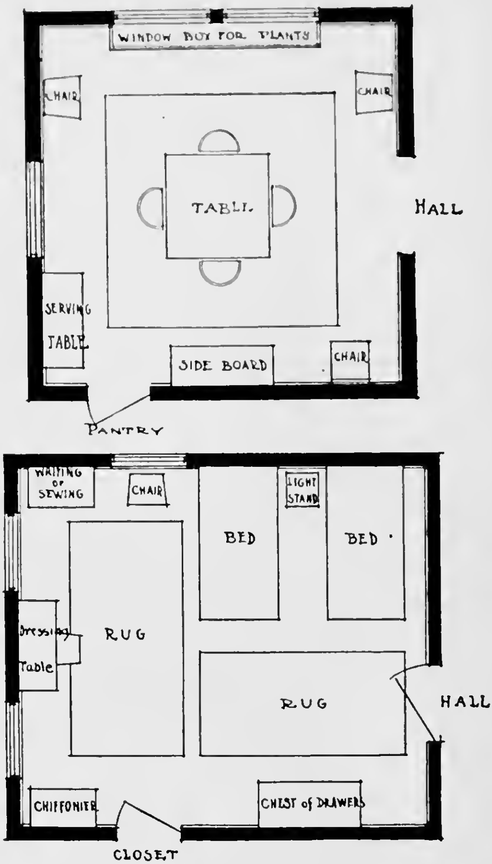


FIG. 33.—Top, an effective and logical arrangement of furniture in a square dining-room. Bottom, a well-planned bedroom showing a serviceable arrangement of dressing and sleeping equipment, with plenty of free space for passage.

In contrast to the living-room, the dining-room has but one function and therefore but one center of interest. The decoration and furnishing of this room should focus on the idea of the table in use. A dining-table capable of enlargement, a rug perhaps, chairs, a serving-table, and a place to keep the dishes, against an interestingly papered or paneled background, constitute the real requirements of the dining-room. Anything provided in addition to this is purely by way of decoration which implies that the added features must enhance the general appearance. Clean linen—white, cream, or gray—simple forms of knives, forks, and spoons, china with refined outlines and restrained decorations, furnish a dining-room with more distinction than an abundance of ornate furnishing.

Unlike the living area, the rooms of the sleeping area stand each one by itself, a complete unit, both in furnishing and in decoration. A sleeping-room should above all be personal in its use, light, airy, and intimate in character. Sufficient window space, light colored walls and woodwork, fresh looking curtains, furniture stained or painted to accord with these, carry out this idea. A clean comfortable bed, conveniences for dressing and storage of clothes provided by dressing-table, bureau, chiffonier and closet, a well-lighted mirror, a comfortable chair or two, a bedside table, and rugs in the open spaces are the essentials. Facilities for writing or sewing may also be needed. Whatever accessories are introduced are of a personal nature.

Bed and dressing arrangements should be located with special reference to good lighting both by day and by night. The bed should be so placed as not to face the light, while the mirror should be so placed that the person dressing is in full light. Side lights are a particularly appropriate type for bedroom use.

The character, equipment, and use of the kitchen are discussed in connection with its planning on pages 100 to 120.

CHAPTER III

PLANNING THE HOME KITCHEN *

By Helen Binkerd Young

Any home-maker should be able to plan a kitchen intelligently. This means a kitchen that measures up to some standard tests on general essential points. The details are of small moment when compared to such fundamental considerations as the size of the kitchen, the amount of light and air, and the general organization of the work. Too much or too little floor space, too many doors, too few windows, and too little wall space are basic matters that may break up the entire convenience of the place, no matter how perfect the details of equipment may be. Naturally, it is too late to begin to plan a kitchen after it is built, for the structural conditions are then fixed and the possibilities of arrangement are accordingly limited. This is not meant to discourage the remodeling of old kitchens, but merely to emphasize the importance of planning the kitchen correctly at the start.

USE OF THE KITCHEN

Properly speaking, the kitchen is a scrupulously clean room intended for operations connected with food materials, and for this purpose only. It is not the province of the kitchen to provide space for eating, for washing and ironing clothes, for lavatory purposes, for removing boots, wraps, and overalls, or for passageway from the back of the house to the front. For the sake of cleanliness and speed, such activities should be provided for elsewhere. It is poor logic and poor economy to plan for such features as laundry tubs and cleaning closets in the kitchen, for they are too unsanitary and too unrelated to food work to

* Cornell Reading-Course for the Farm Home, Bull. 108.

have a place there. Moreover, in order to include the laundry work, the kitchen must be made larger than it would otherwise need to be. A separate room for laundry purposes should be provided, either in the basement or, as in the case of the farm-house, on the same floor as the kitchen and adjacent to it.

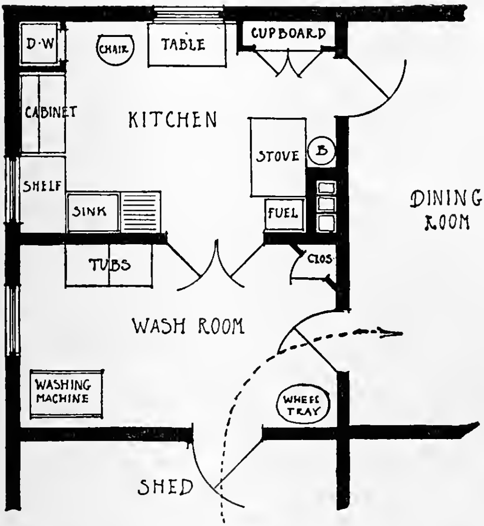


FIG. 34.—A large kitchen, 14 by 18 feet, so rearranged that food and laundry work are separately grouped, while the stove is common to both.

This room can also be used for the storage of cleaning materials and as a direct entrance into the main part of the house, thereby eliminating constant passage through the kitchen. Therefore, by taking out of the kitchen proper all operations foreign to foods, a smaller and more convenient room may be planned.

Even in altering an old house, this idea of planning the kitchen proper for food work only, should be the guiding thought. Thus, a large kitchen in which the family washing has been done should be remodeled in such a way that all food work is grouped at one end and laundry work and passage at the other end, with the stove as the common piece of equipment between. If the room is large enough for it, a thin partition wall may be used to complete the division. This makes a more cleanly and more economical arrangement than does the single large room with the two kinds of work crossing each other. Such a kitchen alteration is shown in Fig. 34.

The same idea of grouping the food work in an alcove and using the remainder of the space for another purpose can be applied to a combination kitchen and dining-room, such as is shown in Fig. 14. The compact kitchen end could be made light and washable in character, and the dining-room end more like a sitting-room, with passage through the room halfway between, thus disturbing the comfort of neither part.

It is evident from the foregoing explanation that the intelligent planning of a kitchen involves a number of side issues, which, in the case of the farmhouse, unite to make of it a very complex problem. If the kitchen is to become a compact, businesslike compartment for one use only, the entire working arrangements of the house must be thoroughly studied in order to make sure that there is a definite place allotted to every need (Fig. 37).

EXPOSURE

The location of the kitchen will of course depend on the remainder of the house plan and on the location of the other rooms. Theoretically, the best exposure and location for a kitchen is toward the north, the northeast, or the northwest, with at least two outer walls for light and air. This implies either a corner location or a separate wing. South, southeast, and southwest are less desirable exposures for a kitchen, because they are likely to be hot and glaring and are usually hard to ventilate. Furthermore, southern exposures are usually at a premium for the more important living-rooms. If the arrangement is such that the kitchen can have but a single exposure, it can still be made a very comfortable one as regards light, air, and coolness, if it faces north and is provided with plenty of windows; whereas, a kitchen having but one outside wall, and that facing directly south, is in the very worst situation from every viewpoint.

SIZE

The size of the kitchen is determined chiefly by the number of workers and by the kind of fuel to be used for cooking. In general it should always be large enough to accommodate two workers in emergency, and yet at the same time as small as convenience will allow.

A kitchen in which coal is to be used for fuel is normally larger than one in which gas is to be used, because of the larger size of the range, the need for a convenient supply of fuel, and the fact that for reasons of comfort the other pieces of furniture cannot be placed too near the stove. Years of experience in planning, equipping, and using kitchens under conservational methods, show that a gas-fuel kitchen with a pass pantry need not exceed 150 square feet of floor space, and that a coal-fuel kitchen, together with a pass and food pantry, ordinarily need not exceed an area of 200 square feet of floor space. This area may be arranged in such shapes as 9 by 12 feet, 10 by 12 feet, 10 by 13 or 14 feet, 11 by 11 feet, 11 by 12 or 13 feet, or 12 by 12 feet, for the kitchen proper, and 5 by 7, 8, 9, or 10 feet, or 6 by 6, 7, or 8 feet, for the pantry, according as these measurements best fit into the plan for the remainder of the house. In general, approximately square shapes for kitchens and pantries are more convenient than are long, narrow ones. Eight feet should be the minimum width for a kitchen.

Of course the areas given are merely guides to help determine the probable amount of space needed for kitchen developments and to serve as a sort of check on wasteful or crowded planning. It is very easy to plan a kitchen that is too large; it is also possible to plan a kitchen that is too small, where freedom of motion is cramped and where one tires of standing always in one place or position.

DOORS

After the size and the location of the kitchen have been determined, the placing of the openings is the next step to be considered. The subject of doors especially should be given the most deliberate attention, for the inconvenience of many kitchens can be traced back to the presence of too many or wrongly placed doors.

It is evident that a kitchen should have as few doors as possible in order to avoid breaking up the wall space and to avoid passage through the kitchen to different parts of the house. Ordinarily, five or six doors are needed in connection with the kitchen work: an outside door, a pantry door, a cellar door, a door to the dining-room, and perhaps one leading to a rear stairway or hall. Fortunately, all these doors need not be located in the kitchen proper. Different combinations can be arranged whereby one door can be made to serve two or three purposes. Thus, the cellar or the rear-stair door might open from a pantry or from an outside entry, which might also contain the outside door. Two or three doors of passage are all that are needed in a well-planned kitchen. These should, as nearly as possible, be arranged at one side, corner, or end, thus leaving a continuous wall space in an alcove form for the arrangement of equipment.

WINDOWS

The function of a window is essentially twofold—to admit light and air. Naturally that arrangement of windows will be most reasonable which provides for the best diffusion of light and the best ventilation with the least amount of glass space. For, while it is poor economy to have too few windows, it is also poor economy to have too many.

It has been found that for effective results, a sort of flexible relation exists between the amount of window space to be used and the size of the room to be lighted. Accordingly, the total window area for a kitchen should in general be about 25 per cent of the floor area. For example, a kitchen 11 by 11 feet, having 121 square feet of floor area, should be provided with about 30 square feet of window space, arranged on the two outer walls. This space may be divided into two windows 3 by 5 feet each, or three windows 2½ by 4 feet each, or three windows 2 by 4½ feet each, as the case may require. The

Plate X.—A good kitchen arrangement.

necessary window space for any given kitchen may thus be approximated.

Ordinarily, kitchen windows should be located as far apart as possible. In the case of a corner exposure, they should be placed near the partition walls rather than near the corner of the house. This arrangement insures a strong diagonal sweep of air and an even distribution of light. The tops of the windows should be not more than a foot from the ceiling, so that the rising heat and odors can easily escape. Broad, short windows, built high from the floor, are an excellent type for kitchen use. The distance from the floor to the sill should be from three to four feet, in order to allow for table space beneath the windows. While not so picturesque as casements, double-hung windows are usually the easier type to operate in a kitchen.

ARRANGEMENT OF EQUIPMENT

Having planned the kitchen that is structurally suited to its use, further convenience depends on the selection and arrangement of the furniture, or equipment. In this, as in the case of any industry, the aim should be to do the most work in the least time without friction and with the fewest workers.

The equipment should line the walls, leaving a free central space for working. Theoretically, every change in working level, whether of floor or table, and every gap between two pieces of equipment, cause loss of efficiency; that is to say, the more continuous the arrangement of equipment, the more convenient will be the work. Having dispensed with all unnecessary doors and deliberately preserved one or two continuous wall spaces, the disposition of the equipment becomes an easy matter. Indeed, it would be difficult to make a really inconvenient work-place of a compact, well-lighted kitchen of limited size, having few doors and generous wall spaces, such as has been previously described. But in order to reach a standard of maximum convenience, the work and the equipment should be organized so that all things pertaining to a given operation are grouped together.

The table, the stove, and the sink represent the three essential operations carried on in a kitchen: the preparation of the food, the cooking of the food, and the cleaning-up process that follows. This equipment and this work form the nucleus of three operation centers: (1) the food center, (2) the heat center, and (3) the water center. This organization is the basis of convenient arrangement for every home kitchen, large or small, whether it belongs to apartment, suburban home, or farmhouse.

1. The food center requires the following equipment:
   a. Table space, from 8 to 12 square feet exclusive of sink-boards
   b. Storage space
      (1) For cold foods .... { Ice-box / Dumb-waiter / Food pantry / (Any or all of these)
      (2) For dry supplies and utensils needed in food preparation { Drawers and shelves / (In form of closet or cabinet)
2. The heat center requires the following equipment:
   a. Stove or range, from 2 by 3 feet to 2½ by 5 feet
   b. Storage space... { Fuel box or bin, if coal or wood is to be used / Pan closet for utensils / Water boiler
3. The water center requires the following equipment:
   a. Sink, 2 by 3 feet, more or less
   b. Drain-board, 8 square feet or more—part to right and part to left of sink
   c. Storage space for china and utensils { Shelves and drawers / (In form of china closet and pan closet)

The food center should, if possible, be located on an outer wall, with the sink and range centers on inside walls and with light coming from the side. Ordinarily, the position of the dining-room and the location of the main chimneys of the house determine the general location of the sink and the range, respectively. The sink should be near or next the dining-room wall, so that meal service involves a short path of travel and but one handling of dishes.

If possible, the food and water centers should be combined into one arrangement, so that all the table space, such as the table top, the cabinet shelf, and the drain-board, forms a continuous work shelf on the same level.

Ordinarily the stove or the range is the one piece of equipment that should be set somewhat apart. It may even be conveniently placed in a detached position on a separate wall space, partly because the other work is more comfortable if the stove is not too near, and partly because the design of stoves is such that two or three sides must be accessible to the worker.

The question is often asked whether movable or built-in equipment is preferable. While the use of either sort can be made entirely convenient in arrangement, there is much to be said in favor of built-in equipment as far as cleanliness and appearance are concerned. In the latter case, there are no cracks behind or under the furniture, and, consequently, the moving of heavy articles is unnecessary in cleaning. A table, a stove, and a cabinet, all separate and standing on legs or casters, make the problem of a clean floor more difficult than if the cabinet and the range were set directly on the floor and the table space was supplied by drain-boards or a shelf. Also, the appearance is simpler and more restful with the built-in pieces. However, a satisfactory kitchen can be made by the use of separate pieces.

Table space.

Extensive table space may be gained by providing generous drain-boards to right and left of the sink, continuous with the cabinet shelf. A movable table of the same height, mounted on casters or, preferably, on small wheels, will prove a great step-saver and will simplify the serving of meals. A double-deck wheel tray would serve this purpose even better since it is lighter to push about. All floors on a level and all table tops on a level save many an accident in the kitchen. A work table covered with zinc will give satisfaction for it is nonabsorbent and is easily cleaned.

Range.

The newer patterns of reliable ranges are simpler and less ornate than those of the older stoves and require less care.

If a new kitchen is to be built, a separate ventilating flue may be provided in addition to the smoke flue. This ventilating flue, provided with a register inlet about four feet above the stove top, will relieve the kitchen of odors and of excessive heat, especially if a projecting metal hood is fastened over the range for collecting the rising air.

The stove or range requires more care and makes more dirt than any other feature in the kitchen. Fuel must be brought in and ashes must be removed. Whatever can be done to simplify the incoming and the outgoing of fuel will make for cleanliness and for economy of labor. A generous temporary supply may be stored either in a separate fuel compartment next to the kitchen, or in a fuel box fitted with a double-hinged cover and built into the wall in such a way that it may be filled from without and emptied from within. The actual arrangement in any case will depend on whether wood or coal is burned and whether the main supply may be stored in or near the house.

Ashes may be emptied directly into an air-tight metal can in the cellar. This is an easier and cleaner method than removing them by hand. A can of a size that one man can handle easily will probably not need to be emptied oftener than once a week. Many of the newer ranges are already equipped for this method of ash-disposal, but any stove may be so arranged if there is a careful workman at hand. The ash pan should first be removed from the stove and a round hole cut through the bottom of the ash compartment and through the floor below; a stovepipe is then passed through these holes and is flanged over the bottom of the ash pit of the stove. Two precautions must be observed in this piece of work: first, the stovepipe which is to lead the ashes into the cellar can must be provided with a damper near the stove, in order to prevent an upward draught of air from burning out the fire; second, a free air space of at least two inches must be allowed all around the pipe where it passes through the floor, consequently the floor hole must be cut at least four inches larger than the pipe. This open space may be filled with concrete or covered with an ordinary metal collar. Measures should also be taken to make the ash can perfectly safe. A container of hot ashes in a place not frequently visited, such as the cellar, may prove a source of danger unless it is surrounded by a wire cage or in some way protected so that rubbish, paper, kindling, or other combustible material can never be thrown directly against it.

Sink and drain-boards.

A one-piece enameled iron sink, with high back, will prove a satisfactory appliance. This sink should be large enough to hold a dishpan conveniently. Dishwashing will be more quickly accomplished with the double drain-board before mentioned than if a single drain-board is used. Enameled iron drain-boards are not advisable. They are more showy than serviceable, for, besides being noisy, they are too small to be useful and too hard to be safe for dishes. Suitable drain-boards may be made of ash or of maple, or they may be made of some other wood and covered with zinc. For the purpose of shedding water, wooden drain-boards should be grooved and zinc-covered boards should be provided with a curbed or raised edge. Furthermore, a drain-board should slope slightly toward the sink, on the rim of which it rests. The resulting board level is about 1 inch above the sink level.

The construction of sink-boards requires the most careful workmanship. The use of wood for draining purposes subjects it to the severe test of being continually wet on one side only. In order to avoid warping and splitting, therefore, a sink-board should be thick, heavy, and well cleated on the underside. A surface finish that will render the boards water-resisting should be applied before they are put into use. Usually sink-boards are varnished, but this finish water-marks, wears off, and on the whole is less serviceable than a surface finished with wood filler, followed with linseed oil.

The sink should be supported from the wall, rather than on legs, and should be piped, if possible, through a partition wall rather than through the floor. A sink should be set at a height convenient for the worker—34 inches from the floor is a good average height. The usual height of 30 inches to the top of the rim is too low for most persons.

DISCUSSION OF PLANS (FIGS. 35-38)

The plan of a farmhouse kitchen that has been developed in accordance with the principles of kitchen planning previously described is shown in Fig. 35. It will be found to work out satisfactorily on each of the essential matters of use, location, size, number and location of doors, number and location of windows, and organization of work. In this kitchen, coal or wood is used for fuel, and the equipment is movable.

In Fig. 36 is shown the arrangement of a kitchen in a suburban house. In this case, gas is used for fuel, and the equipment is built in. This arrangement also will be found to stand the test on the points essential to good planning.

The working area of a farmhouse is represented in Fig. 37, in which the principles of kitchen planning are clearly expressed. The relation of the kitchen to the dining-room, the porch, the pantry, and the washroom, should first be noted, after which size, location, openings, and general equipment may be studied. This kitchen has a corner location on the plan, with the food pantry and one wall exposed in a northerly direction. The kitchen proper represents an area of 130 square feet and the pantry an area of 45 square feet. The number of doors has been reduced to two, which are placed adjacent so that travel from the porch occurs around a corner and not across the working center. The most direct passage from the barns lies through the washroom, as should be the case. The windows of the kitchen, which are placed high, light the working area sufficiently and provide good ventilation. Moreover, if it is needed, a complete sweep of air may be obtained from end to end by opening the two pantry doors, over either of which a transom may be built. Both these doors are glazed, in order to afford light and view. A fuel compartment is conveniently located for either kitchen or washroom. An eating porch, looking toward the garden and the sunset, occupies the corner angle between the kitchen and the dining-room. The kitchen and the porch connect with a Dutch door, so that outdoor meals are easily served. Extra food and extra fuel are stored in the cellar, whence they are delivered by a dumb-waiter, or lift.

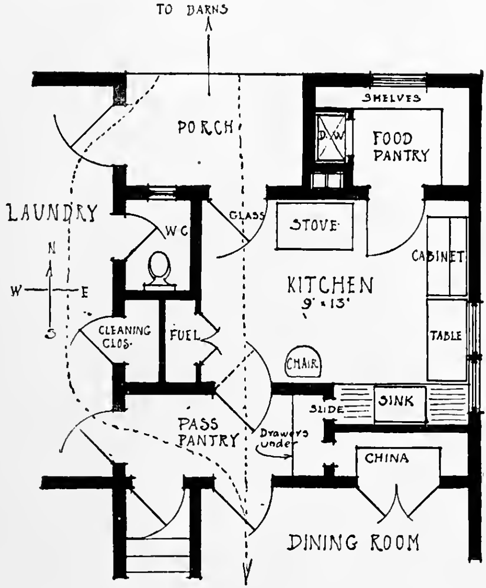


FIG. 35.—A farmhouse kitchen that demonstrates the principles of sound planning.

The purpose of a washroom is to save the other parts of the house. Here all dirty and occasional forms of work may be done. The room is equipped for the family washing and ironing, and stores such general cleaning apparatus as brooms, pails, and vacuum cleaner. Here, also, men coming from the barn may remove muddy boots and overalls, and may clean up before going to the table. Such feeding pails for stock as are brought to the house should be deposited here, not taken into the kitchen.

Considering the nature of this room and its many uses, it should be made as large as can be afforded, and should be provided, if possible, with a cement floor and a painted wall so that splashing will not injure it. The room shown in Fig. 37 is in reality

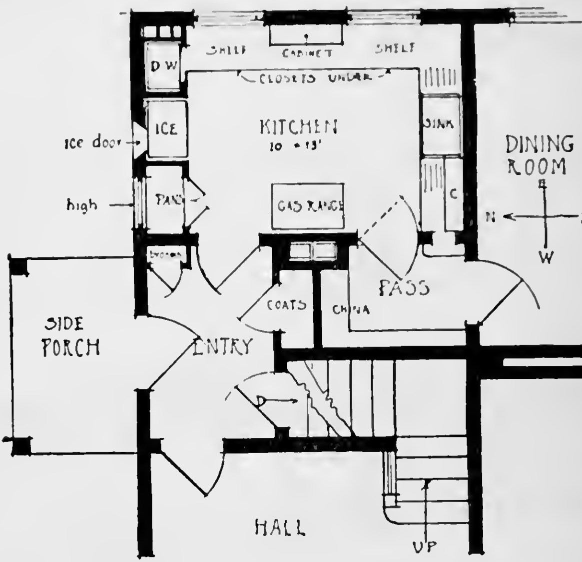


FIG. 36.—A kitchen for a suburban house, developed in accordance with the principles of good arrangement.

the old washhouse and woodshed, fitted more completely than formerly, and is an important part of the plan.

PANTRIES AND CLOSETS

No part of the kitchen equipment has been so evaded in planning as has accurate and systematic storage space. The habit has been acquired of using every corner and tuck-away place for a closet, the idea being that the more closets, the greater would be the convenience. Too much or inaccessible storage space invites slack housekeeping and is, therefore, more destructive to the general scheme than is too little closet room.

Plate XI.—(Above) Shelves of suitable size for the materials to be stored. (Below) Utensils in which foods may be both cooked and served—casseroles and meat plank.

Limited storage space compels one to organize, to eliminate, and to arrange compactly, the general result thereby favoring conservation. Only such storage space should be planned as

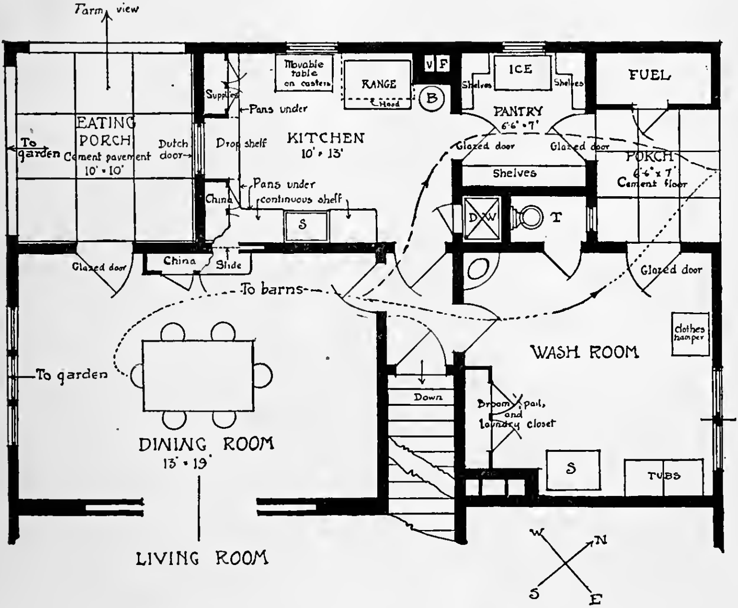


FIG. 37.—Plan in which principles of kitchen arrangement are clearly expressed.

is really needed to complete and assist the operation of the kitchen.

There are three general types of storage space that may be used in connection with the kitchen arrangements: (1) the pantry, (2) the cupboard filled with shelves, and (3) the cabinet, or dresser. Of these three, the pantry is by nature the most capacious, the cupboard next, and the cabinet least. An analysis of these three forms should enable one to plan intelligently the storage space for an individual kitchen.

The pantry may be defined as an enlarged closet through which one passes or into which one steps instead of merely reaching. Its purpose is primarily to furnish more generous storage space than is provided by the ordinary cupboard. There are in general two types of pantries, the food pantry and the pass pantry. The food pantry is intended primarily for the storage of food supplies that must be kept cooler than the tem-

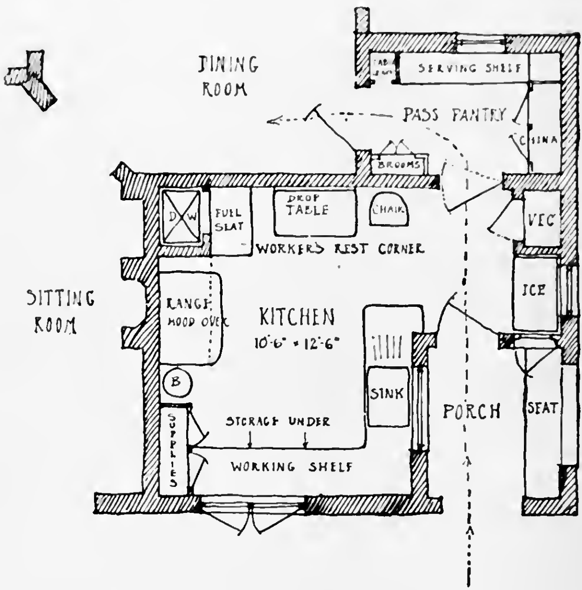


FIG. 38.—A complete and convenient kitchen for any house.

perature of the kitchen. The pass or butler's pantry is used for the storing of china and for the serving of meals. Often these two pantries can be combined into one without breaking up the organization of the work.

Whether a food pantry, or a pass pantry, or both, or a combination of the two shall be planned for any given house, depends on the conditions of that special case. In general, a food pantry is always needed when coal is used for cooking, because the temperature of the kitchen then becomes so warm that certain foods will not keep; whereas, when gas is used, the temperature is likely to be fairly cool and even, which often allows for the food pantry to be replaced by an ice-box, a dumb-waiter, or both, placed directly in the kitchen. If the ventilation of the room is good, such an arrangement will require very little more ice a year than the amount needed if the refrigerator were placed in a separate entry or pantry or on an outer porch.

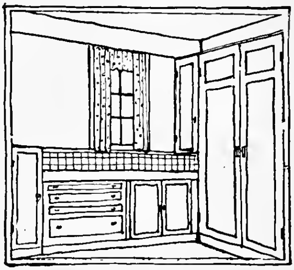


Fig. 39.—The pass pantry or serving-pantry, shown on plan in Fig. 38.

If the family is large, however, or the house located at a distance from the markets, a food pantry is almost necessary to store sufficient supplies. Often one tier of shelves in the food pantry is reserved for utensils, which makes a separate cupboard unnecessary. Owing to the nature of its use, the food pantry should preferably be located on a northerly outside wall and should be provided with a window.

The pass pantry (Fig. 39) is for several reasons an almost invaluable adjunct to the kitchen. Not only does it provide closet space for china and aid the smooth serving of meals, but it also shuts off the noise and the odors of the kitchen from the remainder of the house. Owing to the nature of its use, the pass pantry should be located on the partition wall between the dining-room and the kitchen. It is of course desirable, but not really necessary, to arrange the pass pantry so that it touches the outer wall and is provided with a window. Where this is impossible, an inside serving-pantry painted white and lighted through a glass panel in the door leading to the kitchen, will be found to be light and satisfactory (Figs. 35 and 36).

Sometimes in place of, or in addition to, the pass pantry, a china closet opening both ways is built into the wall between the dining-room and the kitchen (Fig. 37). Although convenient, this destroys the quieting effect of the pass pantry, as it provides direct communication between the dining-room and the kitchen, and danger of noise and odors. A simple and direct arrangement for meal service is shown in Figs. 35 and 36, where the pass pantry is used and there is a slide through to the sink drain-board. In neither case are the dishes carried across the kitchen; they are delivered, washed, and returned within the shortest possible line of service.

Glass china closets and plate rails should be used sparingly in the design of the dining-room. The cupboard—a closet filled with shelves—is a valuable place of storage for pans, china, or supplies. If intelligently shelved, it can be made almost as capacious as a small pantry.

The arrangement of shelving is perhaps the most important feature in the planning of storage space. For the best results, shelves should be designed only wide enough to hold comfortably one row of supplies, of whatever kind considered. An arrangement of narrow shelves spaced close together will prove to be more capacious, accessible, and easy to clean than wide shelves spaced far apart. From every standpoint, deep shelves are a great mistake, because one must then arrange for two or three rows of materials in order to use the space. It will be found that the area of comfortable reach is between one and six feet from the floor, leaving about five feet of quickly available space. For the sake of efficiency, this space should be as compactly shelved as is feasible for the use intended. A cupboard provided with one or two broad shelves below and a series of narrower shelves above, will hold a large number of articles, both effectively and accessibly displayed. A cupboard with doors for pans, china, or supplies is ample if made from 10 to 15 inches deep; a series of open shelves, if made from 8 to 10 inches deep. Shelves as narrow as 6 inches are good for single rows of dry supplies. From 7 to 10 inches between shelves is a safe average distance for spacing; but in order to make the most out of a given space, it is best to think out carefully the materials that are to be stored, and to space the shelves accordingly.

The kitchen cabinet, or dresser, brings a new element into the storage arrangement. It introduces a work shelf at table height, thereby dividing the storage into an upper and a lower part. The deep under part may be arranged for either closet or drawer space; the upper part may be arranged as a shallow cupboard for supplies. The most valuable form of storage for the lower section of a cabinet is an arrangement of drawers, for these pull out and expose their contents from the top so that one need not stoop to reach them. From four to six well-planned drawers will be adequate for the ordinary kitchen: a broad, shallow drawer subdivided for small utensils, such as knives, forks, spoons, egg-beaters, and the like; a deeper drawer for kitchen linen, such as towels, clean cloths and aprons; and two or three deep, narrow drawers, or bins, for storing flour, sugars, and other dry supplies of a bulky nature.

Appropriate drawer space for the pass pantry is about as follows: a broad, shallow drawer with subdivisions for the different kinds of table silver; one, two, or three broad, shallow drawers for table linen; and a deep drawer for miscellaneous needs, containing perhaps a compartment for string, one for wrapping paper, and so on.

It should be realized from the foregoing discussion that the cabinet, or dresser, is an appropriate form of storage only when table space is needed also; that is, the emphasis is here placed on the work shelf rather than on the storage capacity. To equip a pantry, whose function is to furnish maximum storage space, with closets of the dresser type is therefore a mistake, since it furnishes an excess of table space at the expense of cupboard room. An ordinary cupboard or a series of open shelves, supplemented by a small table or work shelf with drawers below, is a much more appropriate arrangement than to break up the most valuable part of the storage space by the intrusion of a work shelf. The cabinet form is chiefly valuable in the kitchen proper.

The subject of kitchen storage should not be dismissed without emphasizing the usefulness of the dumb-waiter. This is an almost indispensable convenience when a portion of the cellar is used for food supplies. The dumb-waiter will carry wood, coal, and food between floors, and is a great labor-saver. With such an arrangement, a cold part of the cellar may be substituted for the food pantry, even taking the place of an ice-box satisfactorily. One trip a day to the cellar is enough to keep the lift supplied.

INTERIOR FINISH

Any kitchen that is to give full satisfaction must be sound in arrangement, sightly in appearance, and smooth in operation. Within reasonable limits, anything that can be devised to enforce this triple standard, must be considered worthy of trial. The demands of convenience will of course always come first, thereby deciding matters of arrangement and of management; but the less insistent needs for a work place that shall be a fit and lovely spot, must also be met. A clean, level floor, walls and furniture with smooth washable surfaces, and a pleasing color scheme are elements that eliminate mental friction and that add the touch of refinement which makes of any work a joy.

Up to the present time, no perfect flooring that is cheap enough for use in private homes has been evolved. The materials most available are wood and linoleum. Of the two, linoleum is thought to be preferable, because it can be cemented tight to the under floor, it is practically crackless, and it is quiet and easy to walk on. Plain brown "battleship" linoleum is a reliable, standard product, or a modest inlaid pattern may be used instead. Experienced housekeepers claim that linoleum with a pattern is both more attractive and easier to keep clean than is the plain color. Although good linoleum is not a cheap floor covering, its satisfactory and lasting nature commends it in spite of its cost.

A maple or a beech floor of narrow boards is the next best material. Yellow pine and oak are too open grained to make a satisfactory floor for kitchen use. Maple and beech are both light in color and do not make a very attractive floor under hard use, but they can be scrubbed and kept clean. A maple floor should be finished by saturating it with hot linseed oil for a number of hours; then all the extra oil should be thoroughly wiped up. In this way, the wood is practically impregnated against the absorption of grease.

Kitchen woodwork should be plain, with as few grooves and moldings as possible. Wooden wainscotings in kitchen and bathroom should never be used.

For the interior finish of the kitchen, nothing is comparable to clean, light-colored paint for walls and woodwork. Warm grays, buffs, and other soft, neutral tints may be used. Sometimes walls, woodwork, and furniture are all painted the same color, thereby uniting the whole effect. Even ready-made cabinets, tables, and refrigerators are far more attractive if painted a light color.

A kitchen finished in stained oak or varnished pine, like the remainder of the house, is unnecessarily monotonous. It should be differentiated from the other rooms in color scheme and general atmosphere. Light colors, mixed on a basis of white, are not only cheering and restful to look at, but have the further advantage of reflecting and distributing the light so that there are no dark corners.

Such a room becomes also an easy and economical one to light well at night. When gas or oil lamps are used, light colors are positively invaluable in the kitchen. Each wall then becomes in reality a huge reflecting surface, so that a given amount of light is virtually used several times over. If an electric fixture for indirect lighting—an inverted metal bowl—is placed centrally on a white ceiling, the entire kitchen is evenly lighted so that there are neither heavy shadows nor dark corners to impede the work. Naturally, the lighter the general color scheme, the less the current that will be needed. Light colors may, therefore, be considered as having a practical, as well as an æsthetic, value.

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PART II

HOUSEHOLD MANAGEMENT

CHAPTER IV

CARE OF THE HOUSE

BY HELEN KNOWLTON

FOR convenience as well as efficient work in housekeeping, a schedule of regular daily, weekly, monthly, and yearly processes should be made out. Time can then be well planned, and a routine established that simplifies the machinery of housekeeping.

CELLAR

To keep the cellar in a sanitary condition, as much sunlight as possible should be admitted. The windows should be made as large as possible and be on opposite sides to insure cross-ventilation. If the house is banked for the winter, dry clean material should be used and the windows should not be covered. If the cellar floor is of concrete and is proof against dampness, it can be washed. The cellar walls should be whitewashed once or twice a year. Whitewash is a disinfectant. If the cellar walls admit moisture, it is recommended to wash them with a dilute solution of hydrochloric acid (1 part acid and 5 parts water), and then apply a plaster of oil-mixed mortar.

A cellar containing a heating plant should be divided into compartments. By constructing one of these compartments with an insulating wall of hollow tile, a cool room for vegetables may be secured. It is sometimes best to construct an outside cellar for such storage (page 584).

KITCHEN

Sink.

A sink without running water is unjustifiable for the busy housewife. A drain connection with a trap and a sanitary disposal outside for wastes should be provided. The best kind of sink and the proper height for placing it are discussed on page 108.

After each dishwashing, the sink should be washed with hot soapy water, and the sink-trap flushed with a generous supply of hot water. This trap must be cleaned occasionally with kerosene. At least one gallon of hot water should be poured down and while the pipe is still warm, one-half cup of kerosene poured in. This should stand for at least five minutes and then the trap may be flushed with a second gallon of hot water. A solution of washing-soda should not be used since it tends to form a hard soap with the grease and to stop up the pipe. Kerosene forms no soap, but simply an emulsion.

The sink should be kept so far as possible for purposes connected only with the preparation of food and the cleaning of dishes.

Walls and woodwork.

Painted walls and woodwork are most easily cleaned. They may be wiped with a broom covered with a soft cloth for frequent cleaning. A long-handled brush is better than a broom. Occasionally they may be scrubbed with a soft brush, warm water and borax, and rinsed before being dried.

Floors.

Floor finishes best adapted for the kitchen are discussed on page 117. A mop-wringer is a great convenience in the work of mopping the kitchen floor.

Dishwashing.

Since the aim of dishwashing is to clean the dishes and to kill the bacteria that may be present by the use of soapsuds and scalding water, special care should be taken in case of tonsilitis, colds, and other infectious diseases. Unless the dishes of the patient are boiled, the germs may infect the whole family.

Kitchen towels and cups.

The roller towel for family use as well as the common drinking-cup must be discarded, if the health of the family is to be safeguarded.

Kitchen dresses.

Washable work dresses are the only kind suitable for wearing in a kitchen. They have been proved to be economical of both money and time. They may be made of various inexpensive and satisfactory materials (page 368). Short sleeves and turndown collars or no collars at all add to the comfort of the worker. The design should be the simplest possible.

LIVING-ROOM AND DINING-ROOM

The window shades of the living-room and the dining-room should be raised more than halfway to let in the sunshine, and the windows should be opened frequently to air out and to keep the temperature below 70° F.

SLEEPING-ROOMS

The ideal sleeping-room is the outdoor porch with only curtains for protection. An indoor sleeping-room should have simple furnishings. Unnecessary draperies collect dust and exclude air and sunshine. The floor should be bare save for a few small, easily cleaned rugs. The wall paper should be of a soft restful color, either plain or with small inconspicuous figures.

An iron bed is better than a wooden one because it can be more easily cleaned. A mattress is more healthful than a feather bed, because the body is not so enveloped as to hinder the escape of waste matter from the skin. The bed covering should be warm but light. Several light-weight blankets or comforts are better than fewer heavy ones.

BATHROOM

Absolute cleanliness and abundant ventilation are essential in a sanitary bathroom. Kerosene applied with a special brush or cloth to the bathtub, bowl, and toilet and washed off with a good soap solution will solve most of the difficulties of cleaning. All brushes or cloths used in cleaning the bathroom should be thoroughly washed in clean soap-suds, rinsed in hot water, and dried in the sunlight each time after being used. Occasional flushing of the toilet with a strong solution of washing-soda is desirable.

Faucets, door knobs, and all parts of the toilet ever touched by the hands, as well as the usually cleaned parts, should be washed occasionally with a solution of some good disinfectant, such as creolin, lysol, or alcohol.

SUGGESTIONS FOR SWEEPING AND DUSTING

Dust should be avoided, since it irritates the throat and may carry germs. If possible a vacuum sweeper should be used. If a broom is used it should be dampened, or bits of moist paper or some commercial substance for sweeping should be sprinkled over the floor. In sweeping, short strokes should be taken away from the person. Rugs which can be cleaned outdoors are generally preferable to carpets.

Dustless mops and dustless dusters are sanitary labor-savers. They can be made at home by dipping the mop or the duster in a solution of some vegetable oil, such as linseed or cottonseed oil, in gasoline or other solvent, about one tablespoon of oil to one pint of gasoline being used. There should be no fire in the room where the gasoline is used. The mop or duster should be hung outdoors until the gasoline has evaporated. The oil will be evenly distributed in this way. The duster may be washed once or twice before it is necessary to redip it in the oil solution.

REPAIR KIT

A well-stocked repair kit should be a part of the equipment of every household. It should be placed in a convenient location and should contain: hammer, screwdriver, plane, pliers, awl, oil-can, saw, soldering outfit, knife sharpener, twine, shears, and such tacks, nails, screws, hooks, and wire as are most often in demand.

SOME SPECIAL DIRECTIONS FOR CLEANING *

Cleaning closet

In every house there should be a cupboard or a closet set aside for cleaning purposes, "with a place for everything and everything in its place." The cleaning materials and apparatus listed under the following directions are not expensive and greatly simplify the cleaning problem. Shelves and racks should be provided for holding all apparatus and materials needed, and as far as possible labels should show where each brush, broom, pail, or bottle is to be returned.

The following list of materials and utensils should be included in the housekeeper's cleaning kit:

Cleaning materials

Alcohol
Alum
Ammonia
Bath brick
Black lead
Borax
Furniture polish
Kerosene
Light oil
Olive oil
Paraffin
Rottenstone
Salt
Soap
Turpentine
Vinegar
Washing-soda
Wax (floor)
Whiting

Cleaning articles

Apron, stove
Carpet, piece old brussels
Chamois skin or leather
Cheese-cloth
Cloth, scrub
Cloth, soft
Flannel, canton
Flannel, heavy
Flannel, waxing
Flannelette for dusters
Gloves, rubber
Mitt, for kerosene
Waste, cotton (cotton waste may be bought at any hardware store)

* Mary Urie Watson. Rules for cleaning. Cornell Reading-Course for the Farm Home, Bull. 23.

Cleaning utensils

Boiler, for clothes	Irons
Brush, closet	Monkey wrench
Brush, cornice	Mop, cloth
Brush, scrub	Mop, string
Brush, soft	Saucepans (old)
Brush, trap	Scissors (for lamp)
Brush, weighted	Step ladder
Brush, wire (for sink)	Tub
Carpet sweeper	Tub, fiber
Dauber	Washboard
Dish-pans	Whisk-broom
Funnels	Wringer
Ironing tables	

To clean lamps.

The apparatus necessary for cleaning lamp is an old newspaper, the kerosene can, a damp flannelette duster, lamp scissors, and a dry towel.

1. Carry the lamps to a sink, or to a table convenient to the sink. 2. Spread the paper and place everything on it. 3. Wash and dry the lamp chimneys as if they were tumblers. 4. Open up the lamp burner, screw up the wick, trim off all the char with the scissors, and screw down the wick ¼ inch below the brass. Round wicks must have the char rubbed off with the duster. 5. Soap one corner of the duster and rub carefully every part of the brass burner; if necessary, polish (see copper, page 232). 6. Fill each lamp nearly full of kerosene. See that the burner is properly screwed on, and wipe the body of the lamp carefully. 7. Put on the chimneys and set the lamps in their places. 8. Wash the scissors and duster and hang the duster to dry. Gather all trimmings in the paper and burn both trimmings and paper. They are not safe to leave around.

To oil a kitchen stove.

1. Put a little light oil on a wad of cotton waste and rub it on all the iron parts of the stove. 2. Rub it off with fresh waste, an old cloth, or some crumpled paper. 3. Polish it with a dry flannelette or woolen cloth until all oiliness is gone. 4. Burn the waste, old cloth, or paper because oily waste and oily cloths are a frequent cause of fire through spontaneous combustion. 5. Wash out the polishing cloth.

To clean a gas stove thoroughly.

This process requires the following apparatus: A stove apron, a few old newspapers, a wire sink-brush, a monkey wrench, whisk, dustpan and brush, a sink towel, several pieces of old cloth, soap and washing-soda, and the oil bottle.

1. Put on the apron and spread the papers on the table. 2. Turn off the gas at the main supply pipe with the monkey wrench. 3. Fill a large dish-pan with strong, hot soap-suds, put into it to soak the dripping-pan and rack and any movable nickel pieces of the stove. 4. Fill a tub half full of strong, hot soda-water. Put the drop tray in the bottom to soak, and on top of it put the top grates, doors, and all movable black parts of the stove. 5. Brush out both ovens and all parts of the stove frame. 6. Wet one of the old cloths in hot water, rub it on the soap, and wash off the stove. Dry it, if necessary, with an old cloth. Then oil the black parts very lightly with the oil and polish it off thoroughly with another old dry cloth. 7. Remove the pieces from the soda-water, rinse them in the sink in fresh warm water, and scrub the doors and other black pieces with the wire brush. Dry them off, oil and polish them, and put them back on the stove. 8. Let the dirty water out of the sink, transfer the nickel pieces, dripping-pan, and rack to the sink, pour in the soapy water, scrub the pieces thoroughly, dry them with the sink towel, and return them to place. 9. Scrub, rinse, dry, and return to place the drop tray. 10. Oil the stove after all the parts are put together. 11. Burn the old cloths and wash the sink out carefully. It is especially necessary to be careful about burning oily cloths that are not washed after using, because they have been known to take fire spontaneously and are therefore dangerous when tucked into corners out of sight.

To clean windows.

A high stepladder, fiber tub, damp flannelette duster, scrub cloth, soft linen towel, chamois leather, ammonia, and warm water are necessary to clean windows.

1. Fill the tub half full of warm water and add a tablespoonful of ammonia or a few drops of kerosene. 2. Carry the ladder to the window, roll up the shade, and take it down. Unroll it on the floor or over a table, then roll it up, dusting both sides as it rolls. Stand it aside, marking to which window it belongs if more than one is being cleaned. 3. Dust the window, especially the surrounding woodwork, with the damp flannelette duster. 4. Wash the glass, especially corners, and dry with the linen towel. 5. Polish with the chamois leather. 6. Replace the shade, testing carefully, and make sure the spring works properly. 7. Wash out the tub, towel, cloth, and duster. Hang the cloths to dry and put everything else away. 8. If chamois leather is not available, use crumpled newspaper. 9. The following mixture may be used instead of ammonia and water, but the resulting white dust must be carefully wiped up: 1 tablespoonful precipitated whiting; 2 tablespoonfuls household ammonia.

To clean a piano case.

A bottle of olive oil, a bottle of alcohol, some new or perfectly clean canton flannel, a perfectly clean chamois leather, and a basin of water will be needed to clean a piano.

1. Wet a small piece of the flannel and drop on it a few drops of oil. 2. Rub, with the wet flannel, a small section of the case at a time, and immediately rub it thoroughly with a dry piece of the flannel, before proceeding to a fresh section. 3. Polish it finally with the chamois or a fresh piece of the flannel. Rub with the grain of the wood, and breathe on it occasionally to help remove any oiliness that may remain. A very little flour rubbed with the grain of the wood will also help to remove oiliness, but its use should not be necessary. 4. Wash the piano keys with a corner of the flannel wet with alcohol. Be careful, however, to avoid touching the wood with the alcohol, as it will ruin the varnish.

To wax a floor.

In waxing floors, the following apparatus is necessary: a can of floor wax, a waxing flannel, a half yard of heavy flannel or a piece of old brussels carpet, and a weighted brush.

1. The floor must be clean and free from dust. 2. If necessary, stand the wax can in a dish of hot water in order to soften the wax. 3. Rub the waxing flannel on the wax and put a very thin, even layer of wax on the floor. It is better to rub along the boards than across. Start at the corner farthest from the door, and do not step on the waxed part. 4. Put away the wax and flannel, and keep off the floor for at least three hours. The polishing can be done after standing an hour, but is more work. 5. Fold the piece of heavy flannel twice, making four layers, put it down on the floor, put the weighted brush on it, and rub each board, with the grain, until it shines. The piece of carpet makes an excellent substitute for the flannel. The polishing can be done on the hands and knees without a weighted brush, but is much harder work.

CHAPTER V

HOUSEHOLD MEASUREMENTS AND THEIR USE

The modern household should be equipped with well-selected measuring appliances which can be intelligently used not only to help standardize the daily housework and living conditions in the home but also to insure and promote just dealing in the community. The exact value of units used must be clearly known. Since the use of the metric system (page 167) is fortunately becoming more widespread, future generations may escape the problems arising from the vagueness and ambiguity of the systems now in common use in this country.*

MEASUREMENTS FOR COMMODITIES

Measuring apparatus for household commodities should be tested and sealed by the local sealer of weights and measures, at the time of purchase.

Weighing scale.

A weighing scale should have a capacity of 10 to 30 pounds or more, and should be graduated to 1 ounce or less. Among good types on the market are the hanging-pan spring scale, the counter beam scale, and the beam scale of the steelyard type designed to hang from a bracket. The cheap scale in which the commodity pan stands above the spring, is likely to be inaccurate.

To use the scale properly, the following precautions should be observed: (1) Handle it carefully, and keep it clean and dry. (2) Keep it in balance. A properly constructed scale will rarely get out of balance, but the proper way of adjusting a particular

* The following material in this chapter, with the exception of the tables indicated, is condensed from Measurements for the Household, Circ. 55, published by the Bur. of Standards, U. S. Dept. of Commerce.

kind of scale should be learned. (3) Keep the eye squarely in front of the point of the scale that is being read. (4) Do not weigh a commodity in cardboard or other heavy covering without weighing the covering separately and deducting its weight from the total weight.

Liquid measures.

The supply of liquid measures should include a quart, a pint, and a half-pint measure, and a 4-ounce glass graduate subdivided to 1 dram or less for measuring small quantities of liquids and determining the errors in larger quantities. The measures should be cylindrical or conical with the top diameter smaller than the bottom, and made of metal, enamelware, composition, or similar and suitable material. They should be strong and rigid enough to withstand ordinary usage.

To test the quantity of a liquid as delivered, the following directions will be useful: Pour the liquid into the measure. If it does not fill the measure, pour it out and fill the measure with water to the same point that the purchased liquid reached. This can be done by observing the wet ring left around the measure. Then put a definite quantity of water into the graduate, and complete the filling of the measure. The difference between the quantity of liquid remaining in the graduate and the original quantity put in is the shortage. If the quantity of liquid ordered more than fills the test measure, the check for error is made on the last portion poured into the measure.

To avoid mistakes in reading cone graduates, it should be noted that these are sometimes more finely subdivided at the base than at the top.

A graduate should be held level in filling it or reading it. It should be read at the main surface of the liquid, not at the point to which the small amount of liquid creeps on the sides of the glass.

Dry measures.

A nest of dry measures holding from ½ bushel to 1 quart may be necessary, although the growing tendency is to sell dry commodities by weight. The weight of a bushel of certain common dry commodities, as fixed by law in certain states, is given on page 162. Dry measures should be of metal, or of well-varnished wood with a metal band around the top, or of some similar and suitable material. They should preferably be cylindrical. If they are conical, the top diameter should exceed the bottom diameter by an amount not greater than 10 per cent of the bottom diameter. The diameters should in no case be less than the following:

For ½ bushel	$13^3/_4$ inches
For 1 peck	$10^7/_8$ inches
For ½ peck	$8^1/_2$ inches
For two quarts	$6^5/_8$ inches
For 1 quart	$5^3/_8$ inches
For 1 pint	4 inches

Length measure.

For measuring length, a yardstick and a tape 3 or 6 feet in length are recommended.

TEMPERATURE

The following thermometers should be a part of the equipment of every household:

Room-temperature thermometer.

To give a fair measure of the temperature of a room, a thermometer should be placed about four feet from the floor, away from a stove, radiator, or ventilation flue and not on an outside wall. Under certain conditions fifteen minutes or more may be required to show the correct temperature if a thermometer is moved.

Outdoor thermometer.

To indicate the real temperature of outdoor air as given in the weather reports, a thermometer must be mounted in a specially well ventilated house or box four feet from the ground and so built as to shield the thermometer entirely from direct sunlight. Nearly the same results may be secured by placing a thermometer in an open shady place, possibly at the north of a building, several feet away from the walls and four feet from the ground.

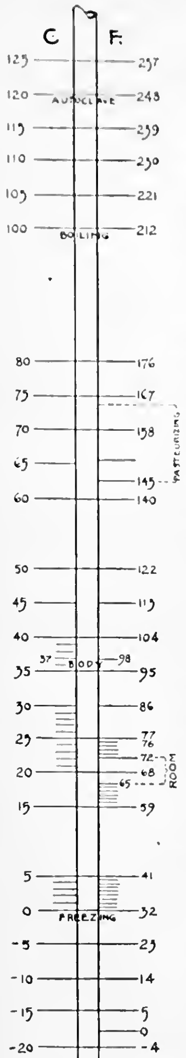

Fig. 40.—Comparison of Centigrade and Fahrenheit scales for measuring temperature.

Clinical thermometer.

The usual clinical thermometer is a "maximum" thermometer, that is, the mercury in the stem registers the highest temperature reached and does not return when the thermometer is cooled, but must be shaken back before another temperature can be measured. For this reason the thermometer may be removed from the mouth and read later.

The usual type of "lens-front" thermometer is so made that the front of the glass tube acts as a lens magnifying the width of the mercury thread. To read such a thermometer, it should be held in the hand and turned until the mercury column suddenly appears magnified to considerable width. This will occur when the clear corner of the triangular tube is directly in front. The reading can then be made, remembering that the smallest divisions of the scale are usually 0°.2. The mercury should then be shaken back into the bulb by holding the thermometer firmly between thumb and forefinger, bulb outward, and giving a few very brisk shakes from the wrist, or with the arm, and then seeing that the thermometer reads as low as 96° F. or 35°.5 C. The thermometer should never be tapped against a hard substance, as this is almost certain to break the bulb.

Bath thermometers.

Bath thermometers usually have their scales printed on paper or milk glass contained in a large glass tube which incloses the thermometer capillary. They are often protected by a wooden cage to prevent breakage. When thus protected, it may take some time to obtain the real temperature of the water unless the thermometer is kept moving. The temperatures in different parts of a tub of water may differ many degrees unless the water has been well mixed.

A bath thermometer should be read while it is in the water because the readings will change very rapidly when the thermometer is taken out of warm water.

Milk thermometers.

Milk thermometers are useful in measuring the temperature of milk or cream, for the control of pasteurizing milk, churning cream, whipping cream, and the like. These processes are best carried out at definite temperatures. Some of these milk thermometers are purposely made large and light so that they will float, making their use more convenient.

Candy-making thermometers.

These thermometers are for use in making candies, boiling sirups, and the like. The thermometer should not be too near the bottom or the sides of the kettle, nor yet should it be at the point where boiling is most violent. Some of the temperatures at which boiling sirups should be removed from the fire to make different kinds of candies, as well as other useful information as to temperature, are given in Table II.

A candy-making thermometer may be tested for accuracy as follows: First find the boiling point for any altitude from Table I (thus at 2,000 feet elevation the average temperature is 208° F. or 98° C.); then hold the thermometer with its bulb well immersed in a dish of briskly boiling pure water, and read the highest temperature reached. If this differs from that found in the table, the thermometer is too high or too low by this difference.

Oven thermometers.

Various kinds of thermometers are used for reading oven temperatures. One kind is placed in the oven door and has a dial with a hand for indicating the temperatures. These thermometers may not indicate the true temperature of the oven because the door never becomes as hot as the remainder of the oven, and often takes much longer in heating up. However, since temperatures sometimes need not be known more accurately than within 10 or 20 degrees, such thermometers are useful and are more convenient than those which have to be hung inside the oven. One kind of thermometer which reads up to 550° F., is made to screw into a special opening in the range. It may be hung inside the oven, but in this case the door must be opened or a window provided in order to read it.

Tests for thermometers.

Household thermometers from reliable makers are usually correct to within 1 or 2 degrees at room temperature and below, although sometimes they are several degrees in error.

Any thermometer which has 32° F. or 0° C. on its scale may be easily tested at this point by scraping a tumbler full of clear ice, saturating this with ice-cold, pure water, and placing the thermometer bulb in this mixture until it reads as low as it will go. Clean snow saturated with water may also be used, but if the snow is left dry it may be much colder than 32° F. If the thermometer tested reads 32° F. or 0° C., it is correct at this point. If higher or lower than this, it is too high or too low by the amount of the difference observed. Such a test is reliable to a tenth of a degree if carefully made.

For other temperatures there are no tests which are quite as convenient or reliable as for the ice point. The steam point, 212° F. or 100° C., is used in the testing of thermometers in the laboratory, but the steam temperature depends on the barometric reading, which varies with the weather, and with the altitude of the place where the water is boiled. For places within 500 feet of sea level, the temperature shown by a thermometer immersed in a steam bath over briskly boiling water, or in the water itself if the same is pure, should be between 210° and 212° F., or between 99°, and 100° C. For higher altitudes the temperature will be lower, as may be seen from Table I. The temperatures given in this table are averages only and variations of 1° F. or 0°.6. C. may take place from day to day because of changes in the barometric pressure.

If a tested clinical thermometer is at hand, a fairly accurate test at about 100° F. may be made. A thermometer which is correct at the ice point and at about 100° F. will probably be correct at other temperatures. Clinical thermometers should be tested by a competent testing laboratory, such as that at the United States Bureau of Standards.

TABLE I.—BOILING POINT OF WATER AND AVERAGE BAROMETER READINGS FOR DIFFERENT ALTITUDES

Altitude	*Temperature of steam*		*Corrected barometer Average readings*	
	Degrees F.	*Degrees C.*	*Inches*	*Millimeters*
Sea level	212.0	100.0	29.9	760
2000 feet	208.3	97.9	27.8	706
4000 feet	204.6	95.9	25.8	655
6000 feet	201.1	93.9	24.0	610
8000 feet	197.6	92.0	22.3	566
10,000 feet	194.0	90.0	20.7	526

TABLE II.—USEFUL TEMPERATURES

	Degrees Centigrade	*Degrees Fahrenheit*
Mercury freezes	—39	—38
Freezing cold storage	—18 0	0 +32
Water freezes	0	32
Danger of frost	+4	39
Household refrigerator, proper temperature	7 13	45 55
Churning	11 17	52 62
Gymnasium, or rooms where occupants are actively engaged in physical work or exercise	13	55
Ripening of cream	18 21	65 70
Rooms where occupants are not exercising	20 21	68 70
Normal temperature of the human body determined by thermometer under the tongue	37	98.6
Incubator temperature	39.4	103

TABLE II.—*Continued*

	Degrees Centi-grade	*Degrees Fahren-heit*
High fever, temperature measured as above	40.6	105
Pasteurizing milk	63	145
Pasteurizing milk (flash process)	71	160
Water boils at normal pressure	100	212
Plain sugar sirups:		
For sirup, 11 pounds to the gallon	101	219
For fondant candies	113 115	236 240
For fudge and other candies of like nature	115	240
For taffy and like hard candies to be pulled	149	300
For clear brittle candies, peanut brittle, etc.	154	310
For almond and walnut brittle	157	315
Melting point of common soft solder	185	365
Oven temperatures for baking:		
Custards, meringues, pies, puddings, etc.	121 177	250 350
Sponge cake, bread, gingerbread, plain cake, and cookies	177 204	350 400
Parker House rolls, popovers, and biscuits	204 232	400 450
Biscuit and pastry	232 287	450 550
Melting point of lead	327	621
Melting point of aluminum	659	1218

TABLE III.—A TABLE OF TEMPERATURES *

Process	*Degrees Centigrade*	*Degrees Fahrenheit*
Freezing of fruit ices (temperature of medium)	—5 to —8	23 to 18
Freezing of water	0	32
Whipping of cream	3 to 10	37 to 50
Butter-making	15 to 16	60
Raising of bread (temperature of room)	26 to 40	79 to 104

* Williams, Anna W., and Gray, Cora E., Cooking Temperatures, Bull. 47, Univ. of Ill.

TABLE III.—*Continued*

Process	*Degrees Centigrade*	*Degrees Fahrenheit*
Cheese-making	37 to 60 (Depends upon acidity)	98.6 to 140
Coagulation of albumin	Begins 56; completes 71	133 to 160
Simmering of water	82 to 99	180 to 210
Soft custards	82 to 84	179 to 183
Double boiler, top part	89 to 94	192 to 201
Boiling water at sea level	100	212
Jellies (boiling point of water 100° C.)	103	185
Sugar cookery (boiling point of water 100° C.)		
Fondant	113	235
Fudge frosting, boiled	111	232
1 egg white to 1 cup sugar	113 to 115	235 to 239
2 egg whites to 1 cup sugar	117	243
1 egg white to 1 cup of dark brown sugar	125	257
1 egg white to ¾ cup of dark brown sugar, ¼ cup white	122	252
* Roasting of meat		
Temperature of oven		
First 15 minutes	250	450
Remainder of time	175	347
Temperature of meat interior		
Rare done	46.5 to 60	115.7 to 140
Medium	60 to 70	140 to 158
Well done	70 to 80	158 to 176
Deep-fat frying. Temperature of fat for		
Uncooked foods	175 to 190	347 to 374
Cooked foods	185 to 205	365 to 401
Cold, wet, uncooked foods	190 to 195	374 to 383
Baking. Temperature of center of oven for		
Sponge cakes	175 to 190	347 to 374
Angel food cakes	150 to 170	302 to 338
Soufflés (surrounded by water)	200	392
Bread	180 to 220	356 to 428

* Sprague, Elizabeth, and Grindley, H. C., "A Precise Method of Roasting Beef," Univ. of Ill. Bull., Vol. IV, No. 19.

TABLE III.—*Continued*

Process	*Degrees Centigrade*	*Degrees Fahrenheit*
Butter cakes		
Loaf	190	374
Layer	210	410
Muffins	220 to 235	428 to 455
Parkerhouse rolls	235	455
Baked potatoes	235	455
Baking powder biscuit	235 to 240	455 to 464
Popovers	235 to 200	455 to 392
* Pastry	240	464

* Sprague, Elizabeth, "Studies of Methods in Food Preparation," *Journal of Home Economics,* Vol. III, No. 5, p. 446.

TIME

The usual clocks found in the home may be divided into two classes, the mantel or wall clock type, which has a pendulum, and the common alarm-clock type, in which the movement is controlled by the vibrations of a balance wheel, as in a watch. The second variety is quite portable and will usually run in any position, but the pendulum clock must be kept fixed in an upright position and must be adjusted every time it is moved.

Moving a pendulum clock.

The pendulum clock usually has its pendulum suspended by a thin flat spring, and to avoid breaking this spring when the clock is to be moved from one place to another, it is best either to unhook the bob from the pendulum rod or to secure the pendulum tightly to the clock works or case so that it cannot swing. In setting up such a clock after removal, it is necessary to put the clock "in beat"; that is, to make the successive vibrations of the pendulum, or the time between successive ticks of the clock, of equal length. This must be done by carefully leveling the clock on its support, unless the clock is provided with adjusting thumbscrews at the top of the pendulum by the movement of which one way or the other it can be made to beat uniformly.

Setting a clock.

The setting of a pendulum clock is usually best done by turning the minute hand forward, several revolutions if necessary, to bring the hour hand to the correct hour. If the clock does not have a striking mechanism, the hour hand, which is usually held on its slightly conical shaft by friction, may be moved forward a sufficient number of hours, and the minute hand adjusted to the correct minute. As the hour hand may have become loosened on its shaft by this procedure, however, it should be pressed tightly into place after it is set correctly. In some clocks with a striking mechanism, the minute hand should not be moved backward across a striking point, although it can, without injury, be moved back short distances in other parts of the dial to set it correctly.

Regulating a clock.

Few clocks of either the pendulum or the alarm-clock type are made with devices to compensate for changes in temperature, and as these changes will alter the rate, it is desirable to keep the clock in the part of a room where its temperature will be most constant. Even with the best conditions in this respect, it will be necessary to regulate the clock's rate frequently on account of the changes of temperature with season or with the conditions of heating or cooling of the room. A rise of temperature will lengthen the pendulum rod and make the clock run more slowly. It will be necessary, therefore, to raise the pendulum bob by turning the supporting nut, unless an adjustment device is provided by which a contact point on the suspension spring at the top of the pendulum can be changed. This is done by turning a key to right or left in a small keyhole in the face of the clock, usually near the upper part of the dial. This has the effect of shortening or lengthening the pendulum.

In the alarm-clock type, the regulation is done by moving a small lever, usually at the back of the clock, which engages with the hairspring on the balance wheel, and so decreases or increases the effective length of the spring, thus controlling the time of a vibration of the balance. The lever should be moved toward the letter "S" when one wishes to make the clock run more slowly and toward "F" when it should run faster. The same rule applies in the regulation of a watch.

When regulating a pendulum clock by the key device, the key should be turned overhand toward the letter "S" or "F," according as one wishes to make the clock run more slowly or faster. If there are no indicating letters ("F" and "S") provided, the usual rule is to turn the key in the direction the hands move to make it go faster or counterclockwise to make it run more slowly.

The amount of movement required to correct the rate must generally be found by trial. Thus, if the clock gains five minutes a day, and one turns the key of the regulator two revolutions toward "S," or moves the lever of an alarm clock two divisions toward "S," and the clock then loses three minutes a day, one can obtain nearly zero rate by turning the key three-quarters of a revolution back toward "F" or by moving the lever three-quarters of a division back toward "F." In some pendulum clocks there may be some motion lost in reversing the regulation, and this should be taken into account in estimating the amount to move the regulator.

To correct the striking of a clock.

While some clocks of a more recent type have the hour and minute pinions and the striking mechanism so geared together that it is almost impossible for the clock to strike wrongly, this frequently happens with other types of clocks. This difficulty can be remedied easily in the latter case by several methods. One method, which can be used in case the hour hand is held in position on its shaft by friction only, is to move the hour hand backward or forward an hour or more as may be necessary to make the hour indicated by the clock-face agree with the striking mechanism, pressing the hour hand tight on its shaft afterwards, as described above. Then the clock should be set to correct time by moving the minute hand around the dial the necessary number of times, allowing the clock to strike the full amount each time the hand passes the XII point before approaching that point again. This method is especially convenient when the clock strikes one or two strokes less than it should. When it strikes more strokes than it should, the same method may be used, or the minute hand may be turned ahead rapidly so that it will again pass through the XII point while the clock is still striking for the previous hour. By so doing the striking mechanism is not released to strike the following hour, and thus an hour is gained in the face indication of the clock compared with the striking. This may be repeated as many times as the number of strokes by which the striking mechanism was in error. The clock may then be set to correct time in the usual way, allowing it to strike the full amount on each passage of the XII point, or the clock may be stopped for as many hours as it is fast, until again it indicates the correct hour, when it can be started and set correct without the necessity of striking all the nine, ten, or eleven hours that may have intervened.

Some clocks have a lever in the movement—an extension of the striking mechanism release arm or shaft—which can be moved up or down to release the striking mechanism and allow it to strike as many hours as are necessary to bring it into agreement with the indication of the hands. Or, if a special lever for the purpose is not provided, it is sometimes easy, on opening the door to the works of the clock, to find the release arm itself and by raising it accomplish the same result.

Care of timepieces.

Precautions should be taken not only with clocks but also with watches to keep them at a constant temperature if one wishes to obtain the best results with them. If possible a watch should be kept at nearly the same temperature at night as during the day. The variations with the drop in temperature at night will affect the rate of the alarm clock uncompensated for temperature much more than that of a watch, which is usually compensated for high and low temperatures.

The careful handling of a timepiece of the balance-wheel type—clock or watch—is also important, because of the effect on the adjustment and rate. All sudden changes of motion should be avoided, and a fall is liable to bend some of the pivots and seriously change the rate. The position in which it is kept also makes a large difference in its rate, especially with the unadjusted cheaper types. Both the watch and the clock should best be kept in an upright position, both day and night, as uniformity of practice is the chief essential. All timepieces should, of course, be kept protected from dust and dirt. They should be wound regularly. It is perhaps better to wind a watch twice a day than once a day, if it is done regularly, and the last part of the winding should be done slowly to avoid injury to the mechanism.

An alarm clock.

An alarm clock may be made very useful in giving a warning of the necessity of inspecting a given process which otherwise might be overlooked, and when food materials are frequently spoiled in preparation from lack of attention, the use of an alarm clock will soon save its cost.

In using the alarm feature of an alarm clock, the setting mechanism should be turned in one direction only, for the same reason as in the case of setting a clock with striking mechanism to correct time, to avoid locking or breaking the setting device. Occasionally the indicating hand of the alarm will not be placed correctly on its pinion and the alarm will sound at a different time from that expected. This error will be a constant one, however, and its amount having been once learned, allowance may be made for it in setting the hand; or a watch repairer can correct the fault very quickly. Many alarm clocks have the dial for setting the alarm of very small diameter, making it difficult accurately to set the hand. For this use it is desirable to secure a clock with as large an alarm-hand dial as possible, preferably one having the alarm hand set on the central pinion with the hour and minute hands. With such a clock the alarm can be set quite accurately for giving a signal at short intervals and can be used to give warnings of the time to inspect certain processes of the kitchen, for the taking of medicine at regular intervals, and the like.

MEASURING GAS

How to read a gas meter.

The index of an ordinary gas meter, which is similar to that of an electric or a water meter, is shown in Fig. 41. The smaller top dial, which is marked "Two feet" inside of the circle, is generally called the "testing circle" or "proving head," and is used principally in testing the meter. One revolution of the hand of the testing circle indicates that 2 cubic feet of gas have passed through the meter. In some meters one revolution of the hand of the testing circle represents more or less than 2 cubic feet of gas and the testing circles are correspondingly marked. The indication of the hand of the testing circle is ignored in the ordinary reading of the meter.

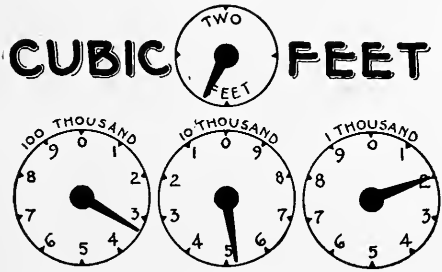

Fig. 41.—The index of a gas meter. Each dial is marked with the volume of gas passed a revolution. The smaller top dial, which is marked "Two Feet" inside of the circle, is generally called the "testing circle" or "proving head" and is used principally in testing the meter.

Of the large dials the first one at the right is usually marked "1 thousand." This means that during one complete revolution of the hand, 1000 cubic feet of gas has passed through the meter. This dial is divided into ten equal parts so that the passage of the hand over each part indicates the passage of one-tenth of 1000 cubic feet, or 100 cubic feet. For most meters, it may be said of the other dials that the complete revolution of each hand indicates the passage of ten times as much gas as one revolution of the hand of the dial of next lower denomination (usually the one to the right). The figure representing the number of cubic feet discharged during one revolution of the hand is written over each dial. Thus if the first dial is

Fig. 42.—Gas meter index reading 79,500 cubic feet.

marked "1 thousand," the second dial will be marked "10 thousand," the third "100 thousand," and so on.

The reading of the index, as illustrated in Fig. 41 is as follows:

Reading of "1 thousand" dial.	200	cubic feet
Reading of "10 thousand" dial.	5 000	" "
Reading of "100 thousand" dial.	30 000	" "
Complete reading of the meter.	35 200	" "

It is not necessary to write down separately the reading of each dial, but it is much shorter to set down from right to left the figure last passed by the hand of each dial, commencing with the dial of lowest denomination and then—if the dial of lowest denomination is marked "1 thousand"—appending two zeros to the resulting figures.

If a hand is very nearly over one of the figures on a dial, it is impossible to tell without consulting the dial of next lower denomination whether the figure under the hand or that just previously passed by the hand should be read. For example, in Fig. 42 the hand of the "100 thousand" dial is over 8, and considering this dial alone the reading might be taken as 8; but it is seen that the reading of the "100 thousand" dial cannot have reached 8, since the hand of the dial to the right (the "10 thousand" dial) has not reached zero. The reading of the "100 thousand" dial is therefore 7, and the correct reading of the entire index is 79 500 cubic feet.

To satisfy one's self that the gas company does not make a mistake in reading the meter, it is well for the consumer, occasionally at least, to read his meter at as nearly as possible the same time that the gas company reads it. Usually the gas company's bill will state the meter readings on the dates between which the bill applies, so that checking meter readings will be easy. If the meter readings are not given on the bill, the consumer can determine what the amount of his bill should be if he knows the meter readings and the price of gas a thousand cubic feet. Should the consumer take one meter reading at the proper time and then miss the next one or two, it is obvious that he can still check up the gas bills by taking a reading at the next convenient time when the company's reader calls, calculating the cost of gas used between the dates of his readings and comparing this cost with the sum of the amounts of the bills rendered for gas between the same dates.

Cost of gas consumed an hour in appliances.

With only a little trouble one can determine the cost an hour of operating a gas light, heater, or other gas-consuming appliance. To do this, one should have in operation the appliance in question and all other gas appliances supplied through this meter shut off. Then, by observing the "testing circle" of the meter, the time in seconds required for 1, 2, or more cubic feet of gas to pass should be determined. The number of cubic feet of gas used an hour is then determined in the following manner: (1) Divide the number of cubic feet burned during the test by the number of seconds, thus determining the number of cubic feet of gas used a second, and (2) multiply the result by 3600 (the number of seconds in an hour).

Example: It is observed that with a gas water-heater in operation, the meter indicates the passage of 2 cubic feet of gas in 1 minute and 40 seconds. Applying the above rule, 2 (cubic feet) is divided by 100 (seconds) (the equivalent of 1 minute and 40 seconds), which gives $\frac{2}{100}$; $\frac{2}{100}$ is multiplied by 3600, giving $\frac{7200}{100}$, or 72. The water-heater is, therefore, using 72 cubic feet of gas an hour.

Knowing the cost of 1000 cubic feet of gas, one can easily calculate the cost an hour for gas used in the heater; for example, if gas were $1 for 1000 cubic feet, the 72 cubic feet would cost 72 times $\frac{1}{1000}$ of $1, or 7.2 cents, which is the cost an hour for gas.

Causes of high bills for gas.

If a consumer's gas bill for a certain period greatly exceeds that of the previous period, it is due to one or more of the following causes:

1. An increased consumption of gas. A careful consideration of the use made of gas during the period covered by the bill will very often reveal the fact that an unusual amount of gas has been consumed. Baking, canning of fruit, entertaining, the coming of long winter evenings, and the like are a common cause of increased gas consumption resulting in larger bills than usual. Leaks in the gas pipes of the house may produce the same results.

2. An error of the gas company in reading the meter or in office work. If the consumer reads his own meter and checks the bill, the question as to whether this cause is operative can be quickly ascertained.

3. A fast meter. If the two above causes apparently do not exist, the consumer will naturally consider that his meter is fast.

The best procedure for the consumer who thinks his meter incorrect varies with the locality. Many of the larger cities are provided with meter-inspection departments, under the supervision of the city or state, and the consumer can have his meter tested by this department. If his meter is found to be fast in excess of the established tolerance, the company usually pays the fee for the test and refunds to the consumer a certain amount, depending on the magnitude of the error of the meter and the probable length of time that the consumer has been thereby overcharged. If the meter is found to be within the tolerance, or "slow," the consumer usually pays the fee (about $1), and may have to pay the gas company for the probable amount he has been undercharged.

MEASURING ELECTRICITY

How to read an electric meter.

A view of the dials of a modern electric meter is given in Fig. 43. The method of reading is similar to that for the dials

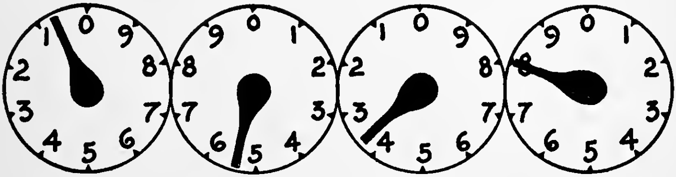

FIG. 43.—Dial of a watthour meter. In this dial the hands are correctly set on their shafts. The reading is 538 kilowatt hours.

of a gas meter as explained on page 144. The reading in Fig. 43 is 538 kilowatt hours. In taking down these figures one should read the dials from right to left; that is, in the reverse of the usual order of writing numbers. The pointer on the dial at the extreme right points to 8; the number 8 is written down as the figure in the units place. The index of the next dial to the left has passed the 3, but has not reached the 4, as shown by the fact that the units' dial reads 8; the figure 3 is accordingly written in the tens' place. The index of the third dial has passed the 5, and this figure is to be written in the hundreds' place, giving 538 kilowatt hours as the reading of the meter, since the index of the dial at the extreme left has not reached the figure 1.

If the index hand of the second dial in Fig. 43 be turned slightly so as to point to, or even slightly past, the figure 4, it becomes more difficult to read the meter correctly, as a hasty inspection may result in the reading being made as 518 kilowatt hours. However, the index of the units' dial standing on the figure 8 shows that it has not quite completed a revolution, and hence that the index of the second dial (if it is properly set on its shaft) should be close to a division and about to reach it. Hence, it should be read as having passed the 3 and not having reached the 4. A view of a meter dial face having the

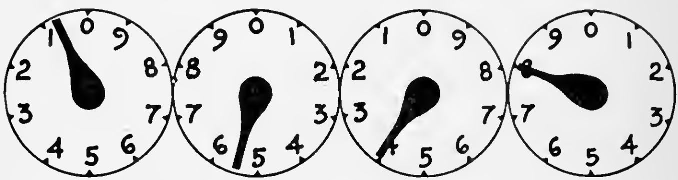

Fig. 44.—Dial of a watthour meter. In this dial the hand on the second circle from the right is slightly in advance of its proper position on its shaft. The reading is the same as in Fig. 43, namely, 538 kilowatt hours, although at a glance it might be incorrectly read as 548 kilowatt hours.

second index to the left slightly displaced in this way is shown in Fig. 44.

When one dial hand points to 9, special care must be taken that the dial hand of the next higher dial is not read too high, as it may appear to have reached the next number, but will not have done so until the dial hand at 9 has come to 0. A simple illustration will make this clear. If the hour hand of a clock points to 10, as closely as can be read, and if the clock had no minute hand, the time would be read as 10 o'clock. If the minute hand, however, is pointing to the figure 11, the time is read as 9.55. Ten minutes later the hour hand may not have moved perceptibly, but the time is now read as 10.05. Similarly, in the electric meter, the reading of each dial must be interpreted by noting the reading of the next dial to the right.

The dial hands on adjacent dials revolve in opposite directions; therefore, a reading should always be checked after being written down, as it is easy to mistake the direction of rotation.

Checking the watthour meter.

The electric meter may be checked approximately by the householder without the use of electrical instruments. For this purpose it is only necessary to note the reading of the meter, then turn on a number of lamps and note the time in hours required to cause the index of the dial farthest to the right to advance one division. It is necessary to use lamps which are rated in watts, as is done with most incandescent lamps now made. If the meter is modern, it will have a dial marked "kilowatt hours," and one division on the dial farthest to the right is a kilowatt hour, which means 1000 watt hours. For example, if 10 lamps, each marked 25 watts, are lighted at a given time, the rate of using electrical energy is $10 \times 25 = 250$ watts. In 4 hours these lamps will use $4 \times 250 = 1000$ watt hours, and this should cause the index of the dial farthest to the right to advance one division. As it is not possible to read a single division accurately, the lamps may be allowed to run until the index has moved over several divisions. If more lamps can be turned on, or larger lamps used, the time required for the test will be reduced.

The preceding test is approximate but will settle the question of whether any large error exists in the meter. To make an accurate test requires portable watt hour meters or other electrical apparatus which is suitable for use only by meter inspectors.

It is desirable for the householder to read the meter at the time it is read by the meter man, and to keep a record of the readings and the dates, in order to have the means of checking the bill rendered by the company.

When the bill for electric current seems unduly high, the meter is often first suspected; in reality it is usually the last thing to blame. Some of the reasons for higher bills are as follows:

1. Cloudy or rainy weather, requiring use of light in daylight hours.

2. Additional lamps may have been installed, or small lamps may have been replaced by larger ones.

3. Old dim lamps may be in use; in order to secure sufficient illumination more of them must be lighted than would be nec-

essary if lamps in good condition were used. A dim lamp takes practically as much current as a new one, and is very wasteful to use. With lamps in good condition, the light will not be efficiently produced if the electric company allows the voltage to be low. In this connection it may be well to state that the tungsten lamp has been improved in quality and reduced in price to such an extent that no customer can afford to use carbon lamps. Many householders cling to the use of carbon lamps because they are usually supplied free. The folly of this course may be realized from the following statement: The cost of a lamp is reckoned in cents, but the cost of the energy to operate it during its life is a matter of dollars. The energy cost for a tungsten lamp is only about one-third that of the carbon lamp.

4. Lamps are sometimes left burning for days in attics, closets, and other out-of-the-way places.

5. Electric laundry irons, toasters, or other heating devices may have been placed in service or used more than in former months. Motor-driven devices may have been installed. Many devices which are operated through flexible cord from a lamp socket take very much more power than any lamp which would be used in the household. If is often erroneously believed that because such devices can be operated from a socket they require no more power than a lamp. The extent of this error may be realized from the statement that a six-pound laundry iron takes as much power as twenty tungsten lamps of about 20 candle-power each.

6. Defective wiring may allow current to flow when no lights or other devices are in use.

7. When electric elevators or electrically driven machinery is used and not properly oiled and cared for, excessive friction may result, with a corresponding waste of power and increase in the bill for electric current.

8. An error may be made by the company's meter reader, so that the bill rendered is too high or too low. If it is too high, the bill for the following month will be low by the same amount, if the meter is then read correctly, so that the consumer will not usually lose anything in the end. When a minimum monthly

charge is made by the company, the consumer may lose. Hence, if an error has apparently been made by the meter reader, the company should be requested to investigate the matter and to render a corrected bill if an error is found.

MEASURING WATER

How to read a water meter.

Meters for measuring water for domestic use are usually graduated in cubic feet—sometimes in gallons. One cubic foot

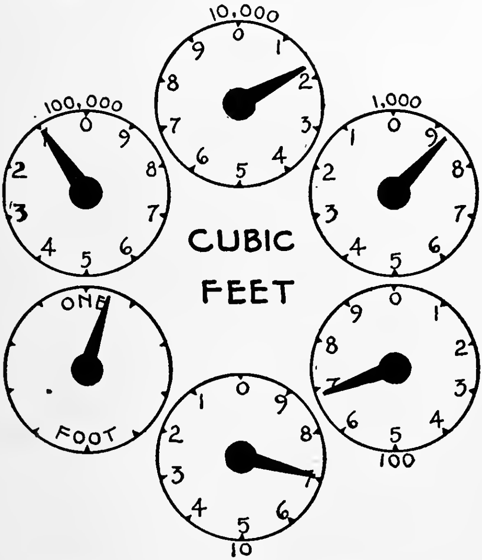

Fig. 45.—Ordinary form of water-meter dial. Reading 11,867 cubic feet.

is taken commercially as equal to $7\frac{1}{2}$ gallons. Hence, to reduce a meter reading in cubic feet to gallons, the number of cubic feet should be multiplied by $7\frac{1}{2}$.

The ordinary form of dial is shown in Fig. 45. A special form of register which is more convenient to read, is known as a straight-line register and gives cubic feet or gallons directly.

In Fig. 45 the unit is cubic feet and is plainly marked on the dial. If the unit were gallons, the method of reading would be the same. The hands revolve around circles, each divided into ten numbered divisions. The number on the outside of each circle indicates the number of cubic feet for one complete revolution of the hand. The divisions of the circles are numbered alternately in the counter clockwise and clockwise direction. Thus, the first dial (at the bottom) is marked 10 and one division measures 1 cubic foot, the second 100 and one division measures 10 cubic feet, the next is marked 1000 and one division measures 100 cubic feet, and similarly for the remainder. The small dial at the left measuring 1 cubic foot for a complete revolution is disregarded in reading the meter, being used for test purposes. One division of a circle is equal to a complete revolution of the hand on the next lower circle. When a hand is between two figures, the lesser is to be taken. If a hand is very near a figure, whether that figure or the next lower is to be taken can be determined by observing the hand in the next lower circle. Unless the hand on this circle has reached or just passed 0, the lesser figure is to be taken. The best method of reading is from low to high, that is, from right to left. For example, reading the dial shown in Fig. 45 and setting down the figures successively from right to left, there are 7 for units' place, 6 for tens' place, 8 for hundreds' place, and 1 for thousands' place and for ten-thousands' place, or 11,867 cubic feet.

The circles on different makes of dials may be differently located on the dial, but the method of reading is the same as given.

In meters larger than those ordinarily used for household measurement, the lowest graduated circle, the one marked 10, corresponding to units' place in the reading, is sometimes omitted, the lowest circle being then the one marked 100. In this case the meter is read exactly as described above, and a zero added in the units' place.

The dial after reading cannot be set back to zero. The record is continuous. The amount of water which has passed through the meter in a given time is, therefore, obtained by subtracting the first reading from the last. For example, if the meter were read the 30th day of June and again the 30th day of July, the June reading is to be subtracted from that taken in July.

Using the water meter as a measuring appliance.

The amount of water required for a particular use—for example, in watering a lawn—may be determined by first turning off all other outlets and allowing the hose to run, reading the meter at the beginning and end of the period and subtracting the first reading from the second.

Since the meter can only register when water is passing through, should the hands move when all outlets are closed, water is being wasted through some leak. This can be most easily detected by observing the circle marked "one foot," referred to above as being provided for purposes of test.

DENSITY OF LIQUIDS

A knowledge of the density or specific gravity of a liquid is usually of value in the household only as an index of some other physical property or quality of the liquid. For example, in the preparation of sirups, jellies, and other food products of similar nature, a measurement of specific gravity is a convenient means of determining when the process of evaporation or "boiling down" has been carried far enough. Also, the quality or fat-content of milk may be determined by measuring its specific gravity.

Specific gravity is the ratio of the weight of any volume of a substance to the weight of an equal volume of water. Milk has a specific gravity of 1.03, since the weight of any volume of milk is 3 per cent more than that of an equal volume of water. The densities given in Table IV are stated in grams to the cubic centimeter, and are numerically the same as specific gravity in terms of water at 4° C. as unity.

Determination of specific gravity.

The specific gravity of a liquid may be most readily determined by means of a small glass instrument known as the hydrometer. This instrument floats in the liquid to be examined and the specific gravity of the liquid is determined by noting the point on the stem to which the instrument sinks in the liquid. Since a floating body sinks in a liquid to such a point that the weight of the liquid displaced by the body is equal to the weight of the body, the hydrometer, when provided with a suitable scale, indicates directly the specific gravity of the liquid.

Classes of hydrometers.

Hydrometers in general use may be divided into three classes with reference to their indication: 1. Specific gravity hydrometers; 2. per cent hydrometers; 3. arbitrary scale hydrometers.

Specific gravity hydrometers indicate the ratio of the weight of a given volume of the substance to the weight of the same volume of some standard substance. The standard substance is usually water at a definite temperature.

Per cent hydrometers indicate the percentage of a substance, either by weight or by volume, in a mixture or solution of the substance in water.

Arbitrary scale hydrometers indicate the concentration or strength of a substance in terms of some arbitrarily defined scale. Lactometers and Baumé hydrometers are examples of this class.

TABLE IV.—Densities of Some Household Materials

Substance	*Temperature in degrees centigrade*	*Density in grams to the cubic centimeter*
Air, dry	20 (68° F.)	0.001205
Air (of 50 per cent humidity)	20	0.001195
Brine (5 parts by weight of salt in 100 parts of of brine)	15	1.035
Brine (25 parts by weight of salt in 100 parts brine)	15	1.191
Butter	....	0.86 to 0.87
Cider vinegar	....	1.013 to 1.015
Cream * (18 per cent butter fat)	20	1.01
Cream (40 per cent butter fat)	20	0.99
Gasoline	20	0.70 to 0.74

* Minimum butter-fat content for cream (definition of Bureau of Chemistry).

TABLE IV.—*Continued*

Substance	*Temperature in degrees centigrade*	*Density in grams to the cubic centimeter*
Ice	....	0.92
Kerosene	20	0.78 to 0.82
Lard	....	0.92
Linseed oil	20	0.92 to 0.93
Milk	20	1.028 to 1.032
Olive oil	20	0.91
Sea water	15	1.023 to 1.025
Sirup, maple*	17.5	1.32 to 1.34
Tallow	....	0.91 to 0.97
Turpentine	20	0.86 to 0.87

* The density of maple sirup varies from 1.32 with 35 per cent of water to 1.34 with 32 per cent of water.

The hydrometer to be chosen for household use will depend on the purpose for which it is intended, the degree of accuracy required, and to some extent on the personal preference of the user. The specific gravity hydrometer is recommended for most purposes.

For use in making sirups, preserves, and the like, an instrument indicating specific gravity in terms of water at 60° F., or one reading in Baumé degrees will be found convenient. The hydrometer should have a range of about 1.00 to 1.50 in specific gravity or 1 to 50 in Baumé degrees, and should be so graduated that the readings can be conveniently made.

Use of the hydrometer.

In using the hydrometer, a portion of the liquid whose specific gravity is to be measured should be placed in a glass cylinder of such a size that the hydrometer when placed in the cylinder will be free to move up and down without coming in contact with the walls of the vessel.

The liquid should be well stirred. For specially accurate work, the temperature of the liquid should be observed by means of a thermometer placed directly in the liquid; when the temperature has become fairly constant, the readings on the hydrometer may be taken.

The eye should be placed on a level with the surface of the liquid and the line where this surface appears to cut the stem of the hydrometer should be taken as the reading of the hydrometer.

In case the liquid is not sufficiently transparent to allow the scale of the hydrometer to be read through the liquid, the reading cannot be made as indicated above. It is then necessary to read as accurately as possible above the surface of the liquid. If the readings in a dark-colored liquid are always made in the same way, the resulting error will not be great, and successive readings will be comparable.

Influence of temperature.

When the temperature of a liquid changes, its specific gravity also changes and the indication of a hydrometer in the liquid will, therefore, differ at different temperatures. All hydrometers should be marked with the temperature at which they are intended to be correct.

In actual practice, however, it is not always necessary that the hydrometer be used at its standard temperature, but if readings are to be compared, they must all be made at the same temperature. For example, it may be found by experience that a certain sirup has the proper consistency when cool, if the reading on the hydrometer is 1.36 at 80° F. The standard temperature of the instrument may be 60° F., but if experience has shown that a certain reading of the hydrometer at some other temperature gives satisfactory results, it is not necessary to wait for the liquid to cool to the standard temperature of the instrument.

KITCHEN MEASURES

In the kitchen more accurate weights and measures are gradually coming into common use, as the units used are becoming better defined. Domestic science departments of schools and colleges are largely responsible for this advance.

The basis of the kitchen system of weights and measures is the standard cup, a measure holding 8 fluid ounces—that is, one-half liquid pint—and used to measure either dry or liquid commodities. One of these cups, subdivided into thirds, fourths, or both, should be procured, since the ordinary china cups vary greatly in size. A special set of spoon measures (from one-fourth teaspoonful up) will be found convenient, since ordinary spoons also vary in size. Moreover, neither the ordinary cup or spoon is adapted to measuring of fractions of their capacity.

The measures of capacity used in the kitchen are based on the standard cup, as follows:

3 teaspoonfuls	=	1 tablespoonful = 4 drams
4 tablespoonfuls	=	¼ cupful = 2 fluid ounces
½ cupful	=	1 gill = 4 fluid ounces
2 gills	=	1 cupful = 8 fluid ounces
1 cupful	=	8 fluid ounces = ½ pint
2 cupfuls	=	16 fluid ounces = 1 pint
16 fluid ounces	=	1 pint
4 cupfuls	=	1 quart

In the above all measures are level full. The equivalents given will permit the use of the large glass graduate for measuring liquids in cooking.

In Tables V to VIII are given equivalents of units commonly used in cooking and for other household purposes.

TABLE V.—EQUIVALENTS OF THE COMMON CAPACITY UNITS USED IN THE KITCHEN

Units	*Fluid drams*	*Tea-spoon-fuls*	*Table-spoon-fuls*	*Fluid ounces*	*¼ cup-fuls*	*Gills (½ cup-fuls)*	*Cup-fuls*	*Liquid pints*	*Liquid quarts*	*Cubic centi-meters*	*Liters*	*Units*
1 fluid dram equals.....	1	¾	¼	1/8	1/16	1/32	1/64	1/128	1/256	3.7	0.004	Equals 1 fluid dram
1 teaspoonful equals....	1 1/3	1	1/3	1/6	1/12	1/24	1/48	1/96	1/192	4.9	0.005	Equals 1 teaspoonful
1 tablespoonful equals...	4	3	1	½	¼	1/8	1/16	1/32	1/64	15	0.015	Equals 1 tablespoonful
1 fluid ounce equals....	8	6	2	1	½	¼	1/8	1/16	1/32	30	0.030	Equals 1 fluid ounce
¼ cupful equals......	16	12	4	2	1	½	¼	1/8	1/16	59	0.059	Equals ¼ cupful
1 gill (½ cupful) equals	32	24	8	4	2	1	½	¼	1/8	118	0.118	Equals 1 gill (½ cupful)
1 cupful equals........	64	48	16	8	4	2	1	½	¼	237	0.237	Equals 1 cupful
1 liquid pint equals.....	128	96	32	16	8	4	2	1	½	473	0.473	Equals 1 liquid pint
1 liquid quart equals ...	256	192	64	32	16	8	4	2	1	946	0.946	Equals 1 liquid quart
1 cubic centimeter equals	0.27	0.20	0.068	0.034	0.017	0.0084	0.0042	0.0021	0.0011	1	1/1000	Equals 1 cubic centimeter
1 liter equals..........	270	203	67.6	33.8	16.9	8.45	4.23	2.11	1.06	1000	1	Equals 1 liter

TABLE VI.—EQUIVALENT WEIGHTS AND MEASURES OF CERTAIN FOODS *

Food	*Measure of 1 pound*	*Measure of 1 ounce*
Beverages:		
Chocolate	5 1/3 cups, grated	1 square or 1/3 cup, grated
Cocoa	4 cups	¼ cup
Coffee	5 1/3 cups	5 1/3 tablespoons
Tea	6½ cups	6½ tablespoons
Water	2 cups	2 tablespoons
Bread stuffs:		
Bread, white	16 slices, ½ inch thick	1 slice, ½ inch thick
Bread crumbs	4 cups	¼ cup
Crackers, graham	57 crackers	3½ crackers
Crackers, oyster	9 2/3 cups	2/3 cup
Crackers, soda	49 crackers	3+ crackers
Saltines	124 crackers	.7 crackers
Cereals:		
Barley, pearl	2 1/8 cups	2 tablespoons
Corn-meal, granulated	2¾ cups	2¾ tablespoons
Corn-starch	3 cups	3 tablespoons
Flour, graham	4 cups	¼ cup
Flour, entire wheat	4½ cups	1/3 cup
Flour, white	4 cups	¼ cup
Hominy, or samp	2½ cups	2½ tablespoons
Hominy grits	2½+ cups	2½+ tablespoons
Macaroni	4½ cups	¼+ cup
Oatmeal	3+ cups	3+ tablespoons
Oats, rolled	5½ cups	5½ tablespoons
Rice	2 cups	2 tablespoons
Whole wheat	2 1/3 cups	2 1/3 tablespoons
Dairy products:		
Cheese (American) A. P.	4 cups grated	¼ cup grated
Cream, 40%	2 cups	2 tablespoons
Milk	2 cups	2 tablespoons
Eggs (whole) A. P.*	9	½ egg
Fats:		
Butter	2 cups	2 tablespoons
Lard	2 cups and 2 tablespoons	2+ tablespoons

* A. P. means as purchased; E. P. means edible portion.

TABLE VI.—*Continued*

Food	*Measure of 1 pound*	*Measure of 1 ounce*
Crisco	2 cups and 2 tablespoons	2 tablespoons
Oil, olive	2 cups	2 tablespoons
Oil, Wesson	2 cups	2 tablespoons
Suet, beef	4 cups, ground	¼ cup
Fruits, dried:		
Apples, A. P.	7 cups	2/5 cup
Apricots	59 halves	4 halves
Currants, A. P.	3½ cups	¼ cup
Dates, A. P.	68	4¼
Figs	24	1½
Prunes	40 to 60	3 to 4
Raisins	3 cups	3 tablespoons or 18 raisins
Fruits, fresh:		
Apples, A. P.	3 apples, or 4 cups diced	¼ apple, or 1/3 cup diced
Bananas, A. P.	3 medium bananas	1/6 (scant) banana
Cranberries	4½ cups	1/3 cup
Grapes, malaga	120 grapes	7½ grapes
Grapefruit	1	
Lemon juice	1 1/3 to 2 cups	2 tablespoons
Oranges	2 to 3	
Gelatin	3½ cups	3½ tablespoons
Meat:		
Bacon, A. P.	30 slices	2 slices
Bacon, E. P.	40 slices	2½ slices
Nuts:		
Almonds, A. P.	6 cups or 254 nuts	2/5 cup or 16 nuts
Almonds, E. P.	3+ cups or 385 nuts	1/5 cup or 24 nuts
Peanuts, A. P.	6 cups or 220 nuts	½ cup or 15 nuts
Peanuts, E. P.	2 1/8 cups	1/8 cup or 40 nuts
Peanuts, butter	1½ cups	1½ tablespoons
Walnuts, A. P.	5½ cups or 56 nuts	3½ nuts
Walnuts, E. P.	4+ cups or 240 average meats	15 halves or ¼ cup
Sugars:		
Molasses	1 3/5 cups	1½ tablespoons
Sugar, granulated	2 cups	2 tablespoons
Sugar, powdered	3 cups	3 tablespoons
Sugar, brown	3 cups	3 tablespoons

TABLE VI.—*Continued*

Food	*Measure of 1 pound*	*Measure of 1 ounce*
Tapioca, pearl	2½ cups	1/8+ cup
Minute	2½ cups	2½ tablespoons
Vegetables, dried:		
Beans, navy, A. P.	2+ cups	2 tablespoons, or 1/8 cup
Beans, lima	2 1/3 cups	2+ tablespoons or 1/8+ cup
Lentils, A. P.	2 1/5 cups	2+ tablespoons
Vegetables, fresh:		
Beets, A. P.	2 medium beets	1/8 beet
Cabbage, A. P.	1/3 to ½ medium head or 5½ cups shredded	¾ cup shredded
Carrots, A. P.	5½ carrots	1/3 carrot
Celery, A. P.	4 bunches	1 stalk
Onions, A. P.	6 to 8 medium	½ medium
Parsnips, A. P.	6 medium	1/3 parsnip
Potatoes, A. P.	2½ medium	2½ tablespoons, dried
Potatoes, sweet, A. P.	3 medium	1/5 potato
Water	2 cups	2 tablespoons

TABLE VII.—Approximate Measure of 1 Ounce of Certain Spices, Leavening Agents, and Flavoring Substances (Mary F. Henry)

Substance	*Measure of 1 ounce*
Allspice (whole)	¼ cup
Allspice (ground)	¼ cup
Baking powder	3 tablespoons
Celery seed	3¾ tablespoons
Cinnamon	3¾ tablespoons
Cloves (whole)	4+ tablespoons
Cloves (ground)	3¾ tablespoons
Cream of tartar	3 tablespoons
Mustard seed	2½ tablespoons
Mustard	4 5/8 tablespoons
Pepper (whole)	4 tablespoons
Pepper (ground)	4 1/3 tablespoons
Salt	1¾ tablespoons
Soda	2½ tablespoons
Vanilla	2 tablespoons

TABLE VIII.—SELECTED LIST OF LEGAL WEIGHTS (IN POUNDS) OF THE BUSHEL OF VARIOUS COMMODITIES *

	Apples [2]	*Dried apples*	*Barley*	*Beans* [2]	*Beets*	*Blue-grass seed*	*Buckwheat*	*Carrots*	*Clover seed*	*Corn* [2]	*Shelled corn*	*Corn meal* [2]	*Cotton seed* [2]	*Cranberries*	*Cucumbers*	*Flaxseed (linseed)*	*Hemp seed*	*Hungarian grass seed*	*Indian corn or maize*
United States	...	...	[3] 48	...	...	...	[3] 42	...	...	[3] 56	...	[3] 48	...	...	...	[3] 56	...		...
Alabama	...	24	47	60	...	...	...	...	...	...	56	...	32	...	...	...	...		...
Arizona	...	...	45	55	...	...	...	...	...	54	...	...	...	...	...	...	...		...
Arkansas	[4] 50	24	48	60	...	14	52	...	60	...	56	48	33 1/3	...	...	56			...
California	...	...	50	...	...	...	40	...	...	...	...	...	...	...	...	...	...		52
Colorado	...	...	48	60	...	14	52	...	60	...	...	50	...	...	...	...	44	...	56
Connecticut	48	25	48	60	[5] 60	...	48	50	60	...	...	50	[6] 44	...	...	55			56
Delaware	...	...	...	...	...	...	...	...	...	...	...	[7] 44	...	...	...	...	...		56
District Columbia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...
Florida	[4] 48	24	48	[8] 60	...	...	...	...	...	...	56	48	[9] 32	...	...	...			...
Georgia	...	24	47	[10] 60	...	14	52	...	60	...	56	48	30	...	...	56	44		...
Hawaii	...	...	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...		56
Idaho	[4] 48	24	48	60	56	[11] 14	50	50	60	...	56	...	...	...	...	56	44	50	[15] 70
Illinois	[4] 50	24	48	[10] 60	60	14	52	50	60	...	56	[12] 48	32	33	48	56	44	50	56
Indiana	...	25	48	60	...	14	50	...	60	...	56	50	...	33	...	...	44	...	...
Iowa	48	24	48	[13] 60	56	14	48	50	60	[14] 50	56	48	...	...	48	56	44	50	...
Kansas	[4] 48	24	48	60	56	[11] 14	50	50	60	...	56	...	...	...	...	56	44	50	[15] 70
Kentucky	...	24	47	[10] 60	...	14	56	...	60	...	56	50	...	...	...	56	44	50	...
Louisiana	...	...	48	...	...	...	...	...	...	56	...	...	...	...	...	...			...
Maine	44	...	48	60	60	...	48	50	...	56	...	50	...	...	...	...			...
Maryland	[4] 50	28	48	60	...	14	48	50	60	...	56	48	...	...	...	56	44	50	
Massachusetts	48	25	48	60	60	...	48	50	60	...	[17] 50	50	[6] 44	32	...	55			56
Michigan	48	22	48	60	...	14	48	...	60	...	56	50	...	40	...	56	44	50	...
Minnesota	[4] 50	28	48	60	50	14	50	45	60	...	56	...	...	36	...	...	50	48	...
Mississippi	...	26	48	[10] 60	...	14	48	...	60	...	56	44	[6] 32	...	...	56	44	50	...
Missouri	48	24	48	60	...	14	52	50	60	...	56	50	33	...	48	56	44	48	...

Montana	45	....	48	60	50	14	52	50	60	....	56	50	....	....	....	56	44	50	....
Nebraska	[4] 48	24	48	[10] 60	56	[11] 14	50	50	60	....	56	50	....	....	....	56	44	50	[16] 70
Nevada	[4] 48	24	48	60	56	[11] 14	50	50	60	....	56	48	....	....	....	56	48	50	[15] 70
New Hampshire	48	25	48	[16] 60	60	....	48	50	60	[17] 50	....	50	....	32	....	56	....	....	56
New Jersey	50	25	48	60	60	....	50	50	64	....	....	....	....	....	....	55	....	....	56
New Mexico	45	24	48	60	56	14	52	50	60	....	56	50	32	....	48	56	44	50	56
New York	48	25	48	60	....	....	48	50	60	....	....	50	[6] 44	....	....	55	....	....	56
North Carolina	[4] 48	....	48	[16] 60	....	14	50	....	60	....	....	48	[19] 30	....	....	55	44	....	56
North Dakota	50	....	48	60	60	....	42	....	60	....	56	....	....	....	....	56	....	....	....
Ohio	48	24	48	60	56	....	50	50	60	....	56	48	....	....	....	56	44	50	[15] 68
Oklahoma	48	24	48	60	60	14	52	50	60	....	56	50	32	....	48	56	44	....	....
Oregon	45	28	46	....	....	....	42	....	60	....	....	....	....	....	....	....	....	....	56
Pennsylvania	50	25	47	[13] 60	60	14	48	50	60	58	56	50	....	40	50	56	44	50	56
Rhode Island	48	25	48	60	50	....	48	50	60	....	56	50	[6] 44	....	....	56	44	50	....
South Carolina	....	....	....	....	....	....	....	....	....	....	....	[20] 48	[21] 30	....	....	....	....	....	....
South Dakota	48	24	48	60	56	14	52	50	60	....	56	50	....	....	48	56	44	50	....
Tennessee	[4] 50	24	48	[13] 60	50	14	50	50	[22] 60	....	56	[7] 50	28	....	48	56	44	48	....
Texas	45	28	48	[10] 60	....	....	42	....	60	....	56	....	32	....	....	56	44	48	....
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Vermont	48	....	48	60	60	....	48	50	60	....	56	50	....	32	48	55	....	50	56
Virginia	....	28	48	[10] 60	....	14	52	....	60	....	56	50	32	....	....	56	44	48	....
Washington	[4] 45	28	48	....	....	....	42	....	60	....	....	....	....	....	....	56	....	....	56
West Virginia	....	25	48	60	....	....	52	....	60	56	....	....	[6] 44	....	....	56	44	....	....
Wisconsin	50	25	48	60	50	....	50	50	60	....	....	50	....	....	[23] 50	56	....	48	56
Wyoming	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

[1] See also "Indian corn."
[2] Not defined.
[3] For customs purposes only.
[4] Green apples.
[5] Sugar beets and mangel-wurzel.
[6] Sea-island cotton seed; upland cotton seed, 30 pounds.
[7] Bolted; unbolted, 48 pounds.
[8] Shelled.
[9] Sea-island cotton seed, 46 pounds.
[10] White beans.
[11] Native blue-grass seed; English blue-grass seed, 22 pounds.
[12] Unbolted, 48 pounds.
[13] Dried beans.
[14] Sweet corn.
[15] Indian corn in ear.
[16] Small white beans.
[17] Cracked corn.
[18] Soy beans.
[19] Sea-island cotton seed, 44 pounds.
[20] Bolted or unbolted.
[21] Seed of long staple cotton, 42 pounds.
[22] Red and white.
[23] Green.

TABLE VIII.—*Continued*

	Millet	*Oats*	*Onions* [1]	*Onion sets*	*Orchard grass seed*	*Parsnips*	*Peaches* [1]	*Peanuts (or "ground peas" *)*	*Pears* [1]	*Green peas, unshelled*	*Peas* [1]	*Potatoes*	*Sweet Potatoes*	*Red top*	*Rye*	*Timothy seed*	*Tomatoes*	*Turnips* [1]	*Wheat*
United States		[2] 32									[2] 60	[2] 60			[2] 56				[2] 60
Alabama		32									60	60	55		56			55	60
Arizona		32													56				60
Arkansas	50	32	57		14						60	60	50	14	56	60		57	60
California		32													54				60
Colorado		32	57									60			56	45			60
Connecticut		32	52			45					60	60	54		56			[3] 50	60
Delaware																			60
District of Columbia												60							
Florida	50	32	56				[4] 54	22	60			60	60		56			54	60
Georgia		32	57					*25			60	60	55		56	45		55	60
Hawaii		32													56				60
Idaho	50	32	57			50	48				[5] 60	60	50		56	45	56	55	60
Illinois	50	32	57	[6] 30	14	50	48	[7] 20	58	32	[8] 60	60	50	14	56	45	56	55	60
Indiana	50	32	48		14	55						60	55		56	45		55	60
Iowa	50	32	52	[6] 28	14	45	48	22	45	50	[8] 60	60	50	14	56	45	50	55	60
Kansas	50	32	57			52	48				[5] 60	60	50		56	45	56	55	60
Kentucky	50	32	57	[9] 36	14			*21			60	[10] 60	55		56	45		60	60
Louisiana															56				60
Maine		32	52			45					60	60			50			[3] 50	60
Maryland	[11] 50	32	54		14		[12] 40	22			[13] 60	60	60	14	56	45	60	60	60
Massachusetts		32	52			45	48	[7] 20	58	28	[14] 60	60	54		56	45	56	55	60
Michigan	50	32	54		14						60	60	56	14	56	45		58	60
Minnesota	48	32	52		14	42					60	60	55	14	56	45			60
Mississippi	50	32	57					*24			60	[10] 60	54		56	45		55	60
Missouri	50	32	57	[15] 28	14	44	48	...	48	56	[16] 60	60	56	14	56	45	45	[3] 42	60

Montana	....	32	57	....	....	50	....	....	45	....	60	60	....	....	56	45	....	50	60
Nebraska	50	32	57	25	....	50	48	....	....	....	[5] 60	60	50	....	56	45	56	55	60
Nevada	50	32	57	....	....	50	48	....	....	....	[5] 60	60	50	....	56	45	56	56	60
New Hampshire	....	32	52	....	....	45	48	[7] 20	58	....	60	[10] 60	54	....	56	45	56	55	60
New Jersey	....	30	57	....	....	....	50	....	....	....	60	60	54	....	56	45	....	....	60
New Mexico	50	32	57	[6] 30	14	42	48	22	48	....	60	60	50	....	56	45	50	56	60
New York	....	32	57	....	....	....	....	....	....	....	60	60	54	....	56	45	....	....	60
North Carolina	50	32	57	....	14	..	....	22	....	....	60	[10] 56	56	14	56	45	....	50	60
North Dakota	50	32	52	....	....	....	....	....	....	....	60	60	46	....	56	45	....	60	60
Ohio	50	32	56	28	....	50	48	....	....	....	60	[10] 60	50	....	56	45	56	60	60
Oklahoma	50	32	57	[15] 28	14	44	48	22	48	56	60	60	55	14	56	45	45	[17] 60	60
Oregon	....	32	....	....	....	....	....	....	45	....	....	60	....	....	56	....	....	....	60
Pennsylvania	50	32	50	28	14	50	48	22	50	56	60	60	54	14	56	45	60	60	60
Rhode Island	50	32	50	....	....	50	48	....	....	....	[18] 60	60	54	....	56	45	56	50	60
South Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Dakota	50	32	57	[6] 32	14	42	48	20	....	50	60	60	46	14	56	45	50	55	60
Tennessee	[19] 50	32	[20] 56	[21] 28	14	50	[22] 50	23	[23] 56	30	60	60	50	14	56	45	56	50	60
Texas	50	32	57	....	....	....	50	....	....	....	....	60	55	....	56	45	55	55	60
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Vermont	50	32	52	....	....	45	48	[7] 20	58	48	60	60	54	14	56	45	56	60	60
Virginia	50	30	57	28	14	....	....	22	....	....	[24] 60	56	56	12	56	45	....	55	60
Washington	....	32	....	....	....	....	....	....	[18] 45	....	....	60	....	....	56	....	....	....	60
West Virginia	....	32	....	....	....	....	....	....	....	....	....	60	....	....	56	45	....	....	60
Wisconsin	50	32	57	....	....	44	....	....	....	....	60	60	54	....	56	45	....	42	60
Wyoming	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

[1] Not defined.
[2] For customs purposes only.
[3] Common English turnips.
[4] Green peaches.
[5] Shelled, dry.
[6] Top sets; bottom sets, 32 pounds.
[7] Roasted; green, 22 pounds.
[8] Dried.
[9] Bottom onion sets.
[10] Irish potatoes.
[11] German and American.
[12] Peaches (peeled); unpeeled, 32 pounds.
[13] Cowpeas; dried peas, 60 pounds.
[14] Smooth; wrinkled, 56 pounds.
[15] Top onion sets.
[16] Including split peas.
[17] Common English turnips, 42 pounds.
[18] Green.
[19] German, Missouri, and Tennessee millet seeds.
[20] Matured onions.
[21] Bottom onion sets, 32 pounds.
[22] Matured.
[23] Matured pears, 56 pounds; dried pears, 26 pounds.
[24] Black-eyed peas.

* U. S. Bur. Standards, Circ. 55.

TABLES OF WEIGHTS AND MEASURES

Apothecaries' Fluid Measure:

60 minims	=	1 fluid dram
8 fluid drams	=	1 fluid ounce
16 fluid ounces	=	1 liquid pint
8 liquid pints	=	1 gallon

(British measures differ from above)

Apothecaries' Weight:

20 grains	=	1 scruple
3 scruples	=	1 dram
8 drams	=	1 ounce
12 ounces	=	1 pound

Avoirdupois Weight:

27 $\frac{11}{32}$ grains	=	1 dram	
16 drams	=	1 ounce	
16 ounces	=	1 pound	
25 pounds	=	1 short quarter	
28 pounds	=	1 long quarter	
4 quarters	=	1 hundredweight	short hundredweight = 100 pounds long hundredweight = 112 pounds
20 hundredweight	=	1 ton	short ton = 2000 pounds long ton = 2240 pounds

Circular Measure:

60 seconds	=	1 minute
60 minutes	=	1 degree
90 degrees	=	1 quadrant
4 quadrants	=	1 circle or circumference

Cubic Measure:

1728 cubic inches	=	1 cubic foot
27 cubic feet	=	1 cubic yard
144 cubic inches	=	1 board foot
128 cubic feet	=	1 cord

Dry Measure:

2 pints	=	1 quart
8 quarts	=	1 peck
4 pecks	=	1 bushel

1 barrel (for fruit, vegetables, and other dry commodities) = 7056 cubic inches = 105 dry quarts

Kitchen measures. See pages 157 and 158

Linear Measure:

12 inches	=	1 foot
3 feet	=	1 yard
5½ yards	=	1 rod or pole
40 rods	=	1 furlong
8 furlongs	=	1 statute mile (1760 yards, or 5280 feet)
3 miles	=	1 league

Linear Measures (special):

1000 mills	=	1 inch
72 points	=	1 inch
4 inches	=	1 hand
7.92 inches	=	1 surveyor's link
9 inches	=	1 span
6 feet	=	1 fathom
40 yards	=	1 bolt (cloth)
10 chains	=	1 furlong
6080.20 feet	=	1 nautical mile = 1.1516 statute miles

Liquid Measure:

4 gills	=	1 pint
2 pints	=	1 quart
4 quarts	=	1 gallon
31 ½ gallons	=	1 barrel
2 barrels	=	1 hogshead

Paper Measure:

For small papers the old measure is still in use:

24 sheets	=	1 quire
20 quires	=	1 ream (480 sheets)

TABLE OF WEIGHTS AND MEASURES—*Continued*

For papers put up in cases, bundles, or frames the following measure is now used:

25 sheets	= 1 quire
20 quires	= 1 standard ream (500 sheets)

Square Measure:

144 square inches	= 1 square foot
9 square feet	= 1 square yard
30¼ square yards	= 1 square rod or perch
160 square rods	= 1 acre
640 acres	= 1 square mile
36 square miles	= 1 township (6 miles square)

Surveyor's Measure:

7.92 inches	= 1 link (Gunter's or surveyor's)
100 links	= 1 chain (= 66 feet)
80 chains	= 1 mile

Surveyor's Area Measure:

625 square links	=1 (square) pole or square rod
16 (square) poles	=1 square chain (surveyor's)
10 square chains or 160 square rods	= 1 acre
640 acres	= 1 square mile
36 square miles	= 1 township

Time Measure:

60 seconds	= 1 minute
60 minutes	= 1 hour
24 hours	= 1 day
7 days	= 1 week
365 days	= 1 year
366 days	= 1 leap year

Troy Weight:

24 grains	= 1 pennyweight
20 pennyweights	= 1 ounce
12 ounces	= 1 pound (Troy)

Carat (for precious stones) = 200 milligrams. The carat was formerly an ambiguous term having many values in various countries.

Karat (fineness of gold) = 1/24 (by weight) gold. For example, 24 karats fine = pure gold; 18 karats fine = 18/24 pure gold.

INTERNATIONAL METRIC SYSTEM

In the international metric system the fundamental unit is the meter—the unit of length. From this the units of capacity (liter) and of weight (gram) were derived. All other units are the decimal subdivisions or multiples of these. These three units are simply related; e. g., for all practical purposes 1 cubic decimeter equals 1 liter and 1 liter of water weighs 1 kilogram. The metric tables are formed by combining the words "meter," "gram," and "liter" with the six numerical prefixes, as in the following tables:

Prefixes		*Meaning*			*Units*
milli-	=	one thousandth	$\frac{1}{1000}$	0.001	"meter" [1] for length
centi-	=	one hundredth	$\frac{1}{100}$	.01	
deci-	=	one tenth	$\frac{1}{10}$	.1	
Unit	=	one		1	"gram" [1] for weight or mass
deka-	=	ten		10	
hecto-	=	one hundred		100	"liter" [1] for capacity
kilo-	=	one thousand		1000	

[1] One meter = 39.37 inches; 1 liter = 1.0567 liquid quarts; 1 gram = 0.035 avoirdupois ounce.

INTERNATIONAL METRIC SYSTEM—*Continued*

Units of Length			*Units of Capacity*			*Units of Weight (or Mass)*		
millimeter =	0.001	meter	milliliter =	0.001	liter	milligram =	0.001	gram
centimeter =	.01	"	centiliter =	.01	"	centigram =	.01	"
decimeter =	.1	"	deciliter =	.1	"	decigram =	.1	"
METER =	1	"	LITER =	1	"	GRAM =	1	"
dekameter =	10	"	dekaliter =	10	"	dekagram =	10	"
hectometer =	100	"	hectoliter =	100	"	hectogram =	100	"
kilometer =	1000	"	kiloliter =	1000	"	kilogram =	1000	"

UNITS OF AREA

The table of areas is formed by squaring the length measures, as in our common system. For land measure 10 meters square is called an "ARE" (meaning "area"). The side of one are is about 33 feet. The hectare is 100 meters square, and, as its name indicates, is 100 ares, or about $2\frac{1}{2}$ acres.

TABLE IX.—COMPARISON OF METRIC AND CUSTOMARY UNITS FROM 1 TO 10*

LENGTH

Inches	*Millimeters*	*Inches*	*Centimeters*	*Feet*	*Meters*	*U. S. yards*	*Meters*	*U. S. miles*	*Kilometers*
0.03937 =	**1**	0.3937 =	**1**	**1**	= 0.304801	**1**	= 0.914402	0.62137 =	**1**
0.07874 =	**2**	0.7874 =	**2**	**2**	= 0.609601	1.093611	= **1**	**1** =	1.60935
0.11811 =	**3**	**1** =	2.54001	**3**	= 0.914402	**2**	= 1.828804	1.24274 =	**2**
0.15748 =	**4**	1.1811 =	**3**	3.28083	= **1**	2.187222	= **2**	1.86411 =	**3**
0.19685 =	**5**	1.5748 =	**4**	**4**	= 1.219202	**3**	= 2.743205	**2** =	3.21869
0.23622 =	**6**	1.9685 =	**5**	**5**	= 1.524003	3.280833	= **3**	2.48548 =	**4**
0.27559 =	**7**	**2** =	5.08001	**6**	= 1.828804	**4**	= 3.657607	**3** =	4.82804
0.31496 =	**8**	2.3622 =	**6**	6.56167	= **2**	4.374444	= **4**	3.10685 =	**5**
0.35433 =	**9**	2.7559 =	**7**	**7**	= 2.133604	**5**	= 4.572009	3.72822 =	**6**
1 =	25.4001	**3** =	7.62002	**8**	= 2.438405	5.468056	= **5**	**4** =	6.43739
2 =	50.8001	3.1496 =	**8**	**9**	= 2.743205	**6**	= 5.486411	4.34959 =	**7**
3 =	76.2002	3.5433 =	**9**	9.84250	= **3**	6.561667	= **6**	4.97096 =	**8**
4 =	101.6002	**4** =	10.16002	13.12333	= **4**	**7**	= 6.400813	**5** =	8.04674
5 =	127.0003	**5** =	12.70003	16.40417	= **5**	7.655278	= **7**	5.59233 =	**9**
6 =	152.4003	**6** =	15.24003	19.68500	= **6**	**8**	= 7.315215	**6** =	9.65608
7 =	177.8004	**7** =	17.78004	22.96583	= **7**	8.748889	= **8**	**7** =	11.26543
8 =	203.2004	**8** =	20.32004	26.24667	= **8**	**9**	= 8.229616	**8** =	12.87478
9 =	228.6005	**9** =	22.86005	29.52750	= **9**	9.842500	= **9**	**9** =	14.48412

*U. S.

TABLE IX.—COMPARISON OF METRIC AND CUSTOMARY UNITS FROM 1 TO 10—*Continued*

AREA

Square inches		*Square millimeters*	*Square inches*		*Square centimeters*	*Square feet*		*Square meters*	*Square yards*		*Square meters*	*Square miles*		*Square kilometers*
0.00155	=	**1**	0.1550	=	**1**	**1**	=	0.09290	**1**	=	0.8361	0.3861	=	**1**
0.00310	=	**2**	0.3100	=	**2**	**2**	=	0.18581	1.1960	=	**1**	0.7722	=	**2**
0.00465	=	**3**	0.4650	=	**3**	**3**	=	0.27871	**2**	=	1.6723	**1**	=	2.5900
0.00620	=	**4**	0.6200	=	**4**	**4**	=	0.37161	2.3920	=	**2**	1.1583	=	**3**
0.00775	=	**5**	0.7750	=	**5**	**5**	=	0.46452	**3**	=	2.5084	1.5444	=	**4**
0.00930	=	**6**	0.9300	=	**6**	**6**	=	0.55742	3.5880	=	**3**	1.9305	=	**5**
0.01085	=	**7**	**1**	=	6.452	**7**	=	0.65032	**4**	=	3.3445	**2**	=	5.1800
0.01240	=	**8**	1.0850	=	**7**	**8**	=	0.74323	4.7839	=	**4**	2.3166	=	**6**
0.01395	=	**9**	1.2400	=	**8**	**9**	=	0.83613	**5**	=	4.1807	2.7027	=	**7**
1	=	645.16	1.3950	=	**9**	10.764	=	**1**	5.9799	=	**5**	**3**	=	7.7700
2	=	1,290.33	**2**	=	12.903	21.528	=	**2**	**6**	=	5.0168	3.0888	=	**8**
3	=	1,935.49	**3**	=	19.355	32.292	=	**3**	**7**	=	5.8529	3.4749	=	**9**
4	=	2,580.65	**4**	=	25.807	43.055	=	**4**	7.1759	=	**6**	**4**	=	10.3600
5	=	3,225.81	**5**	=	32.258	53.819	=	**5**	**8**	=	6.6890	**5**	=	12.9500
6	=	3,870.98	**6**	=	38.710	64.583	=	**6**	8.3719	=	**7**	**6**	=	15.5400
7	=	4,516.14	**7**	=	45.161	75.347	=	**7**	**9**	=	7.5252	**7**	=	18.1300
8	=	5,161.30	**8**	=	51.613	86.111	=	**8**	9.5679	=	**8**	**8**	=	20.7200
9	=	5,806.46	**9**	=	58.065	96.875	=	**9**	10.7639	=	**9**	**9**	=	23.3100

TABLE IX—COMPARISON OF METRIC AND CUSTOMARY UNITS FROM 1 TO 10—*Continued.*

VOLUME / AREA—*Continued*

Cubic inches	*Cubic millimeters*	*Cubic inches*	*Cubic centimeters*	*Cubic feet*	*Cubic meters*	*Cubic yards*	*Cubic meters*	*Acres*	*Hectares*
0.000061	= **1**	0.0610	= **1**	**1**	= 0.02832	**1**	= 0.7646	**1**	= 0.4047
0.000122	= **2**	0.1220	= **2**	**2**	= 0.05663	1.3079	= **1**	**2**	= 0.8094
0.000183	= **3**	0.1831	= **3**	**3**	= 0.08495	**2**	= 1.5291	2.471	= **1**
0.000244	= **4**	0.2441	= **4**	**4**	= 0.11327	2.6159	= **2**	**3**	= 1.2141
0.000305	= **5**	0.3051	= **5**	**5**	= 0.14159	**3**	= 2.2937	**4**	= 1.6187
0.000366	= **6**	0.3661	= **6**	**6**	= 0.16990	3.9238	= **3**	4.942	= **2**
0.000427	= **7**	0.4272	= **7**	**7**	= 0.19822	**4**	= 3.0582	**5**	= 2.0234
0.000488	= **8**	0.4882	= **8**	**8**	= 0.22654	**5**	= 3.8228	**6**	= 2.4281
0.000549	= **9**	0.5492	= **9**	**9**	= 0.25485	5.2318	= **4**	**7**	= 2.8328
1	= 16,387.2	**1**	= 16.3872	35.314	= **1**	**6**	= 4.5874	7.413	= **3**
2	= 32,774.3	**2**	= 32 7743	70.629	= **2**	6.5397	= **5**	**8**	= 3.2375
3	= 49,161.5	**3**	= 49.1615	105.943	= **3**	**7**	= 5.3519	**9**	= 3.6422
4	= 65,548.6	**4**	= 65.5486	141.258	= **4**	7.8477	= **6**	9.884	= **4**
5	= 81,935.8	**5**	= 81.9358	176.572	= **5**	**8**	= 6.1165	12.355	= **5**
6	= 98,323.0	**6**	= 98.3230	211.887	= **6**	**9**	= 6.8810	14.826	= **6**
7	= 114,710.1	**7**	= 114.7101	247.201	= **7**	9.1556	= **7**	17.297	= **7**
8	= 131,097.3	**8**	= 131.0973	282.516	= **8**	10.4635	= **8**	19.768	= **8**
9	= 147,484.5	**9**	= 147.4845	317.830	= **9**	11.7715	= **9**	22 239	= **9**

TABLE IX—Comparison of Metric and Customary Units from 1 to 10—*Continued*

Capacity

Milliliter (cc.)	*U. S. liquid ounces*	*Milliliters (cc.)*	*U. S. apothecaries' drams*	*U. S. apothecaries' scruples*	*Milliliters (cc.)*	*U. S. liquid quarts*	*Liters*	*U. S. liquid gallons*	*Liters*
1	= 0.03381	**1**	= 0.2705	0.8115	= **1**	**1**	= 0.94636	0.26417	= **1**
2	= 0.06763	**2**	= 0.5410	**1**	= 1.2322	1.05668	= **1**	0.52834	= **2**
3	= 0.10144	**3**	= 0.8115	1.6231	= **2**	**2**	= 1.89272	0.79251	= **3**
4	= 0.13526	3.6967	= **1**	**2**	= 2.4645	2.11336	= **2**	**1**	= 3.78543
5	= 0.16907	**4**	= 1.0820	2.4346	= **3**	**3**	= 2.83908	1.05668	= **4**
6	= 0.20288	**5**	= 1.3525	**3**	= 3.6967	3.17005	= **3**	1.32085	= **5**
7	= 0.23670	**6**	= 1.6231	3.2461	= **4**	**4**	= 3.78543	1.58502	= **6**
8	= 0.27051	**7**	= 1.8936	**4**	= 4.9290	4.22673	= **4**	1.84919	= **7**
9	= 0.30432	7.3934	= **2**	4.0577	= **5**	**5**	= 4.73179	**2**	= 7.57087
29.574	= **1**	**8**	= 2.1641	4.8692	= **6**	5.28344	= **5**	2.11336	= **8**
59.147	= **2**	**9**	= 2.4346	**5**	= 6.1612	**6**	= 5.67815	2.37753	= **9**
88.721	= **3**	11.0901	= **3**	5.6807	= **7**	6.34009	= **6**	**3**	= 11.35630
118.295	= **4**	14.7869	= **4**	**6**	= 7.3934	**7**	= 6.62451	**4**	= 15.14174
147.869	= **5**	18.4836	= **5**	6.4923	= **8**	7.39677	= **7**	**5**	= 18.92717
177.442	= **6**	22.1803	= **6**	**7**	= 8.6257	**8**	= 7.57088	**6**	= 22.71261
207.016	= **7**	25.8770	= **7**	7.3038	= **9**	8.45345	= **8**	**7**	= 26.49804
236.590	= **8**	29.5737	= **8**	**8**	= 9.8579	**9**	= 8.51723	**8**	= 30.28348
266.163	= **9**	33.2704	= **9**	**9**	= 11.0901	9.51014	= **9**	**9**	= 34.06891

TABLE IX—COMPARISON OF METRIC AND CUSTOMARY UNITS FROM 1 TO 10—*Continued*

U. S. dry quarts	*Liters*	*U. S. pecks*	*Liters*	*Deka-liters*	*U. S. pecks*	*U. S. bushels*	*Hecto-liters*	*U. S. bushels per acre*	*Hecto-liters per hectare*
0.9081	= **1**	0.11351	= **1**	0.8810	= **1**	**1**	= 0.35239	**1**	= 0.87078
1	= 1.1012	0.22702	= **2**	**1**	= 1.1351	**2**	= 0.70479	1.14840	= **1**
1.8162	= **2**	0.34053	= **3**	1.7620	= **2**	2.83774	= **1**	**2**	= 1.74156
2	= 2.2025	0.45404	= **4**	**2**	= 2.2702	**3**	= 1.05718	2.29680	= **2**
2.7242	= **3**	0.56755	= **5**	2.6429	= **3**	**4**	= 1.40957	**3**	= 2.61233
3	= 3.3037	0.68106	= **6**	**3**	= 3.4053	**5**	= 1.76196	3.44519	= **3**
3.6323	= **4**	0.79457	= **7**	3.5239	= **4**	5.67548	= **2**	**4**	= 3.48311
4	= 4.4049	0.90808	= 8	**4**	= 4.5404	**6**	= 2.11436	4.59359	= **4**
4.5404	= **5**	**1**	= 8.80982	4.4049	= **5**	**7**	= 2.46675	**5**	= 4.35389
5	= 5.5061	1.02157	= **9**	**5**	= 5.6755	**8**	= 2.81914	5.74199	= **5**
5.4485	= **6**	**2**	= 17.61964	5.2859	= **6**	8.51323	= **3**	**6**	= 5.22467
6	= 6.6074	**3**	= 26.42946	**6**	= 6.8106	**9**	= 3.17154	6.89039	= **6**
6.3565	= **7**	**4**	= 35.23928	6.1669	= **7**	11.35097	= **4**	**7**	= 6.09545
7	= 7.7086	**5**	= 44.04910	**7**	= 7.9457	14.18871	= **5**	**8**	= 6.96622
7.2646	= **8**	**6**	= 52.85892	7.0479	= 8	17.02645	= **6**	8.03879	= **7**
8	= 8.8098	**7**	= 61.66874	7.9288	= **9**	19.86420	= **7**	**9**	= 7.83700
8.1727	= **9**	8	= 70.47856	8	= 9.0808	22.70194	= **8**	9.18719	= **8**
9	= 9.9110	**9**	= 79.28838	**9**	= 10.2159	25.53968	= **9**	10.33558	= **9**

TABLE IX.—COMPARISON OF METRIC AND CUSTOMARY UNITS FROM 1 TO 10—*Continued*

WEIGHT (OR MASS)

Grains	*Grams*	*Avoirdu-pois ounces*	*Grams*	*Troy ounces*	*Grams*	*Avoirdu-pois pounds*	*Kilo-grams*	*Troy pounds*	*Kilo-grams*
1	0.06480	0.03527	**1**	0.03215	**1**	**1**	0.45359	**1**	0.37324
2	0.12960	0.07055	**2**	0.06430	**2**	**2**	0.90718	**2**	0.74648
3	0.19440	0.10582	**3**	0.09645	**3**	2.20462	**1**	2.67923	**1**
4	0.25920	0.14110	**4**	0.12860	**4**	**3**	1.36078	**3**	1.11973
5	0.32390	0.17637	**5**	0.16075	**5**	**4**	1.81437	**4**	1.49297
6	0.38879	0.21164	**6**	0.19290	**6**	4.40924	**2**	**5**	1.86621
7	0.45359	0.24692	**7**	0.22506	**7**	**5**	2.26796	5.35846	**2**
8	0.51839	0.28219	**8**	0.25721	**8**	**6**	2.72155	**6**	2.23945
9	0.58319	0.31747	**9**	0.28936	**9**	6.61387	**3**	**7**	2.61269
15.4324	**1**	**1**	28.3495	**1**	31.10348	**7**	3.17515	**8**	2.98593
30.8647	**2**	**2**	56.6991	**2**	62.20696	**8**	3.62874	8.03769	**3**
46.2971	**3**	**3**	85.0486	**3**	93.31044	8.81849	**4**	**9**	3.35918
61.7294	**4**	**4**	113.3981	**4**	124.41392	**9**	4.08233	10.71691	**4**
77.1618	**5**	**5**	141.7476	**5**	155.51740	11.02311	**5**	13.39614	**5**
92.5941	**6**	**6**	170.0972	**6**	186.62088	13.22773	**6**	16.07537	**6**
108.0265	**7**	**7**	198.4467	**7**	217.72437	15.43236	**7**	18.75460	**7**
123.4589	**8**	**8**	226.7962	**8**	248.82785	17.63698	**8**	21.43383	**8**
138.8912	**9**	**9**	255.1457	**9**	279.93133	19.84160	**9**	24.11306	**9**

CHAPTER VI

HOUSEHOLD RECORDS

BY EDITH FLEMING BRADFORD

The business of housekeeping needs its records, not only those dealing directly with finances—the whence and whither of the income—, but those showing such facts as the quantities of staple supplies bought each season and the amounts remaining on hand. These records should include tested recipes, varying in quantity or cost from the originals, and such data as the comparative cost of supplies, and the time required to carry on different kinds of work in the routine of housekeeping. The filing of correspondence helps to prevent the accumulation of unimportant letters and acts as a reminder that replies are due. It also gives latest addresses, thus replacing the address-book which, of necessity, shows many alterations and is frequently not up to date. Magazine and newspaper clippings become of greater value when systematically arranged than when allowed to accumulate in a desk drawer or when pasted in a scrapbook. Many housekeepers try to preserve data of this nature by memory, dreading the thought of systematizing records to so great an extent. Such organization, however, may be carried out gradually, beginning with the data most frequently used and extending to other subjects of interest.

The following list of subjects may suggest a classification of household records: (1) accounts; (2) financial papers, such as insurance policies; (3) inventories of furniture, linen, and the like, with a separate card for each type of equipment, such as chairs, sheets single, sheets double; (4) comparative cost of foods having approximately the same value in the diet; (5) stock of staple food supplies; (6) tested recipes; (7) dishes suitable for each of the three meals, those quickly prepared being listed separately; (8) household hints on laundry, dyeing, and the like; (9) storage record; (10) time record for certain kinds of household work, when no interruptions occur, valuable not only to the woman who supervises the work of others, but to the one who does her own housework; (11) medical and dental record; (12) correspondence; (13) gift record, of special value to those who send many gifts at Christmas; (14) plans for the future, such as making gardens; (15) amateur photography. Films may be classified according to place or subject. Prints may be placed with films or separately under a similar classification.

HOW TO KEEP HOUSEHOLD RECORDS

A small filing cabinet of pasteboard or wood, in which the information is recorded on cards arranged according to the classification chosen, may be used. The general headings should be written or printed on cards known as guides, which are of heavier paper than are those for the records and which have on their upper edge a projection which serves to call attention to the name of the subdivision written upon it. Both classes of cards should be arranged alphabetically.

Cards 3 by 5 inches may be used for all records, although they are rather small for recipes and accounts. Many housekeepers use a card 4 by 6 inches for recipes and one that is 5 by 8 inches for accounts; but as far as possible the same size should be used in order to avoid having many filing cases.

One cabinet of wood that will harmonize with the study desk or table will be found very convenient. Such a cabinet of one drawer, will accommodate several hundred cards. A desk, with a drawer adapted to the purpose may be bought, or a drawer of suitable depth may be subdivided so that the cards will fit it. In buying a desk it is well to choose one in which the drawers may be so subdivided as to conform to the standard sizes of cards and papers. These sizes are 3 by 5 inches, 4 by 6 inches, 5 by 8 inches, and 8½ by 11 inches. The last size permits the filing of papers such as clippings, receipted bills, and correspondence in the manila folders generally used in offices. These manila folders may be classified in the same way as are the cards, the topics treated being noted on the upper left-hand edge of each. The names of the classifications, if there are several, may be written or printed on large guides placed in front of each section of folders.

HOUSEHOLD ACCOUNTS

The advantages of keeping household accounts include: (1) an accurate knowledge of the use of the family income; (2) a check on wasteful expenditures; (3) an encouragement to form a proper relationship between the various classes of expenditures; (4) an encouragement to save; (5) a protection against paying a bill twice; (6) a settlement of disputes.

Equipment.

Equipment for keeping accounts may be of the most simple kind. In the kitchen there should be a hanging hook file on which to place delivery slips and bills to await entry in the accounts. A small pad for memoranda, to which is attached a pencil, is found to be a timesaver. Either a desk or a small table with a drawer should be provided in the study or in the living-room for keeping the necessary records, which include an account book and a check book. A filing case, with compartments indexed alphabetically, serves to keep bills in order. If it is possible to have the best equipment, a desk with a drawer sufficiently large for the filing of papers, including not only bills but correspondence, is desirable.

At least some equipment is necessary in order that there may be a place for everything, a factor which contributes greatly to the satisfaction, as well as to the profit derived.

Forms of keeping accounts.

Accounts may be kept in book form, either bound or loose leaf, or on cards. The simplest method of keeping accounts is one that records merely receipts and expenditures, each in its own column, no entry being made for charged items until payment is made. For this purpose pages like form 1 (page 183) are good, receipts being kept on the left-hand page and expenditures on the right-hand page. A book in which the receipts are kept on the left half of the page and the expenditures on the right half of the same page may be used, but such a book generally does not allow sufficient space for all details of itemization. Some persons like to use a book with two columns at the right-hand side of the page, one column for receipts and one for expenditures, but with this form more care must be taken to enter the figures in the proper column.

Such a record, however, gives merely the total income and expense for any period of time without answering such questions as the amount of bank balance, of cash balance, how much has been paid for food during a certain period, how the expenditure for food compares with that for rent, how much has been spent for medical service, for wages, for recreation, for education, the amount owed, to what extent the family has been supplied with produce from the home farm or garden; or a question of dietetic significance, such as how the expense for meat and similar foods compares with that for fruit and vegetables.

In order to answer such questions, the expenditures must be analyzed. In the type of account shown in form 1 (page 183), such an analysis is difficult, and in a busy household the time is lacking to accomplish it at the end of a month or a year. If, therefore, it is agreed that little satisfaction is to be derived from a mere list of daily expenditures, a type of account that readily gives the desired information must be considered (form 2, pages 184 and 185).

Expenditures may be divided under the headings shelter, food, clothing, and miscellaneous, and as many subdivisions as desired may be used under these headings. Under shelter, for example, there may be rent, heat, light, wages and laundry, furniture and furnishings. In case the house is occupied by the owner, the rent column may be replaced by one in which are recorded such items as repairs, taxes, and insurance. The heading food may be subdivided into meat and eggs, milk and cream, fruits and vegetables, groceries and miscellaneous items. Under the heading clothing may be entered all the expenses for such supplies for the family, or an account may be opened for each individual. Miscellaneous will include such items as education, traveling expenses, medical services, allowances to children, recreation, and benevolence.

In the foregoing types of accounts all cash is entered in the receipts column; therefore, in order to prove the accuracy of the record, the difference between receipts and expenditures must agree with the sum of the bank balance, as shown by the check-book, and the cash on hand. In the plan outlined in form 2 (pages 184 and 185), the totals of the columns showing the subdivision of expenditures must agree with the total of the expenditures column.

If the number of columns is too large to be accommodated on one page, a separate page of columns may be ruled for each of the divisions: cash account, charge account, produce, shelter, food, clothing, and miscellaneous (form 3, pages 186 to 189). This necessitates the entering of dates on the proper page of subdivisions, as well as in the cash account, the charge account, or the produce account. The ruling of pages in form 3 (pages 186 to 189) will explain this matter more fully.

As much detail as is desired may be given in the itemization columns. More than one item may be written on each line, if dates are inserted where there is a change. The charge accounts of a household are generally with so few firms that either of the forms shown on pages 184 and 187 may be used satisfactorily. If the firms with whom charge accounts are kept are numerous, however, it may be well to devote a separate page to each firm.

If it is considered desirable to keep a separate record of the bank account and the cash account, another subdivision may be made as shown in form 3 (page 186). The advantage of this method is that it serves as a test of the accuracy of the bank book and the check book, and it also shows the state of the bank account without reference to any other record.

The opening entry of a cash account must be "balance on hand," the bank balance being shown in the deposits column, and the cash balance in the receipts column. Later entries will be as follows:

Bank deposits in the deposits column.

Withdrawals from the bank in both the withdrawals and the receipts columns.

Receipts for current use in the receipts column.

Expenditures, whether by check or in cash, in the expenditures column, as well as in the proper column on the page of the subdivision of expenditures.

Goods for which payment is not made, in the right-hand column of the charge account and also on the proper page of subdivisions.

Payment of a charged item or items in the expenditures column, and in the left-hand column of the charge account. In entering such items, reference should be made to the name of the firm and the date on which the bill was rendered.

Receipt of produce, valued at current market rates, in the produce account and on the proper page of subdivisions.

If an account such as that indicated in form 3 (pages 186 to 189) is to be kept, a loose-leaf account book may be used so that additional sheets may be inserted where they are needed. If a bound book is preferred and it is necessary to rule all the sheets used, the book may be divided into portions, each of which consists of a sufficient number of pages to accommodate a year's records.

To balance accounts

It is desirable that accounts be balanced at least once each week in order that errors and omissions may be avoided. In balancing accounts, totals of all columns may be inserted in small pencil figures, which, if not erased, make it unnecessary to repeat the addition at the end of the accounting period. A test of the accuracy of such records is as follows:

Deposits minus withdrawals = bank balance

(This must agree with the check book and with the bank-book balance minus the checks not yet presented.)

Receipts minus expenditures = cash on hand

Balance in the charge accounts = amount owing

Total of all subdivisions of expenditures = total of expenditures in the cash account, plus produce, plus balance in the charge account.

To pass to a new page, the totals are entered at the foot of the completed page and again at the top of the new page in the corresponding columns, the word *forward* being written in the itemization column on each page.

To close accounts.

Accounts may be closed monthly or yearly according to whether it is desired to compare the records of: (1) different months of the same year; (2) corresponding months of different years; or (3) yearly totals. At the end of each accounting period, however, the old account should be closed by entering, preferably in red ink, the bank balance in the withdrawals column and the cash balance in the expenditures column of the cash account, and by then obtaining the totals of all the columns. The same balances should be carried forward to the deposits and the receipts columns, respectively, of the new account, as shown in form 3.

Summaries for comparison.

Monthly or annual summaries may be arranged in the following form:

Income		$.........
Expenditures:		
Food	$.........	
Shelter	$.........	
Clothing	$.........	
Miscellaneous	$.........	
Total		$.........
Balance		$.........
Produce account	$.........	

As an example, on pages 183 to 189 are found entries necessary to record the following facts in the three types of accounts:

On May 1, 1916, the bank balance was $285.46 and the cash balance $17.64. Bought from A. B. Jones on account 6 pounds of butter at $.35 a pound, $2.10; 2 bushels of potatoes at $1.00 a bushel, $2.00; 10 pounds of sugar at $.08 a pound, $.80.

May 2, paid rent by check, $30.00; bought for cash from L. K. Harvey, 3 dozen eggs at $.22 a dozen, $.66; received check for $50.00 from F. A. Brown for board and deposited it; received from J. Williams, salary, $30.00, of which $20.00 was deposited and $10.00 retained in cash.

May 3, paid account of May 1 with A. B. Jones, $4.90.

May 5, bought 9 yards of dress goods at $1.25 a yard, $11.25; gathered garden vegetables worth $.20 for home use; paid $2.00 for magazine subscription to May 1, 1917.

By checking these accounts according to form 3, the following results are obtained:

BANK ACCOUNT:		
Deposits	$355.46	
Withdrawals	30.00	
Balance		$325.46
CASH ACCOUNT:		
Receipts	$57.64	
Expenditures	48.81	
Balance		$ 8.83
TOTAL BALANCE		$334 29
AMOUNT OWING		0.00
PRODUCE	$ .20	
EXPENDITURES:		
Shelter	$ 30.00	
Food	5.76	
Clothing	11.25	
Miscellaneous:		
Education	2.00	
Total		$ 49.01

RECEIPTS

1916 Date		Items		
May	1	Balance (Bank 285.46, Cash 17.64)	303	10
	2	F. A. Brown, board, check	50	00
		J. Williams, salary	30	00
		[Subtotals]	383	10

FORM 1.—(Left-hand page.) The simplest form in which an account can be kept is one that records merely receipts and expenditures. The first and last lines of each page are reserved for the totals, which are carried from the bottom of one page to the top of the next page.

EXPENDITURES

1916 Date		Items		
May	2	Rent check	30	00
		Eggs, 3 doz. at .22, L. K. Harvey		66
	3	A. B. Jones account of May 1	4	90
	5	Dress goods	11	25
		Subscription to magazine to May 1, 1917	2	00
		[Subtotals]	48	81

FORM. 1.—(Right-hand page.) Charge accounts are not entered until paid. Subtotals are made in small pencil figures when the account is checked.

1916 Date		*Items*	*Receipts*		*Expenditures*		*Charge Accounts*			
May	1	Balance (Bank 285.46, Cash 17.64)	303	10						
		A. B. Jones on account:								
		6 lbs. butter at .35								
		2 bu. potatoes at 1.00								
		10 lbs. sugar at .08							4	90
	2	Rent, check			30	00				
		Eggs, 3 doz. at .22, L. K. Harvey				66				
		F. A. Brown, board, check	50	00						
		J. Williams, salary	30	00						
	3	A. B. Jones account May 1			4	90	4	90		
	5	Dress goods, 11.25			11	25				
		Subscription to magazine, to May 1, 1917, 2.00			2	00				
		[Subtotals]	383	10	48	81	4	90	4	90

FORM 2.—(Left-hand page.) A type of account that readily gives an analysis of expenditures. Charged items are entered first in the right-hand column of charge accounts and, when paid, in the expenditure column and in the left-hand column of charge accounts.

SUBDIVISION OF EXPENDITURES

Shelter		Food		Clothing		*Miscellaneous*									
						Education									
		4	90												
30	00														
			66												
				11	25										
						2	00								
30	00	5	56	11	25	2	00								

FORM 2.—(Right-hand page.) Subdivisions under miscellaneous depend on individual requirements.

CASH ACCOUNT

1916 Date		*Items*	*Bank Account*				*Cash Account*			
			Deposits		*Withdrawals*		*Receipts*		*Expenditures*	
May	1	Balance	285	46			17	64		
	2	Rent, check			30	00	30	00	30	00
		Eggs, 3 doz. at .22, L. K. Harvey								66
		F. A. Brown, board, check	50	00						
		J. Williams, salary	20	00			10	00		
	3	A. B. Jones, account May 1							1	90
	5	Dress goods							11	25
		Subscription to magazine t. May 1, 1917							2	00
		Garden vegetables								
		[Subtotals]	355	46	30	00	57	64	48	81

FORM 3.—The bank account is separated from the cash account in this form, but the expenditures column includes payment made by check as well as in cash.

CHARGE ACCOUNT

1916 Date		*From whom purchased*				
May	1	A. B. Jones			4	90
		6 lbs. butter at .35; 2 bu. potatoes at 1.00; 10 lbs. sugar at .09				
	3	A. B. Jones, account May 1	4	90		
		[Subtotals]	4	90	4	90

Form 3.—The charge account in this form differs from the charge account in Form 2 in having an itemization column separate from that of the cash account. The entries in the two forms are identical.

PRODUCE

1916 Date		*Article*		
May	5	Vegetables		20

Form 3.—In some cases it is desirable to know to what extent the family has been supplied with produce from the farm or garden. It is difficult to keep an accurate account of produce, but at least a fair estimate of such income can thus be made.

FOOD

1916 Date		*Meat and eggs*		*Fruits and vegetables*		*Groceries and miscellaneous*					
May	2		66								
	3			2	00	2	90				
	5				20						

Form 3.—If more subdivisions than can be accommodated on one page are desired, a separate page of columns may be ruled for each subdivision. This necessitates the entering of dates on the proper page of subdivisions as well as in the cash account, the charge account, or the produce account. Subdivisions are determined by the individual need.

SHELTER

1916 Date		*Rent*							
May	2	30	00						

Form 3.—The number of subdivisions is limited only by the space on the page.

CLOTHING

1916 Date																	
May	5	11	25														

Form 3.—A separate column may be reserved for each member of the family; or expenditures may be classified according to the type of clothing, for example, dresses, suits, underwear.

MISCELLANEOUS

1916 Date		*Education*															
May	5	2	00														

Form 3.—Subdivisions under this heading should be those that will best serve the individual.

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CHAPTER VII

HEAT AND LIGHT

The enormous waste of fuel in the homes of this country is coming to claim the attention of thoughtful householders. In both the heating of dwellings and the cooking of food, careful choice of equipment, intelligent operation, and forethought in planning will go far toward saving one of the world's most valuable commodities.

CARE OF FIRES

A few general rules for controlling heating and cooking fires are as follows:

1. To increase the amount of heat, open drafts which let air into the ash pit, and with soft coal and wood when fresh fuel has been added admit some air by draft immediately over the fire to help burn the combustible gases coming from the fresh fuel. For all fires burning without flame keep this draft closed.
2. To decrease the amount of heat, close all drafts tight, being sure that ash-pit door and drafts particularly are tight and that the ash pit itself is free from air leaks; if this is not sufficient, open a check draft in the smoke pipe—never the one in the fire door or the door itself, as this practice is extremely wasteful of fuel.
3. To insure economy of fuel, see that all flues and surfaces which the hot gases pass on their way to the chimney are cleaned every two or three weeks.
4. Be very careful in the use of the damper which closes off the smoke pipe, as such a damper is dangerous if closed too tight and can be left wide open or taken out entirely provided the ash pit is tight and the above directions are followed.
5. Keep the direct draft in a cooking stove or range closed except in hot weather, or when starting a fire.

RADIATION *

Hot objects, like stoves and steam pipes, lose much of their heat by radiation, and the blacker the object the more it will

* From U. S. Bur. Standards, Circ. 55.

lose; hence, stoves and steam pipes should be black if they are intended to give out heat, but hot-air pipes and cooking utensils should be bright, for example tinned or nickeled, in order to lose as little heat as possible. A stove nickel plated all over will give out only about half as much heat as the same stove at the same temperature if black.

A bright nickel or aluminum kettle will cool very much more slowly than a black kettle. On a coal or wood stove or directly over a coal or wood fire, a kettle is heated largely by heat radiated from the stove or fire; therefore, if the bottom is black the kettle will heat more rapidly than if bright. Over a gas, gasoline, or similar blue flame the condition of the bottom will not make so much difference, since here most of the heat is received by contact with the hot gases. The best kettle for general use is, therefore, one with the bottom black and the remainder polished, but for use on a gas stove it makes little difference whether the bottom is black or not.

COMPARATIVE COST OF VARIOUS METHODS OF HEATING

The ideal heating system is one that will give a uniform temperature throughout the house, if desired. Furnaces are more likely to produce this result than are stoves.

A stove seldom heats more than two rooms and often only one. A "drum," or radiator, for utilizing otherwise wasted heat, will remove the chill from an upstairs room but generally will not give warmth enough for a sitting-room. The care of several stoves is greater than that of one central plant.

TABLE X.—COMPARISON BETWEEN STOVES AND HOT-AIR FURNACE

Method of heating	*Initial cost including installation*	*Coal used during one year*	*Number of rooms heated*	*Temperature*
Two stoves	$90, and drums for upper rooms, $8	12 to 14 tons of more expensive coal	5	Uneven
Hot-air furnace	$100 to $150	8 to 12 tons	8 to 10	Fairly even

A hot-air system is the cheapest system to install but the most expensive in the amount of fuel used.

A steam system costs about twice as much as hot-air but it requires less fuel.

A hot-water system costs about three times as much as hot-air but requires less fuel than does either a hot-air or a steam system.

FACTORS GOVERNING CONSUMPTION OF FUEL AND CONVENIENCE OF OPERATION *

Climate.

Variable weather and high winds make difficult the economical use of fuel and convenient operation.

Size and type of dwelling.

Fuel consumption varies with the size of the house, the number of rooms heated, the thoroughness of construction, to a certain extent the building material, and the distribution of the radiators.

Location of dwelling.

A house standing alone on a hill requires much more heat than one in a closely built row standing in a hollow.

Heating and ventilating system used.

Convenience of operation of any house-heating apparatus is largely dependent on the system of heating and ventilation employed. The cost of heating will also depend, but to a less degree, on the type of equipment. Fuel economy and convenience are against a separate fire in each room unless the house is small or only a small part of it is to be warmed, except in those localities where natural gas is available at low rates or the duration of cold weather is brief. In comparatively few homes is any special provision made for removing the foul air, leakage from windows and doors being the usual reliance, particularly in a house heated by a hot-air furnace. If an indirect steam or hot-

* Condensed from Saving Fuel in Heating a House. L. P. Breckenridge and S. B. Flagg. Bur. of Mines, U. S. Dept. of the Interior, Tech. Paper 97.

water system is installed, means of removing foul air are more frequently provided, either by vent stacks leading into the attic or through the roof, with register openings in different rooms, or by open grates, the flues for which can be equipped with dampers to regulate the removal of foul air. The system sometimes fails to work satisfactorily if provision is not made for the escape of foul air from a room, as the fresh warm air will not continue to flow in unless an equal amount escapes. The first cost of heating by the hot-air furnace is less than that of either the steam or the hot-water system, but to maintain equal temperature conditions may require the burning of more fuel, whether the furnace heats air taken from outdoors or reheats air already in the house. Evidently, reheating air will require less fuel, and consequently less attention to the furnace, than heating fresh air, but the ventilation will not be good. In homes heated by steam or hot water, the method of heating, whether direct or indirect, and the provision, if any, for removing foul air will affect the consumption of fuel, which will vary with the percentage of the total radiation that is indirect and with the amount of warm air removed through vent stacks or grates.

A furnace-heating system maintains a less even temperature because less heat is stored in it. In this respect, hot-water heating has a distinct advantage over both steam and hot air because the large quantity of water in the boiler, pipes, and radiators can maintain the temperature throughout the house for a considerable time after the fire dies down. In addition, the maintenance of an even temperature in mild weather is easier with the hot-water system because the temperature of the water in the radiators, hence the amount of heat given off, can be controlled within wide limits.

Size of boiler and furnace.

If to supply the necessary heat requires the consumption of 20 pounds of fuel an hour and the boiler or furnace is to keep this up for eight hours without attention, it is evident that the fire pot must be large enough to hold 160 pounds of fuel, and in addition the quantity necessary to rekindle a fresh charge, this quantity being ordinarily assumed to be 20 per cent of the quantity of fuel in the fire pot after the firing, or in this case 40 pounds. Hence the fire pot must hold 200 pounds of fuel and still leave space for combustion.

If anthracite coal, bituminous coal, and coke are available and each has such heating value that 20 pounds of it will be required an hour to supply heat, the fire-pot space occupied by an eight-hour charge of each fuel may be figured by dividing 200 by the weight a cubic foot of each fuel, the space thus calculated being approximately 3.6 cubic feet for anthracite, 4.0 cubic feet for bituminous coal, and 5.7 cubic feet for coke. Therefore, if the fire pot were designed for anthracite, it would hold coke enough for a firing period of approximately five hours instead of eight.

Not only is the capacity of the fire pot important, but its depth should receive consideration. If the full-rated load is to be carried without attention to the fire for a minimum period of eight hours, the depth of the fuel-bed should be at least 12 inches. A heater that is to burn coke should be designed for a greater depth—probably 24 inches—on account of the bulkiness of the fuel and the different combustion conditions required for burning it satisfactorily. In fact, one of the largest manufacturers of boilers for heating houses by steam or hot water now designs such equipment for a fuel-bed 18 inches deep when anthracite is to be used.

Regarding the necessary size of fire pot, another detail that affects both economy and convenience of operation is the combustion space above the fuel-bed. Any unburned combustible gases that leave the fire pot are rapidly cooled in passing over the heat-absorbing surfaces between the fire pot and the smoke pipe, and their temperature is quickly brought below that necessary for ignition. If either anthracite coal or coke is to be burned, a relatively small combustion space above the fuel-bed will be required because combustion takes place in or close to the fuel-bed. If bituminous coal is to be used, however, more space should be provided for burning the combustible gases rising from the fuel-bed, or a considerable part of these gases will escape unburned, the flue surfaces will become coated with soot, and the heat losses will be large.

Another important detail, if bituminous coal is to be used, is the cross section for the gas passages between the fire pot and the smoke pipe. If the passages are not large enough, the draft may be cut down by the accumulation of soot in the flues, possibly to such an extent that the fire will go out. Also, if bituminous coal is to be used, the flues should be of such size and so arranged as to invite frequent and easy cleaning.

Obviously, if the heater is smaller than the proper size, fire at shorter intervals will be necessary, drafts will have to be kept open, and the temperature of the escaping gases will be higher than if a heater of proper size is installed—between 375° and 475° F. in ordinary winter weather. The inconvenience resulting from too large a boiler or furnace is less than from one under size, but careful handling will be necessary to control the fire satisfactorily in mild weather.

Each heater has a particular capacity at which its efficiency is highest, but if the heater be properly designed, within a certain range of capacity the efficiency will be practically equal to the maximum. The equipment selected should be one that during most of the heating season will be operated within these limits, but will take care of maximum demands for a short time.

Kind of fuel used.

The most desirable fuels are, as a rule, the most expensive. It may be possible to burn some of the smaller sizes of anthracite with the furnace or egg size and thus effect a saving. The price a ton of these smaller sizes is less in proportion to their calorific value because they are in less demand and they can be used to advantage in banking the fire overnight or in carrying a slow fire in moderate weather. Pea coal is probably the best size for such use, but unfortunately it and the smaller sizes are obtained with difficulty in many of the markets where the larger, or domestic, sizes are sold.

Among the various kinds and grades of bituminous coal, the differences in fuel value and in their physical characteristics are much greater than among anthracites, and for that reason should receive especial attention. In every locality a number of coals will be available and the most satisfactory one in any particular case will usually have to be determined by trial, unless the characteristics of each and the effects of these are known.

Uniformity of size is a desirable characteristic, as it permits easier control of the fire. This is particularly true of anthracite, a mixture of sizes often accounting for poor results from a certain lot of coal. Sized or screened bituminous coal may be bought for its greater convenience, even though its cost may exceed that of lump coal or run-of-mine. In some localities slack coal has been burned successfully, although it is believed that this would not ordinarily be possible because of the strong draft required.

Care of furnace.

The heater should receive regular attention, and if the demands for heat are intelligently anticipated, as they ordinarily can be, the house can be warmed with minimum trouble and fuel. When the rooms become too warm, the fire should be checked by stopping the admission of air under the grate and decreasing the draft by opening the "check damper." If, as often is done, the ash-pit damper or the ash-pit door be allowed to remain open, and the draft reduced by opening the fire door, the combustion of the fuel continues, although at a slower rate, but the cold air entering the fire door chills the heater so that little heat is realized from the coal.

Sometimes the draft is so strong that the difficulty of controlling the fire is increased, especially when the demand for heat is small or the fire is to be banked. To facilitate control under such conditions, it is usually advisable to have, besides the check damper, a plain damper in the smoke pipe. This damper should fit the smoke pipe loosely and must never be entirely closed; during most of the heating season it can be kept partly closed, but during severe weather, when more heat is required, it can be opened wide. Sometimes the draft may be insufficient to burn the necessary quantity of the particular fuel used. If such a condition is always noticed in severe weather, the heater may be too small, the smoke pipe may be choked or be poorly fitted to the heater or to the chimney, or the chimney may be too small or be obstructed by soot or debris.

If the draft trouble proves to be due to leaky connections or to obstructions, it can readily be corrected. If the heater or the chimney is too small, the difficulties may be lessened either by firing more frequently and keeping the fuel-bed thinner, or by using larger coal, or fairly uniform size, in order that the air may more easily flow through the fuel-bed. Conversely if the draft is very strong, a smaller size of coal may possibly be used to good advantage. Under no circumstances should the top of the chimney be lower than the highest part of the roof, or a current of air may be forced down the chimney and the basement be filled with smoke when the wind blows in certain directions. Similar trouble may be experienced if the chimney is not as high as an adjoining building.

If the bottom of the ash pit is on a level with the floor, or only a short distance below the grates, as is ordinarily the case, ashes cannot be allowed to accumulate under the grates for more than two days, or possibly more than one day, except in moderate weather.

Brightly tinned hot-air furnace pipes often lose less heat when bare than they do when covered with one or two layers of asbestos paper, since the latter radiates heat so much more readily than the bright tin as more than to balance the insulating effect of the thin asbestos covering. Of course if the pipes were originally black, the covering would be useful, and if the insulating material were thick enough ($^3/_8$ inch or more) it would save heat even on bright tin pipes.*

SUGGESTIONS FOR FIRING AND CLEANING A FURNACE †

Suggestions for firing and cleaning a furnace that apply regardless of the fuel used may be given as follows:

* U. S. Bur. Standards, Circ. 55.

† L. P. Breckenridge and S. B. Flagg. U. S. Bur. Mines, Tech. Paper 97.

The fire should be attended to regularly, and not left until it has burned low and heat is needed throughout the house. Often the need can be anticipated and by attention at the proper time trouble can be avoided. In addition, economy of fuel is more likely to be obtained by fairly uniform rates of burning than by attempting to supply a large amount of heat in a short period and then suddenly checking the fire.

The size of the coal fired should be as nearly uniform as possible. Using coal of uneven size prevents an even flow of air through the fuel-bed and increases the tendency of the fire to burn through in spots.

One should try to keep the fuel-bed free from air holes, as they cause waste of fuel and may prevent the heater from maintaining the desired temperature.

Excessive shaking of the grates should be avoided and thus the amount of coal lost by falling into the ash pit reduced. Ordinarily, the shaking of the grates should be stopped as soon as bright particles begin to drop through or, under some conditions, as soon as light from the fuel-bed begins to show in the ash pit.

When the demand for heat is urgent or the fire must be built up quickly, the fuel-bed must be kept uniformly thick, but not too thick, using the coarser part of the coal and all the draft available. Air will then flow freely through the entire fuel-bed and burn the coal at a maximum rate. Under such conditions, the firings should be made at frequent intervals and small charges used, so that the fresh fuel will only for a short time chill the temperature of the fire pot. When heavy firings are made the fresh fuel not only increases the resistance to flow of air through the fuel-bed, so that the rate of combustion is lowered, but it acts as a cold blanket to screen the heating surfaces from the radiant heat of the fuel-bed.

In mild weather it is well to leave on the grates a layer of ashes under the active fuel-bed. This layer will increase the resistance to the flow of air through the fuel-bed and facilitate the maintenance of the low rate of combustion required in such weather; also, it will cut off some of the grate surface.

Clinkers should be kept worked out of the fuel-bed, for they obstruct the flow of air through it, clog the grates, and may break the parts of shaking grates.

Heating surfaces, or flues as they are sometimes called if the heater be a boiler, must be swept clean so that they will readily absorb heat. Soot cuts down the heat-absorbing power of any heating surface very rapidly, and, therefore, should not be allowed to accumulate. Ashes should not be allowed to pile up under the grates in the ash pit, for they will seal off the air from part of the grate surface and may cause the grate-bars to be burned and warped.

Coal as free from slate and ash as possible should be purchased.

ADVANTAGES AND DISADVANTAGES OF VARIOUS FUELS

Some of the advantages and disadvantages of various fuels for residence heating have been mentioned. These and some others are summarized in the table on page 201:

LIGHTING

Although electricity is in many ways the most desirable form of artificial light, other lights may still have certain advantages. The most effective use of any type of light should be studied for both economic and hygienic reasons.

Types of lights and their care.

Candles.

The use of candles is now limited almost entirely to decorative lighting. Candle light is expensive in comparison with other lights.

Kerosene.

Kerosene gives a soft light that is easy on the eyes if it is properly shaded by a slightly bluish chimney. The disadvantages of kerosene lighting are the labor of cleaning and filling the lamps, the odor and the vitiation of the air, and the danger of explosion. Following are some suggestions for the care of kerosene lamps:

TABLE XI.—ADVANTAGES AND DISADVANTAGES OF VARIOUS FUELS AND OF ELECTRICITY [1]

Fuel	*Advantages*	*Disadvantages*
Wood	(*a*) Cleanliness, (*b*) cheerful fire, (*c*) quick increase of heat, (*d*) cheap in some localities.	(*a*) Low fuel value, (*b*) large storage space necessary, (*c*) labor in preparation, (*d*) scarcity, (*e*) does not hold fire long, (*f*) unsteady heat.
Anthracite	(*a*) Cleanliness, (*b*) easy control of fire, (*c*) easier to realize heat in coal than is the case with other coals, (*d*) steady heat.	(*a*) High price, (*b*) difficulty of obtaining, (*c*) slower response to change of drafts.
Bituminous coal	(*a*) Low price, (*b*) availability, (*c*) high heat value (in the best grades), (*d*) low percentage of inert matter (in the best grades).	(*a*) Dirty, (*b*) smoke produced, (*c*) more attention to fire and furnace necessary than with anthracite.
Subbituminous coal and lignite.	(*a*) Relatively low price, (*b*) availability (in some regions), (*c*) responds quickly to opening of drafts.	(*a*) Slakes and deteriorates on exposure to air, (*b*) takes fire spontaneously in piles, (*c*) heat value generally low, (*d*) heat in fuel difficult to realize, (*e*) fires do not keep well, (*f*) gases generated over fire pot sometimes burn in smoke pipe, causing excessive heating.
Peat	(*a*) In general, the same as for wood.	(*a*) Low heat value, (*b*) bulkiness.
Coke	(*a*) Cleanliness, (*b*) responds quickly to opening of drafts, (*c*) fairly high heat value.	(*a*) Bulkiness, (*b*) liability of fire going out if not properly handled, (*c*) fire requires rather frequent attention unless fire pot is deep.
Oil	(*a*) High heat value, (*b*) immediate increase of heat, (*c*) cleanliness, (*d*) small storage space necessary.	(*a*) High price, (*b*) difficulty of safe storage.
Gas	(*a*) Ease of control, (*b*) cleanliness, (*c*) convenience, (*d*) immediate increase of heat.	(*a*) High price in many places.
Electricity	(*a*) Every advantage	(*a*) High price.

[1] L. P. Breckenridge and S. B. Flagg. U. S. Bur. Mines, Tech. Paper 97.

1. Fill lamps daily if they are in use. Do not fill them too full. 2. Keep the wicks low when lamps are not lighted. 3. Do not turn the wicks low when the lamps are lighted, because too little air is allowed for burning, and ill-smelling gases are given off. 4. Blow out a lamp by a cross-wise motion at the top. Do not blow into the chimney. A paper may be held at the top on one side and a current of air directed against it. 5. Occasionally boil the burners in a solution of washing-soda or in strong soapsuds.

Acetylene, air gas, and Blau gas.

Lighting by acetylene, air gas, or Blau gas is fairly common in village and country homes. It is, however, in general more expensive than the gas or electric light available in larger towns. Acetylene gives a brilliant white light. Its greatest disadvantage is the danger of explosion from careless handling. The products of combustion are not given off in great amounts.

Gas.

Mantles should always be used on gas burners, since they give much more and a steadier light for a given amount of gas than does an open flame (Fig. 46). The saving in gas will more than pay for the lamp and mantles. The tubes of drop lights and stoves should be handled carefully in order to prevent their cracking and allowing gas to escape.

*Electricity.**

Of electric lamps three kinds are common in household

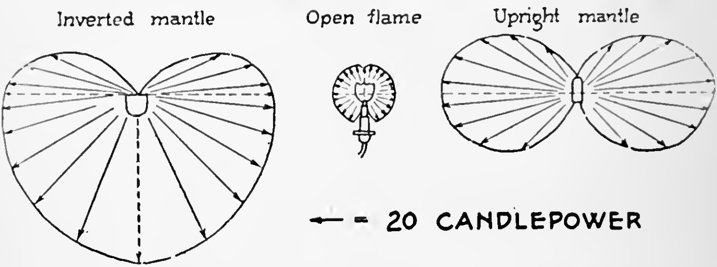

FIG. 46.*—Comparison of amount of light given by different gas lamps. Each lamp is supposed to burn 5 cubic feet an hour, costing ½ cent if gas is $1.00 a 1000 cubic feet. Note that the mantle lamp gives four or five times as much light as the open flame. The inverted mantle gives more light downward and less upward than the upright mantle.

use. These are the ordinary carbon, the metallized carbon or "Gem," and the tungsten lamp. Nearly all of the last kind sold in this country bear the trade name "Mazda." All three kinds are commonly marked with the number of watts (power) they take when used at the number of volts (electrical pressure) also marked on the lamp. When electricity is paid for at a certain rate a kilowatt hour, the cost of current for any lamp is easily calculated. The kilowatt hour is 1000 watt hours, and the number of watt hours used by any electrical device is simply the watts times the number of hours burned. For example, a 50-watt lamp in twenty hours uses 1,000 watt hours or 1 kilowatt hour; at 10 cents a kilowatt hour current for such a

* U. S. Bur. Standards, Circ. 55.

lamp costs one-half cent an hour. This is true of any 50-watt lamp without regard to the kind of filament it has. The amounts of light produced by different kinds of filaments are, however, decidedly different (Fig. 47). If the voltage supplied is lower than the lamps are intended for, the watts taken by the lamps are reduced somewhat, but the light is reduced a great deal more. The amount of light obtained from a given amount of electric

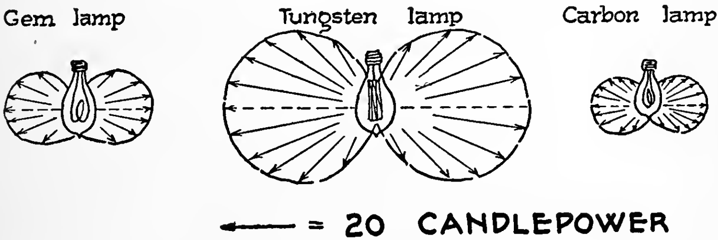

Fig. 47.—Comparison of amount of light given by different electric lamps. For comparison a consumption of 50 watts is assumed, although tungsten lamps are not usually made in this size. Fifty watts at 10 cents a kilowatt hour costs ½ cent an hour, and gives 12 to 16 candles in a carbon lamp and 40 to 45 in a tungsten lamp. All lamps give different candle-power at different angles. Each arrow in the figure is proportional to the candle-power in its direction.

energy depends, therefore, on the voltage. Under fair conditions the amount of light and the corresponding cost for current (at 10 cents a kilowatt hour) would be about as follows:

TABLE XII

Kind of lamp	*Candles per watt*	*Cost for 1,000 candle hours in cents*
Carbon	0.25 to 0.33	30 to 40
Gem	About 0.40	25
Tungsten	0.80 to 1.00	10 to 12.5

From a 60-watt lamp, for example, the candle power obtained is 15 to 20 for a carbon lamp, 24 for the Gem, and 56 for the tungsten.

Comparative cost of various common lights * (Fig. 48).

For the production of light a great variety of lamps are available, and in some kinds remarkable improvements have been made in the last few years. These improvements have made it possible in many cases either to improve the lighting of the home without increasing the cost or to reduce the cost.

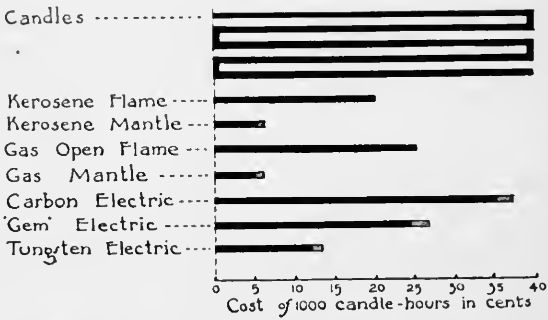

FIG. 48.—Relative cost of producing a given amount of light by various illuminants at usual prices. Costs are based on the following prices: Candles, 12 cents a pound; kerosene, 15 cents a gallon; gas, $1 for 1000 cubic feet; electricity 10 cents a kilowatt hour. The solid lines represent cost of fuel or of current, the shaded parts the cost of the mantles and bulbs. Where prices are different from those given above, costs will be correspondingly different.

The total economic gain which is made possible by doubling the efficiency of production of light is almost incalculable. To consider only one item, it has been estimated by good authorities that the liberal use of the newer lamps might reduce the yearly consumption of coal in the United States by $8,000,000. The general tendency has been, however, not to reduce the amount of power used, but rather to use more light. The ability to produce so much more light without increasing the cost has encouraged the development of methods of lighting in which attention is given primarily to artistic appearance and

* U. S. Bur. Standards, Circ. 55.

to the comfort of the user rather than to getting as much light as possible out of a fixture.

The cost of lighting by any method depends to some extent on local conditions, and the statements of cost given below will apply only approximately in any particular case. The cost will naturally depend on the candle power of lamps used and the time the lamps burn. In order to make comparisons between different kinds of lamps, it is convenient to consider a definite amount of lighting, which is obtained by multiplying the candle power of the lamps burned by the number of hours they burn. For example, 1,000 candle-hours of lighting may be obtained by burning a 10-candle lamp 100 hours or a 50-candle lamp 20 hours, but if the lamps are of the same kind the cost will be about the same. Calculations of the cost of producing 1,000 candle-hours by different lamps are sometimes useful in choosing between lamps, but of course it does not necessarily follow that the lamp for which this cost is lowest is most economical for household use.

Methods of distributing light.

The three methods of lighting, direct, indirect, and semi-indirect, are dependent for their efficiency on the type of shade or reflector employed. By means of reflectors, light may be concentrated on a small spot or spread out over a large area.

In the direct method of lighting, the light falls or is reflected directly on the objects to be lighted. Although the maximum amount of light is furnished by this method, the disadvantages of a light that is too brilliant and concentrated are now recognized. If a drop light is used for close work, it is advisable at the same time to have another light for the general illumination of the room in order to prevent a strain on the eyes produced by the contrast of a small brilliantly lighted area in a practically dark room.

In indirect lighting all the light is reflected upward by an opaque reflector and returned to the room diffused generally from the ceiling. This method is the most comfortable for the eyes, but the most expensive.

In semi-indirect lighting a diffusing bowl allows some of the light to pass through the bowl to the room and the remainder to be thrown up to the ceiling. This is a good method for the general illumination of a room.

CHAPTER VIII

STOVES AND COOKERS

Every kitchen should be equipped with a good range and a fireless cooker. If a coal or a wood range is used in combination with a fireless cooker, the two should be near enough together to prevent much loss of heat in transferring the food from the range to the cooker. Sometimes the two pieces of equipment are combined in gas or electric stoves, the oven being insulated so that after it becomes thoroughly heated the heat may be retained long enough to cook food without the use of more fuel. Such stoves are more expensive than the ordinary type, but the saving of fuel throughout the lifetime of the range would doubtless justify the increased cost in the beginning.

A coal or wood stove which is used in winter for heating as well as cooking should be supplemented by a kerosene stove or some other kind that will help to keep the kitchen cool in hot weather. With a kerosene stove and a fireless cooker, the discomfort of a hot kitchen in summer and the waste of unnecessary heat may be avoided.

Any kind of kitchen range should be as free from dirt-collecting crevices and grooves as possible. In selecting, attention should be paid to the possibilities of convenient and thorough cleaning.

Kerosene, gas, and electric stoves are often built with the oven at such a height that stooping is unnecessary. There is no reason why such a location should not be better in every way than the customary one which has been borrowed from coal stoves. Ovens higher than the working surface of the stove can be heated quite as efficiently with these fuels as when placed below the main surface of the range. A good height for working surfaces in a kitchen is 34 inches (page 110). This applies to cook stoves as well as to tables and sinks. It may be necessary to raise the stove on blocks to bring it to this level. If a range is raised on feet, it should be at such a height that the floor underneath can be reached easily for cleaning. It may be set flat on the floor. Zinc or tiling is generally placed under the stove, extending for 8 or 12 inches beyond the edge for protection.

Drafts in kitchen stoves.

As soon as the fire has warmed the air in the stove, stovepipe, and chimney, the heated air rises, forced up by the cooler air from the room and from outside. Admitting air below the fire box gives a draft and helps the fire to burn. Admitting air through the opening in the stovepipe checks the draft by admitting cold air and by causing less air to pass through the stove.

The oven and the hot-water reservoir, if there is one, are heated by opening a damper which allows the hot smoke from the fire box to pass over the oven, under the hot-water reservoir, under the oven, then up behind the oven and into the stovepipe.

Utensils for fuel-saving.

Special utensils are made for use on kerosene, gas, and electric stoves, which are so shaped as to make it possible to cook two or three foods in as many utensils at one time over one burner.

A pressure cooker cooks food in from one-third to one-fourth the usual length of time. Although its initial cost is somewhat high, the amount of fuel that may be saved by its use during a year greatly decreases this cost.

A steamer in which several kinds of food can be cooked at the same time over one burner saves fuel if the meal is planned to that end.

Selection of wood.

In general, the greater the dry weight of a non-resinous wood, the more heat it will give out when burned. Woods having high fuel values are osage orange, locust, hickory, oak, apple, black birch, yellow birch, hard maple, beech, long-leaf pine, and cherry. One cord of wood such as the above, weighing when dry about 3,500 to 4,000 pounds, is required to equal the heating value of one ton of coal. Of other woods, such as ash, black walnut, short-leaf pine, hemlock, red gum, sycamore, or soft maple, which weigh about 2,500 to 3,400 pounds a cord, it requires about a cord and a half to equal one ton of coal, while of wood such as Norway pine, cypress, basswood, spruce and white pine, two cords weighing when air dry 2,000 to 2,500 pounds each are required.

The available heat value of a cord of wood depends upon the extent to which it has been dried. If the wood is green part of the heat is taken up in evaporating the water. Therefore the drier the wood, the greater is the available heat.

A cord of wood occupies 128 cubic feet of space. If air spaces between the sticks are large, if the sticks are of small diameter, finely split, or twisted and knotty, or if the wood is loosely stacked, less wood is secured in a cord. If necessary to burn wood in a stove or furnace intended for coal, it may be done by covering the grate partly with sheet iron in which holes have been punched, or with fire brick, in order to reduce the draft. If this is not done the wood is wasted by being consumed too fast, producing a hot fire which may damage the fire-box.

Hickory is generally first choice among the non-resinous woods, because of the high fuel value to a unit volume of wood, even burning, and lasting quality. White oak is next, followed by black locust, hard maple, beech, birch, and "white ash." The white pines have a relatively low heat value, but ignite readily and give out a quick hot flame.

Kerosene stove.

Kerosene is obtained by distilling crude petroleum which consists of a variety of inflammable liquids. The more volatile it is, the more brilliant the light. Kerosene which can be heated to 140° F. without yielding a vapor, will not take fire even if the container is broken and oil spilled.

The following rules for operating a kerosene stove should be observed: Select the best burners possible; do not blow directly down on the flame but blow across it; wash burners occasionally in a little washing-soda and if wicks are kept clean, smoke may be avoided; do not leave the burners with the flame turned down; change the wicks when they become clogged with impurities; do not fill the kerosene lamp or stove near a fire or burning lamp; burners should allow air to gain access to the wicks to create a current to carry off products; air holes and tubes should be free from dust and dirt; containers should be kept nearly full but if too full the oil expands with the heat and oozes out.

Coal range.

A coal range which has as much insulation as possible should be selected to avoid waste of heat. Over 90 per cent of the heat generated in the ordinary kitchen range is usually lost.

Ashes should be shaken down gently, leaving a thin layer of half-burned coal in the bottom of the grate, or if the coal is burned out, a thin layer of fresh coal may be placed upon the bottom of the grate. Usually a half turn of the grate is sufficient to shake down the ashes without shaking out any half-burned coal.

In keeping a fire in a range, it is better to add a small amount of coal each time and fire often. The bed of live coals should not be entirely covered with coal but spaces should be left through which enough heat can pass to fire the gases as they distill off from the new coal; gases that go up the chimney are lost.

The grates should be kept clean and clear of clinkers, and caking of ashes and cinders at the bottom of the fire should be avoided.

In kindling a fire, crumpled paper or shavings may be used, across which kindling is laid in a way to provide air spaces; a few pieces of hard wood are added to the kindling and a little coal, followed by more later.

Gas range.

Gas-stove burners should be adjusted so that the blue-green central part of the flame is about half the height of the entire flame. If the flame is very long and is bright yellow in parts, too little air is being admitted; if short and inclined to make a slight roaring noise, there is too much air. In the latter case the flame is liable to "strike back," under which condition much carbon monoxide is formed. In all gas burners the various openings should be kept clean. The amount of air supplied to gas burners is usually adjusted by means of a small damper or slide to be found at the base of the burner.

Insulated ovens.

It is estimated that 90 per cent of heat supplied for baking in ovens is lost through the sides of the oven. A considerable saving of heat can be effected by insulating the oven, as is done in the case of most electric and some gas ovens. An ordinary gas oven may be fairly well insulated by means of sheet asbestos cut to fit all the sides with the possible exception of the one occupied by the door, and attached by wires to the corners of the oven.

The so-called automatic cookstove, or insulated oven, has the advantage over the ordinary fireless cooker of being still more economical in regard to heat and labor and of eliminating an additional piece of equipment in the kitchen, because, as ordinarily made, it has top burners also, and hence takes the place of the usual range. In the commercial insulated oven, both the preliminary heating of the food and the complete cooking process are accomplished; consequently, both the loss of heat occasioned by transferring the food container from the stove to the cooker and the labor of this motion are eliminated. Moreover, the walls of the oven itself are heated and do not draw the heat from the food. There are now on the market insulated ovens adapted to the use of gas, electricity, and kerosene. The heat supply in some of these ovens is controlled by a dial hand that may be adjusted for the number of minutes for which the heat is required, at the end of which time the heat is cut off without

TABLE XIII.—General Cooking Processes *

Method of cooking	*Definition*	*Coal or wood range*	*Gas stove*
(1) *Dry heat* Broiling	Cooking slices or small pieces of meat or fowl by hot air from red-hot coals or flame. Pan broiling: cooking on heated metal.	Over bed of hot coals. In heated frying pan on stove.	Under broiler of gas oven. In heated frying pan.
(2) Roasting	Cooking large pieces or whole carcass of meat or fowl by hot air from open fire or in hot oven. No water added.	In very hot oven.	Under broiler or in very hot oven.
(3) Baking	Cooking meat, vegetables, or batters and doughs by hot air of oven. Baking of batters on hot pan or stone.	Oven of range. Griddle on top of stove.	Gas oven or griddle on top of burner.
(4) Toasting	Browning surface of flour mixtures over fire.	Over bed of hot coals or over heat from metal top.	On heated metal stand over burner or under oven broiler
(5) Browning	Heating of flour to brown in the first or last period of cooking of dredged meat or crumbed dish.	In hot oven.	In hot oven or under broiler.
(6) *Moist heat* Boiling	Cooking by immersing in water which is bubbling well.	In kettle on top of stove.	In kettle over burner.
(7) Simmering	Cooking in hot water that slightly bubbles but does not boil.	In kettle or pan on stove or in double boiler.	In kettle or pan over small burner. In double boiler.
(8) Stewing	Long, slow cooking or simmering of meat, fish, poultry.	In partly closed kettle on back of stove.	In partly closed kettle over low burner.
(9) Steaming	Cooking in steam above boiling water.	In steamer over kettle on stove.	In steamer over kettle on burner.
(10) Poaching	Cooking of eggs or egg mixtures in hot water—boiling as they are dropped into it and simmering to cook.	In saucepan or iron frying pan on range.	In saucepan or iron frying pan over burner.
(11) Braising	Cooking of meat by a combination of baking and stewing. Bake in hot oven 15 minutes, add water and continue cooking.	Oven.	Oven.
(12) *In heated fat* Frying	Cooking by immersing in hot fat.	In frying kettle on stove.	In frying kettle over burner.
(13) Sautéing	Cooking in frying pan in small amount of fat, searing and turning often.	In frying pan on stove.	In frying pan over burner.
(14) Fricasseeing	Cooking of flesh food by sautéing and then stewing.	In frying pan on stove.	In frying pan over burner.
(15) Casserole cooking	Fricasseeing in oven. Brown in fat in frying pan, place in covered earthenware or glass dish and cook several hours in oven.	Top of stove and in slow oven.	Top of stove and in slow oven.

* Anna M. East

TABLE XIII.—General Cooking Processes—*Continued*

Oil stove	*Open fire*	*Fireless cooker*	*Pressure cooker*	
In heated frying pan.	Before open fire in fireplace. Over open camp fire.			(1)
In very hot oven.	On spits or crane over open fire.			(2)
Oven or griddle over burner.	Dutch oven or on griddle over fire.	By means of heated stones.		(3)
On heated metal stand over burner.	Held in wire rack before open fire.			(4)
In hot oven.				(5)
In kettle over burner.	In kettle suspended over fire.	In kettle set on heated stone.		(6)
In kettle or pan. In double boiler.	In kettle or in double boiler over fire.	In kettle of cooker.		(7)
In partly closed kettle over low burner.	In closed kettle on heated racks in open fire.	Best use of fireless cooker.		(8)
In steamer over kettle on burner.	In steamer over kettle on open fire.	Pudding can, set in boiling water.	Set in rack above water in pressure cooker.	(9)
In saucepan or iron frying pan over burner.				(10)
Oven.	Dutch oven.	Brown first and put in cooker.	Brown first and put in cooker.	(11)
In frying kettle over burner.	In suspended frying kettle.			(12)
In frying pan over burner.	In frying pan over fire.			(13)
In frying pan over burner.		Brown in fat and put in cooker.	Brown in fat and put in cooker.	(14)
Top of stove and oven.				(15)

further attention. A large insulated oven, modeled somewhat like an ordinary gas stove, is more expensive than is a fireless cooker; but the cost of a moderate-sized range with an insulated oven is practically the same as that of both a gas range and a fireless cooker. This is a subject worthy of investigation by one who is purchasing new kitchen equipment.

*Fireless cookers.**

The commercial fireless cooker costs more than does the home-made one; on the other hand, it is likely to be more durable, it seldom has any absorbent material exposed to the odor and the steam from food, the cooking compartment can be kept clean more easily, and it is frequently provided with a ventilating valve or some such device that makes baking and roasting possible. However, the home-made fireless cooker has proved to be wholly satisfactory for such foods as cereals, vegetables, dried fruits, custards, fowls, and certain cuts of meat.

There is practically no danger of fire from a home-made cooker unless very hot radiators are used. Since thermometers are not used in the average home, and the radiators may be heated to an unnecessarily high temperature, it seems safest to advise against the use of radiators unless the insulator is not inflammable. Under no conditions can a very hot radiator above the food be safe, because it is too near the muslin of the cushion. While baking is impossible without the use of radiators, there are sufficient other processes for which the home-made cooker may be used, to warrant the trouble and the small cost of making one.

The cost of a home-made fireless cooker may range from about \$1.50 to \$8.00 or more, depending on the materials used. If several sizes of aluminum pails with clamps are bought for food containers, the cost may equal that of a small commercial cooker. In buying a fireless cooker the following points should be considered: insulation, exterior case, interior lining, cooking utensils, vent valve, hot plates, locks and hinges, size, and cost.

* Canon, Helen, and Brewer, Lucile. The Fireless Cooker and Its Uses. Cornell Reading-Course for the Farm Home, Bull. 95.

The following materials and utensils are needed for making a fireless cooker (Fig. 49):

For the case, or cabinet: A wooden box, a trunk, an ice box, a galvanized iron ash-can, a wooden candy-bucket, or the like. Any kind of case that is used should be provided with a tight-fitting cover. If an ordinary box is

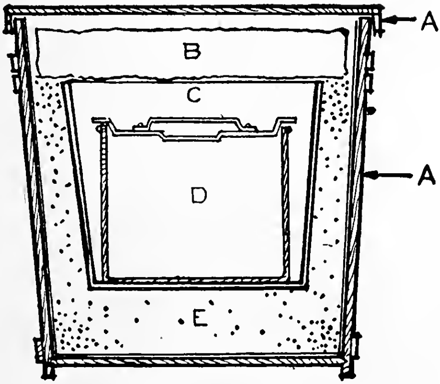

FIG. 49.—Diagram of a home-made fireless cooker. A, outer case; B, cushion; C, cooking compartment; D, food container; E, packing material.

used, it should be of sufficiently heavy material to permit the use of good hinges and fastenings.

For the lining of the case: Sheet asbestos 1/8 inch thick, or heavy wrapping paper.

For packing material: Ground cork, sawdust, excelsior, mineral wool, paper torn in small pieces and crumpled, powdered asbestos, shavings, straw, hay, wool, cotton batting, or some such non-conducting material. Mineral wool and powdered asbestos are both good non-conductors of heat, and they have the additional merit of not being inflammable; but they are harder to work with than are the other materials. Gloves should be worn by the person doing the packing, and care should be taken not to allow the material to enter the nose and the mouth.

For the cooking compartment: A deep bucket or kettle of agate, galvanized iron, or tin, of such a size that there may be a space of at least three inches between the case and the top, the bottom, and the sides of the bucket. This bucket or kettle should have a tight-fitting, flat cover. In place of a bucket, two thicknesses of 1/16-inch sheet asbestos or heavy wrapping paper may be shaped to form the cooking compartment; but a bucket is more durable and can be kept in a more sanitary condition.

For the cooking utensil: A covered kettle or bucket of agate or aluminum, of a size suitable for the amount of food ordinarily to be cooked in it. The utensil should be durable, and free from crevices and seams in which particles of food and harmful micro-organisms may lodge, and it should be supplied with a tight-fitting cover that can be clamped down. Seamless aluminum is perhaps most commonly used for this purpose. Special fireless-cooker utensils can generally be obtained from a local hardware dealer or a firm that manufactures fireless cookers.

For the collar to cover the packing material: A piece of zinc, cardboard, sheet asbestos, or muslin, of such a shape as to fit the space between the case and the bucket that serves as the cooking compartment. Zinc is good for this purpose because it does not tear with constant use as do the other materials, it can be washed, it does not rust, and it is not inflammable.

For the cushion: Heavy drilling, denim, or muslin.

For the hot plates, if desired: Flat stones, stove lids, or special soapstone or metal radiators. Most foods can be cooked without the use of hot plates or radiators, but a higher temperature can be reached and a cooking temperature prolonged by their use. Hot plates should never be used unless the cooker is packed with non-inflammable material, such as mineral wool or asbestos.

Directions for making a fireless cooker are as follows:

(1) Line the case and its cover with sheet asbestos of 1/8 inch thickness. (2) Pack into the bottom of the asbestos-lined case a layer at least 3 inches deep of whatever packing material is to be used. (3) Place the bucket that is to form the cooking compartment on the layer of packing material in the bottom of the case. Pack the space between the case and the cooking compartment closely with more of this material, filling the space to within ½ inch from the top of the bucket. (4) Make a collar of any of the materials suggested, to cover the exposed surface of the packing material between the case and the cooking compartment. (5) Make a cushion of some of the materials suggested, which when filled with the packing material will be at least three inches thick, and will, as exactly as possible, fit into the space between the top of the cooking compartment and the top of the case. Cut from the material two pieces of the desired shape and size, and put them together with a straight strip of the desired width, with extra allowance for seams.

The interior of the fireless cooker should be kept absolutely clean. It should be washed, dried, and sunned, if possible, each time after being used. It should remain open for several hours after use, and it should never be tightly closed when not in use. The observance of these precautions prevents the food from acquiring an unpleasant taste from odors or remnants of food previously cooked.

For convenience, all equipment to be used in connection with the cooker, such as hot plates, hooks, racks, and cooking utensils, should be kept near the cooker. A shelf, a cupboard, or an improvised cabinet made from a box may serve as a convenient storage place.

The cooker itself should be placed near the stove, both to prevent unnecessary loss of heat in transferring the food from the stove to the cooker and to save labor on the part of the worker.

The soapstone radiators, when not in use, may be kept warm on the back of the stove or in the sun in order to reduce the length of time required to bring them to the desired temperature when they are needed.

The fireless cooker, like any other piece of equipment, should be used intelligently in order that the best results may be obtained. As previously stated, for certain cooking processes and under certain conditions, it may be no more economical in fuel, time, or labor, than is the ordinary range; therefore, fireless cookery should be studied carefully by the housewife in order that she may discover its best applications. A few experiments with various kinds of foods, based on recipes adapted to the use of a fireless cooker, are necessary in order to give one the desired mastery.

The efficiency of insulation, the quantity of food, and the rapidity of the transfer from the stove to the cooker, influence the length of time required for the cooking. The temperature to which the radiator is heated also determines to a certain extent the length of time the food should remain in the cooker. The period that gives the best results is more or less definite for each food. However, since individual tastes differ, definite statements in regard to the required time should be verified for each household.

Care should be given to correct proportions, because there is no opportunity for the evaporation of excess moisture in the cooker.

Foods, such as pancakes, that require rapid cooking over a hot fire, are not well suited to the fireless-cooker method. Biscuits may be baked successfully in the cooker, but since the heat required to raise the radiators to the proper temperature will bake the biscuits in an ordinary oven, there seems to be no justification for its use in this case. However, for foods that require long cooking in order to be made more palatable and digestible, the fireless cooker is admirably suited. Cereals such as rolled oats, cracked wheat, and hominy, give excellent results when cooked in a sufficient quantity of water in a fireless cooker (page 506). The tough cuts of meat, which require long cooking at a low temperature in order to be made palatable are good when properly cooked in a fireless cooker. Steamed breads and puddings are well adapted to this method.

Hot beverages and sauces may be set aside in the cooker to be kept hot for serving.

The use of the fireless cooker for canning fruits is recommended by some. The juices of fruits may be satisfactorily extracted for jelly-making. Various conditions, however, determine the practicability of its use for this purpose.

As a means of enabling one to have warm water at hand without keeping a fire, the fireless cooker is of use in homes where there is no boiler connected with the range, and especially when the fuel used is coal or wood, which necessitates building a fire.

Tables of proportions and time of cooking foods in a fireless cooker are given in Table XIV on page 219.

Thermos bottles.

Thermos bottles may be used as miniature fireless cookers for a small amount of cereal or other food requiring long, slow cooking.

TABLE XIV.—TIME-TABLE FOR USE WITH A FIRELESS COOKER

Food	*Proportion of food to water*	*Minutes for boiling on the stove*	*Hours in the cooker*
Cereals:			
Corn-meal	1 to 6	10	6 or all night
Cracked wheat	1 to 5	25	8 or all night
Cream-of-wheat	1 to 6	5	2 or all night
Farina	1 to 7	5	2 or all night
Hominy grits	1 to 5	15	8 or all night
Macaroni	1 to 4	5	2
Rice	1 to 4	5	2
Rolled oats	1 to 3	5	3 or all night
Vegetables:			
Beans, dried (soaked and cooked in the same water)	1 to 4	5	6 or more
Beans, string	1 to 1	2	2
Cabbage	1 to 1	2	1½
Carrots	1 to 1	2	2
Onions	1 to 1	2	2
Potatoes	1 to 1	2	2
Dried fruits:			
Apples	1 to 2	5	4 or all night
Apricots	1 to 2	2	4 or all night
Peaches	1 to 2	2	4 or all night
Prunes (soaked and cooked in the same water)	1 to 2	5	4 or all night
Meats:			
Beef, boiled	.....	15	3
Beef, pot roast	.....	30	5
Chicken, stewed	.....	30	3
Ham, boiled	.....	20	7
Mutton, leg or shoulder, boiled	.....	20	6
Mutton stew	.....	10	4
Breads and puddings:			
Brown bread	.....	30	5
Cup custard, steamed	.....	..	1
Suet pudding	.....	30	5

CHAPTER IX

METHODS OF KEEPING FOODS COOL

Some of the methods of keeping foods cool that were used by primitive people are still resorted to, sometimes with certain modifications. The use of vessels permitting evaporation, the running water of streams, caves or holes in the ground, packing with grasses, all have lent their principles to more elaborate cooling methods and refrigerating systems of to-day.

Refrigerators.

Ordinary household refrigerators, even of the best make with the best insulated walls, are by no means as effective in saving ice as might be desired. Three points to consider in purchasing a refrigerator are low temperature, dryness, and sanitation. The low temperature is obtained by ice and proper insulation. The ice compartment should be large enough to hold at least 50 or 75 pounds of ice and should be kept filled in order to avoid a fluctuation in temperature which is favorable to the growth of micro-organisms that cause food to spoil. The location of the ice compartment at the side is thought to be better than across the entire top. The door for icing is perhaps more convenient at the side than on the top. A rear icing-door can be made at a very small additional cost; if the refrigerator is to be placed where rear icing would eliminate much tracking across floors, it is worth considering.

Insulation is accomplished by a dead air space between the outside case and mineral felt, cork, asbestos, or whatever insulating material is used. The wood should be of such a kind that it will not warp. There should be no wood where water can come in contact with it, since damp wood is an excellent place for micro-organisms to lurk.

There should be a good circulation of air in order to keep the atmosphere dry. The cold air from around the ice should go to the bottom of the refrigerator and then travel to the top before it again goes over the ice; the inside openings, therefore, should be large enough at the bottom and the top to permit the free passage of air.

To insure good sanitary conditions, the lining must be of such material that the daily cleaning will be easy, and there must be as few seams as possible to harbor germs. The material may be galvanized iron, enamel, or porcelain. There is little difference in cost between galvanized iron and enamel; the enamel is somewhat easier to clean that the galvanized iron and with proper care wears very satisfactorily. Porcelain is perhaps in many ways the most desirable but it is also the most expensive. The drainpipe and shelves should be easily removable in order that they may be cleaned frequently.

To make the best use of a refrigerator,* such foods as milk and meat should be placed where they will be kept coldest; generally near the place the air leaves the ice-chamber, or directly under the ice. The doors should be opened seldom and for as short a time as possible. The ice should not be covered to prevent its melting, since only by melting can it keep food cool.

Iceless refrigerator.

An iceless refrigerator depends for its efficiency on the cooling effect of evaporating water. An open framework of shelves is surrounded by a cloth kept moist by means of a large pan of water on the top. A good current of air to evaporate the water is essential. The refrigerator will work wherever the cloth will dry readily, but it must be kept in a shady place since a low temperature is the main object. A temperature of about 55° F. can be maintained.

Directions for making an iceless refrigerator are as follows (Figs. 50, 51):

Make a strong set of shelves open on four sides with a solid top and bottom. Raise it on short legs. Screen this on three sides, and fit a

* U. S. Bur. Standards, Circ. 55.

screen door to the fourth side. The efficiency will be greater if the shelves and the bottom are made of reinforced screening to allow freer circulation of air.

Cover the four sides entirely with canton flannel, smooth side out, buttoning it closely to the frame. This may be done easily by sewing buttons on tape and tacking this tape firmly around the upper edge of the case on three sides, also down each side of the framework next the door and on the upper and outer edges of the door. Allow a flap of flannel to extend past

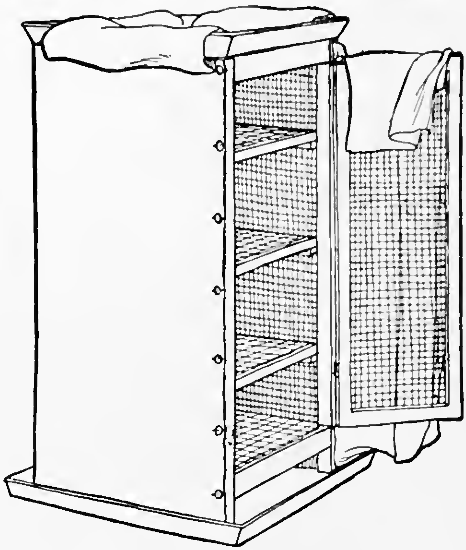

FIG. 50.—An iceless refrigerator.

the outer edge of the door to be buttoned over on the framework. It will be necessary to unbutton and button this flap when opening the case. Make buttonholes in the flannel covering corresponding to the buttons on the case. Around the top of the covering sew four flaps of canton flannel a little narrower than each side of the case and large enough to extend up over the top and dip into the pan of water. These will serve as wicks to keep the entire surface of the flannel moist. If the refrigerator is to be set on the porch, a pan must be placed underneath the refrigerator to catch the water that drips down.

An extra flannel covering should be made for the case so that one may be washed each week.

It is desirable, but not essential, to paint the case with enamel paint. A non-rusting wire must be used for the screening.

The following dimensions are suggested, and the amount of material required is indicated.

Height: 4 feet, 8 inches.

Base: 24 inches square.

Space between shelves: 11 inches.

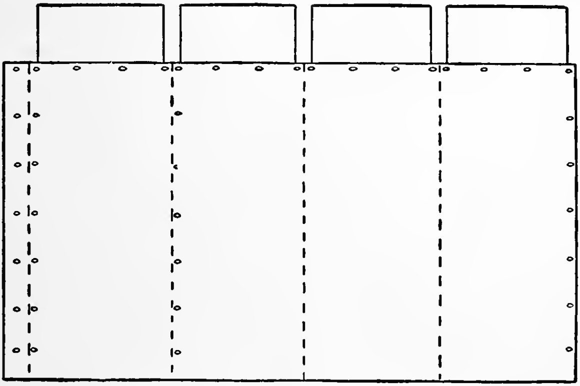

FIG. 51.—Removable canton flannel cover for the refrigerator. The buttonholes are placed to correspond with the buttons on the framework.

Materials: 3 yards of 24-inch opal zinc screen wire, 1 pint of flat coat white paint for first coat, 1 pint of white enamel paint for second coat, 50 feet of board ¾ x 3 inches for frame and door, 16 feet of board 1 x 12 inches for 4 shelves, 4 feet of board 1 x 24 inches for top and bottom, 46 feet of screen molding, 2 hinges, 1 cabinet catch, 2¾ dozen white china buttons, 10 yards of white cotton tape, nails, tacks, 13 yards of 30-inch canton flannel (two covers).

*Unglazed earthen vessels.**

If the air is dry, evaporation is quite rapid even when water is cool. Thus, when water is placed in a slightly porous unglazed earthen vessel, a small amount constantly filters to the outside and evaporates, keeping the contents several degrees

* U. S. Bur. Standards, Circ. 55.

cooler than the surrounding air. This device in various forms has been used for hundreds and perhaps thousands of years.

Fireless cooker.

A fireless cooker (page 214) may be used for keeping foods cool as well as hot, since proper insulation will keep the heat out as well as in.

Thermos bottle.

A thermos bottle is a convenient way of keeping a small amount of food cold. A wide-mouthed bottle can be used for other foods than liquids.

CHAPTER X

KITCHEN UTENSILS *

While waiting for the day when labor-saving machinery will be the rule instead of the exception, much can be done by selection, arrangement, and care of kitchen equipment to make work easier and working hours shorter.

Kitchen utensils should not be selected at random to clutter storage space. Only those articles that are used daily or at least weekly should be given a place in the kitchen cupboards. A housekeeper should weigh well the usefulness and the cost of any article that is only seldom to be taken from the shelf. The following considerations should be kept in mind in choosing kitchen utensils: Whether the utensil is all that it is advertised to be; whether it is durable, convenient to handle, well balanced, of good weight for its purpose; whether a handle or a bail is desirable; whether the cover is good for the purpose; whether the lip of the utensil is on the proper side for use; whether the utensil is easy to clean, free from seams and corners, free from rolled rims, rough edges, and grooves; whether the utensil is of the proper size and shape for the amount and kind of cooking to be done; whether it is a safe receptacle for food.

UTENSILS BEST ADAPTED TO VARIOUS COOKING PROCESSES

Baking.

Cake.—Tin, if well cared for (page 237), is the metal best adapted for cake-making. It does not scorch, heats quickly to the point at which the leavening agent in the cake becomes effective, and responds rapidly to necessary regulation of tem-

* Adapted from "Choice and Care of Utensils" by Ida S. Harrington, Cornell Reading Course for the Farm Home, Bull. 27.

perature during baking. The round tin with a tube in the center, known as an angel-cake tin, produces the most level and evenly baked cake, owing to the heat reaching the center of the cake as soon as any other part, and the "pull" between metal and batter being more even at every point than in tins of other construction. A plain round tin, not too deep, gives the next best result; a square tin is next, while an oblong tin requires very careful regulation of heat in order to produce a well-baked cake.

Bread.—The choice of utensils for bread baking lies between tin and russia iron (a sheet iron treated by a process that originated in Russia, having a polished blue-black surface). Since bread requires a hotter oven than does cake, the russia iron pan should have first choice; it absorbs more heat than does tin, is less affected by high temperature, and is more durable.

Pie.—Experiments have shown that in baking the lower crust of juicy pies, the best results are obtained by the use of granite-ware plates, that old tin plates are next in order, while perforated and wire plates come third.

Cookies.—Cookies are best baked on russia iron sheets cut to fit the oven, with heavy tin sheets as second choice. The sheets are kept in better condition and produce more delicate results if, instead of being greased with butter or lard, they are warmed and rubbed very lightly with paraffin. If kept scrupulously clean, they require no greasing.

Cooking of meats.

Roasts.—Roasts require a high temperature at the start in order to sear the surface; for this reason the best choice is a pan of iron or high-grade granite ware. An oval pan can be more carefully cleaned than one with sharp corners. There is less danger, therefore, if this shape is chosen, that particles of fat will adhere to the pan, grow rancid, and give an unpleasant odor to the utensil and a taint to the food.

Pot roasts.—The iron kettle with tight-fitting cover, called also the "Dutch oven," best supplies the steady heat that a pot roast needs. Although a casserole may be used, or a bean pot with waxed paper tied tightly over the top, in either of these there is more evaporation than in the iron kettle and the roast is, therefore, drier, although just as tender.

Meat stews.—Since in stews more liquid is added than in pot roasts, the casserole may well be used, or a shallow aluminum or graniteware stewpan with close-fitting cover, straight sides, and very short or loop-shaped handles. The long, slow cooking may thus be done either in the oven or on top of the stove. In brown stews, the meat is first sautéed in an iron pan in order to give the desired color and flavor.

Stewing fruits or vegetables.

Aluminum, granite, and enamelware are equally good for stewing fruits and vegetables. A wide, shallow type of saucepan, with a well-fitting cover, should be selected for fruits and for such vegetables as must be cooked in a small amount of water; while a deep saucepan, without a cover, is best for the cooking of strong-juiced vegetables that need a large amount of water.

Sautéing.

A rather heavy iron or steel frying pan is best adapted for this purpose. In a thin pan, or in one of graniteware, the fat passes too soon from the temperature at which it forms the desired golden-brown crust on the food to be cooked, to the point where it begins to decompose and becomes irritating to the digestive tract.

Frying.

For frying in deep fat an iron or steel frying kettle is best. It may be bowl-shaped, or it may have straight sides. The latter shape accommodates a greater number of articles at a time, and is more convenient for use with a wire frying basket. In using the bowl-shaped kettle, a long-handled skimmer may be more convenient for removing the food. The kettle should be deep, so that when it is two-thirds full of fat the food to be cooked will be entirely immersed.

Candy-making.

Professional confectioners use a copper kettle connected with an apparatus that makes a partial vacuum in the kettle and allows the sugar to boil at a lower temperature than the ordinary boiling point, thus lessening the danger of scorching the sugar. For the home candy-maker, aluminum is the best substitute for copper as a conductor of heat. Sirup boiled in an aluminum kettle rarely scorches, and the smooth surface makes it easy to keep the sides wiped free from sugar crystals as they form.

Jelly-making.

Enamel or graniteware—unless there is a defect in the enamel finish—makes the best utensil for jelly-making, because of the ease with which it may be cleaned and the certainty that it will not be affected by the acid of fruit juices.

SPECIAL UTENSILS AND EQUIPMENT

Knives.

The assortment of knives should include a bread knife, butcher's knife, vegetable knife, a knife with a waved edge for cutting fresh bread and cake, and a spatula. The most durable knife is a hand-forged one in which the steel extends, flat and unnarrowed, to the end of the handle, and is fastened to it by rivets of steel, copper, or brass. Strength is lost if the steel extends only half the length of the handle. In the cheapest setting, known as the "twang," the steel is narrowed to a point, pushed into the handle, and fastened by adhesion. This is the kind of handle that is sure to come off at the most inconvenient time. Handles of beech or birch wood wear best. Rubber handles are unpractical because they shrink, swell, and burn. Ivory, pearl, or bone handles are likely to blacken or become loosened if they are put in water.

Egg-beaters.

Different types of egg-beaters are needed, according to the consistency desired in the beaten whites. For all-round use, the dover egg-beater is a good choice because it works most quickly. It is operated by turning a wheel, without being lifted from the eggs to be beaten, and hence beats in comparatively little air and gives a fine, close texture. One should be selected in which the cogs do not "interfere." The balloon-shaped egg-whisk made of piano wire carries more air into the moisture, and the flat wire beater gives the airiest texture of all. Either of the latter types is preferable to the dover egg-beater for angel cake, sponge cake, or meringues where lightness is more desirable than fineness of grain.

Spoons.

Spoons of hard wood should be used whenever possible; they are lighter than metal ones, do not discolor the hand, make less noise, and do not scratch metal surfaces. For basting roasts, or whenever a specially strong spoon is needed, a tinned iron spoon is good. Enamel spoons are not practical, as they are likely to bend and crack the enamel.

Brushes.

If brushes are used in connection with food—that is, for greasing pans or for brushing rolls or pastry with butter, egg, or milk—they must be of a kind that can be cleaned with boiling water. This is impossible if the bristles are glued in. The bristles should be strong and pliable (Russia or Chinese bristles are best) and should be bound to the handle with twine rather than with metal. A shaving brush of badger hair is really better adapted to the purpose than any brush specially designed.

Small wooden-backed brushes are indispensable for the proper cleaning of vegetables, for brushing grated lemon rind from the grater, and for many other purposes. A small poker heated red hot can be used to mark on the backs of the brushes the purposes for which they are to be used. A round pitcher- or bottle-brush, and a long wire-handled trap-brush for the refrigerator, are sanitary necessities.

Double boilers.

A double boiler should be selected with a lower part sufficiently large to hold a quantity of water that will not soon boil away.

Paper.

Heavy absorbent brown paper, on a roller, such as is used in meat markets, is a great kitchen help. In breading cutlets or making croquettes, for example, the table or the rolling board may be covered with paper and the bread crumbs emptied on it. After the croquettes are breaded, the crumbs may be removed and the same paper used for draining the croquettes when they are fried. It may afterwards be folded up and burned, or given as a titbit to the chickens, in either case saving the washing of a mixture of egg and bread crumbs from the rolling board.

Waxed paper, so essential for putting up lunches, lining cake tins, and covering food in the refrigerator, may also be obtained on rollers or in sheets.

Covered paper pails, lined with waxed paper, are useful for storing dry left-overs. Paper cups, plates, and napkins are a welcome help in the picnic lunch or the grange supper. The plates may be bought with linings, or "insets," which may be replaced by clean ones for a second course. Folding paper cups should be a part of every school lunch or traveler's outfit.

Fiber pails, washbowls, and tubs are useful because of their lightness, and with careful handling they will last a long time. Breaks in the finish may be mended by filling with a little putty, covering this with a piece of stout cotton cloth, and holding the whole together with oil paint to match the finish.

Wooden skewers and toothpicks.

For testing cake, wooden toothpicks are as good as broom straws and much cleaner. Skewers are helpful in cleaning corners, or, covered with several thicknesses of cheese-cloth, in keeping free from crystals the sides of the saucepan in which sugar is being boiled down.

ARRANGEMENT OF UTENSILS

The best-selected utensils may fail in usefulness if arranged awkwardly. Although "stacking" is not the menace to kitchen utensils that it is to tableware, it calls for many unnecessary motions, especially if the utensil sought is the lowest one in the stack. Utensils in regular use are best hung on small brass hooks in the wall, each article having a separate hook. They should hang bottom side out, so as to protect the inside from dust, and should be within easy reach of the hand. If there is sufficient space for some definite system of arrangement—whereby, for example, the largest utensils hang at the left and the utensils decrease in size toward the right—it will improve the appearance of the kitchen and make it possible to reach mechanically the tool needed, without expending thought on its whereabouts.

Whatever is kept in storage cupboards should be so arranged as to be easy of access, easy to keep account of, easy to keep in order, and easy to note the condition of. The average cupboard shelves are too far apart. Shallow shelves that accommodate only one or two rows of utensils, easily seen and reached, will save many searchings (Plate XI). Covers are conveniently stored behind ribs of wood nailed to available wall space or to a cupboard door. Arrangement according to size will again be found a great saving of time. A canvas or leather pocket, divided off in a way similar to a traveler's case or shoe-bag, is a convenient place for the cook's knives, each one slipping into its own division and being safer and easier to find than when in a kitchen drawer filled with miscellaneous articles.

HOW TO PREPARE NEW UTENSILS FOR USE

Iron, tin, and enamelware.—It is a general custom to prepare a new iron utensil for use, after thorough cleaning, by rubbing unsalted fat over it and baking the fat in. The same treatment is adapted to tin, for, while it destroys its shiny new appearance, it protects the tin from rust and increases its capacity for holding heat. Another way is to coat the kettle with fat outside and inside and allow it to stand for two days. It should then be cleaned in a solution of washing-soda (page 235). Enamelware is said to be protected from cracking and chipping if it is well rubbed with fat before being used for the first time; the fat, however, cannot be baked in as with tin and iron, since it would not be absorbed but only burned fast to the glaze.

Glass.—Tumblers, jars, and lamp chimneys may be toughened by being placed in a kettle of cold water which is brought gradually to the boiling point. After being boiled for a few minutes they should be allowed to cool gradually in the water.

Machinery.—Egg-beaters, ice cream freezers, and other utensils in which there is friction between two parts, should be carefully oiled before being used, the wheels turned until the oil has reached every part, and all surplus oil wiped off before the utensil is used for food.

HOW TO PROTECT METALS NOT IN USE

If the house is to be closed for a time, or if for any other reason utensils are to be set aside, all metals should be protected from dampness by a coating of vaseline, paraffin, or unsalted fat of some kind.

MATERIALS AND THEIR CARE

The advantages and disadvantages of the various materials used in kitchen utensils, together with their care, may be summed up as follows:

Aluminum

Advantages:

1. The utensils are light.
2. They are generally seamless.
3. They hold the heat longer than do some of the other materials, even though they are somewhat slow in heating.
4. They are durable.
5. Food is less likely to burn in utensils of aluminum than in those of some other metals, and if it does burn, the kettle is generally more easily cleaned.
6. Aluminum utensils are generally made in good shapes.
7. Aluminum does not rust.
8. It does not chip.

Disadvantages:

1. Aluminum discolors easily.
2. It is expensive.
3. Acid foods should not be allowed to remain for any great length of time in aluminum. So little aluminum is dissolved in cooking the ordinary

acid foods, that its use for this purpose is no longer considered a bad practice.

General care:

1. Scour aluminum with only mild abrasives, such as whiting or bon ami, since it is a soft metal and scratches easily. Steel wool may be used.
2. Wash aluminum with neutral soap and water, since an alkaline soap or cleansing substance will attack the metal. Add a small amount of ammonia water, and polish the utensil with whiting occasionally.
3. Remove dents with a wooden mallet.
4. Cook foods containing weak acids, such as sour milk, tart apples, tomatoes, or weak vinegar in aluminum utensils to remove the tarnish that appears with common use.

Special care:

1. To remove burnt food, soak the kettle in hot water, use a wooden spoon instead of metal to scrape it off, or if necessary boil water in the kettle.
2. The coarser abrasives may be used on bad stains, but the aluminum will be scratched.
3. For a kettle in very bad condition, use an oxalic acid solution in the proportion of 4 tablespoons of oxalic acid crystals (poison) to 1 gallon of water. Allow the cold solution to stand in the kettle overnight, or boil it in the kettle for not more than five minutes. Wash the kettle thoroughly with soap and water before using it. Care must be exercised in handling the solution since it is a very poisonous substance.

Copper

Advantages:

1. Copper utensils are durable.
2. They are attractive in appearance.
3. Copper is an excellent conductor of heat.

Disadvantages:

1. Copper utensils are heavy.
2. They are expensive.
3. They are dangerous to use for cooking unless they are kept scrupulously clean.
4. They require much cleaning.
5. Acid foods must not be allowed to stand in copper.

General care:

1. Copper utensils should be kept clean by thorough washing in hot soapsuds.
2. They must be kept bright, because the tarnish is easily soluble in weak acids and forms a poisonous compound.
3. If not stained, copper is best brightened with rottenstone or tripoli and sweet oil.

Special care:

1. Wash the utensil with a solution of washing soda to remove grease.

2. Remove the tarnish from copper with a weak acid, such as oxalic, cream of tartar, vinegar, lemon juice, or the acid of sour milk. The acid should be completely rinsed off with water, and the utensil rubbed with whiting, since any acid remaining on it will cause it to tarnish the more quickly.

3. Scour the utensil with vinegar and salt. Wash it at once and polish it with tripoli and sweet oil.

4. Use rottenstone and oil, and follow this with dry whiting, rottenstone, or tripoli.

5. Use ammonia water, and wash it off thoroughly, since the compound formed is poisonous.

Enamelware

Advantages:

1. Enamelware is light.
2. It is easily cleaned.
3. It radiates heat readily.
4. It is fairly durable.
5. It is not affected by food acids.
6. It has a clean, attractive appearance.

Disadvantages:

1. Enamelware must be handled almost as carefully as glass to prevent chipping. Granite and enamelware are made by coating sheet iron or steel utensils with an enamel or glaze.

2. It does not withstand sudden changes of temperature, such as being placed over a direct flame that gives intense heat.

3. It cannot be used for strong alkalis.

4. Some cheap enamels contain lead compounds which are soluble in vinegar and fruit acids and give rise to the danger of lead poisoning. A simple test is to let a beaten egg stand in the utensil for a few minutes. If it becomes discolored, lead is probably present.

General care:

1. Wash enamelware in hot soapsuds. Clean any seams with a wooden toothpick or skewer.

2. Remove ordinary stains with sapolio or Dutch cleanser.

3. To remove food that has been burnt on, place a small amount of fat in the dish, warm it gently, and scrape off the burned particles.

Special care:

If greasy food is so badly burned on an enamelware utensil that none of the general methods of cleaning has any effect, strong acids may be used, although enamelware should not be expected to be proof against them. Place a few drops of 25 per cent sulphuric acid in the pan and add a few drops of 25 per cent hydrochloric acid. Be exceedingly careful not to allow the acids to get on the hands or clothing. As soon as the acids begin to fume, neutralize them by adding ammonia water, pour them off, wash the utensil thoroughly, and flush the drainpipe well, rinsing it at last with boiling water.

Iron and steel

Advantages:

1. Iron utensils are strong and durable.
2. They hold heat well.
3. They endure intense heat.
4. They are relatively inexpensive.
5. They become smooth with long use and are then not hard to clean.
6. They make an even heat possible and are consequently excellent for frying. Russia iron is a good sheet iron for roasting and baking.

Disadvantages:

1. Iron utensils should not be used for cooking acid foods.
2. They are heavy.
3. They rust readily.

General care:

1. Iron utensils must be kept smooth and free from rust, which means that they must be kept dry.
2. Wash them thoroughly in hot soapsuds.
3. Use a wire dish cloth to remove food that has been burnt on.
4. To preserve the temper of steel knives, avoid the practice of heating the blade on top of the stove in order to facilitate cutting fresh bread or cake. Allowing hot water to run over the blade accomplishes the same purpose without injury to the knife.
5. Never allow the cogs of an egg-beater or ice cream freezer to be covered with water, since they cannot be perfectly dried and therefore they become roughened and clogged with rust.

Special cleaning:

1. To clean iron utensils thoroughly, boil them occasionally in a solution of washing-soda made in the proportion of 6 quarts of cold water to 1 pound of washing-soda, rinse them with boiling water, and dry them thoroughly over heat before putting them away. Use some scouring powder after rinsing them, if necessary.
2. If iron utensils are to be put away for some time they should be coated with paraffin or unsalted fat.
3. If rust is not too thick it may be removed by scouring the utensil, iron or steel, with bath brick or fine emery and rubbing it with kerosene or by allowing kerosene to remain on it for some time to soften the rust and then scouring it with bath brick.
4. If a utensil is badly rusted, apply dilute hydrochloric acid, add ammonia water to neutralize the acid, wash the utensil, dry it, and oil it.

5. Scour steel knives with bath brick or some similar material after they have been washed and rinsed but not wiped. Rest the knife blade on a board, dip a moistened cork into the scouring powder, and apply it to the blade, rubbing it until the stain has disappeared. Rinse the knife thoroughly and wipe it dry.

Nickel

Advantages:

1. Nickel-plated utensils are durable.
2. They are easily kept clean and bright.
3. They do not rust.

Disadvantages:

1. Nickel-plated utensils are heavy.
2. They are expensive.

General care:

Wash nickel utensils in hot soapsuds and rinse them in very hot water.

Special care:

1. Polish nickel with a paste made of lard and whiting.
2. Apply whiting moistened with ammonia or alcohol, and polish the utensil with soft cotton waste.

Pottery

Porcelain, stoneware, and earthenware have clay for a foundation, but differ in appearance and quality according to the fineness of the clay used, the kind of glaze applied, and the length of time taken for firing.

Advantages:

1. Pottery utensils are excellent for slow, even cooking in even heat, such as slow baking.
2. They can be used for both cooking and serving food and therefore save dishwashing.
3. The good grades are nonabsorbent.
4. Pottery utensils are comparatively cheap.
5. They are relatively durable.
6. They are easy to clean unless they are cracked.

Disadvantages:

Pottery utensils are not good for use over direct heat that is unsteady or intense, such as on top of a stove.

General care:

1. Pottery utensils should be kept exceedingly clean.
2. If they are allowed to dry without being wiped, they should be rinsed in very hot, clean water to prevent their becoming covered with a thin film which in time spoils the glaze.

Silver or plated silver

Advantages:

1. Silver is an excellent conductor of heat.
2. It does not tarnish readily.

Disadvantages:

1. Silver is too costly for ordinary use, although plated silver is used to a limited extent in baking dishes and the like.
2. It becomes tarnished if sulphur is allowed to touch it.

General care:

Wash silver in hot soapy water, rinse it thoroughly in clear hot water, and wipe it with a clean dry cloth.

Special care:

1. Use a brush in cleaning raised patterns.
2. To remove tarnish, use silver polish according to directions given on the package, or use whiting moistened with alcohol, ammonia water, or water. Rub in the paste, allow it to dry, and rub it off with a soft cloth, chamois skin, or tissue paper. Scald the silver. This method gives a burnished appearance.
3. Boil the silver until the tarnish is removed, in an enamelware kettle containing a piece of aluminum and a solution made of 1 teaspoon of salt, 1 teaspoon of either washing or baking soda, and 1 quart of water. Aluminum kettles of any value for cooking should not be used, since the process corrodes them quickly. A piece of zinc is sometimes used in place of aluminum, but it becomes corroded and inactive in a much shorter time. This method gives a satin finish rather than the burnished appearance obtained by an abrasive silver polish. This electrolytic method, however, causes no loss of metal and requires less time. It may be desirable, therefore, to use the solution with aluminum as frequently as it is necessary to remove tarnish, and the abrasive polish occasionally to restore the burnished appearance.

Soapstone

Advantages:

Soapstone gives a good even heat for cake griddles.

Disadvantages:

Unless it is of excellent quality and is well cared for, it is likely to be too absorbent to be sanitary.

General care:

Soapstone should be cleaned occasionally with soap and water, and thoroughly dried. The pores should always be kept well filled with oil.

Tin

Advantages:

1. The utensils are light.
2. They are comparatively inexpensive.

3. They are attractive in appearance when new.

4. They are good conductors of heat; this allows food cooked in them to become evenly heated.

5. The best grades of tinware are not corroded by water.

Disadvantages:

1. Tin does not endure intense heat, which makes it unsuitable for frying and makes drying it by setting it on the stove a bad practice.

2. Scratches expose the steel and make rust possible. Therefore, metal spoons and scrapers should not be used on tin.

3. Tin utensils are in general not good for cooking acid foods because even the best tin is likely to be acted on by hot acid.

General care:

1. Wash tinware in hot suds made with neutral soap.

2. Use scouring powders if necessary to remove food that has been burned on.

3. Do not scour tin to restore its brightness because the tarnish acts as a protective coat and makes the utensil wear longer.

Special care:

Boil tin utensils for two or three minutes in a solution of washing-soda made in the proportion of 6 quarts of cold water to 1 pound of washing-soda.

Wood

Advantages:

Wooden spoons are lighter than metal spoons and not so noisy, they do not scratch saucepans, they do not discolor the hand, they are non-conductors of heat.

Disadvantages:

1. Wooden utensils may become dented, rough, or darkened.

2. They are likely to be unsanitary and to take up odors because of improper cleaning.

3. If wood is not well seasoned, it cracks and splinters easily.

General care:

1. Fine sand is better than soap for scrubbing wood because the alkali in soap combines with wood to form a dark stain.

2. Never use hot water on wood.

3. Scrub wood with a circular motion, but rinse it and dry it with the grain in order to leave the fibers flat.

4. Rub steak planks thoroughly with some food oil, until the wood has absorbed all it will.

Special care:

1. To remove dents, put a wet pad of several thicknesses of cheese-cloth or muslin on the dent and cover it with a hot iron. The steam will raise the fibers of the wood much as it raises the pile of velvet.

2. To smooth away a rough place, rub it with steel wool, following the grain of the wood.

3. To restore the color of wood that has become darkened, use steel wool and weak hydrochloric acid.

Zinc or galvanized iron

Advantages:

1. Zinc makes a good sanitary covering for table tops.
2. It does not become tarnished readily by action of the air.
3. It is rust-proof.

Disadvantages:

1. Zinc becomes tarnished by the action of damp air and is affected by salt, which prevents its lasting well on the seashore.
2. It is acted on by acids.
3. It cannot be used for cooking utensils because it is affected by both acids and alkalis.

General care:

Wash zinc with hot suds made of mild soap.

Special care:

1. Kerosene dissolves a film of grease and helps to remove inclosed dirt.
2. Bath brick may be used for food bins, in which case it would not be desirable to use kerosene.
3. Scour zinc with a paste made of kerosene and baking soda, and rinse it thoroughly with hot water.
4. Acids, such as vinegar, sulphuric acid in the proportion of one part of acid to twelve parts of water, or alum and acetic acid may be used to remove tarnish, but they eat into the zinc. The metal should be rinsed thoroughly with hot water. The tarnish is likely to appear soon again.

CHAPTER XI

TABLE SETTING AND SERVING

BY FLORA ROSE

When an attempt is made to formalize any household practice, there is always the danger of red tape. Yet some formalities, if based on a strong foundation of common sense, make life more unselfish and delightful. A safeguard against useless formality is to keep constantly in mind this fact—every good rule should have a good reason. When the rule is being applied, the reason should be made to appear. If in any household no good reason is forthcoming for the formal rule imposed, the rule should be discarded. This is particularly true in table setting and serving where mere formality may have developed to such an extent as to obscure original good reasons for doing things. Yet most of the fundamental rules in good table setting are built on a sound foundation of reason.

TABLE SETTING

The table itself may be bare wood or it may be clothed in finest linen or oilcloth. It should be clean.

For each person, 20 to 30 inches of lengthwise space should be allowed, unless the table is round or square and seats only four or eight persons. Less than 20 inches means uncomfortable crowding; more than 30 inches means difficulty in talking across the distance.

Covering for the table

The reasons for covering a table with tablecloth, tablesquare, runners, doilies, or napkins are: (1) to protect the surface of the table; (2) to hide the surface of the table; (3) to insure quieter service; (4) to reflect the light; (5) to improve the appearance of the table. If any covering is used, it should be clean. A rough, bare, clean table is better than soiled, rumpled linen, no matter how fine and expensive.

A tablecloth may make a more homogeneous picture than either doilies or runners, and its unbroken white surface reflects more light than a partly bare, dark table. There is no other good reason, however, why doilies or runners may not always be used in place of the larger cloth to protect the table. Any rule such as using only a tablecloth at a formal dinner is pure form. Doilies and runners have some great advantages. Small pieces of linen are easy to wash, and if one is spotted it alone may be washed. Furthermore, the table is easier to set with doilies, particularly for a small family.

To set the table

If a tablecloth is to be used.

A tablecloth keeps clean and unmussed longer if a heavy cotton or padded cloth, called a silencer or protection cloth or "husher," is used under it, than if it is placed next to the table. An old clean sheet may serve this purpose if no other cloth is available. The table should first be covered with the silence cloth, care being taken to arrange it so that it will not hang below the tablecloth. The tablecloth is then stretched on the table so that the center fold is uppermost and so that the cloth hangs evenly on both sides and at both ends of the table. Care should be taken to see that the cloth is straight. If possible to prevent it, a cloth should not hang over the sides and ends much more than 12 or 14 inches, since otherwise it will not clear the seats of the chairs and will spoil the appearance of the table. Furthermore, it is in the way at mealtime.

If doilies are used.

Doilies that are rectangular are better than round or square ones, since they give a wider space for the arrangement of silver and glasses on the table and are a better protection to it. The doilies should first be arranged at one end and on one side of the table. On the side one should try to space the doilies so that they are equally distant from each other. Then, exactly opposite these doilies, those to be used at the other end and on the other side of the table should be placed. Doilies should be placed so that one edge is about at the edge of the table.

The individual cover.

The place arranged for each individual at the table is called the cover. After the cloth or doilies have been placed, each individual cover should be arranged. It is desirable, as a rule, to place at the individual cover as much of the silver and china as may add to the convenience of the meal. If, for example, spoons are placed at the individual covers instead of in a holder, considerable confusion may be prevented at mealtime.

Knives are placed at the right of the cover with the sharp edge of the blade toward the plate. This is because the knife is usually lifted with the right hand.

Forks are placed at the left of the cover with the tines up. This is because the fork is lifted in the left hand when something is being cut with the knife and fork. If only a fork is to be used, a very good reason may be found for placing it at the right of the plate. It is in general a good rule to try to keep a balance between the silver on each side of the cover, since all the silver on one side makes a heavy-looking design.

Spoons may be placed at the right of the knife or in front of the plate with handles toward the right hand. The knife and fork nearest the plate should be far enough apart to permit the largest plate used at the meal to be set between them without pushing them out of place. They should not be spread unnecessarily far apart. All the silver in one group should be compactly placed.

The glass may be placed at the tip of the knife and slightly to the right. There is no reason why it should not be placed at the tip of the fork and slightly to the left if preferred in that place. The butter-plate may be placed at the tip of the fork and slightly to the left. Butter-plate and glass may be made to change places if preferred.

The napkin may be placed at the left of the forks, at the right of the knives, in the center of the cover, or in front of the cover, according to convenience. The napkins should be so placed that the corners of each face the same way, if they have been so ironed that this is possible.

The plate.—If a plate is set at the individual cover before the meal begins, it should be placed ½ to 1 inch from the edge of the table. This is to prevent danger of tipping through any thoughtless movement of the individual.

Relation of covers.—All the glasses on one side of the table should be in a straight line. The same is true for butter-plates, silver, and napkins or other utensils. On looking down the table, a straight line running from the center of one utensil should strike the center of the next utensil of the same kind. This makes a well-ordered, trim table. If each side of the table has the same number of covers, the center of each cover on one side should be exactly opposite the center of the cover on the other side. The ends of the handles of all the silver used at the covers should be ½ to ¾ inch from the edge of the table and should be in a straight line. This is a basic principle of good design.

General equipment.

There is a certain amount of general equipment which must go on each table. This varies with the simplicity of the meal and with the formality of the service. As formality decreases, food is left to be served on the table.

If possible, salt-containers should be allowed for each two persons and should be placed inconspicuously and within reach of each.

If jelly or pickles are placed on the table, a dish of jelly at one end and at one side of the table may balance a dish of pickles at the other end and on the other side of the table. If spoons or forks are placed for serving these, they should be placed straight and parallel with the silver at the sides or ends of the table, not on the bias.

A good general rule is not to cross any of the extra silver to be used for serving and never to place it on a bias line. If, for example, a small butter-spreader is used, it should be placed on the butter-plate parallel to all the other silver, or placed next to the other knives. The reason for straightness is good design.

As far as possible, silver for service should be arranged on the main table or on a side table before the meal begins. This silver may be placed on the right and left of the cover of the server and in the same way and line as the remainder of the silver at that cover.

If cups and saucers are put on the table before the meal, they should be arranged in such a way as to facilitate the pouring of the beverage and the passing of the cups. The handles of the cups should all be in line and in a position for the server to take hold of them most conveniently. Place should be left for the pot and for cream and sugar servers, and these should be placed in such a way as to facilitate service. The handle of the pot should be toward the hand of the server.

After the table is set, the chairs may be arranged. They should be in straight rows and sufficiently far from the table to require but slight moving when the persons are seated.

Just before the meal, the glasses should be filled with cold water, the butter may be placed on the plates, and the bread may be cut.

TABLE SERVICE

A few simple rules will greatly facilitate attractive and convenient serving. No attempt will be made here to discuss service of the extremely formal type.

To pass food

Food should be passed at the left of the person sitting at the table. This is because it is easier to reach across than around with the right hand. The opposite procedure is more convenient for left-handed persons.

When food is passed, the dish should be held close to the table with the edge of the dish slightly over the edge of the plate of the person to be served. This prevents accidents and is convenient for the person served.

A tray is not necessary for passing single vegetable dishes, salad bowls, or platters. In fact, safer service results if the serving dish rests on the palm and spread fingers of the left hand. The hand should be protected with a folded napkin. This leaves the right hand free to rearrange the spoon between servings and to guard against possible movements of persons at the table.

To place food

In general it may be more convenient to place food from the right of the person served. This is because it can be placed by the right hand. If it is more convenient to place from the left, there is no reason against so doing. When a cup and saucer are placed, the handles of the cup and the spoon should be in a position most convenient for the user.

To remove dishes

In general it may be more convenient to remove dishes from the right than from the left of the person served. They may be removed from either side.

To serve food carved or served at the table

Semi-formal method.

It is more convenient for the carver if only one plate is placed in front of him at a time. Hot plates should be kept on the side table, one set in front of the carver, and a second held in the left hand. The waitress should stand at the left of the carver, unless he prefers the opposite side. When the plate in front of the carver is filled, it is removed from the left with the right hand, and a hot plate put in place with the left hand in order to reduce interference with the carver. After placing the filled plate, the waitress should secure a fresh plate from the side table and return to the same position by the carver.

This method means slow service and should not be followed unless the number to be served is few or there is more than one waitress. It may be hurried by having the vegetables served at the other end of the table. In this case, the plate must be carried from the carver to the server and then placed at the intended cover. If the vegetables, gravy, and bread are to be passed, the following order may be observed: potatoes, gravy, bread, other vegetables, condiment, such as jelly or pickles.

Informal method.

For the informal method, all the plates are placed in front of the carver. It is wisdom on the part of the carver, with this type of service, to cut the entire number of portions before beginning to serve.

After the plate is filled, the carver may pass it with his right hand to the person at his left, or with his left hand to the person at his right. In this order it is passed from one to the other until it reaches its destination. The vegetables may be served by the carver or by someone at the opposite end of the table.

Clearing the table for dessert

Semi-formal method.

The large general dishes should be removed first. The plates are taken from the individual cover, and carried from the room, one in each hand. Smaller equipment, such as salt and pepper dishes, should be removed on a small tray. Nothing should be left on the table which is not to be used for the remainder of the meal. Glasses may be left, since many individuals prefer water toward the close of a meal. The table is crumbed with a clean folded napkin and plate, or with a crumb brush or knife and tray. One should replace in an orderly way any silver or glassware left for the last course.

Informal method.

The large general dishes should be removed first. The plates are then taken from the individual covers, and one placed carefully and quietly on top of the other. One should not attempt to pile more than can be safely and quietly handled. It saves time and effort to have a wheeled tray or a large tray on the side table. Plates may then be carried two at a time to this table, carefully stacked upon it, and all removed at once. The dining table should then be crumbed.

SOME TABLE MANNERS AND CUSTOMS

The order of serving at a meal.

If little children are present, it is often desirable to serve them first, since they eat slowly and must have their food made ready for them. Older children need the experience of waiting. In the family, after the little children are served, the mother is served, then the girls, and finally the boys.

If guests are present, they should be served first if the service is informal; if, however, the service is semi-formal, they may be served first or the hostess may be served first and the guests next. There is good reason for this last rule since it enables the hostess to set the pace in choice of silver, and in use of equipment and food, and may prevent embarrassment on the part of guests. If two guests are present, a man and a woman, the woman should be served first; an older woman should be served before a younger one.

At a dinner where both men and women are present, it facilitates service, after the hostess and guest of honor at her right are served, to complete the serving on that side of the table before beginning on the other. This is more practical though not so chivalrous as the custom at formal meals of serving all women first.

Handling table equipment.

The fork functions as a spear, as a shovel, and as a pick. The good workman learns to handle his tools in an efficient way. When the fork functions as a spear to hold food on the plate, there is only one way to hold it which is at once graceful and altogether efficient. That is by resting the top end of the fork in the palm of the hand, with the rounded part of the tines up and the tip of the forefinger resting on the waist of the fork and the base of the tines to steady it. When the fork is used as a pick, it should be held in either hand in this same way. The food is lifted on the tips of the tines, the hand always uppermost, and carried to the mouth. When the fork is used as a shovel, it is held with the rounded surface of the tines down to put the bowl uppermost. The fork rests on the top of the curve in the hand formed by the thumb and forefinger and is grasped between the thumb on the body side and the forefinger away from the body. Food is scooped up by this shovel and transferred by rotary motion of the wrist to the mouth.

The knife was first used to cut food and to transfer it to the mouth. When the fork was introduced, the knife lost caste as an implement for transporting food. Its only acceptable use at present is to cut and spread. The knife is held in the right hand in the same way as the fork in the left one.

Knife and fork.—When the plate is passed back to the carver for a second serving, the knife and fork should be placed together and sent along with the plate. This is because no other place is so safe for them. At the close of a meal the knife and fork should be placed close together on the plate, the knife at the right, the fork at the left, and the handles facing the same direction in which they were originally placed on the table.

The spoon is useful for mixing liquids and for transferring soft foods from the plate to the mouth. The spoon should never be left in a cup or high glass dish after its use as a stirrer or feeding implement has ceased, since it gives a loose handle which endangers the safety of the dish. With beverages, the function of the spoon is as a stirrer and taster, and not as a vehicle. This is because it is easier to sip a beverage quietly from the cup than from the spoon.

Soup should be sipped from the side of the spoon. When, however, a soup is full of solid substances, and if the spoon is a soupspoon and not a tablespoon, it may be necessary to eat the solid part of the soup from the tip of the spoon instead of sipping it from the side.

Fork and spoon.—With many desserts it is desirable to give both a spoon and a fork. For example, if pie is served with cream, both are needed. If baked apple or prunes are served, the fork helps to steady the food on the plate while the soft flesh is being removed from the core or seeds. This avoids the removal of prune seeds from the mouth.

The glass.—Before drinking, the lips should be wiped with a napkin. Otherwise the number of sips may register themselves on the side of the glass.

CHAPTER XII

THE LAUNDRY *

By Flora Rose

Washing has a threefold purpose: to remove dirt and thus reopen the pores of the cloth, to dry the cloth so as to renew its power of absorption; and to destroy any bacteria that may be in it.

FABRICS

A first step toward gaining necessary knowledge of laundry methods is to learn something of the nature of the fabrics to be laundered and how they respond to the cleansing agents or solvents generally used in the laundry (p. 305). The common fibers used for clothing are of vegetable and animal origin. The chief vegetable fibers are cotton and linen; the animal fibers, wool and silk. Among the common laundry cleansing agents, called reagents, are two classes of chemicals known as acids and bases, or alkalis.

Even cold dilute mineral acids may seriously injure cotton and linen if allowed to dry on the material. Fruit acids have no action on cotton and linen unless allowed to dry and then moistened and ironed dry. Dilute acid does not affect wool, but it weakens silk.

Weak alkalis, such as dilute washing-soda solution, borax, and soap, have little or no harmful action on cotton and linen, but lye is more destructive. Dilute solutions of borax or a mild soap, if only lukewarm, have but a slightly injurious action on wool, but they weaken silk and destroy its luster.

* From Cornell Reading-Course for the Farm Home, Bull. 11.

WATER

Water is the natural solvent for much of the dirt that accumulates on clothing; moreover, it acts as a carrier to rid the clothing of all forms of dirt, both soluble and insoluble. A water good for the laundry should be clean, soft, clear, odorless, free from discoloration, free from iron, free from organic matter.

Hard and soft water.

The very characteristic—its solvent power—that renders water valuable as a cleansing agent, or detergent, is the cause of its greatest shortcomings; for water may pass over, or through, soils that contain soluble substances of an undesirable nature. The characteristic known as hardness, possessed by some waters, is due to the presence of lime salts gathered in the way described. Hard water is not the best for laundry purposes, since lime salts decompose the soap used and form in its place an insoluble lime soap, which collects as a curd on the surface of the water. Such soap decomposition takes place as long as any lime remains in the water and the cleansing, or detergent, properties of soap are not in operation until every bit of lime has combined with soap to form lime soap. By leaving minute particles of lime soap in its pores, hard water is said to weaken a fabric. If the available supply of water is hard, then, the problem of the housekeeper is to find some means of removing lime or of reducing its ill effects.

According to the nature of the lime salts present, water is said to be either temporarily or permanently hard. Temporary hardness is caused by the presence of carbonate of lime, and such water may be softened by boiling. If the boiled water is allowed to stand, the lime settles at the bottom of the receptacle and the softened water may be drawn from the top of it. Permanent hardness is due to the presence of sulfate of lime or magnesium. Boiling has no softening effect on permanently hard water, but certain reagents are effective.

Another salt often very obnoxious in laundry water is iron. Its presence, even in very small amounts, may give a yellow tinge to clothing, owing to the deposit of minute particles of iron-rust in the pores of the fabric.

Organic matter may be present in the water used for laundry purposes, which causes clothing washed in it to become dangerous to the wearer. It is very desirable in all the cited cases to eliminate mischievous substances.

Materials for softening water.

A number of materials for softening water are on the market. The cheapest and best of them are alkalis, known as washing-soda, lye, borax, and ammonia. In softening water, the objection to the use of any chemical is the injury it may do to the fabric.

Washing-soda (*sodium carbonate*) is the best alkali to soften water for general household use, for, while effective in its action, it is not so corrosive as to render its handling difficult or its use unduly harmful, nor is it expensive. It should never be used in its dry form, however, for it is an alkali sufficiently strong to eat holes in a fabric if it is used in full strength, and wherever a particle of the dry substance falls, a strong solution is formed. Carelessness causes many of the complaints against present-day laundry methods.

Lye (*sodium hydroxide, or caustic soda*) is an alkali of far greater strength than washing-soda; one pound of lye being equal to about twelve pounds of washing-soda, it should be used with just so much the greater caution. It should never be used save in solution and, as the solution deteriorates very rapidly on exposure to air, if any quantity is made it should be kept in bottles or jars tightly stoppered with rubber stoppers. The compound formed by exposing lye to the action of air and water, is washing-soda, so there is no advantage in using it. Lye is much more difficult to handle, and its action is so much more corrosive than is that of other alkalis that it is not advisable to use it in the home laundry.

Borax (*sodium biborate*) is one of the mildest alkalis to use in the laundry. This alkali is more expensive than either lye or washing-soda and is not so vigorous in its action; but in some instances it is greatly to be preferred. Washing-soda and lye, unless thoroughly rinsed from clothing, have a tendency to cause yellowing, particularly when starch is used afterward. Borax, on the other hand, has a tendency to whiten fabrics and is added directly to starch, in order to give it good color and to increase its clearness. When colored fabrics or wools are to be washed in hard water, borax is one of the best alkalis to use for softening the water.

Ammonia (*ammonium hydroxide*) is another good alkali for softening water when it is not advisable to use stronger alkalis. Ammonia is a very volatile substance, consequently it should be used only when the laundry process is to be conducted quickly. It is better and cheaper to purchase the full-strength ammonia from a druggist and then dilute it, than to buy the article known as household ammonia, which is of unknown strength.

How to soften water.

Both permanently and temporarily hard water may be softened by distillation, but that method involves apparatus not practicable for the average home.

If water is temporarily hard, however, it may be softened by being boiled, then allowed to stand until the lime settles. The top water is afterward drawn off. Boiling water to soften it is without doubt the best method if it softens the water sufficiently, since no harmful chemicals are left in the water to injure fabrics.

Either temporarily or permanently hard water may be softened by adding lime or washing-soda to the water, then allowing it to stand in open kegs for several days before its use. The water should then be drawn from the top. If the water is boiled after the addition of the softening agent, the time for standing may be considerably lessened. Neither of the two processes just described is much in use in the household, since the time consumed by them is often considered unwarranted. The more common method is to add washing-soda, lye, borax, or ammonia at the time of washing. The addition of one of those substances at that time prevents the action of the lime on the soap. A good suds may thus quickly be obtained, but it does not rid the water of the lime-soap curd which forms and which, in part at least, becomes entangled in the pores of the cloth. The entangled curd has a weakening action on the fabric and gives it a close, filled-in appearance.

The only satisfactory method of getting rid of iron is to add washing-soda to the water, then allowing the water to settle for five or six days before using it. The top water is afterward drawn off.

Water may be softened by any of the following methods:

1. For each gallon of water, use 2 tablespoons of a solution made by dissolving 1 pound of washing-soda in 1 quart of boiling water. The solution should be bottled and kept on hand, as it is a useful cleansing agent, or detergent.

2. For each gallon of water use $^1/_4$ tablespoon of lye dissolved in 1 cup of water.

3. For each gallon of water use 1 tablespoon of borax dissolved in 1 cup of water.

If water is very hard, increase the amount of alkali used.

Organic matter.

Organic material may be precipitated by the use of alum in the form of an alum-borax mixture. The sediment should be allowed to settle and the water may then be drawn from the top.

To remove organic matter, for each gallon of water 1 tablespoon of a mixture made up of two-thirds borax and one-third alum should be used. If the water is rich in organic matter, more than 1 tablespoon of the mixture must be used. When water is very scarce, alum is sometimes used to separate the dirt from the water and the water is then filtered and used again.

SOAP

A question often arises as to the advisability of using kitchen-waste fats in making soap at home. While some housekeepers may find such use an economy, the fact remains that home-made soaps are generally poorly made and of inferior quality. The inferiority of home-made soaps may have several causes. The so-called cold process is usually followed in making these soaps, and rarely is the union of the fat with the lye complete. The fat used in home-made soap is often filled with impurities and they are not always removed before the soap is made. As the fat in kitchen waste varies greatly in composition, it is impossible to give the exact amount of alkali required for home-made soap. It is evident, then, that home-made soap is likely to be filled with impurities and to be both greasy and excessively caustic, "eating," because of the presence of free fat and an undue amount of free alkali. For the benefit of those housekeepers who wish to try its manufacture, however, a formula is given on page 256.

Soap substitutes and accessories.

Soap is the best all-round cleansing agent to use in the laundry, but there are other substances with similar cleansing properties that may be used with good results in its place:

In the leaves, stems, roots, or bark of some plants occurs a soap-like substance that is closely allied to soap in its power to remove dirt. Soap-bark (quillaia bark) is a familiar example of this kind of cleansing agent. When powdered soap-bark is put into water it gives a good lather, and it acts quickly and effectively to remove dirt and stains.

Another substance with soap-like characteristics, but of animal origin, is known as ox-bile, or ox-gall. Soap-bark and ox-gall are doubtless well known to the housekeeper, for they are often used to wash garments easily injured by the strong alkalis, for example, woolens, and fabrics printed in delicate colors.

Bran, rice, potatoes, and starch are frequently recommended as good substitutes for soaps in washing delicate fabrics and colors.

Various substances are used with soap to facilitate or accelerate the washing process. Among them may be mentioned lye, washing-soda, borax, and ammonia; turpentine, paraffin, kerosene, and benzine; and fuller's earth.

Alkalis are often used in connection with soap, in excess of the amount needed to soften hard water, to facilitate the removal of dirt by their direct action on it. In many cases it is a mistake to pursue such a course if the alkali used is lye. The same objections may hold with washing-soda, but in lesser degree. If the fabric is of such nature that limited amounts of lye or washing-soda will not seriously injure it, a strong soap will contain all the free lye that is safe to use. Borax and ammonia are mild alkalis and may be very useful when the presence of some free alkali is needed and the effect of a strong soap would be injurious. They are often utilized in connection with a neutral or mild soap for washing flannels and delicately colored fabrics.

Turpentine, paraffin, kerosene, and benzine are all valuable aids to the laundress, for they exert a solvent action on matter of a fatty nature and thus soften and loosen dirt, materially facilitating the washing process. The disadvantage in the use of these substances is, that clothing in the washing of which they have been used may be insufficiently rinsed afterward and retain the odor of them. Benzine is dangerous to handle because of its inflammability, and cannot be used with very hot water because it evaporates.

Fuller's earth is a valuable adjunct in cleaning, and is sometimes used partly to replace soap in the washing process when the articles to be washed are in a very greasy condition and the use of a strong soap is not sufficient, and when the use of a strong alkali is not advisable.

Manufacturers have put on the market various soaps and powders that have incorporated with them some one or more of the above substances. Naphtha and borax soaps and soaps containing fuller's earth give satisfaction. Good results may be obtained at less cost by the use of soap and the accessory material uncombined, though it may often be more convenient to use the manufactured article that is a combination of the two.

Washing powders are mixtures of soap and some alkali such as lye, washing-soda, and borax, and may have incorporated with them some one or more of the substances of the nature of turpentine, paraffin, fuller's earth. In the case of the poorer powders a "filler" is used, that is, a substance giving weight to the powder and very properly considered an adulterant. The best powders contain large amounts of soap and only small amounts of alkali. A report is made of one of the poorer varieties of washing powder containing only 10 per cent of soap. Enough has been said in connection with the effect of alkalis and their use to guide the housekeeper in her purchase and use of these powders. There may be occasions when a washing powder is desirable, but indiscriminate use of these strong cleansing agents is inadvisable and should not be generally indulged in.

Directions and formulas.

Home-made soap:

1 pound can lye dissolved in 3 pints cold water
5 pounds fat melted, 1½ tablespoons borax, ½ cup ammonia

When lye mixture has cooled add it to fat, stir until as thick as honey, pour into wooden or pasteboard boxes lined with oiled or waxed paper, set away to harden.

Soap-bark:

1 pound soap-bark equals 2 pounds soft soap. Use in place of soap.

Bran:

1 cup bran
1 quart water

Boil ½ hour. Strain, boil bran in a second quart water ½ hour. When needed, reduce with warm water.

Potato water:

Grate two large-sized potatoes into 1 pint clean, clear, soft water. Strain into 1 gallon water, let liquid settle. Pour off and use.

Soap solution for washing colored goods:

¼ pound mild or medium soap to 1 gallon water.

Soap solution for ordinary purposes:

1 bar ordinary washing soap
2 to 3 quarts water

Shave soap and put into saucepan with cold water. Heat gradually until soap is dissolved (about 1 hour).

Soap solution for soaking clothes:

1 bar ordinary soap
3 gallons water
½ to 1 tablespoon turpentine
1 to 3 tablespoons ammonia.

Soap solution for washing much-soiled woolens and delicate colors:
½ pound very mild or neutral soap
¼ pound borax
3 quarts water.

Soap jelly with turpentine incorporated:
1 bar soap
1 quart water
1 teaspoon turpentine or kerosene.

A liquid for washing delicate fabrics and colors may be made from laundry starch, grated potatoes, rice, flour, and the like. The water in which rice has boiled may be saved and utilized for the same purpose. The cleansing liquid after cooking should be as thick as cream and should be diluted from one to four times, according to the amount of dirt in the clothing. Clothing should be rinsed in a more dilute solution, which may be blued for white clothes.

STARCH

There is a twofold reason for the use of starch in laundry operations: (1) the glazed surface of a starched garment keeps clean longer than an unglazed, or unstarched, surface; (2) the increase in body of the starched garment gives it increased resistance to moisture and some garments are considered correspondingly more attractive in appearance. In the commercial laundry and in those industries in which the finishing of fabrics is a consideration, use is made, not of one kind of starch, but of several, according to the nature of the work to be done.

The American housekeeper uses, as a rule, only cornstarch, because of its cheapness and a lack of knowledge of the characteristics of the other starches. The several varieties of starch vary considerably in their ability to penetrate fabrics. The reason for the use of rice starch with finer fabrics by those considered to do a superior grade of laundry work, is because of its penetrative quality. It is said to penetrate the pores of a fabric more completely than does any other starch and to give a finer, smoother finish. Next to rice starch in penetrability comes wheat starch. Cornstarch is the poorest of the three starches; it has a tendency to lump and show starch spots after ironing.

Rice starch gives a natural, pure white color to fabrics, while cornstarch gives a yellow color, and wheat starch a color between the two. Since wheat starch and cornstarch are the practical possibilities in the American household, further comparison will be between these two. When good color, smoothness of surface, pliability, and fine finish are desired, wheat starch gives the better results; moreover, it is said to hold up better in damp climates. Cornstarch gives the greater stiffness, or body, to a fabric.

According to the finish desired, advantage is taken of the different characteristics of wheat starch and cornstarch. When flexibility and finish are the main objects, wheat starch is used alone; if stiffness is the chief consideration and finish may be overlooked, cornstarch is used alone; when it is desirable to combine stiffness with flexibility and good finish, a mixture of cornstarch and wheat starch is used. There is no reason why the use of wheat starch should not extend to the home laundry.

Various substances are used with starch to increase its penetrability and prevent it from sticking to the iron, as well as to give pliability to the cloth, increase its body, and improve its color. Of these substances may be mentioned borax, alum, paraffin, wax, turpentine, kerosene, gum arabic, glue, and dextrin.

Borax increases the penetrability of starch and aids in preventing it from sticking to the iron. Moreover, starch containing borax adds gloss to a garment, increases its whiteness, and gives it greater body, together with more lasting stiffness, than it would otherwise have.

Alum is used alone, or with borax, in starch to improve color, to increase penetrability and pliability, and to thin the starch mixture. When alum is cooked with a starch paste it causes the paste to become thinner. "Cooking thin" with alum does not affect the strength of the starch mixture and is an advantage when a stiff starch is desirable and the thick mixture would be inconvenient to handle. By the use of alum, starch may be made thin without dilution. Alum has been objected to by some persons as being somewhat injurious to fabrics.

Oily substances, such as wax, paraffin, turpentine, lard, or butter, are used to add a smoothness, gloss, and finish, to prevent the starch from sticking to the iron, and to aid in preventing the absorption of moisture.

Substances resembling glue, such as gum arabic and dextrin, are used with starch to increase its stiffening power. They are sometimes used alone when the white color of starch is considered a disadvantage in stiffening colored fabrics.

Directions for using starch, starch substitutes, and starch accessories:

In making starch, a naturally soft water is greatly to be desired, but if the water furnished is hard it should be softened with borax, not with washing-soda or lye, since these tend to produce a yellow color with starch:

1. ¼ cup wheat starch to 1 quart water gives flexible, light, durable finish.
2. ¼ cup cornstarch to 1 quart water gives moderate body stiffness.
3. ½ cup wheat starch to 1 quart water gives flexible, firm finish.
4. ½ cup cornstarch to 1 quart water gives stiff body finish.

A mixture of the two starches may be varied, to produce any desired result.

Directions for cooking starch:

Starch should first be mixed with a little cold water and then stirred slowly into boiling water and cooked in accordance with the following directions:

1. If wheat starch is used, cook slowly at least 25 or 30 minutes.
2. If cornstarch is used, cook slowly 15 to 20 minutes.
3. If a mixture of wheat starch and cornstarch is used, the wheat starch should be added first and cooked 15 minutes. The cornstarch should then be added and the mixture cooked 15 minutes longer. Stir the mixture frequently, to prevent sticking and formation of a film.

Thorough cooking of starch is very desirable in laundry practice, for it increases the penetrability of the starch and decreases its tendency to stick to the iron. If borax, lard, butter, kerosene, or other like substance is used, it should be cooked with the starch, to insure thorough mixing.

Thick starch:

½ cup starch, mixed with ½ cup cold water

1 quart boiling water

½ to 1 level tablespoon borax

¼ level tablespoon lard or butter or kerosene or turpentine; or ¼-inch-square wax or paraffin

Mix, and cook according to directions for cooking starch.

Thin starch:

½ cup starch, mixed with ½ cup cold water

3 quarts boiling water

Other ingredients, same as for thick starch

Mix, cook according to directions for cooking starch.

Clear starch:

Dilute ½ cup thick starch with 1 quart hot water.

Clear starch is used for thin muslins, infants' dresses, and the like.

Raw starch:

Same proportions as for thick starch.

Use borax but omit fatty substances.

Stir thoroughly before using.

Raw starch is often used with very thick or very thin goods, to increase their stiffness. A fabric will take up a greater amount of starch in the raw than in the cooked form. The desired stiffness is produced by the cooking given the raw starch by the heat of the iron. The difficulty of ironing is increased by using raw starch, for unless the ironer is skillful the starch cooks on the iron and starch specks are then produced on the clothes. Moreover, raw starch gives a less durable finish than does cooked starch.

Rice starch:

¼ cup rice

1 quart boiling water

Wash rice, cook in water until very soft.

As water evaporates, add more to keep quantity up to 1 quart.

When cooked add another quart boiling water.

Strain, without squeezing, through double thickness of cheese-cloth or through flannel. Use while hot. The most satisfactory starch for delicate fabrics is rice starch, and it may be used in place of clear starch.

Glue for stiffening dark clothes:

12 ounces dark glue

1 quart water

Boil together until glue is dissolved, cool somewhat. Dip the garment to be stiffened into glue and wipe off excess of glue with piece of black cheese-cloth, sateen, or calico. After sprinkling, roll garment in black cloth and iron on ironing board covered with black cloth. Any glue left over may be saved and used again.

To increase stiffness:

1. Partly dry garment before starching.
2. Add 1 tablespoon powdered gum arabic reduced to liquid in ½ cup boiling water, to the stiff starch mixture.
3. Use borax.
4. Add a small amount of glue to starch mixture.
5. Dry quickly.

Gum arabic as a starch substitute:

4 tablespoons pulverized gum arabic
1 pint cold water
3 tablespoons alcohol.

Put water and gum arabic in saucepan and set into saucepan containing boiling water.

When dissolved, strain through cheese-cloth, cool, add alcohol, pour into a bottle, cork, set away for use. The alcohol acts as a preservative and the mixture may be kept for any length of time.

BLUING

White fabrics have naturally a creamy tint, which may be deepened to an unpleasant pale yellow by careless washing, by insufficient rinsing, or by lack of exposure to the bleaching influence of sunlight and fresh air. Bluing is used to hide the yellow color, because blue and yellow are complementary colors and when used together in proper proportions give the effect of whiteness. Bluing is unwarrantably used to hide a yellowness which comes from careless washing.

No one kind of bluing may be recommended to the housekeeper. She must experiment for herself, choose one good variety, and learn to use that one properly.

Sufficient bluing should be used to make a little of the bluing water taken up in the cup of the hand show a pale sky-blue color. More than that amount of bluing should not be needed. It is always best to make a small amount of strong bluing in a bowl of water, then draw from it to color the water in the tub.

WASHING

While Monday has long been chosen as the home day for washing, there may be good reason to postpone the process until Tuesday. Before washing day, clothing should be thoroughly gone over to discover rents and stains, carefully sorted, and the white clothes put to soak. This preliminary work requires time which it may be inconvenient to give on Saturday and which may not be justified on Sunday.

The following outline is suggested for the preparation of clothes for washing:

1. Sort the clothes according to kind:
   a. White cotton and linen clothing
      Table linen and clean towels
      Bed and body linen
      Handkerchiefs
      Soiled towels and cloths.
   b. Colored clothing.
   c. Flannels.
2. Mend rents, except in stockings.
3. Remove stains (pages 282 to 306).
4. Put as many white clothes to soak as is practicable. Some colored clothes having fast colors may be soaked if very much soiled.

The purpose of soaking soiled clothes before washing them is to soften and separate the fibers of cloth in order to loosen dirt. Water alone accomplishes this purpose to a great extent; but the use of a soap solution, or a soap solution to which has been added borax, ammonia, or other alkali, and turpentine, kerosene, or benzine, makes the washing process both easier and quicker.

It is well before beginning the washing to make a soap solution, as it gives a quick suds and is more easily handled, and its use will, therefore, save time.

All the clothing should not be put to soak in the same tub. If three tubs are available, table linen and clean towels should be soaked in one, bed linen and body linen in a second, soiled towels and cloths in a third. If only two tubs are available, table linen and clean towels may be washed without preliminary soaking. Soiled towels and cloths should always be soaked before washing.

If colds have prevailed in a family, the handkerchiefs should be put to soak in a solution of boric acid in a basin by themselves, and should be separately washed and boiled for twenty minutes.

The garment to be soaked should be wet, the more soiled part rubbed with soap solution, and that part folded in. Each garment should be folded and rolled separately and packed into the tub with the other garments. Folding and rolling prevents the dirt in the soiled parts from spreading. The clothes are then covered with warm soapy water, to which may have been added an alkali such as borax or ammonia, and an oily substance, perhaps turpentine, kerosene, or benzine. Directions for making soap solutions are given on page 256. The tub should be covered, and if possible the clothing allowed to soak in it during several hours or overnight. If colored clothes are to be soaked, they should be covered with warm water or with water very slightly soapy. No alkali should be used with the colored clothing.

No arbitrary order can be recommended for washing clothes, but flannels, white goods, and colored goods should be washed separately as the washing process differs somewhat for each case.

A few simple explanations may aid the houskeeper in solving some of her problems. Heat tends to expand the threads of the cloth, and the expansion aids in removing dirt caught between the threads. If the cloth is cooled during the washing process, the thread contracts and the dirt is again entangled; consequently, after the cloth has once been warmed, one of the objects of the launderer should be to maintain an even or a rising temperature. In the commercial laundry, an even temperature is kept by turning the correct amount of steam into the washing-machine. In the home laundry, boiling water added from time to time will aid in keeping an even temperature. A good suds is necessary in the washing process. As the suds falls, that is, as it is used up by uniting with dirt, more suds should be supplied by adding more soap or soap solution. If insufficient soap is used, insoluble black specks are often left on the clothing.

All utensils, receptacles, and apparatus should be immaculately clean.

Order of washing white linen and cotton clothes:

1. Put water on to heat.
2. Make soap solution.
3. Rinse clothes from water in which they have soaked.
4. Wash clothes in warm suds in following order:
   a. Table linen and clean towels
   b. Bed linen
   c. Body linen
   d. Handkerchiefs
   e. Soiled towels and cloths
   f. Stockings
5. Wash again in clean suds. Wring.
6. Boil in clean, slightly soapy water.
7. Rinse in clean, clear water. Wring.
8. Rinse in bluing water. Wring.
9. Starch.
10. Hang to dry.
11. Remove from line, dampen, and fold.

Directions for washing:

1. Have plenty of hot water before beginning the washing. If possible the water should be soft; if it is not, soften it as directed on pages 252 and 253.

2. Make a soap solution; use one cake of soap to two or three quarts of water.

3. Rinse the clothes from water in which they were soaked, removing as much of the dirt as possible. Parts of the clothing that are very much soiled should be rubbed a little and rinsed in fresh water before the garments are put into a tub or a washing-machine. The precaution of rinsing saves wear and tear on the whole garment.

4. Pour warm water into tub or washing-machine; if the water is hard, soften it with washing-soda solution or borax. Add enough soap solution or soap to make a good suds. A tablespoon of turpentine, kerosene, or benzine may be added to the washing water as well as to the water in which clothing has soaked. Put in clothes to be washed. Rubbing is essential for soiled garments. It may be accomplished in one of two ways: by using the washboard and old-fashioned tub, or by using a washing-machine. It is well to have a board for very soiled parts, such as hems and edges, but the washing-machine is a great improvement on the older method.

Whenever the water becomes dirty, use fresh suds. Clothes cannot be made clean without the use of plenty of water. Keep up a good suds while washing, and add hot water from time to time. If a washing-machine is used, do not put enough water in the machine to float the clothes; if this is done, they will escape the mechanical action of the dasher and will not be sufficiently rubbed. Clothes should be wrung from the wash water through the wringer. The screws of the wringer should be adjusted to bring its rolls close together and clothing should be folded so as to give it an even thickness in passing through the wringer; for heavier garments loosen the screws of the wringer. Fold in buttons and hooks and turn the wringer slowly.

5. A second suds is generally necessary, though it may be omitted if the clothing has been only slightly soiled. Shake out clothes wrung from the first suds, look them over for soiled parts, turn them wrong side out, and drop them into a second suds. Wash and wring them ready for boiling.

6. Clothes should be clean before they are boiled, as the boiling process is intended not so much to remove visible dirt as to destroy germs and purify the clothing as well as to whiten it. Boiling is omitted when a naphtha soap is used, because the soap loses its effect in very hot water; it is asserted that boiling is not needed because naphtha itself is a purifier. Nevertheless, at least once a month, the clothing washed at other times with naphtha soap should be boiled.

Fill the boiler half full of cold water; if the water is hard, soften it. Add enough soap solution to make a light suds. Half fill the boiler with clothes, wrung and shaken out from the last suds. Use plenty of water and do not put too many clothes into the boiler. Bring the water very gradually to the boiling point, and boil it for ten minutes.

Kerosene or turpentine is sometimes added to the boiler water to counteract the yellow color given clothing by the use of the dark resin soaps. It is better to avoid kerosene and turpentine at this point if possible, because clothing treated by them requires very thorough rinsing to remove the odor. Each boilerful of clothes should be started with clean cold water. Cloths or clothes containing lampblack or machine oil may be placed in the hot water left in the boiler after the last clothes have been wrung from it. Kerosene or turpentine should then be added, since they are the solvents for such dirt.

7. Rinsing is an important part of the washing process, for if soap or some of the strong alkalis are left in the cloth, they may be very detrimental in the bluing or starching process.

If water is hard, it should be softened for rinsing with either borax or ammonia and not with washing-soda. The rinsing water should be hot. The clothes should be slowly lifted with a clean stick from the boiler into a dishpan, and drained or wrung and shaken before being put into the rinse water. It is not always practicable to use more than one rinse water before bluing the clothes, but better results are obtained when the clothes are rinsed more than once. With some kinds of bluing, the presence of soap or an alkali precipitates the blue as iron-rust. If the starch used is not pure, and any lye or washing-soda or soap has been left in the cloth, a yellow color is produced from the starch impurities by the action of those alkalis. Wring the clothes from the rinsing water, and shake them out.

8. It is impossible to give any rule for the amount of bluing to use or the depth of color to be decided on. Some fabrics, such as soft, loosely-woven ones, absorb more bluing than others. The amount of bluing to be used is a matter for experimentation by the launderer. Clothes should not be allowed to stand in the bluing water, as they might become streaked.

If a ball bluing is used, tie it in a thick cloth, wet, and squeeze it into a bowlful of hot water. Use a part of the resulting solution for bluing the water. More of the bluing in the bowl should be added to the bluing in the tub from time to time as the clothing takes it up. As some kinds of bluing are in the form of minute particles, the bluing water should be stirred each time before adding clothes to it. After they are wrung, unstarched clothes will then be ready for drying.

9. Make the starch according to directions on pages 259 to 261. Starch those garments requiring thick starch first, because moisture from the clothing gradually thins the starch, and a medium stiff, medium thin, and thin starch gradually result.

Stiff starch: Collars, cuffs, shirt bosoms.

Medium stiff starch: Shirt waists, collars and cuffs, coarse lace curtains.

Medium thin starch: White petticoats, duck skirts, and some dresses.

Thin starch: Skirts and dresses when a stiff finish is not desired; shirt waists.

Clear starch: Infants' dresses, fine laces, curtains, light-weight table linen when it is desirable to give it some body.

Raw starch: Collars, cuffs, shirt bosoms when an extra stiffness is desired; some light curtains.

The starch should be thoroughly worked into the cloth so as to distribute it evenly through the threads of the fabric. Such working insures a smooth, even stiffness and prevents starch spots in ironing. All garments starched with boiled starch should be dried thoroughly before being dampened. They should be dampened several hours before being ironed. If articles are to be raw-starched, they should be thoroughly dried first. They are then dipped into the raw starch and rubbed as for washing, squeezed dry, and spread out on a clean sheet or cloth, but not one over the other. They should cover only half the sheet. The other half of the sheet should be folded over them. Then the sheet with its contents should be rolled tightly and allowed to stand for two or three hours to insure even distribution of moisture.

10. When possible the process of drying should accomplish more than the mere removal of moisture. Clothing should be hung where it will be freely exposed to the action of fresh air and sunshine. Such exposure purifies and bleaches at the same time.

The launderer should be provided with a clothes-pin bag or, better still, with a clothes-pin apron having a deep wide pocket.

When possible, lines should be taken down each week, but when they cannot be, they should be well wiped with a damp cloth before hanging up clothes. The clothes-pins should be clean. Each article should be turned wrong side out and hung with the threads of the material straight; the garment should be shaped as nearly as possible in its natural shape. Avoid hanging pieces by corners, for thus hung they would be pulled out of shape. Fasten garments by their bands when possible. Table linen, bed linen, and towels should be well stretched and hung very straight; the larger pieces should be pinned in at least four places, as it is nearly impossible to iron properly a piece that has been improperly hung. Careful hanging greatly reduces the labor of ironing. When the clothes are brought in from the line, the clothes-pins should be put into the apron or basket kept for that purpose and placed where they will be clean.

Starched pieces should not be allowed to freeze and should be removed from the line as soon as dry. Long hanging reduces their stiffness. If flannel underwear is properly stretched and hung, it may be folded and put away without further treatment.

11. Clothes should be dampened some hours before being ironed, because during the interval between moistening and ironing the moisture becomes distributed evenly and does away with the necessity of using a superfluous amount of water. The dampening is best done at night, but only as many articles should be sprinkled as can be ironed next day, for damp fabric will mildew if left wet for a few days, especially in hot weather. Although clothes should be well dampened, they should not be drenched. Very often, trouble in ironing starched pieces is owing to overwetting. The starched part is soaked and made limp and sticky. A clean whisk-broom kept for the purpose is the best thing to use for sprinkling clothes. Some persons have used a toy sprinkling pot. There is, however, a danger in its use, for it may rust and give rise to rust spots on clothing. Large pieces should be sprinkled and folded separately. Small pieces may be sprinkled and laid together before folding. Care should be taken to fold and roll garments smoothly, since this aids in their ironing. The rolls of dampened pieces should be packed closely in a basket lined with a clean cloth and covered with a clean cloth.

Table linen and other linen should be made very damp, not wet. If table linen is sprinkled with a mixture of one part alcohol and four parts water, the result after ironing will be a slight stiffness resembling that of new linen.

If an ironing machine is used, unstarched pieces may be removed from the line while still damp and ironed immediately without the preliminary sprinkling.

Washing colored clothing.

Colored goods require more careful treatment than do white goods. The conditions that most affect the stability of colors in fabrics are: long-continued action of water and soap; strong alkalis or acids; strong sunlight, which is a powerful bleaching agent and is used frequently for bleaching.

In washing colored clothing, the factors just enumerated should be kept in mind. Colored clothing should not be soaked for any length of time unless its color is known to be very stable. Any soap used in the washing process should be a mild soap in solution, or if the color of the goods to be washed is very delicate the soap solution should be replaced by soap-bark, bran, rice water, potato water, or cooked-starch water. The washing process should be conducted quickly, and in water not very hot. After washing, colored garments should be turned inside out and hung in a very shady or dark place, and should be taken in as soon as dry. Fading is more often due to careless drying than to any fault in washing. Washing powders and strong alkalis should never be used with colored clothing. If the water needs softening, borax should be used. If starch, bran, rice water, and the like, are substituted for soap, the mixture should be employed as if it were soap-suds.

In starching colored clothes, the starch should be rubbed in thoroughly, and any excess of it wiped off; no difficulty will then be experienced with white starch spots.

Sometimes a fabric shows a decided tendency to fade even under the best washing conditions. It is always well if there is any doubt about fading, to test a small piece of the cloth before washing it. If the color fades, an attempt should be made to set it. With most colors, the dyer uses chemical substances which cause a firmer union between the color and the cloth. Such substances are called mordants. The process of making a color fast may sometimes satisfactorily be used by the housekeeper to strengthen weak colors. The household mordants are vinegar, brine, and sugar of lead, used in the following proportions:

To 1 gallon water add:
- ½ cup mild vinegar; most effective for blues
- 2 cups salt; most effective for browns, blacks, and pinks
- 1 tablespoon sugar of lead (poison); most effective for lavenders.

Small pieces of cloth should be tested in each of the above solutions and a choice made after the test. The cloth of which the color is to be made fast should be left in the mordant solution overnight and may be left in for several days with good results. It should be thoroughly dried before being washed. Even with relatively strong colors, soaking a fabric overnight in a brine solution before washing it for the first time may render it far less susceptible to fading influences than it otherwise would be. The effect of brine, however, is said not to be lasting. Colored goods are often rinsed in a dilute salt solution just before being dried.

Washing woolens.

Strong soaps should never be used in washing woolens, nor should soap be applied directly to the garment. The soap should be used in solution. A great deal of stress is laid on having the water used in washing flannels not much more than lukewarm, for at a lukewarm temperature soap and water have a less detrimental action on wool. It is even more important than the lukewarm water to have all the waters used of the same temperature, in order to avoid changes from hot to cold water, or vice versa, as sudden changes in temperature cause shrinkage.

To wash flannels, two receptacles should be used. Into one of them water not too hot for the hand to bear comfortably should be poured and enough soap solution made from a neutral or mild soap or a wool soap added to make a good suds. If the water is hard, or the clothing is very much soiled, a tablespoon of borax or ammonia should be added for each gallon of water used, the garment shaken or brushed free from dust, and put into the water to soak for ten or fifteen minutes. Before beginning to wash the flannels, a second tub of water should be prepared having the same or a slightly higher temperature than that of the first. One garment should be washed at a time by drawing it through the hands and washing it up and down in the water; rubbing should be avoided if possible since this mats the fibers. The garments are passed from the first to the second water; the second water should be a suds if the first suds has not removed all the soil. They should be rinsed free of soap in several waters, the temperature being kept constant. They are then wrung through a loosely set wringer. They should be turned wrong side out and hung in a warm place, but not near a fire as heat will cause shrinkage. When nearly dry, they should be turned. When drying they must be shaped by pulling and stretching.

It is a mistake to ascribe all the shrinkage in woolen garments to washing. The moisture, heat, and movements of the body may cause a marked shrinkage.

If flannels are to be pressed, they should be allowed to dry first and should then be covered with a slightly dampened piece of cheese-cloth and ironed with a moderately hot iron. The cheese-cloth draws up the fibers of the flannel, giving it the fluffy appearance of a new garment. Underwear and woolen stockings should be stretched into shape and should not be ironed. For very soiled garments the soap formula given on page 256 will be useful.

Blankets are washed in the same way as other woolen articles, except that, because of their size, only two blankets or only one pair of them is washed at a time, and fresh water is used for each pair. After wringing, they may be stretched and dried on curtain stretchers. If stretchers are not available, blankets should hang on the line until perfectly dry, and occasionally the water should be squeezed from the hanging ends. To press them, they should be folded evenly and carefully and wrapped in a sheet. They should be kept smooth and unwrinkled, a flat board placed over them, weighted heavily and allowed to remain thus for several days.

An excellent blanket wash may be made according to the following formula: *

1 large cake neutral soap
3 quarts cold water
2 tablespoons borax
½ cup wood alcohol

* Laundering. L. Ray Balderston.

In using the above wash, the soap should be shaved into the cold water, and heated at a low temperature until it is dissolved. It is then cooled and the borax added, mixed with the alcohol. The mixture should be poured into wide-mouthed jars, and kept air-tight. This quantity is sufficient for washing two pairs of blankets.

Sweaters or loosely woven or knitted garments should be washed as follows:

1. If the garment is silk, wool or cotton, follow the general directions for the laundering of garments made of these fabrics. A woven garment should be squeezed with the hands and lifted up and down in the water rather than rubbed on a board.

2. Measure the length and width of the different parts of the garment before wetting it. For example, in the case of a sweater, measure the length of the front, the width of the front, the length of the back, and the width of the back in several places, the length of the sleeve along the seam, and the length of the shoulder.

3. Spread one or more clean sheets, folded several times, on a flat surface such as a table, and place it where there is a good draft. Outdoors in the sunshine is a good place, if the garment to be dried is not too delicate in color. After the garment has been rinsed, place it with the back next to the folded sheet. Bring the fronts together, and place the sleeves in a nearly outstretched position.

4. After the garment has been placed as suggested, test the measurements with those taken before it was wet. Stretch it until it gives the correct measurements. If necessary, pin it into place.

5. When the garment is practically dry on the side exposed, turn it and let it dry on the other side. It may be necessary to turn the sweater several times.

This method is much better than hanging the garment on a coat-hanger after washing, because the size may be kept the same as before washing.

Washing silk.

Silk should be washed in much the same way as wool. While it is not so strongly affected by soaps and alkalis as is wool, its gloss is destroyed by the use of strong cleansing agents. The delicacy of the fiber makes hard rubbing impossible, for it breaks the fibers and destroys not only their durability but also their silkiness. In wringing silk, it should be placed between dry towels or heavy cloths and put through a loosely adjusted wringer. It should be ironed on the wrong side while still damp, with a moderately hot iron. Silk is very easily scorched and, if the iron is too hot, the silk will be stiff. The iron should be pushed back and forth with a wriggling motion to give softness and pliability to the silk. It is often best to iron silk under a cloth; to do so gives less body and a softer finish.

Ribbons, if of good quality, may be very successfully washed. To iron them they should be covered with a dry cloth and the iron moved frequently back and forth over the surface of the cloth above them.

Washing laces.

It is often best to dry-clean fine laces, as they thicken slightly in washing. To wash them, a warm neutral soap-solution should be used to which has been added ammonia or borax. The dirt is squeezed out by pressing the lace in the hands but should not be rubbed; rubbing breaks the delicate threads. A good way to wash fine lace is to baste it to strips of cheese-cloth, being careful to catch down all its points. It should then be put to soak overnight in warm soapy water containing a little borax or ammonia. It should be washed by squeezing, then rinsed free of soap. Old yellow lace may be bleached by stretching it, while wet, around a bottle, and standing it in the sun, rewetting the lace occasionally. Javelle water may be used to bleach lace. Lace may be stiffened by rinsing in a mixture of two tablespoons of alcohol to one cup of water; by rinsing in borax water, two tablespoons to a cup; or by using gum arabic, one-eighth teaspoon to a cup of water. If a yellow color is desired, the lace may be dipped in coffee or tea.

Black lace should be cleaned by squeezing it repeatedly in a mixture of one cup of strong coffee and one tablespoon of ammonia. It should be rinsed in gum arabic water made with coffee, to give natural stiffness.

Lace curtains should be washed with as near an approach to the care given to lace as is practicable. They should be clear-starched, stretched, and pinned out on sheets, one curtain over another. If available, it is better to use curtain-stretchers than sheets, but if care is taken to square off the first curtain and stretch it straight and even, good results may be obtained by pinning the curtains to sheets.

BLEACHING

Occasionally, even in the household, it may be necessary to supplement the natural bleaching process accomplished by sunshine, fresh air, and green grass, by the use of chemicals. If a garment has yellowed by age or by being packed away with starch in it, it may be expedient to use a chemical bleach.

The best bleach to use is Javelle water, which should be made as follows:

1 pound washing-soda
1 quart boiling water
½ pound chloride of lime
2 quarts cold water.

Put soda in granite pan; add boiling water and stir until dissolved; let cool.

Dissolve chloride of lime in cold water; let settle and pour the clear liquid into the soda; let settle. Pour off clear liquid, bottle, and put away in dark place.

Use, mixed with equal parts or more of water, and do not let the garments stay in over ½ hour. Rinse thoroughly in several waters and lastly in dilute ammonia water.

Moisture is necessary if clothes are to be bleached by the action of the sun. After a garment dries, it should be made wet again and hung out. It may be necessary to repeat the wetting operation a number of times before the yellow tinge yields. It is said that clothes are whitened if they are allowed to freeze out of doors on the line. The reason given for the bleaching action is that freezing causes the clothes to retain moisture, hence the time of their bleaching is prolonged.

IRONING

For ironing, the following equipment should be provided: a flat, firm, unwarped ironing-board or table, tightly covered with a blanket and clean sheet, securely fastened underneath; clean irons; an iron stand, which may well be a clean brick; two pieces of old cloth for cleaning irons; a piece of paper folded several times for testing irons; a piece of beeswax or paraffin tied in a cloth, for keeping irons smooth; a bowl of water and a clean cloth for moistening parts dried by exposure to air. A large paper should be spread or a basket placed under the ironing-board to receive the clothes while they are being ironed.

For ordinary ironing a good firm surface is desirable. A thin woolen blanket and an outside linen cover are sufficient. For embroideries or wool, a thick covering is better, because the fabric should sink into a soft foundation to bring out the pattern in one case and to give a soft finish in the other.

Method and order of ironing.

The following simple rules for ironing may be followed:

Iron first that part of the garment which will be least mussed by further handling or in which a little wrinkling will not seriously interfere with good results.

If the garment is trimmed, iron laces and embroideries first, as they dry out quickly because of their porous nature.

Leave as much of a garment folded as possible, to keep it moist. Sometimes it may be convenient to lay a piece of dampened cheese-cloth over any unironed part to keep it moist. Figs. 52–55 give some of the methods of folding various garments.

The method and order of ironing various articles is somewhat as follows:

Night dresses: Embroidery; sleeves; yoke; body.

Drawers: Trimming; tucks; body; band.

Skirts: Ruffle; hem; body.

Shirt-waists: Cuffs; collar-band; sleeves; yoke; back; front.

Silk waists: Iron as a shirt waist on the wrong side while it is still damp.

Embroideries: Iron on wrong side on a soft foundation, to allow the design to stand out.

Laces: Lay on a piece of flannel covered with a piece of cheese-cloth. Iron on the wrong side, and pull out points with the tip of the iron. Lace should be stretched and pinned out on a hard surface. Pull it out at each point and catch it down with a pin; or stretch it and roll it on a bottle.

Tablecloths: Use heavy irons, iron on both sides, iron partly dry on the wrong side and complete the process on the right side, to bring out the pattern. Fold the selvages together first. Fold all edges evenly, except when folding the lengthwise folds in half. Draw the upper half back about ½ inch in making the last fold, or that part will be pushed out of place, giving an uneven edge. The same rule applies to sheets, napkins, handkerchiefs, and the like. Tablecloths may be folded lengthwise twice and then rolled to avoid creases.

Napkins, handkerchiefs, and towels: Iron and fold as for tablecloths.

Sheets: The hems of sheets must be smoothly ironed. It is a good plan to iron only the hems when time is a consideration.

Flannels: Iron after laying a dampened cheese-cloth over them. If

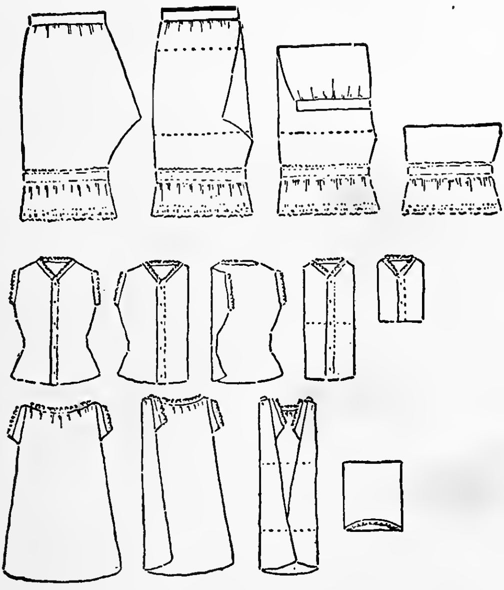

FIG. 52.—Methods of folding underwear.

they are not covered with a damp cloth, iron them on the wrong side; have the iron only moderately hot.

Pillowcases: Iron smooth.

Colored garments: Iron on the wrong side, when practicable, as to do so prevents fading. Do not have irons too hot.

Silk garments: Iron on the wrong side; to do so prevents shininess.

After being ironed, each article should be hung on a frame or clotheshorse to dry and air before it is put away. If hung in a poorly ventilated room, the clothes will have a bad odor.

Sprinkling may not be necessary when an ironing-machine is used for ironing, if the operator will remove the clothes from the line just at the right time, that is, while they are still damp. The process can be carried through so quickly that it is unnecessary to keep one garment damp while the other is being ironed.

EQUIPMENT FOR THE LAUNDRY

It is always best, when possible, to have a separate room for laundry purposes. Much of the apparatus can then be made

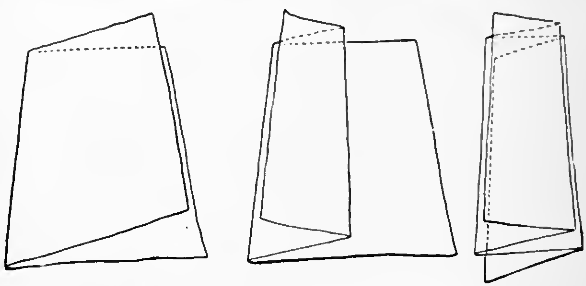

FIG. 53.—A method of folding sheets and tablecloths.

stationary and many little labor-saving conveniences devised. Some dairy farms have running water, drains, power, steam, and cement floors. It would be a simple matter on such a farm to equip a small room in the barn with the necessary laundry apparatus. Good lighting (page 201) and good ventilation are quite as necessary in the laundry as in other parts of the house. The floor and walls should be of such a nature that they can be kept dry and clean with the least labor. Many of the suggestions for the arrangement of kitchen equipment (pages 104 to 109) are equally applicable to the laundry.

Hand-driven machines are effective labor-savers even though to a somewhat smaller degree than those run by other power. Washing-machines are now on the market with wringer attached, which run by power. On many farms the gasoline engine has already become a fixture for grinding corn, separating milk, and the like. The same source of power might also be used to run the washing-machine and turn the wringer. If running water is brought to the barn, it should be continued to the house, and, if the water-power is sufficient, a water motor may be purchased that can be used for running the washing-machine.

Washing-machine.

The home laundry should be equipped with a washing-machine and at least one stationary tub. If running water has not yet been introduced into the house and the barn, at least it is possible to provide a drain for the kitchen sink and the laundry tub. This makes easier the problem of getting rid of dirty water.

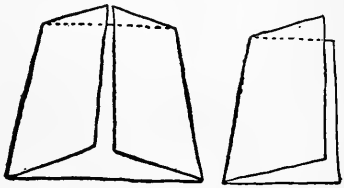

Fig. 54.—Another method of folding sheets.

Washing-machines include five types: (1) The Dolly type, which cleans the clothes by agitation, (2) the friction type, somewhat like double washboards; (3) the two-cylinder type, which cleans the clothes by agitation; (4) the suction washers, including the simple hand machines; (5) the cradle type which rocks and throws the clothes from side to side. A washing-machine should never be overloaded if it is to do good work; and the process should not be unduly hurried. Clothes should be removed carefully from the machine to prevent tearing. Cheese-cloth or net bags for small pieces and fine materials save trouble.

Ironing-machine.

The ironing-machine, or, as it is often called, the mangle, is another device for making laundry work easier. It may successfully take the place of the hand iron for a larger part of the family ironing. There are two types of ironing-machines on the market: (1) cold-roll ironing-machines, in which the rollers between which the garment passes are made of wood and are unheated, depending on their weight and pressure to remove wrinkles; (2) hot-roll ironing-machines, in which one roll is cold and is covered with a blanket and cloth, just as for an ironing-board, and the other roll or concave plate is made of smooth iron and is heated. The cold roll revolves against the heated metal plate. This is the more economical and satisfactory ironing-machine, although its original cost is greater. The

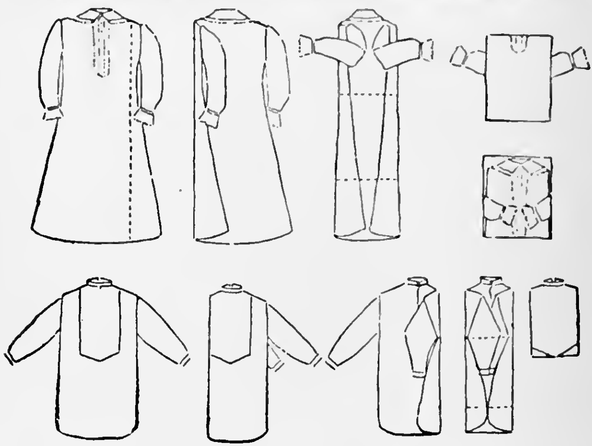

FIG. 55.—A method of folding nightdresses and shirts.

hot-roll machine may be heated by gas, or gasoline by a slight change involving a small expense. If power is available, the machine may be run by power. The use of one of these machines reduces greatly the time required to iron in the usual way. Garments with gathers and sleeves cannot be thus ironed to look perfectly smooth and well shaped, but all bed and table linen, towels, handkerchiefs, stockings, such underwear as may not require perfect smoothness, kitchen aprons and the like, may be done successfully and satisfactorily.

Irons.

A number of irons are now on the market for summer use when it is not desirable to have sufficient fire in the range to heat the irons. Some of these are electric irons, gas irons, and denatured-alcohol irons.

For general laundry purposes, one size of the ordinary sadiron is sufficient, but it is advisable to put several irons into a well-equipped laundry, to use for the various kinds of work to be done. Among them should be heavy, medium heavy, and small-pointed irons, the last for ironing ruffles and laces.

A frequent cause of poor ironing is the condition of the irons. They must be kept clean and free from rust to do good work. New irons should be heated thoroughly and rubbed with wax or grease before using. If irons are to be put away for any length of time, they should be covered with a thin coating of vaseline, clean grease, or paraffin, or wrapped in waxed paper. If starch cooks on, it should be removed immediately with a dull knife. If irons become dirty from careless use, or from being left on the stove during the preparation of the meals, they should be thoroughly washed with soap and water and carefully dried. To keep irons smooth while using them, they should be rubbed with wax or paraffin and wiped immediately with a clean cloth. They improve with wear, if they have good treatment.

Tubs.

Although a washing-machine may be used, there should be one or more tubs in a laundry. Stationary tubs are best, even though running water is not available, for some simple method of draining them can be devised. The tubs are best made of porcelain, enameled iron, or alberine stone. White tubs are a good background for bluing clothes. Wooden tubs may be more cheaply constructed; but there is danger of the wooden tub becoming unsanitary from careless handling.

A stationary tub should always be set with regard to the height of the person who is to use it most. Many tubs are set far too low and necessitate too much back bending on the part of the operator.

If stationary tubs are not available, fiber tubs are the best to buy for the laundry, as they are light and easy to care for. Galvanized iron and wooden tubs are cheaper.

Laundry bench.

The laundry bench for holding tubs should be of the proper height. Most benches are far too low, involving effort out of proportion to the task to be accomplished.

Wringer.

A wringer should be a part of the laundry equipment, and the best on the market is always the cheapest. After a wringer is used, it should be carefully dried and the screws pressing the rollers should be loosened. When not in use, it should be kept cov-

FIG. 56.—A sleeve-board.

ered with a cloth to protect it from dust and dirt. The bearings should be oiled occasionally. Oil dissolves rubber, and that property of oil is taken advantage of in cleaning the rubber rollers. They are carefully wiped with a little kerosene which eats away a thin film of the rubber, exposing a fresh surface. The operation should not be performed frequently, however, and the oil should be carefully and completely removed immediately after its use.

Ironing-board.

An ironing-board that has its broader end attached by hinges to the wall is a great convenience, for then it is always in place and can be put out of the way by folding up against the wall.

Ironing-blanket.

The ironing-blanket and sheet should be put on smoothly and tacked securely under the board, using short brass-headed tacks. It is a good plan to have a separate blanket and sheet also, which fit the table used in the laundry, because a table is a convenient place for ironing large pieces. The ironing sheet should be kept clean.

Sleeve-board.

A sleeve-board (Fig. 56) is good not only for sleeves, but for gathers and for small dresses. It is not difficult to manufacture at home.

Character of utensils.

As far as possible, all utensils that are to come in contact with clothing or to contain material to be used on the clothing, should be non-rustable. Tinware is not good for laundry use because of the ease with which it rusts. The boiler should have a copper bottom at least, and is best made entirely of copper. It then conducts heat better and does not rust.

Other equipment and supplies.

The miscellaneous equipment necessary for efficient laundry work is given in the following list:

Rubbing-board
Wooden spoon
Dipper
Dishpan, enamel
Tea kettle
Measuring cup
Quart measure
Iron holder
Teaspoon
Clothes basket
Strainer for starch
Beeswax or paraffin wrapped in cloths to keep irons smooth
Laundry bags
Clothes stick
Pail, enamel or fiber, for emptying water and carrying clothes
2 saucepans, enamel, one for starch and one for soap solution
Iron stand
Tablespoon
Case knife
Clothes-horse
Scrubbing brushes
Clothes-pin aprons, best made of ticking
Clothes-pins

References

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CHAPTER XIII

STAIN REMOVAL *

With some stains prompt treatment is necessary in order to save the article in question from being ruined, and in most cases it is desirable, since all stains are removed more easily when fresh. Changes in the character of the stain, brought about by drying, exposure to air, washing, ironing, or in other ways, often make it necessary to use chemicals in removing old stains, whereas in many cases much simpler methods are successful if the stains are treated when fresh.

The nature of a stain should be known, if possible, before its removal is attempted, since this determines the treatment to be adopted. Moreover, if an unsuitable stain-remover is used, the stain may be "set" so that its removal becomes difficult or even impossible. For example, if hot water, which easily removes most fresh fruit stains, is applied to stains containing protein, such as stains of milk, blood, eggs, or meat juice, it coagulates the albumin in the fibers of the cloth and makes it extremely difficult to remove. Similarly, soap, which aids in the removal of grease spots, sets many fruit stains.

The kind of fabric upon which the stain occurs also should be known. The method of treatment adopted depends as much on the nature, color, weave, finish, and weight of the fabric as on the kind of stain. Cotton and linen are destroyed by strong

* This chapter contains almost the whole of Farmers' Bull. 861, Removal of Stains from Clothing and Other Textiles, by Harold L. Lang and Anna H. Whittelsey of the U. S. Dept. of Agr. Since this bulletin is the report of the most extensive and careful work on stain removal that has been done for the benefit of housekeepers, it has been only slightly adapted for reprinting here.

acids and attacked to some extent even by weaker ones. Concentrated acids, therefore, should never be used in removing stains from these fabrics, and when dilute acids are used they should be neutralized afterwards with a suitable alkali or removed by thorough rinsing; otherwise the acid may become concentrated on drying and destroy the fibers. Generally speaking, alkalis do not attack cotton or linen fabrics to the extent that acids do. However, long-continued or repeated exposure to alkalis, especially in hot solution, weakens the fibers. The damage to fabrics resulting from the careless use of strongly alkaline soaps, washing powders, washing-soda, or lye, is well known to the housekeeper.

Wool and silk, being more delicate than cotton and linen, require more careful treatment. The use of very hot water must be avoided, since it turns both wool and silk yellow, shrinks wool, and weakens silk and injures its finish. These materials also will not stand much rubbing, as this felts together the wool fibers and results in a shrinking or thickening of the material, while the silk fabrics, as a rule, are too delicate to stand much rubbing without breaking or separating the fibers. Both wool and silk are dissolved by strong alkalis and are injured even by washing-soda or strongly alkaline soap. The only alkalis which should be used in laundering or removing stains from wool and silk are the milder ones like borax or dilute solutions of ammonia. Acids, with the exception of nitric which weakens and turns the fibers yellow, do not attack wool and silk readily.

In general it is more difficult to remove stains from wool and silk than from cotton or linen. In removing stains from materials made from two or more kinds of fibers, such as silk and cotton mixtures, the effects of the stain-removers on all of the fibers should be considered. No chemical should be used which would injure the most delicate of the fibers present.

It is also much more difficult to remove stains from colored than from white materials, for the reason that most of the bleaching agents which must be used to remove persistent stains are likely to destroy the color of the material as well.

METHODS FOR TREATMENT OF STAINS IN GENERAL

The following paragraphs deal with methods and reagents commonly used in the removal of a number of stains. To save repetition, these are given here in detail and reference is made to them in dealing with the particular stains in later pages.

Laundering.

Ordinary laundering, mentioned frequently as a method for removing stains, should be done as follows: First, soak the stained portion in cold or lukewarm water, rubbing the stain with a neutral soap if necessary. Follow this by thorough rinsing in clean water, after which the article may be laundered as usual. This method should be used only for cotton and linen (white or fast colors) and the so-called wash silks and washable woolens. If the materials are delicate, they should be sponged according to the following directions.

Sponging.

Sponging is applicable to all fabrics, but especially to delicate materials or colors which ordinary laundering might injure. The stained article should be spread on a flat surface in a good light, and beneath the stain a cloth folded into several thicknesses or clean white blotting paper should be placed to absorb the superfluous liquid. The pad must be changed for a fresh one as soon as it becomes soiled. The sponging should be done with a clean, soft lintless cloth (preferably of the same material as that stained) and renewed as frequently as may be necessary. The stained material should be laid with the wrong side up and the water applied to the back, so that the foreign substances can be washed from the fibers onto the pad without having to pass through the material.

Application of chemicals.

Chemicals should not be used until water or laundering has been tried, for they attack the fibers of the cloth as well as the stain.

There are a few common chemicals which are necessary in removing some stains, and these should be kept in every household. A good plan is to have a small cupboard in the laundry where these chemicals may be kept together with the utensils used in applying them. As some of these chemicals are poisonous, they should not be kept in the family medicine cabinet or pantry. Chemicals most commonly used in removing stains are Javelle water (p. 273), potassium permanganate (solution), oxalic acid, ammonia water, hydrogen peroxide, French chalk, and cream of tartar. These chemicals may be bought at any drug store.

With these chemicals should be kept some of the utensils used in applying them; such as a medium-sized bowl, a medicine-dropper, a glass rod with rounded ends, several pads of cheese-cloth or old muslin, and a small sponge.

If the effect of the stain-remover on the fiber or color is not known, it should be tried by applying a little to a sample or to an unexposed portion of the goods. Sometimes it is best to remove the stain even if some of the color is removed also, for the color often may be restored by careful tinting.

One should work rapidly when using chemicals to remove stains, so as to give them as little time as possible to act on the textile fibers. Many brief applications of the chemicals, with rinsing or neutralization after each application, are preferable to the practice of allowing them to remain on the stain for a long time. The stained portion of the garment should be stretched over a bowl of clean water and the chemical applied with a medicine-dropper. The chemicals may be rinsed out quickly by dipping in the clean water. Another method is to place the stained portion over a pad of folded cloth and apply the chemical with a glass rod. The rinsing or neutralizing always must be thorough.

Javelle water may be used successfully in removing a number of stains, but should be applied only to uncolored cotton or linen materials, since it bleaches colors and rots silk or wool. In treating stains with Javelle water, the stained portion should be stretched over a bowl filled with water and the Javelle water applied to the stain with a medicine-dropper. The Javelle water should not be allowed to remain in contact with the stain for more than one minute and then oxalic-acid solution should be applied to neutralize the Javelle water and the stain rinsed by dipping in the bowl of water.

Commercial ink-removers are similar in action to Javelle water and are very convenient for removing many stains besides ink spots.

Potassium permanganate can be used in removing stains from all white fabrics. It also may be used successfully upon many colored materials, but should always be tried first on an unexposed portion of the goods, to determine its effect on the dye. It does not harm delicate fibers, provided it is used with reasonable care. One should first remove as much of the stain as possible by sponging or washing with cold water. The permanganate should be prepared and used as follows: Dissolve 1 teaspoonful of the crystals in a pint of water and apply a little of this to the stain with a medicine-dropper, a glass rod, or a clean cork, and allow it to remain for about five minutes. Remove any pink or brown stain left by the permanganate, by applying one of the following chemicals: 1. Hydrogen peroxide, made slightly acid (if not already so) with oxalic acid. One drop of the acid usually is enough to acidify 3 teaspoons of the peroxide. 2. Oxalic acid in saturated solution or lemon juice for cotton, linen, or silk. Hydrogen peroxide is more satisfactory for wool. The treatment should be followed by thorough rinsing. One or more repetitions of this treatment may be necessary in the case of persistent stains.

Oxalic acid is poisonous and should be used carefully; the bottle in which it is kept must be marked "Poison" and kept out of the reach of children. To prepare a solution of oxalic acid for use, as many of the crystals of the acid as possible should be dissolved in a pint of lukewarm water. This should be put into a bottle, stoppered tightly, and used as needed. This solution may be applied to the stain with a medicine-dropper or glass rod and after allowing it to remain for a few minutes the garment should be rinsed thoroughly in clean water.

Hydrogen peroxide, as obtained for medicinal purposes, usually is made slightly acid, to give it better keeping quality.

For use in removing stains a small amount of the peroxide should be made slightly alkaline with ammonia. Since hydrogen peroxide affects the fiber also, in the case of cotton and linen materials, it must be followed by very careful rinsing. It may be applied to the stain with a medicine-dropper, a glass rod, or a clean cork, or the stain sponged with it. The method of using it in neutralizing potassium permanganate is described above.

SPECIFIC METHODS FOR INDIVIDUAL STAINS

In cases in which the nature of the stain is not known, it should be attacked first by sponging with cold water, provided, however, that the fabric would not be injured by water. If the stain is not removed by cold or warm water, chemicals should then be applied. Often the behavior of a stain, when treated with cold water, will give some indication of its nature; for example, a grease spot will not absorb water. Hot water should be avoided in treating unknown stains until after other substances have been tried, since hot water will set many stains and make their removal more difficult.

Acids.

With the exception of nitric acid, acids do not generally produce stains upon white fabrics but often change or destroy the color of dyed materials. However, cotton and linen fibers are destroyed readily by some acids, especially by those of greater concentration or strength. Dilute acids do not attack wool and silk fibers to any great extent unless they are allowed to dry on the cloth and become concentrated, but they do sometimes affect the color of the fibers. It is essential, therefore, that acid spots on textiles be neutralized at once by some alkaline solution. For this purpose any one of the following should give good results:

1. Water. Rinse the spot several times in a large volume of water. This treatment serves to stop any further action of the acid on the fabric, but usually has no effect on any discoloration due to the acid.

2. An alkaline substance, such as washing-soda, ammonia, or borax. Apply an alkali to the acid spot. The alkali forms a salt with the acid and this must be removed later by rinsing or sponging with water. The acid should be neutralized completely with the alkali or the discoloration may reappear after a while. Either of the following alkalis may be used: (*a*) Ammonia. If the spot is slight, neutralize it by holding it in the fumes from an open bottle of strong ammonia. (*b*) Sodium bicarbonate (baking soda). Sprinkle this on the stain—on both sides, if possible—moisten

with water, and allow to stand until the acid is neutralized (shown in this case by the ceasing of the effervescence); and remove the excess by rinsing with water.

Alkalis.

Dilute alkalis have little effect on cotton and linen, but strong alkalis cause the fibers to swell and become yellow, and the cloth to contract. The fiber, however, is not weakened unless the alkali is allowed to remain a long time upon the cloth or to become very concentrated through evaporation. Wool and silk, on the other hand, are yellowed or destroyed by strong alkalis even in dilute solutions. Even if the fiber is not affected by the alkali, the color may be changed or destroyed. It is important, therefore, to neutralize alkali spots at once. Any of the following agents may be used:

1. Water. Rinse thoroughly. Frequently this is sufficient in the case of such alkalis as washing-soda and ammonia.

2. A mild acid. Apply the acid with a cloth until the fabric changes back to its original color, or until the stain is slightly acid as shown by the odor or sour taste. Then rinse the fabric thoroughly in water. In the case of colored goods it is helpful to rub the stain dry, using a piece of the same material as the stained fabric, if possible. Use either of the following mild acids:

(*a*) Lemon juice. Squeeze the juice on the stain. As long as the spot remains alkaline the juice is a bright yellow in color, but when the spot becomes acid the color disappears almost entirely. Apply the lemon juice until this color change takes place.

(*b*) Vinegar. If the vinegar itself leaves a spot, remove it by sponging with water.

Blood.

Any of the following agents may be used:

1. Cold or lukewarm water. Either soak the blood stains or rub them in the water until they turn light brown in color; that is, until most of the coloring matter is dissolved. Then wash the material in hot water, as in the ordinary process of laundering. For stains on silk or wool, sponge in cold or lukewarm water.

2. Soap (for washable materials). Rub the stained portions with soap and place in cold water, either allowing them to stand in it until the stains are loosened or bringing the water very slowly to the boiling point.

3. Ammonia (for washable materials). Use about 1 ounce (2 tablespoonfuls) of household ammonia to 1 gallon of water. Soak the stains in this until they are loosened and then wash in the usual manner. For old stains ammonia is somewhat more satisfactory than soap.

4. Hydrogen peroxide. Sponging with a little hydrogen peroxide often will remove the last traces of blood stains after the main part has been

removed as described in No. 1 above. This agent can be used on wool and silk, provided it does not injure the color of the material.

5. Raw starch mixed with cold water to a paste is efficient for stains on thick materials, such as flannel and blankets, which cannot conveniently be soaked in water. Apply the paste thickly to the stain and brush it away when it becomes dry. Repeat the application until the stain is removed.

Bluing.

Three types of laundry bluing are in common use, namely, ultramarine, Prussian, and aniline blues. Since they differ chemically, spots due to them require different treatment. It is not difficult to determine to which type a blue belongs, and methods for doing this are suggested in the following paragraphs:

The commercial blues which come in balls or blocks with directions to wrap them in a piece of flannel or other cloth and shake them about in the water to be blued are generally ultramarine. To remove such stains, the following procedure may be followed:

1. Cold water. Soak fresh stains or rinse them in an abundance of cold water.

2. Soap and water. Wash the stains as in ordinary laundering, with an abundance of soap, and rub thoroughly. This treatment will remove stains which are not removed by soaking.

Liquid bluing, which is used commonly in the home laundry, usually is a Prussian blue. It is greenish-blue in color and soluble in water. Clothes are occasionally overblued with Prussian, as with other bluings, or may become streaked with the bluing if it has not been mixed evenly with the water. To overcome this condition the following treatment is recommended:

1. Cold water. Rinse the stains in an abundance of cold water. This is effective only for very fresh stains.

2. Boiling water. Boil the stained material for about half an hour, or until the stains disappear.

Prussian blue is sometimes the cause of yellow discolorations or spots upon white clothes. If the clothes are not rinsed free from strong soap, washing-soda, or other alkali used in washing, before they are blued with Prussian blue, the alkali remaining on the clothes precipitates ferric hydroxide from the bluing which is deposited upon the clothes. This is set by subsequent drying and ironing, and is identical, chemically, with iron-rust. For methods of removing these stains, see "iron rust" stains, page 297.

The aniline or coal-tar blues probably are used less commonly in the household than the other blues, but are employed frequently in commercial laundries. They are sold usually in the form of small crystals or of a powder having a dark blue or iridescent color and are soluble in water. To remove aniline blues, one of the following methods should be used:

1. Cold water. Soak the stained material for several hours or overnight
2. Boiling water. Boil the stains for 15 minutes or until they disappear.

Butter.

Stains due to butter are essentially grease spots and should receive the same treatment.

Candle wax (colored).

These stains consist of paraffin in which an organic dye is dissolved. Remove the paraffin as completely as possible (page 300), and then dissolve the coloring matter remaining in the fiber by sponging it with alcohol. If a slight grease spot still remains, remove it by sponging with soap and water.

Chocolate and cocoa.

For removing chocolate and cocoa stains the following agents are satisfactory:

1. Soap and hot water (ordinary laundering; see page 284).
2. Borax and cold water. Sprinkle the stains with borax and soak them in cold water, then rinse them thoroughly in boiling water. This method is applicable only to stains on washable materials.
3. Lukewarm water. For stains on delicate fabrics, sponge with lukewarm water.

Coffee.

Cream in the coffee sometimes necessitates the use of grease solvents in addition to other reagents.

One of the following agents should be employed:

1. Soap and water. Fresh stains and most old ones on washable materials can be removed by ordinary laundering. A slight trace of the stain sometimes remains in the case of very heavy or old stains. Drying the material in the sun frequently helps to remove the last traces.
2. Potassium permanganate. Slight stains remaining after treatment with soap and water can be removed with this agent.
3. Boiling water, poured on the stain from a height of 2 or 3 feet. This is effective on stains which are not more than a few hours old.
4. Cold or lukewarm water. Sponge the stains from wool or silk materials. If a grease spot from cream remains after the spot has dried, remove it by the use of grease solvents.
5. Damp cloths and a hot iron. Fairly good results are obtained in removing small coffee stains from light-colored silk material by placing the stain between clean, damp cloths and pressing the whole with a hot iron.

Dye and running colors.

As the dyes of textiles differ greatly in chemical composition, different methods must be tried, beginning with the simplest, until the stains disappear. For washable materials, No. 1 may be tried.

1. Cold or warm water and sunlight, for stains on washable materials. Rinse the stains in water, or soak them (for 10 or 12 hours, if necessary), and then dry them in the sun. Repeat the treatment if the stains are not removed entirely by the first treatment. Spots on woolen and silk materials sometimes may be removed by soaking or washing in cold water.

2. Javelle water.

3. Potassium permanganate.

4. Hydrogen peroxide made slightly alkaline with ammonia, for stains on white silk or wool. Soak the stains in this solution until they disappear, and then rinse thoroughly.

Egg.

Egg stains should be washed or sponged with cold or lukewarm water before any hot water is applied. Sometimes a large part of the stain hardens on the surface of the material and may be scraped off with a blunt knife.

One of the following agents should be used to remove egg stains:

1. Cold water followed by hot water and soap, as in ordinary laundering.

2. Cold water followed by a grease solvent. Allow the stained place to dry after being sponged with cold water. Then apply the grease solvent (pages 292 to 293).

Fly paper (sticky).

See "resinous substances," page 301. Turpentine and kerosene are especially effective.

Fruits and berries (fresh).

Practically all fruit stains, when they are fresh and still moist, can be removed with boiling or even warm water. After they have dried, they become much more difficult to remove. The color of some materials may be affected by the organic acids present in certain fruits like the grapefruit and lemon. In such cases the color can generally be restored by the methods used for acid stains.

The following agents are satisfactory for fruit or berry stains:

1. Boiling water, for white or fast-colored washable materials. Stretch the stained material over a bowl or other vessel, holding it by a string or an elastic band, if necessary, and pour boiling water upon it from a teakettle held at a height of 3 or 4 feet so that the water strikes the stain with some force. With some stains, especially those in which fruit pulp was present, a little rubbing alternated with applications of boiling water is helpful. A stain remaining after this treatment frequently can be bleached by hanging the wet material in the sun to dry.

2. Warm water, for silk, wool, and other delicate materials. Sponge the stains.

3. Lemon juice and sunlight. Stains remaining after treatment with

boiling water can often be bleached by moistening with lemon juice and exposing to the bright sunlight.

4. Lemon juice or oxalic acid. A stain which turns blue or gray and cannot be removed readily by boiling water sometimes can be loosened by moistening with a little acid, which restores its original color and renders it more easily soluble in the boiling water. If necessary, apply the acid several times, alternating with boiling water.

5. Potassium permanganate (p. 286). Treat the stains first with boiling water (see No. 1).

6. Javelle water (p. 285).

7. Hydrogen peroxide made slightly alkaline with ammonia. Stains remaining on silk or wool (white or fast color) after sponging with warm water frequently can be removed with a little hydrogen peroxide.

8. Warm water as in No. 2, followed by alcohol. Sponge the spots (p. 284).

Fruits and berries (cooked).

In many cases changes in cooking render the stains from cooked fruit much easier to remove than those of fresh fruit. In fact, they often are removed from a fabric by ordinary laundering. Stains from some cooked fruits, however, especially the dark red and purple fruits and berries, such as cranberries and black raspberries, are similar to the fresh fruit stains in being set by alkaline substances.

One of the following agents should be employed:

1. Boiling water (see No. 1, under "fresh fruit stains").

2. Warm water. Sponge delicate fabrics.

3. Soap and water (ordinary laundering). This does not apply to the dark-colored (red or purple) fruits and berries. Treat them in the same way as fresh fruit.

Glue.

One of the following agents should be used in removing glue spots:

1. Water. Either soak the spot in warm water or, if small, sponge it. Occasionally it is necessary to boil the stained material.

2. Vinegar. Sponge the spot or soak it in vinegar.

Grass and other fresh green foliage.

One of the following agents should be used in removing stains of this character:

1. Hot water and soap, as in ordinary laundering. Remove the stain mechanically, by thorough rubbing.

2. Grain or wood alcohol. Apply by sponging. This is especially useful upon materials which laundering might injure.

Grease.

Sometimes it is possible to scrape or wipe much of the adhering grease from a stained material.

One of the following agents should be used in removing grease spots:

1. Warm water and soap, as in ordinary laundering. Grease spots usually can be removed from washable materials in this way, provided care is taken to rub the particular spot thoroughly. Soaps containing naphtha or kerosene are efficient.

2. Absorbent substances—blotting paper, fuller's earth, brown paper, French chalk, powdered magnesia, or white talcum powder, for fine materials; cornmeal or salt, for carpets, rugs, and other coarse materials. The use of absorbents generally is effective only on spots of grease or oil unmixed with particles of dirt or metal. The advantages of using them are that the fabric is not wet and there is no danger of leaving a ring, as in the case of grease solvents. In using an absorbent, such as a clean blotter or a piece of unglazed brown paper, lay it on each side of the stain and apply a warm iron. The grease is melted and is absorbed by the paper. To use the absorbent powders, lay the stained fabric upon a flat surface and spread a layer of the absorbent over the stain and work it around gently so as not to pull the fibers. As soon as it becomes gummy, shake or brush it off and repeat the process until the bulk of the stain is removed. Then apply another layer of the absorbent and allow it to remain overnight, or longer if necessary. This removes all traces of the stain, and in the case of slight stains the preliminary treatment is unnecessary. Then dust or brush off the absorbent thoroughly. If it is not convenient to let the stain stand overnight, place a layer of cloth or brown paper over the absorbent and apply a warm (not hot) iron for several minutes. In the case of stains made by solid fats, which must be melted before they can be absorbed, the use of the warm iron is necessary.

3. Organic solvents. Chloroform, ether, and gasoline or naphtha. The first is the safest to use, since it is not inflammable. It is a better solvent of tarry substances than is ether or gasoline, and therefore more satisfactory for general use. Gasoline and naphtha are obtained easily and are comparatively inexpensive, but they are very inflammable and likely to contain impurities and to leave an odor in the cleaned fabric. Ether is expensive and inflammable, but it is clean, and usually it leaves no odor. The greatest care should be taken in using inflammable solvents. It is best to use them in a shady place out of doors, and if in the house by an open window and away from all flames. Place a pad of clean cloth or a white blotter beneath the stain and change it as soon as it becomes soiled. Sponge the stain with a clean cloth, preferably a piece like the stained material, moistened with the solvent. To prevent the spreading of the grease and solvent, it is best to use small amounts of the solvent at a time and to work from the outside of the spot toward the center. It is well also to surround the stain with a ring of French chalk or any of the absorbents mentioned in No. 2, and to rub the stain with a clean cloth until it is thoroughly dry.

In removing grease spots which contain dirt or fine particles of metal, more rubbing and a freer use of the solvent are necessary. It is best to apply the solvent from the wrong side of the material, so that the particles will be washed mechanically from the fibers onto the pad of cloth placed underneath. If the spot does not yield to this treatment, immerse it in a small bowl of the solvent and brush it gently with a small, soft brush. The brushing serves to loosen the insoluble particles, which then fall to the bottom of the bowl.

In general, when the stained place must be dipped in the solvent, it is more satisfactory to immerse the whole article finally in clean solvent, which prevents the formation of rings. If sufficient solvent is not at hand for this, the ring usually can be removed by careful and patient sponging with small quantities of fresh solvent, taking clean cloths, pads, or blotters, as suggested above, and working from the wrong side of the material.

4. An absorbent (see No. 2) mixed with a solvent (see No. 3) in the form of a thick paste. The white absorbents (French chalk or magnesia) are most satisfactory. Spread the paste over the spot, leave it until thoroughly dry, and brush it off. Repeat this treatment if necessary. The spreading of the solvent and the formation of a ring will be avoided to a considerable extent in this way. The method is especially useful for cleaning light-colored unwashable materials, laces, and the like.

Gums.

See "resinous substances," page 301.

Ice cream.

One of the following agents may be employed in removing ice-cream stains:

1. Soap and water as in ordinary laundering. Use this for wash materials in the case of stains in which no chocolate or highly colored fruit or other substance is present.

2. Cool or lukewarm water, followed by agents used in removing grease spots. Sponge the stains thoroughly with water. If, on drying, a grease spot from the cream remains, remove it by any of the methods suggested for "grease spots," (page 292).

3. Agents suggested under "fruit and berries (fresh)," "fruit and berries (cooked)," "coffee," "chocolate and cocoa," and the like, according to the stain in question.

Indelible (copying) pencil marks.

The dye and the reagents used to remove such stains may vary with different makes of pencils, but for those used in these experiments the following reagents are satisfactory:

1. Alcohol (grain or wood). Soak the stains for a few minutes or until they are dissolved. The graphite marks then remain, but can be removed by washing with soap and water. The alcohol is effective also after these stains have been washed and ironed.

2. Javelle water. This destroys the dye. Remove the graphite either before or after applying this agent by washing with soap and water.

Ink (India).

The treatment for removing India ink from textiles is the same as for "ink (printing)" (p. 295).

Ink (marking).

So-called "indelible" or "marking" inks are of two common types, namely, that containing silver nitrate or other silver compound and that with an organic dye, usually "aniline black," as its basis.

Silver nitrate ink may be known generally from the directions for its use, which state that articles marked with it must be laid in the sun or pressed with a warm iron before they are washed. This is to bring about the precipitation of metallic silver, which gives the black or brown color to the marks. Javelle water may be used to remove stains from silver nitrate inks (p. 285). Apply this repeatedly until the color of the spot disappears. Then soak the stained place in ammonia to remove the silver chloride formed.

Aniline black ink may be known also from the directions for its use, which generally state that the articles marked with it must not be ironed until after they have been washed. Aniline black inks are remarkably fast and it is practically impossible to remove them after they have once become dry. The method given above for the removal of silver nitrate ink stains is not effective in removing aniline black ink stains; neither are satisfactory results obtained by trying most of the methods used for ordinary writing ink stains.

Ink, black (printing).

One of the following agents should be used for removing printing-ink stains:

1. Soap and water (ordinary laundering). Remove fresh stains by applying an abundance of soap and rubbing thoroughly.

2. Lard, followed by soap and water, as in No. 1. Rub the stained place with lard, and work it well into the fibers to loosen the stain.

Ink (writing).

For an ink spot of unknown composition, it is necessary to try various agents, beginning always with the simplest and that least likely to injure the fabric. One of the following agents may be utilized:

1. Absorbents: Cornmeal, salt, French chalk, fuller's earth, magnesia, talcum powder, and the like. The application of such substances serves to remove any ink not absorbed by the fibers and keeps the ink from spreading. For a large ink spot, apply one of these substances before trying other agents. Work the absorbent around with some blunt instrument and renew it when it becomes soiled. When dry absorbent fails to take up more ink, make it into a paste with water and continue the application.

2. Soap and water as in ordinary laundering. This is satisfactory for some types of school inks, which can be washed from fabrics; for carbon inks, which are unaffected by chemicals and can be removed only mechanically; and sometimes for the fresh stains of other inks.

3. Milk. Soak the stains for a day or two, if necessary, in milk, changing the milk as often as it becomes discolored. This is effective for some stains.

The foregoing methods may be used safely on all washable fabrics. If they fail to remove the spot, apply one of the chemicals mentioned below:

4. Oxalic acid, saturated solution. Soak the stain for a few seconds, then rinse in clear water, and finally in water to which a few drops of ammonia have been added.

5. Potassium permanganate. This is satisfactory for stains upon many delicate fabrics as well as on ordinary materials.

6. Javelle water.

7. Commercial ink-removers generally are satisfactory if the directions furnished with them are followed and the excess of the substance is removed by thorough rinsing in clean water.

8. Lemon juice. Keep the stain moistened and exposed to the sun.

For ink on carpet, first apply absorbents, as in No. 1; follow by repeated applications of oxalic acid, as in No. 2, or potassium permanganate, as in No. 5, or by rubbing with the cut surface of a lemon, squeezing on the juice and rinsing between applications with a clean, wet cloth until no more ink can be removed. Rub the spot then with a clean, dry cloth. After the carpet is dry, brush up the nap with a stiff brush or a cloth.

Iodine.

One of the following agents may be used in removing iodine stains from unstarched materials:

1. Water. Wash the stain in an abundance of water or soak it for a number of hours in cold water. These stains can be removed also by wetting with water and drying in a warm place, such as over a radiator, repeating this if necessary.

2. Ammonia. Sponge the stain with dilute ammonia.

3. Alcohol. Sponge the stain. This agent frequently can be used on materials which water would injure.

4. Starch, prepared as for laundry purposes; for washable materials. Immerse the stained place in the starch and boil; it first turns blue and then disappears.

5. Flour, used in the same manner as starch.

For removing iodine stains from starched materials one of the following agents may be employed:

1. Ammonia. Soak the stains in dilute ammonia until they disappear.

2. Water. Boil the stained material for 5 or 10 minutes.

Iron-rust.

For iron-rust stains on white washable materials one of the agents given below should be used. In the case of colored materials, the effect of the agent should be tried first on a sample or in an inconspicuous place.

1. Hydrochloric acid, made by diluting the strong acid with an equal volume of water. Spread the stained place over a bowl of hot water and apply the acid drop by drop until the stain turns bright yellow; then immerse at once in hot water and rinse thoroughly. Repeat the treatment, if necessary. Add a little ammonia or borax to the last rinsing water to neutralize any acid which may remain in the goods.

2. Oxalic acid, in saturated solution, used in the same way as hydrochloric acid in No. 1. Or apply the crystals directly to the stain and moisten.

3. Cream of tartar. Boil the stained place in a solution of 4 teaspoonfuls to 1 pint of water, until the stain disappears. This agent, owing to its cost, is practicable only for stains upon small articles which can be immersed and boiled in a cup or two of solution, though it may be used in the case of larger articles by holding them above the solution in such a way that only the stained portion is immersed.

4. Lemon juice. Spread the stained place over a vessel of actively boiling water, and then squeeze lemon juice on the stain. After a few minutes rinse the stain and repeat the process. This method is rather slow but does not injure delicate white cotton or linen fabrics.

5. Lemon juice and salt. Sprinkle the stain with salt, moisten with lemon juice, and place in the sun, adding more lemon juice if necessary.

6. Acid fruits or vegetables. Those mentioned below are satisfactory and have the advantage of being found in the home garden or easily purchased. Others cannot be used because their juices are so highly colored as to leave stains themselves on the fabric. The use of lemon juice has been described above.

(*a*) Rhubarb stalks. One stalk, cut up and boiled in one cup of water, gives a solution strong enough to dissolve iron-rust. If the stalks have highly colored skins peel them before using. Boil the stain in the solution for 15 minutes or longer, if necessary.

(*b*) Begonia. Place several leaves, together with the stems, in a saucepan with only enough water to keep them from burning. Boil the stain in the infusion until it disappears.

(*c*) Pineapple. Cut up a round slice, about one-half inch in thickness, and boil with enough water to keep it from burning. Boil the stains for five minutes or until they disappear.

(*d*) Grapefruit. Use the pulp and juice from one-fourth of a fresh grapefruit in the same way as the pineapple.

Lead foil.

One of the following agents may be employed for this purpose:

1. Soap and water, for washable materials. Use the soap freely and rub the stain thoroughly. Sponge woolen materials.

2. Chloroform or other clean organic solvent. Immerse the stained place in a small vessel of the solvent and brush gently with a small soft brush or rub with a cloth.

Lead pencil.

The marks from lead pencils contain graphite, which is insoluble. The methods of removing pencil marks from textiles are the same as for removing lead foil marks. A soft eraser sometimes can be used successfully in effacing the marks, especially upon stiff or starched materials.

Leather.

The following agents are satisfactory in some cases:

1. Soap and water, as in ordinary laundering. Use an abundance of soap, with thorough rubbing.

2. Potassium permanganate (p. 286).

Lime (slacked).

To remove lime stains, allow the spots to dry, brush carefully, and treat in the same way as alkali stains (p. 288).

Meat juice or gravy stains.

Stains from meat juice are similar to blood stains (page 288). Hot water sets the stains and should not be used until the protein material has been removed by cold water. Grease spots, which sometimes remain after the remainder of the stain is removed, especially in the case of stains from cooked meat, can be removed by the methods used for grease (p. 292). In the case of gravies thickened with flour, it sometimes is necessary to follow this treatment by one of the treatments recommended for "white sauce" (p. 306).

Medicines.

If the nature of the medicine is known, the remover can be chosen accordingly. If the nature of the medicine stain is not known, it is necessary to try various agents until one is found which serves the purpose.

Each of the following agents is satisfactory in removing some medicine stains:

1. Boiling water, poured on the stain from a considerable height, as for fruit stains (p. 291).

2. Soap and water, as in ordinary laundering.

3. Acids, such as hydrochloric or oxalic. Dilute solutions of these acids sometimes are useful for stains containing metallic salts.

4. Alcohol. Sponge the stain with alcohol or soak it in alcohol.

5. Javelle water. This agent sometimes will bleach a stain that resists treatment by other means.

Mildew.

One of the following agents may be used for the removal of mildew stains:

1. Soap and water, as in ordinary laundering. Very fresh stains can be washed out. Drying in the sun helps to bleach the spots.

2. Sour milk. Soak the stains overnight in sour milk and then place in the sun without rinsing. Repeat the treatment several times if necessary. Light stains can be removed in this way.

3. Lemon juice. Moisten the stains with lemon juice and allow them to remain in the sun. This is effective in removing slight stains.

4. Javelle water. Use this agent for bleaching old stains.

5. Potassium permanganate. Use this agent upon old and persistent stains.

Milk and cream.

One of the following agents should be used in removing spots from milk and cream:

1. Cold or lukewarm water, followed by hot water and soap (ordinary laundering), for stains on washable materials. For spots on other fabrics, sponge with soapy water and then with clean water.

2. Cold or lukewarm water, followed by chloroform, gasoline, or some other grease solvent. For fabrics which ordinary laundering would injure, first sponge carefully with water, allow to dry, and then sponge with a grease solvent.

Mucus.

To remove mucus stains, soak in ammonia water or in salt and water, then wash with soap and cold water.

Mud.

Allow mud stains to dry and brush carefully before any other treatment is used. Sometimes no other treatment is necessary.

The following agents are satisfactory:

1. Soap and water, as in ordinary laundering, for washable materials.

2. Alcohol. Sponge the stains with alcohol.

3. Water. Sponge the stains.

4. Cut raw potato. For black silks of firm weave, after brushing, rub the spot with the potato. This leaves a thin film of starch on the surface of the cloth, which can be brushed off when dry. This treatment is too harsh for any but rather smooth, firm goods and leaves a spot on all but black materials.

Paints and varnishes.

Before using any agent upon paint or varnish stains, it is best to scrape off as much of the stain as possible from the surface of the material.

One of the following agents may be used for the removal of paint and varnish stains, not including "alcohol stain," which is discussed separately:

1. Soap and water. Fresh stains, especially on washable materials, are removed easily by carefully washing with plenty of soap. Older stains sometimes can be removed in this way if they are first softened by rubbing oil, lard, or butter into them thoroughly.

2. Turpentine. Sponge the stains with pure turpentine, or wash the

whole article in it, if the spots are large or scattered, and then rinse it several times in fresh quantities of the solvent.

3. Turpentine and ammonia. Stains which are not fresh and yet have not entirely hardened can be softened by moistening them with ammonia and sprinkling them with a little turpentine. Roll the article up for 15 or 20 minutes, or soak it for several hours, if necessary, and then wash it with warm water and soap.

4. Oil solvents, such as chloroform, applied in the same way as the turpentine, are satisfactory (No. 2). Gasoline, kerosene, and alcohol are less satisfactory.

5. Sodium carbonate or washing-soda (3 tablespoons to each gallon of water). Boil the stains in this solution. The method is successful for such materials as will stand the treatment.

None of these methods will remove extremely old stains.

In paint causing an alcohol stain, a pigment is suspended in alcohol with small amounts of shellac and other resinous material. The methods of removing it from fabrics differ somewhat from those for ordinary paint stains. Treatment with turpentine alone or with other oil solvents, which usually will remove ordinary paint stains, is ineffective. One of the following agents should be employed:

1. Soap and water for very fresh stains on washable materials.

2. Alcohol. If the stains are fresh, sponge them freely with alcohol.

3. Turpentine and ammonia for old stains.

4. Strong ammonia for old stains. Soak the stain for half an hour in strong ammonia and then wash.

Paints, water color.

The following agent will be found satisfactory for removing stains made by water color paints on materials not injured by water:

1. Soap and water. Wash the material in lukewarm or cold water with soap, the stained portions being rubbed if necessary. Both fresh and old stains can be removed in this way. This method is satisfactory in the case of washable silks and woolens, as well as cotton or linen materials.

The following agents are fairly successful in removing these stains from materials like finished silks, which would be injured by washing. Although it is almost impossible to remove all traces of the stains, the appearance of the spots may be improved greatly.

2. Gasoline. Dip the stained portion in gasoline and rub vigorously.

3. Glycerin and water. Sponge the stain with glycerin until the water color is removed and then with lukewarm water to remove the glycerin. In case a water ring is left, treat this as described under "water spots" (page 306).

Paraffin or paraffin wax.

For removing the part of the stain which has penetrated the fiber, use one of the following agents:

1. Blotting paper or an absorbent powder and a warm iron (No. 2 under "grease").

2. Grease solvents. If a trace of the stain remains after treatment, as in No. 1, sponge the stain carefully with a grease solvent (see No. 3 under "grease").

For colored paraffin see "candle wax (colored)," page 290.

Perspiration.

While the perspiration from most of the body is acid, that from the armpits is alkaline. For treating colors changed by this, see "alkali," page 288. The yellow stains sometimes caused upon white material by perspiration are removed by the following agents:

1. Soap and water. Exposure to the sun helps to bleach the stained material.

2. Javelle water.

3. Potassium permanganate.

Pitch.

See "resinous substances," below.

Resins and resinous substances.

One of the following solvents may be used: Turpentine, chloroform, alcohol (grain or wood), ether, kerosene, gasoline, and water for water-soluble gums, such as gum arabic. In each case sponge the stain or immerse it in the solvent and rub.

Salad-dressing.

Salad-dressings usually contain oil, vinegar (or lemon juice), and condiments, and may contain egg or cream also. If egg or cream is present, hot water must not be used. For discoloration due to the acid of the vinegar or lemon juice, treat in the same way as acid stains (p. 287).

One of the following agents should be used for salad-dressing stains:

1. Soap and water (ordinary laundering), for washable materials. Sponge delicate materials with lukewarm water, using soap if the material is not harmed by it.

2. Grease solvents.

Scorch.

Scorch upon cotton and linen sometimes can be removed, if the fibers are not actually burned. Wool and silk are disintegrated at a lower temperature than cotton and linen and cannot be restored to their original condition after being scorched.

For removing slight scorch stains from cotton and linen, use one of the following agents:

1. Soap and water (ordinary laundering). This is sufficient to remove very slight stains.

2. Water and sunlight. Wet the spot with water, or soap and water, and expose to the sun for a day, or longer, if necessary. The scorch disappears much more slowly if the material is not moistened before exposure.

3. Bread crust. Very slight scorch on the surface of materials which are not especially delicate sometimes can be rubbed away with a bread crust.

Shoe-dressings.

One of the following agents should be used in removing stains from the black shoe polishes:

1. Soap and water for the pastes. If the stains are fresh, sponge or wash them thoroughly with an abundance of soap (p. 284).

2. Turpentine only for the pastes containing turpentine—this may be detected by the odor. Immerse the stained places and rub gently in turpentine.

3. Potassium permanganate or javelle water for stains from the black liquid dressing. First remove as much of the stain as possible by sponging or washing as in No. 1.

The common tan leather dressings consist either of a liquid cleaning solution or a box of polishing wax, or both. The cleaning solution sometimes contains a considerable amount of free oxalic acid, which may weaken a fabric seriously if allowed to remain long in contact with it. Sometimes also water-soluble dyes are present and these make a much more persistent stain on wool than on cotton. Use one of the following agents:

1. Soap and water, for stains upon cotton and linen (p. 284).

2. Alcohol. The stains on wool are removed more successfully by sponging (p. 284) with alcohol, than with soap and water.

The stains produced by the polishing waxes usually may be removed by one of the wax solvents (page 300).

For removing spots caused by white shoe pastes or liquids, use the following agent:

Water. First sponge the spot (p. 284), and when dry, brush thoroughly or rub in the direction of the weave with a piece of the same material.

Silver nitrate.

See "ink (marking)," page 295.

Soap.

When a material has not been rinsed sufficiently and is ironed with soap still present in the fiber, stains sometimes appear which resemble iron-rust stains, but usually are lighter yellow in color. Use the following for such stains:

Soap and water (ordinary laundering). Bleaching in the sun helps to remove stains which are especially persistent.

Soot.

Soot spots, being composed of fine particles of carbon, are insoluble and must be removed from a fabric mechanically. Use one of the following agents:

1. Soap and water (ordinary laundering). First brush the stain, then place on the stain absorbent powders, such as fuller's earth, French chalk,

cornstarch, cornmeal, or salt, work them around until they become soiled, and brush them away. Then wash or sponge the stain.

2. Chloroform, gasoline, or other organic solvents, for materials injured by washing. First brush the stain lightly or treat it with absorbent powder, as in No. 1, then immerse it in the solvent and rub gently, or brush with a small, soft brush. For the treatment of rings caused by organic solvents, see "grease," page 292.

Soup.

Stains from soup should be treated in the same way as those from white sauces (page 306).

Stove-polish.

The following agents are fairly satisfactory:

1. Soap and water (ordinary laundering). Rub the soap thoroughly on the stain.

2. Chloroform, gasoline, or other organic solvent, for materials injured by washing. Immerse the stain in the solvent and while immersed rub it gently or brush it with a small soft brush.

Sugar sirups.

One of the following agents should be used in removing sugar sirup stains:

1. Soap and water (ordinary laundering), for washable materials.
2. Sponging with clear water is satisfactory for other materials.

Tar, road oil, creosote oil, asphalt, asphalt paint, and the like.

The stains from these substances are grouped together because they are somewhat similar in their chemical composition. In general, the same solvents are used for all. The stains are rather difficult to remove from textiles, especially from cotton, and after the oily or tarry part of the spot has been removed, dark-colored organic or mineral impurities are likely to remain.

One of the following agents may be used:

1. Turpentine. Sponge the stains or immerse them in turpentine, and rub. The latter treatment is best if the fabric is not too delicate. For stains on carpet, scrub with a cloth soaked in turpentine, changing to a fresh cloth as soon as it becomes discolored, and continuing as long as any color comes off.

2. Turpentine, as in No. 1, followed by thorough washing in soap and hot water (p. 284).

3. Chloroform, applied in the same way as turpentine in No. 1 and No. 2.

4. Lard. Rub thoroughly into the stain, then wash in hot water and soap. Repeat the treatment if necessary.

Tea.

One of the following agents should be employed in removing tea stains:

1. Borax, boiling water. If stains are on cotton or linen and not more

than a few days old, soak them in a borax solution (½ to 1 teaspoon to 1 cup of water) and then rinse in boiling water.

2. A strong soap solution, containing a half-inch cube of soap to each cup of water. Boil the stained material in this solution. Stains 2 or 3 weeks old are removed successfully if they are on small articles of white wash material which can be boiled in a small quantity of liquid.

3. Potassium permanganate, for stains which resist other reagents.

4. Javelle water for persistent stains. This is slightly less satisfactory than the potassium permanganate.

5. Lemon juice and sunlight. Keep the stains moist with lemon juice and expose them to the sun for a day or two. They will be practically removed.

Tobacco.

One of the following agents may be utilized in removing tobacco-juice stains:

1. Soap and water (ordinary laundering). Sponge materials which cannot be washed. If a stain on washable materials cannot be completely removed by washing, bleach it in the sun. Moistening it with lemon juice makes it disappear more quickly.

2. Wood or grain alcohol. Traces of color remaining upon wool fabrics after sponging with water can be removed sometimes by sponging with alcohol.

3. Potassium permanganate, for stains which washing will not remove (p. 286).

4. Javelle water, for stains which washing will not remove.

Tomato vine.

One of the following agents should be used in removing such stains:

1. Lemon juice and sunlight. First wash the stains carefully, then moisten them with lemon juice and expose them to the sun for several days if necessary. This is satisfactory for stains on white washable materials.

2. Alcohol (wood or grain). Sponge the stains with alcohol, which removes the green part of the stain. Stains on wool or silk are practically removed by this treatment.

3. Potassium permanganate. First wash the stains with soap and water or sponge with alcohol.

4. Javelle water. First wash the stains with soap and water or sponge with alcohol.

Turmeric.

Turmeric is a constituent of many pickles and of curry powder, to which it is added for its yellow color and aromatic flavor. To remove such stains, one of the following agents may be used:

1. Dilute ammonia. Remove fresh stains on white materials by soaking in this reagent.

2. Alcohol (grain or wood). Apply in the same way as No. 1. These agents are very satisfactory on old stains.

3. Javelle water.

4. Potassium permanganate.

Varnish.

See "paint and varnish," page 299.

Vaseline.

One of the following reagents may be employed in removing vaseline stains:

1. Turpentine. Sponge fresh stains with this agent. Old stains, even those which have been washed and ironed, usually can be removed by soaking in turpentine, if care is taken to immerse them completely.

2. Agents used in Nos. 2, 3, and 4, under "grease," page 292, for fresh stains. Ordinary washing (No. 1, under "grease,") is not usually sufficient to remove the stains.

Verdigris.

The blue-green tarnish on copper, brass, and bronze, consisting of basic copper carbonate, is known commonly as verdigris. In removing it from textiles use the following agents:

1. Soap and water (ordinary laundering). Stains that are merely on the surface of the material can sometimes be removed in this way.

2. Dilute acids, such as vinegar, or lemon juice. Apply one of these to the stain and rinse off as soon as it has dissolved the verdigris.

Vinegar.

See "acid," page 287.

Walnut, black.

Fresh stains, which are still moist, usually can be removed, provided the material is strong enough to stand the treatment, but old stains or stains on delicate fabrics in many cases cannot be removed by any of the reagents tried.

The following reagents are satisfactory in some cases:

1. Concentrated soap solution, prepared by shaving about 1 cubic inch of laundry soap into 1 pint of hot water and stirring until dissolved. Boil the stain in this solution. This treatment is successful only with fresh stains upon cotton or linen. In the case of week-old stains, a gray color persists.

2. Soap solution as in No. 1, followed by bleaching with Javelle water. This treatment is effective in removing the gray stains mentioned in No. 1, in many instances.

3. Javelle water, diluted with an equal volume of hot water. Soak the stained place for 1½ hours in this solution, then rinse thoroughly, treat with dilute oxalic acid, and rinse again. This is effective in removing a week-old stain and the fibers of the material are not seriously injured.

Soaking the stain in Javelle water of full strength, however, rots the material.

Water spots.

Some silks and wools are spotted by water. This probably dissolves some of the finishing or weighting substances present and on evaporating these substances are deposited irregularly or in rings. A satisfactory method for removing such spots is to dampen the entire material evenly and press it while still damp. Either sponge the material carefully with clean water or shake it in the steam from a briskly boiling teakettle until it is thoroughly damp, then press it.

White sauces, cream soups, gruel, and the like.

These usually consist chiefly of milk and butter, thickened with flour. Flavoring materials and vegetables, which may be added, do not as a rule affect the character of the stain. The presence of the starch and gluten of the flour makes it particularly hard to remove such stains from materials that cannot be washed. Use one of the following agents for treating these stains:

1. Soap and water (ordinary laundering).
2. Hot water. Sponge the stains. Follow this by a grease solvent when necessary.

Whitewash.

Whitewash stains should be treated in the same way as alkali stains (page 288).

Wine.

See "fruit and berries (fresh)," page 291. When the stain is first made sprinkle salt on it to keep it from spreading.

PART III

CLOTHING

CHAPTER XIV

TEXTILES *

By Beulah Blackmore

The word textile as used in this chapter is applied to the common fibers and the woven goods produced from them. Since the making of fabrics has been taken out of the home, the housewife's knowledge of materials has become very limited, while the industry has been steadily advancing. In fact, the manufacturer can so disguise, substitute, and adulterate a textile that even the expert may be deceived by the appearance. No objection should be raised to any fiber that is suited to its purpose; the point for contention is that the buyer frequently pays for one kind of material and receives another. Textiles cannot be standardized until the consumer is ready to train himself through study, experience, and observation, to recognize good materials and to demand a fair return for his money.

COTTON

Cotton has short, flat fibers with a spiral twist, characteristics that give elasticity and the possibility of being spun into

* In this discussion are frequent quotations, as indicated, from Some Points in Choosing Textiles, by Charlotte M. Gibbs (Baker), Univ. of Ill., Bull. 15. Acknowledgment is also made for valuable suggestions from The Study of Textiles, by Nellie Crooks in the Proceedings of the Lake Placid Conference on Home Economics, 1908, and from Hints on Choosing Textiles, by Bertha E. Titsworth, Bull. 45, in the Cornell Reading-Course for the Farm Home.

fine thread (Fig. 57). The quality of cotton materials depends on the strength of the fibers, the fineness or coarseness of the material, the weave, the color and design, and the adulterations.*

Adulteration.

Cotton, being the cheapest fiber, is not adulterated with any other fiber when the material is to be sold as cotton cloth, but it can be made to appear heavier by the addition of mixtures called sizing. Starches, gums, dextrin, glue, china clay, as well as other ingredients in varying proportions, constitute this sizing which may add a large percentage to the weight of the cloth. The spaces between the threads are filled up, and a good finish is given to the cloth, although the wearing quality is not improved. If present in large quantities, the cloth is greatly reduced in weight and firmness after the first washing. Adulterations of this kind can be detected by the feeling, a large quantity imparting a harshness to the material.*

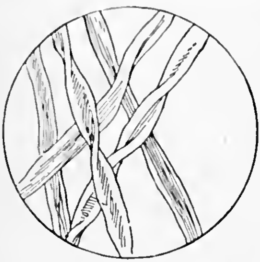

FIG. 57.—Cotton fibers, showing the characteristic twist.

If material suspected of being heavily weighted or sized is rubbed vigorously between the hands, the white chalky specks of sizing may be seen on the hands. If the material is held up and torn quickly, a small cloud of starch or sizing may be seen. If very heavily starched material is touched by the tongue, the starch may be tasted or a sticky spot left on the material. In very thin fabrics the sizing may often be detected by holding the cloth up to the light, when the starch shows between the threads. Washing or thoroughly boiling a sample in soda water will show the amount of sizing present.

Another method of adulterating cotton is shown in certain kinds of dotted swiss. A good swiss has thread dots woven or embroidered in the cloth. These dots are generally woven

* Univ. of Ill., Bull. 15.

with continuous threads on the back of the cloth; and in a later process of finishing, the threads between the dots on the wrong side of the material are sheared off, leaving only the threads which catch through to make the dots on the right side. Occasionally one finds a piece of swiss selling at the regular price, on which the dots instead of being woven as just described are merely dots of very stiff paste. In washing, these dots disappear; or if they do not disappear entirely, they are made brown from the heat of the iron.

Occasionally cotton cloth which has been on the market for some time is weakened by the action of the chemicals used in bleaching, dyeing, or in the sizing. This may be easily detected by tearing the cloth.*

Mercerization.

Mercerized cotton is cloth produced by the action of a strong alkali on cotton fiber rinsed under tension. The process of mercerization is generally carried on while the fiber is still in the yarn. Mercerized cotton is actually stronger than cotton which has not been so treated. The characteristic twist of the cotton fiber is taken out, and the cell-wall is thickened by contraction. The result is a stronger fiber, a long slender cylinder which reflects the light, rather than a flat twisted, ribbon-like filament. The cellulose of the fiber is changed into another kind of chemical substance which has a much greater affinity for dye substances; therefore, beautiful colorings may be found in mercerized cotton materials.

The cost of producing a high grade of mercerized cotton, it has been stated, is about three times that of unmercerized cotton; consequently if a piece of this material is offered at a very low price, it is well to test it for true mercerization before buying. This may be done by thoroughly washing a sample or exposing it to friction and the weather. The gloss of properly mercerized material will not disappear on hard wear or laundering.

An imitation of mercerized cotton may be made by the action

* *Opus cit.*

of very heavy and very hot cylinders on ordinary cotton cloth. This imitation will not withstand friction or laundering.

*Standard cotton materials.**

Standard cotton materials such as muslins, organdies, percales, calicoes, and sheetings differ only in the weight of the material, fineness of thread, hardness of twist, and method of finish. Ginghams have the thread dyed before weaving and fancy weaves are frequently used. Duck, denim, and some other heavy materials have very hard twisted threads and are frequently woven with a twill. Silkolene is a trade name for a fine cotton cloth with a silky finish given after the cloth is woven. Mercerized cottons make lustrous materials, such as poplin, imitation pongee, and numerous attractive house-furnishing materials. India linon is entirely cotton, as are outing flannel and canton flannel. Many tussahs, voiles, and economy linens and other materials with rather deceptive names are cotton materials made to imitate silk, wool, or linen.

Uses of cotton materials.

Cotton fiber is covered by cotton wax, which serves as a protective coat and renders cotton material very slow in absorbing water. For this reason, cotton dish-towels are unsatisfactory. If a cloth to absorb moisture is desired, it must be made of a fiber that is not water-repellent. In absorbent cotton the wax has been removed.

Cotton is light in weight and inexpensive and affords a most desirable fabric for general wear. It is especially desirable for undergarments and house dresses, since it is not impaired by frequent laundering. Starch is absorbed by the cotton fibers as readily in the process of laundering as at the time of manufacture. It is, therefore, possible to keep the garments as fresh as when new. Cotton fabrics shrink for the first few times that they are laundered. The percentage of shrinkage varies with the type of fiber and the method of manufacture of the material. A loosely woven material will often shrink more than a closely woven piece.

* *Opus cit.*

Some of the more common cotton materials are as follows:

Sheeting should have round firm threads closely packed together with the warp and filling threads equally balanced. Little sizing should be used. Unbleached sheeting will give better wear than the bleached, because fewer chemicals are used in finishing it. It will become white in time. It is used for bed coverings.

Long cloth is a soft, firm fabric with a close weave made of a fine grade of cotton yarn of medium twist. The material is dull in finish and has a rather fuzzy surface, making it undesirable for outer garments. It is used for undergarments and aprons.

Cambric is a plain weave with a smooth surface on one side. There are many grades of this material. Because of its smooth surface it sheds the dust. It is a most desirable material for undergarments, aprons, waists, and baby clothing.

Nainsook is a very soft, light cotton fabric with one surface slightly calendered, or pressed with heavy hot cylinders to give a gloss. It may be distinguished from cambric, long cloth, or batiste, because its construction is not so firm nor its finish so smooth. It is used for infants' clothes, lingerie, and undergarments.

Batiste is a sheer, lustrous cloth in white and dainty colors. There is often a mercerized thread introduced in the better grades. It is used for waists, dresses, and baby clothes.

Canton flannel is a heavy cloth with twilled surface on one side and a soft nap on the other. It is used for children's underwear because of warmth and durability, and for linings in order to add warmth to other garments.

Flannelette is a soft cloth with a nap on both sides of the weave and with figures printed on plain backgrounds. It is low in cost and launders easily. It is used for nightgowns, underwear, and children's clothing. Because flannelette is so popular for children's garments and because it is so inflammable, manufacturers have been working for a long time to find a process whereby they may render this material permanently fire-proof without injuring the feel or durability of the cloth or causing it to appear damp or making it dusty. The process must not affect the colors or the design that are woven into the cloth or dyed or printed upon it. After many investigations, this permanent fire-proofing has been accomplished.

Calico is a cotton cloth with a design printed on one side. Calicoes may be seen in almost any color. The colors are generally not fast and will often run or fade when subjected to water. This material is usually heavily sized. It is used for inexpensive dresses, aprons, and wrappers because of its low cost, its durability, and the ease with which it is laundered. Percale is much like calico, but much superior in quality.

Gingham has a plain weave with warp and woof of variously colored threads that form plaids, checks, and stripes. It is used for dresses, aprons, and shirts.

Chambray is a staple fabric of many years' standing. It is a light-weight single cloth that is always woven with a plain weave and always has a white selvage. Its effect is that of a cloth woven with one color in the warp and a white filling. It is used for dresses, men's shirts, and aprons.

Galatea is a heavy firm sateen weave with design printed on one side. It is used for children's clothes, outing suits, and the like, when a cloth of strength and durability is desired.

Cotton damask has very much the same appearance as linen damask before it is washed. This excellent finish is brought about both by mercerization and cloth finish. However, one who buys cotton damask defeats his own purpose in getting a material that will take a good polish and retain its smoothness, from the very fact that the cotton fiber is short and the ends of the fibers cannot be held in place as can the fewer ends of the linen fibers. Therefore, after a few washings the cotton damask has a fuzzy surface, it refuses to take or hold a polish, and it is very limp and easily soiled. Cotton damask is used for tablecloths and doilies.

Velveteen is a material woven in imitation of velvet, but it is made wholly of cotton. It is used for dresses and suits.

Other cotton materials are:

For dresses		*For household purposes*
Albatross	Lawn	Awning
Bedford cord	Linon	Chintz
Buckram	Mull	Crash
Canvas	Muslin	Cretonne
Cheese-cloth	Organdie	Denim
Crêpe	Percale	Diaper
Crinoline	Percaline	Mummy
Dimity	Piqué	Rep
Drill	Poplin	Scrim
Duck	Sateen	
Gauze	Silesia	
Khaki	Tarlatan	

LINEN

Linen was formerly the most important vegetable fiber, and was commonly used for all household purposes. Of late years it has been largely replaced by cotton, with which it may be compared, although there are still uses for which linen is demanded, and others for which linen is preferred to cotton.

The linen fiber is long, smooth, and quite lustrous (Fig. 58) when spun into a thread. It is very strong and there are not so many fuzzy ends as are found in cotton. Cloth made from it is not only lustrous and rich-looking, but because of its smoothness stays clean longer than cotton. The snowy whiteness of linen, obtained with some difficulty in bleaching, is quite permanent, and since the fiber takes dyes with difficulty and parts with them quite readily, it also does not retain stains as persistently as does cotton.*

Adulteration.

Linen is much more expensive than cotton, and when linen prices are paid, linen should be received. Since the two fibers are rather hard to distinguish, especially when heavily starched and given a good finish, it is easy to deceive the buyer. "Linen" collars are frequently largely cotton, "linen" handkerchiefs may not have a thread of linen, as is apt to be the case with rather inexpensive embroidered handkerchiefs, and table "linen" may be mercerized cotton, cotton and linen, or even ordinary cotton. To distinguish linen from cotton, the threads should be examined carefully; cotton is made up of short fibers which project from the surface of the thread, and become fuzzy when the thread is rubbed between the fingers; when broken, cotton has a tufted end, while the linen fibers break more unevenly and leave a more pointed end. The linen thread should be stronger than the cotton; it has more luster, and is usually more uneven. Some kinds of linen have flat threads, but cotton is frequently finished in imitation of flat-thread linen.†

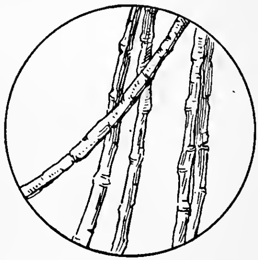

Fig. 58.—Linen fibers, showing the characteristic nodes and longitudinal striations.

Color.

Linen is more easily disintegrated than cotton, and therefore does not withstand the action of boiling alkali solutions, bleaching powder, and oxidizing agents. This characteristic together with its slow reaction to dyestuff, makes it difficult to obtain

* Univ. of Ill., Bull. 15.

† *Opus cit.*

a fast color that will take hold of the fiber. Natural color and white are, therefore, more likely to give complete satisfaction than any applied color in linen fabrics.*

Sizing.

Linen always contains a certain amount of sizing, for the yarn would become rough in the weaving if it were not so treated. Often sizing is used to conceal imperfection, coarse weaving, or the use of cotton or mercerized cotton fibers.

Selection.

Good linen yarn is round and twisted; if the yarn is loosely twisted and flat, the material will not wear so well.

Linen fiber absorbs moisture readily; it is, therefore, very suitable for towelings and for other materials that are used to remove moisture from surfaces. Huck, an uneven weave giving a good surface for the absorption of water, makes good towels, and, decorated with designs in damask weave, may be very handsome.

Many linens in plain weaves are available for clothing, or embroidery, while the coarse Russian crashes are becoming popular for decorative purposes. The texture of linen is such that the heavier kinds hang well in folds, lie flat on a table, and are very artistic for many purposes. The old test for identifying linen by moistening the finger and putting it under the cloth is not always a sure one, since the moisture will not come through a heavy linen, or one with much starch in it, and it will come through a sheer, tightly twisted cotton. A better test is to put a drop of olive oil on the cloth and press it between blotting papers. The linen becomes more transparent than the cotton. There is a peculiar leathery feeling about good table linen, which cotton will not give, and the luster is different, although this is difficult to describe.†

It is more difficult to choose medium-priced linen wisely than to choose the finer and more expensive grades, because substitution for strong fiber and various finishes may be used to lower

* Cornell Reading-Course for the Farm Home, Bull. 45.

† Univ. of Ill., Bull. 15.

the price while they maintain the appearance. Shoppers for institutions as well as for the home are often lacking in ability to judge and consequently buy towels and table linen which will not give satisfactory wear. Without training, the only safe procedure is to keep strictly to reliable firms rather than to be attracted by what seem to be better values at lower prices elsewhere. Many housekeepers prefer to buy the unbleached tablecloths and bleach them for themselves. There is economy in this, because the chemical bleaching used almost exclusively for medium grades, weakens the fiber. The quality to be avoided is poorly spun, flat, rather thin yarn, heavily sized, the cloth loosely woven and light in weight, sized and beetled so that it looks substantial and glistening.*

Characteristics and uses of some common linen fabrics.

Butcher's linen is a heavy, coarse weave. It is used for skirts, waists, and aprons.

Cambric is a fine, sheer material. It is used for dresses and handkerchiefs because of its sheer texture.

Crash is a coarse material, the yarns being irregular in size and slightly flattened. It is used for toweling, skirts, runners, and upholstery.

Damask is a fine satin weave with figured designs. It is used for tablecloths, napkins, and towels.

Huckaback is an uneven weave with much of the filling showing. It is used for toweling because of its rough surface which easily absorbs moisture and causes a glow to the skin.

Handkerchief linen is a firm, even weave but a sheer material. It is used for waists, handkerchiefs, and baby dresses.

WOOL

In point of quality wool belongs next to cotton, although in price there is a long distance between them. A scaly structure on the surface of wool (Fig. 59), especially marked in sheep's wool, gives it virtues possessed by no other fiber. It is by reason of these scales that wool mats together, that air is held in the spaces of a woolen garment, that it absorbs a great amount of moisture without seeming wet—characteristics which all have

* Medium priced linens for institution and home. Mary Schenck Woolman. Journal of Home Economics, 9:10:447–451.

their value in clothing. Elasticity, strength, and luster also are attributes of wool, and the kink, more or less conspicuous, aids in spinning and also in identifying the fiber. The finish given to the best grades of woolen cloth makes them stand the weather better than do other materials. There are a number of fibers commonly classed as wools which vary somewhat from sheep's wool. The more hair-like fibers from different goats and the camel do not possess the felting quality of wool, but on the other hand are more lustrous. Very attractive upholstery fabrics are made of goats' hair. Angora goat hair is manufactured into mohair as well as the various angora knitted fabrics. Camel's hair has a number of uses, and the public is more or less familiar with alpaca from the animal of that name. Wool fiber alone may be spun a second time. Loosely twisted threads, such as those in knitted fabrics or worsted goods, may be pulled to pieces and the fiber spun again either alone or in combination with new wool or cotton, the product being known as shoddy.*

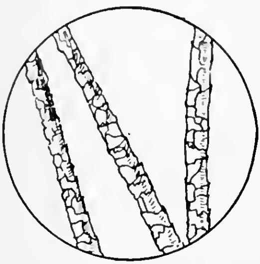

FIG. 59.—Wool fiber, showing the characteristic scales and the serrated surface.

As compared with other textile fibers, wool is light in weight in proportion to its warmth. Wool absorbs moisture very slowly. It retains drops of moisture on the outside fibers, and the lustrous surface of these fibers often causes the drops to slide off. Thus it actually sheds moisture. The durability of materials made from wool is due to the elastic nature of the fiber. Wools absorb dyestuffs readily and ordinarily retain them in their original color during the full life of the fiber. The felting, or matting, quality of wool is much increased by treating the wool with acid or alkaline solutions or even with boiling water. Such treatment softens the fiber and opens up the scales to such an extent that, when the fabric is cooled or

* Charlotte Gibbs Baker. Seven Textile Fibers. Journal of Home Economics, 8:3:144–147.

dried, the fibers interlock more firmly than under ordinary conditions.*

Adulteration.

Since the demand for woolen cloth far exceeds the supply of new wool, there are many devices for making the supply go a long way, and consequently many methods for deceiving the buyer. The manufacturer seeks a material cheaper than the fiber he wishes to adulterate, one which can be concealed readily. Wool when combined with the cheaper cotton fiber makes a material which wears well, but does not keep its shape as well as all-wool cloth, is less warm, and should of course demand a lower price than all-wool. Because of the felting property of wool, it is quite possible to conceal a good deal of cotton under the surface of the woolen cloth, and when the fibers are mixed before the threads are spun, the task of detecting them becomes doubly difficult.†

By the modern methods of manufacturing, cotton and wool mixtures are becoming much more satisfactory, and for certain types of garments, such as dresses and caps, where there is no particular strain on any part, the mixture has proved satisfactory. Only by combining fibers is the manufacturer able to meet the great demand for material. For an outer suit and an overcoat, nothing has been found more satisfactory than the all-wool material.

The most reliable tests for a mixture of cotton and wool are chemical or microscopic, but as these are not practicable for the average buyer, others must be sought. Wool has luster and kinks; the ends of the threads are stiff and look rather wiry. When a sample is carried home, burning will serve to distinguish between the two. Wool burns slowly, chars, has an odor of burnt feather, goes out easily, and leaves a crisp ash; cotton burns quickly with a flame, with little odor, and leaves no ash. A little practice in breaking the threads will help one to distinguish between the two; the difference is not one that can be easily explained, but the experienced housewife knows it well.‡

* Univ. of Ill., Bull. 15. † *Opus cit.* ‡ *Opus cit.*

Woolens and worsteds.

Two classes of cloth are manufactured from wool: woolens and worsteds. Woolens are made generally of short wool carded and spun into yarn in which the fibers lie in all directions. This is woven into cloth, the surface of which usually is heavily felted, as in flannel blankets, so that all of the intersections of threads in weaving are covered. In materials of this class the manufacturer has great opportunity to introduce either shoddy or cotton, for the fibers may easily be covered by surface felting.

Worsteds are made from longer staple wool, combed and drawn until the fibers are parallel, then hard twisted. When woven, the ends of the fibers do not project on the surface, and the finish is not intended to cover the weave; hence it is more difficult to adulterate unless entire cotton threads are woven with the worsted, and these are more easily detected than either a mixture of cotton and wool, or shoddy in woolen cloth. Common examples of woolens are flannel, broadcloth, and venetian cloth; of worsteds, serge, challie, men's suitings, and voile. Mohair is a worsted cloth woven of the wool of the Angora goat, with a warp usually of cotton or silk.*

It is economical to buy good worsted fabrics for the following reasons: They are made from new, long, wool fibers and therefore make a strong fabric; they seldom contain shoddy; they hold in place well when pressed; they are firmly woven and are not easily frayed; they will endure constant wear for more than one season and, if cared for, will look well as long as they last.

*Shoddy.**

As has been pointed out, the demand for woolen goods is so much greater than the supply that it is necessary to resort to various measures to increase the supply of cloth. One method is to use the wool over and over again. Rags are bought up by the rag-man, sold to the larger dealer, again to the "shoddy" manufacturer, who cleans them, sorts them, tears them to pieces, and uses the best all-wool rags to produce fibers, which

* *Opus cit.*

are re-spun and again woven, either separately, if of very good quality, or mixed with new wool or cotton. Such a material is warm, looks well for a time, and has its place, but must not be bought for new wool or demand the price of good woolen cloth. This industry is enormous and shoddy is often found in expensive novelty materials as well as in cheap "all-wool" cloth. Because of the shortness of the fibers, it may be detected readily when used alone, but in combination with good wool it is more difficult to detect.

One class of shoddy consists of very short fibers, clippings from the mills, which are worked into the surface of a felted cloth after it is woven. These short fibers after a time work out, and are found in the bottoms of coats and inside the linings, leaving the surface of the cloth threadbare.

Characteristics and uses of some common woolen materials.

Albatross.—A material of plain weave and rather open texture. On the surface is a printed or impressed design giving a crêpe effect. It is used for dresses.

Alpaca.—A thin fabric of close texture made from the fibers of an animal of the llama species. Since this fiber is hard to spin, it is generally combined with a cotton or a silk warp. It is used for linings and dresses.

Astrakhan.—A fabric with a curly, wavy surface resembling astrakhan fleece. It is used for dress and coat trimming, such as collar and muff sets.

Bedford cord.—A fine woolen cloth with ribs of different widths running with the length. It is often all-wool, but the raised ribs are sometimes padded with cotton. It is used for dresses.

Bolivia cloth.—A close felted material, very thick but light in weight. The surface is often wavy. It is used for suits and coats.

Brilliantine.—A cloth resembling mohair, generally a plain weave with a cotton or silk warp. It has a hard wiry feel. It is used for dresses and linings for heavy coats and suits.

Broadcloth.—A soft, closely woven material with a satin finish. The surface is napped in the finishing process and then pressed down. The best qualities are called satin broadcloth. It is used for dresses and suits.

Bunting.—A plain, even thread weave of mohair, wool, or worsted. It is used for flags.

Cashmere.—Made from the hair of the cashmere goat. The surface is twilled but rather uneven, since the yarn is very difficult to spin. It is used for dresses and wraps.

Challis.—A plain, even weave of soft texture. A challis design is always printed. It is used for dresses, kimonos, and children's dresses.

Cheviot.—A stout woolen cloth woven with a rather shaggy surface. It is used for dresses, suits, and wraps.

Chinchilla.—Heavy coating material with rough wavy surface.

Covert.—Heavy twilled cloth generally in natural undyed shades. It is used for suits and coats.

Felt.—Fabric made by pressing a mass of wool fiber together. It is used for padding, banners, and table-covers.

Flannel.—Coarse-threaded, loosely woven, light-weight fabric more or less spongy and elastic. It is used for baby dresses and garments.

French flannel.—A fine soft twill-woven variety dyed in solid colors, also printed. It is used for dresses and waists.

Shaker flannel.—A variety of white flannel finished with a nap. Cotton warp and woolen filling. It is used for baby dresses.

Mackinaw.—A very heavy blanket-like material used by lumbermen and outdoor workers for overshirts and jackets.

Silk-warp flannel.—A high-grade, pure variety of flannel woven with a silk warp. It is used for infants' wear, shawls, and undergarments.

Baby flannel.—A light-weight variety of flannel. It is used for children's and infants' wear.

Gloria.—Plain weave of silk and wool, or silk and cotton. It is used for umbrella coverings.

Grenadine.—An openwork net-like fabric in fancy designs. Woven of silk wool, mohair, or cotton. It is used for dresses.

Henrietta.—A twilled cashmere of light weight. It is used for dresses.

Homespun.—A rough, loosely woven material. The yarns are often quite uneven. It is used for men's and women's suitings and coatings.

Kersey.—A felted satin-finish woolen fabric with a satin weave on the back. It is used for overcoats.

Linsey woolsey.—A coarse cloth of linen and wool. It is used for inexpensive skirts and dresses.

Melton.—A thick heavy woolen fabric with a short nap. It generally comes in black or dark blue. It is used for coats and suits.

Panama cloth.—Woven of worsted yarn in a plain weave. A solid color usually piece-dyed, or dyed after it is woven. It is used for dresses and suits.

Prunella.—A rich, satin-faced worsted fabric, usually in plain colors. It is used for suits and dresses.

Serge.—Worsted material with twill weave. This material comes in many weights and qualities. It may be obtained in any color. It is used for suits and dresses.

Sicilian.—Heavy-weight cotton warp, mohair filled cloth. It is used for dresses and linings.

Tartans.—Plaids of various Scottish clans. They are worn as diagonal scarfs.

Tweed.—A soft, woolly, rough-finished woolen material. It is usually woven of yarns of two or more shades or colors. It is used for suits and separate skirts.

Velour.—A thick, soft, felted material. It is used for suits and coats.

Vicuña.—A soft wool cloth with a teasled surface, resembling cheviot. It is used for waists.

Voile.—Material woven with a plain, even weave and a hard twisted yarn. It is dyed in plain colors. It is used for dresses.

Whipcord.—Whipcord is much like serge with a pronounced diagonal line. It is used for suits and dresses.

Diagonal.—A material with a serge weave. The diagonal effect is made very prominent. It is used for suits, dresses and separate skirts.

Unfinished worsted.—A fabric woven with yarn of little twist. The twill effect of the weave is covered with loose fibers. This material is very dense. It is used for suits and coats.

Finished worsted.—Woven in much the same way as unfinished worsted but with a much tighter twisted yarn. The weave may be distinctly seen. It is not so dense as the unfinished worsted. It is used for suits and coats.

Zibeline.—The better grades are woven with a worsted warp and camel's hair filling. These long hairs from the filling spread over the surface. It is used for suits.

SILK

Silk is commonly known as the fiber of luxury. It is the most expensive to cultivate, the most beautiful, and the strongest fiber. Since it is the most expensive to buy, and the demand for it is so large, the temptations to adulterate are also naturally very great. The long, strong, lustrous silk fiber which bleaches and dyes beautifully, and is fine as a spider's web is not to be duplicated (Fig. 60). The best grade, or "reeled silk," is taken from the cocoon in one continuous thread which may be several hundred yards long. In manufacturing reeled silk, many defective cocoons are found in which the fibers are not perfect or are broken. The silk from these cocoons may be treated like a short fiber and spun into threads varying in strength according to the length of the fibers. This so-called

FIG. 60.—Silk fiber, showing the two minute filaments from the spinnerets of the silk worm and the gum which at first holds these two filaments together.

"spun" silk has not the high luster nor strength of "reeled" silk, but is often used as warp with reeled silk filling, or in imitation pongee, and back of satins, velvets, and in many other ways.*

In the raw state, silk is sold by the pound. Three thousand silkworms are required to spin one pound of silk, and one to two pounds are required for a dress. When these figures are considered, it will be seen why good silk must necessarily be expensive. There is, however, a demand for a product at a moderate price, and in order to satisfy it, the manufacturer resorts to methods of adulteration.†

Adulteration.‡

In olden times the price of silk was much greater than now, but the material was much more durable. Silks which have been laid away for a hundred years are still in fairly good condition. At present silks are much cheaper, but the result is that when they are put away, even for only a few months they may fall into bits, and their wearing quality cannot be compared with old silks. The reason for this change is not hard to find. The cost of raw silk is about thirty times that of raw cotton and the waste at least five times that of cotton. The manufacturer must make up in some way if he is to sell silk at the prices demanded by the public.

Silk has a very great ability to absorb dyes and metallic salts without apparently changing the quality of the material, and since dyes and metallic salts are much cheaper than pure silk, the manufacturer makes great use of these materials. Loading is the common name for this process of treating silk, and it is common practice to add 30 per cent of foreign material, just the percentage lost by the silk when the gum is removed, while it is possible to add 250 or even 300 per cent.

When one buys novelties and does not care how short their life is to be, these heavily weighted silks answer the purpose very

* Univ. of Ill., Bull. 15.

† Cornell Reading-Course for the Farm Home, Bull. 45.

‡ Univ. of Ill., Bull. 15.

well, but they are not durable. Practically no silk can be found on the market entirely free from loading, but there is a great difference in the amount present.

Another method of adulterating silk is with cotton and mercerized cotton. The fibers are not spun together here as the cotton and wool, but the threads of the two materials are woven together. In satins, velvets, and brocades the cotton is entirely covered by the silk threads on the surface, and appears as the back of the cloth. In cheap silks a fine cotton thread sometimes forms either warp or filling.

Pongee is a material made from the cocoon of the uncultivated silkworm; rajah, tussah, and other uneven, coarse materials are from the same source. These silks are very strong, but do not have a high luster. Mercerized cotton looks quite silky and is sometimes mixed with these silks, or a material of mercerized cotton and spun silk may be sold for pongee, or even a material entirely of mercerized cotton.

Characteristics and uses of some common silk fabrics.

Bengaline.—Very similar to cotton rep. Woven entirely of silk but often padded with wool or cotton. It is used for waists and dresses.

Brocade.—A fabric woven with raised figures on a plain ground. Often a combination of plush and satin weave. It is used for coats and dresses.

Brocatel.—A kind of brocade often having wool figures on a silk background. It is used for draperies and upholstering.

Chenille.—Cloth woven with a soft fuzzy face. It is used for curtains.

Chiffon.—A thin, transparent silk material with plain weave. It is used for dress trimmings, fancy work, and millinery.

China silk.—A plain woven, light-weight silk. The warp and filling are evenly balanced. This silk may be obtained in any color. It is used for gowns, waists, and underclothing.

Crêpe de chine.—A soft lustrous silk woven with tightly twisted threads. The threads are so twisted and woven as to make a crêpe. It may be obtained in printed designs or plain. It is used for dresses, waists, and undergarments.

Foulard.—A plain silk cloth, very soft and highly finished. This silk wears excellently. It is used for dresses.

India silk.—Very similar to China silk. Originally woven in India.

Japanese silk.—Similar to China and India silk.

Jersey cloth.—This material is a soft knitted fabric in plain colors. It is used for dresses, suits, and gloves.

Meteor.—Crêpe de meteor is similar to crêpe de chine in texture. Its face is more satiny. It is used for waists and dresses.

Moiré.—A waved or watered effect produced on plain or ribbed silk. It is used for dresses, trimmings, and linings.

Panne.—A name applied to velvets when the pile is pressed down giving a high luster. It is used for coats, evening dresses, and millinery.

Peau de soie.—A heavy, soft-finished silk material. It is so woven that fine close ribs may be seen running with the filling. Better grades are the same on both sides. It is used for dresses and coats.

Plush.—Long-piled fabric resembling velvet. It is used for wraps and dresses.

Pongee.—A soft plain unbleached washable silk. It is used for waists, dresses, and coats.

Poplin.—A ribbed material resembling cotton poplin. It is used for dresses, waists, and suits.

Sarcenet.—An open, plain, rather stiff silk resembling cotton mull. It is used for hat linings.

Satin.—A silk material with a very high finish caused by the floating of silk threads over the surface. There are many qualities and variations of this material. It is used for dresses, linings, and trimmings.

Taffeta.—Taffeta is either plain or woven in lines so fine as to appear perfectly plain. It may be obtained in a great number of ornamental patterns such as fancy cords, plaids, and stripes, both printed and woven. It is used for dresses, suits, and trimmings.

Tulle.—Openwork silk net. It is used for draperies and evening dresses.

Velvet.—Material so woven that the surface is covered with projecting fibers. The better qualities are made entirely of silk. It is used for dresses, coats, and suits.

Velveteen.—A material woven in imitation of velvet, but made wholly of cotton. It is used for dresses and suits.

ARTIFICIAL SILK

For years chemists of America and Europe have endeavored to make a fiber which would compare favorably with silk. A number of so-called artificial silks have been made synthetically, but each has lacked some desired characteristic. One has not withstood moisture, another lacked strength, a third was not sufficiently pliable, and so on. It is only recently that a satisfactory fiber, which can be manufactured at a reasonable price, has been developed. The artificial silk now commonly found on the market is a collodian-like substance, made from cotton or wool fiber, put through capillary tubes, hardened in the air and so treated that it will withstand moisture. This fiber may be manufactured at a cost below that of pure silk, and has the promise of a great future.*

The artificial, or fiber, silk is used in many knitted sweaters, scarfs, dress braids, fancy ribbons and is combined with both pure silk and cotton. It may always be detected by its brilliancy and stiffness. If the burning test is used, artificial silk is found to burn with almost explosive rapidity. It also disintegrates if it comes in contact with water; but this deficiency is being gradually overcome by science.

RAMIE

Ramie, a vegetable fiber of antiquity, has until very recently been used almost exclusively in China and Japan. A highly lustrous fiber, in this respect surpassing linen, and very white, its use has been limited by the difficulty with which the fiber is removed from the surrounding woody tissue. Ramie has been used in combination with silk and cotton, its luster making it hard to distinguish when woven with silk, and adding richness when combined with cotton. Japanese and Chinese embroideries on this material have been common in the markets for some years, but only recently has ramie linen, by the piece, been sold in this country. As methods for producing the fiber are improved, more of it may be expected to appear on the market, and the shortage of European linen due to the war may give an impetus to the importation of ramie from the Orient.†

At present, ramie is combined with cotton or linen or used alone in making dress materials.

JUTE

Jute, another vegetable fiber, is familiar in sacking, twine, and door-mats, but it is not expected in finer materials. The natural color of this fiber is somewhat darker than linen color, it is harsh and coarse, yet it has considerable luster. In burlap the fiber is used alone, while in monk's cloth it is combined with

* Baker, Charlotte Gibbs. Seven Textile Fibers. Journal of Home Economics, 8:3:144–147.

† Journal of Home Economics, 8: 3: 144–147.

cotton in a heavy material. In its natural color it adds a pleasing tone to a more denim-like cotton and jute fabric, particularly when the cotton is in soft tones.*

TESTS FOR FABRICS †

A general comparison of fabrics may be made, but this will mean little even to the expert, since each class includes so great a variety of fabrics which differ widely in appearance, feel, and strength.

Feel.

The feel of many fabrics very closely resembles that of the raw fiber.

Cotton material: Unresponsive, soft, and inelastic. Cotton because of its inelasticity crushes easily. It may be made to look and feel somewhat like wool, but it always retains its inelastic characteristic.

Wool material: Springy, harsh, and elastic. The elasticity of wool is one of its most desirable qualities. If a woolen garment becomes wrinkled, many of the creases fall out if the garment is merely hung away. This responsiveness is caused by its elasticity. If woolen material is combined with much cotton or shoddy in either spinning or weaving, it loses much of its elasticity.

Silk material: Smooth, cool, and very elastic. If silk is of good quality, it is the most elastic material. For this reason, silk garments hung away will look very smooth and fresh in a short time. Silk loses this quality when adulterated with mercerized cotton or heavily weighted.

Linen material: Firm, stiff, smooth, cold, very inelastic, and leathery if woven with a firm weave. The very inelastic quality of linen causes it to crush readily and thus to require continual pressing. If adulterated with cotton, it loses somewhat its firmness and smoothness.

Artificial silk material: Very smooth, wiry, and cold. Artificial silk material is very unyielding. If combined with another fiber, it is much more satisfactory.

Ramie: Firm and stiff. It resembles both linen and cotton. It does not crush quite so easily as linen.

Strength.

No satisfactory comparison of the strength of different fabrics can be made, since this depends on the size and quality of the

* Journal of Home Economics, 8:3:144–147.

† This material is condensed from Tests for Fabrics as discussed in Dressmaking, by Jane Fales, published by Charles Scribner's Sons.

yarn and the kind and quality of the weave. The strength of a fabric has much to do with its wearing quality, but there can be no fixed standard. Each fabric should be sufficiently strong for the purpose for which it is intended.

The warp and filling threads should be equally balanced either in numbers or size of yarn. Dimity is an example of unbalanced warp and filling; it is well known that after a few washings, dimity breaks along the heavy threads. The weaving should be well done with the threads closely enough woven to give firmness and body to the cloth without any adulteration and sizing.

The strength of the warp and the filling threads may be tested by breaking the threads after raveling. The size and twist of the yarns should also be observed.

The threads should not slip out of place with a slight strain. To test durability in this respect, two edges may be pinned together as for a common seam, and the material opened apart and pulled on both sides of the pin. If the pin makes conspicuous holes in the material, one may be sure the cloth cannot be satisfactorily used for a garment that would have strain at the seams.

Color.

Color is affected by various factors, chiefly by washing, boiling, soap, hot irons, wear, friction, and exposure to sun and air.

Cotton and linens must generally be tested for laundering. A sample should be cut in two, and one-half kept fresh. The other half should be subjected to vigorous soap and water washing, dried, pressed, and then compared with the original sample. The sample may be exposed to strong sunlight by placing it outdoors for a few hours or days. Half of the sample should be kept covered so that the degree of fading may be observed.

Materials worn next to the skin should have sufficiently fast color to withstand friction. They may be tested by vigorous rubbing with a piece of clean white cloth.

Burning.

Burning a small sample of cloth gives about the same result as burning the fiber. The closeness of the weave may somewhat retard the rapidity of the burning. This is one of the best and most reliable tests for the housewife.

Cotton: Since cotton is cellulose, it burns like paper or wood. Cotton material burns rapidly and with a steady yellow flame leaving a gray ash without residue.

Wool: Wool burns much like hair, smouldering and becoming extinguished often. Woolen material leaves oily, gummy globules as a residue.

Silk: Since silk is an animal fiber, it burns much like wool, although more rapidly, with a blue leaping flame. It leaves an oily, gummy globule. Unless silk material is weighted, when burned it is similar to the silk fiber. If the silk material is heavily weighted, the burned fabric leaves a shell-like residue slightly smaller than the sample. This remaining shell is the weighting which does not burn easily; it crumbles at the slightest touch. More satisfactory than lighting a silk sample is to place the sample on a tin dish and set it in a very hot oven. The silk will burn away leaving the weighting in the shape of the original sample.

Linen: Since linen is a vegetable fiber, it burns in much the same way as cotton. It is slightly less inflammable than cotton, because it has more oil; it leaves about the same ash.

Union goods: In testing union goods, or materials made of several different fibers, the problem is more difficult. In this case the material is frayed and both the warp and the filling tested separately. To carry the test still further, both the warp and the filling threads may be untwisted and the various fibers in each yarn tested.

Tearing.

The tearing of material will help to determine in a general way the kind of fiber as well as the strength of the material.

Cotton material: Cotton material tears easily with a shrill sound. The torn edges are fuzzy and have a tendency to curl.

Wool material: Wool material tears with a dull or muffled sound. The ease with which the cloth tears depends on the weight of the yarn and the weave. If cotton and wool are woven together, the kinds of fibers may often be distinguished along the tear.

Plain silks: Plain silks tear with a rather clean edge and give a shrill sound. If corded, the silk tears with difficulty if at all.

Linen: Linen tears with difficulty, leaving the ends of the broken threads with long straight smooth fibers projecting. If cotton is present in a linen fabric, it may often be distinguished along the torn edges.

WEAVE *

The weave affects the appearance and often the wearing quality of cloth. A close twill weave makes a firm, durable material, while the loose basket weave gives quite a different effect and is frequently lacking in firmness. The satin or sateen weave makes a beautiful surface especially in linens or silks, but may cover up defects in the hidden threads. Fancy weaves in cotton novelties, in shirt-waist materials, and in fancy mulls, often leave loose threads which become soiled easily and may not be as attractive after washing. A cloth with a very heavy cross thread or filling, and a very fine warp, or vice versa, may split because of the great difference in the strength of the threads.

Sometimes figures are woven in such a way that when the cloth is finished each figure has short ends of thread. For example, in weaving madras curtain material, the filling thread which makes the figure, jumps from one figure to another, and after the material leaves the loom, the loose threads on the back of the material are cut off. Often these short pieces wash out, or the ends become rough and fuzzy looking.

* Univ. of Ill., Bull. 15.

CHAPTER XV

THE MAKING OF CLOTHING

By Beulah Blackmore

To the woman generally falls the responsibility of the wise or unwise expenditure of that part of the family income apportioned to clothing. Whether she spends wisely depends on her knowledge of all phases of the clothing problem.

One of the first questions that arises is whether she shall buy ready-made garments or buy the materials and make similar garments at home. The conditions surrounding each individual or family are so different as to make impossible an answer to this question which will suit all cases. Probably skill, time, and the limitation of one's purse are the most influential factors in such a choice.

When selecting materials or garments, one should be able to judge the durability, including the quality of the material, their suitability to the occasion for which the garments are to be worn and to the wearer, the becomingness of color and line, and the price in relation to the clothing allowance from the income.

Clothes have the power to make persons feel comfortable and at ease or to make them conspicuous and unhappy. This does not mean that the costume need be new or old; it means that it should be appropriate and becoming. It means adapting the prevailing style to one's own type of figure and personality. A person may be just as conspicuous in an ultra-fashionable costume as in one that is very out-of-date; but either may be adapted to conform with good taste, without a great expenditure of time or money.

To be well dressed the woman who makes her own garments must depend largely on familiarity with the principles of design, a critical, discriminating, and thoughtful attitude toward clothing, common sense, skill in the manipulation of fabrics, in draping, or in cutting cloth by a pattern, and knowledge of the best equipment to be used. "Right dress is, therefore, that which is fit for the station in life, and the work to be done in it, and which is otherwise graceful, becoming, lasting, healthful and easy; on occasion splendid; always as beautiful as possible."*

Dictates of fashion too often outweigh one's good judgment, which in this case should have as a background the principles of design. Clothing should interpret the personality of the wearer and emphasize pleasing elements of face or figure rather than exhibit the prevailing fashion, which often exaggerates deficiencies instead of concealing them.

No costume can be artistic or picturesque, although it may be considered fashionable, if it perverts the natural lines of the figure. In good design it is generally possible to emphasize the good points or lines of the figure and to make the less desirable lines inconspicuous. This necessitates careful consideration of the silhouette. Simplicity in silhouette, in line, in the divisions of the costume made by line or dark and light, and in decoration, cannot be overestimated. The search for greater simplicity and for original detail are the two principles followed by the greatest designers.

Of equal importance with line and the spaces formed by these lines is the study of color, texture—an extremely subtle surface quality of a fabric often confused with color—and dark and light values (pages 45 to 47). This is a problem for each individual; it can not be studied too much. After deciding, then, on the type of gown necessary for the occasion for which it is to be worn, the following phases of costume design must be considered, if the result is to be harmonious and beautiful: silhouette; line, including space division and balance; dark and light spacing; color; texture.

It is unwise to lay down hard and fast rules for the use of suitable color in costumes for different types of persons, because general rules may have many exceptions. The following table, however, may be suggestive.

* John Ruskin. Arrows of the Chace.

TABLE XV.—Colors Appropriate to Different Types of Persons[1]

Color	*Hair* *Black* *Brown* *Eyes* *Brown*	*Hair* *Black* *Brown* *Eyes* *Blue* *Gray*	*Hair* *Light* *Eyes* *Blue* *Gray*	*Hair* *Light brown* *Eyes* *Brown*	*Hair* *Red* *Auburn* *Eyes* *Blue* *Gray* *Brown*
Black	Good especially with colors, if hair is black and eyes are very dark	Good	Very becoming	Good if combined with white or light colors	Good in combination of white or colors
White	Good, especially cream white	Cream white is especially good	Good	Good; cream is very good	Good, especially cream and ivory
Gray	All shades good, particularly with sallow complexion	Good if brightened by contrasting colors	Warm grays, if fair skin with delicate color	Warm tones are good	Good
Blue	When one has rosy cheeks, all blues are good. If sallow, deep blues only	Good in nearly all shades, if there is color in face	Very good in nearly all shades. Light blue demands color in face	All shades except brilliant	Dark or gray blues only. Avoid all others
Green	Avoid except clear tones. Blue green and hunter's green are good	Good if only a little color in the face	Both light and dark are good	Warm tones are good	Dark shades are good. Avoid all light and bright greens

[1] Ext. Circ. 14, Coll. Agr., Univ. of Ill.

TABLE XV.—COLORS APPROPRIATE TO DIFFERENT TYPES OF PERSONS—*Continued*

Color	*Hair* Black, Brown; *Eyes* Brown	*Hair* Black, Brown; *Eyes* Blue, Gray	*Hair* Light; *Eyes* Blue, Gray	*Hair* Light brown; *Eyes* Brown	*Hair* Red, Auburn; *Eyes* Blue, Gray, Brown
Yellow	Avoid if sallow. If color in face, soft yellow may be becoming	Good only in maize	Pale yellow is good if hair is very yellow	If good color in face, amber and gold are especially becoming	If fair, gold and amber are good. Avoid others
Brown	If rich color in face, warm browns are good. Use neutral or grayish brown if sallow	Not very good	Only very dark browns	Good in warm tones	Warm, dark browns are good
Red	If complexion is pale, red is usually very becoming	Cardinal and clear rose good if skin is clear. If rosy cheeks red may reflect too much color	If pale, dark red is good	Good especially in yellowish hues if warm coloring in face	Avoid all except the very dull tones
Pink	Avoid pale pink. Rose or flame pink is good	If skin is clear, pale pink may be worn	Good if cheeks are pink Pale and old rose good	Rose pink is good	A touch of rose may be worn
Purple	Avoid violet, but deeper purples may be worn	Almost all shades of violet and purple are good if white is worn next to face	Heliotrope, wistaria, and violet may be worn	Good; most shades can be worn	Avoid except in combination of other colors

EQUIPMENT FOR THE SEWING ROOM

Good equipment is necessary if the home worker is to turn out good work with the least drain on her own strength. In addition to the customary pieces of equipment, a floor cloth, a dress form, a sleeve form, and pressing boards are almost necessary conveniences.

A floor cloth is a large square of cloth or a sheet which may be placed on the floor under the machine to catch ravelings and cuttings. This cloth may then be folded around the base of the machine at night and opened when work is resumed, or it may be shaken.

A dress-form is almost indispensable, when good work and time are considered. This may be obtained at a department store, or ordered directly from a manufacturer. A dress-form is bought by size, the number corresponding to ready-made garments. A form one or two sizes too small should be selected and padded out to the correct size. Only in this way is one able to make a form showing individual measurements. A tight-fitting lining must be made of some very heavy material, such as unbleached muslin or drilling, and fitted on the person. The normal armhole, neck, bust, waist and hip-line should be marked. The lining should be made to extend about 10 inches below the waist-line or to fit well down over the fullest part of the body. This lining should then be placed on the form and padded out with tissue paper, hair, or excelsior. The lining should be overhanded firmly together in the back, from the top of the collar to the bottom of the peplum. It is also desirable to make a skirt for the figure which will fit tightly around the hips.

A sleeve board and a skirt board, well padded, are very useful. It is also convenient to have a padded broom handle over which seams may be pressed without marking the remainder of the garment.

*Sewing machine.**

There are two types of sewing machine in use—the automatic, or single-thread, and the lock stitch, or two-thread

* Ext. Circ. 14, Coll. of Agr., Univ. of Ill.

machine. The single-thread machine makes a chain stitch, which requires about a half more thread than the double-thread machine. The stitch on the former is a very fine, pretty one, and for thin cotton and linen materials it cannot be excelled. The ends of the thread must be fastened to prevent the stitching from ripping out. The two-thread machine, which makes a lock stitch, has a greater variety of uses, as the tension is adjustable to the material which is being used. The threading, operating, and oiling of the machine, and the use of the attachments are all described in the instruction book which accompanies the machine. The following suggestions will be of assistance to those who are unfamiliar with the operation of the lock stitch machine: (1) Practice treading until it can be done easily and evenly; (2) practice stitching, first on paper before the machine is threaded, then on material, either plain or striped; (3) be able to remove the bobbin, thread it, and replace it, and always draw up the bobbin thread before beginning to stitch; (4) practice threading the machine, and then stitch until good straight lines can be made; (5) to turn a corner, have the needle at its lowest point and use it as a pivot; (6) in removing the work from the machine, have the needle at its highest point, raise the presser foot, and draw the material back and to the left, cut the threads with the thread-cutter or with scissors; (7) where there is no cross stitching, always draw the ends of the threads to the wrong side and tie them; (8) good stitching depends on several factors: (a) Correct length of stitch: The length should conform to the material. Heavy cloth requires a longer stitch than does a thin material. The length is regulated by a screw. (b) The tension: The tension is also governed by the material. In a perfect tension the bobbin and the spool threads lock in the center of the thickness of the cloth. If the bobbin thread is drawn to the upper side of the cloth as it lies in the machine, the tension is too tight; and if the spool thread is drawn to the lower side, the tension is too loose. The tension is regulated by a screw which turns either from right to left, or from front to back. (c) The needle: The needle should be the correct size to carry the thread which is being used.

Be sure that the point is good, and that the needle is set correctly.

PREPARATION OF MATERIALS

Shrinking

Nearly all cottons and linens should be shrunken before being made up. Probably the most satisfactory way is to place the folded piece of material in a tub of lukewarm water and to allow it to remain in the water for about one hour. The material must be thoroughly wet, even to the innermost fold. The material should then be removed from the water, but not wrung, because wrinkles will appear which will be difficult to press out. The greater the care taken in hanging the material to dry, the easier it is to press later. The material should be hung with the selvage as straight as possible. It should be ironed just before it becomes dry, great care being taken to iron it with the warp and filling threads, or with strokes both parallel to the selvage and at right angles to it. It is most important to keep the warp and filling straight, to prevent difficulty in placing a pattern on the grain of the material.

FIG. 61.—Method of shrinking fullness out of a garment. By means of two or three gathering threads the material is drawn up to the desired size. A damp cloth is placed over the material, which is then pressed with a hot iron. It is often necessary to repeat this process several times. If the material is to fit over a curved surface such as the hip or the shoulder, a cushion should be used in pressing.

Sponging.

All woolen fabrics should be sponged to prevent shrinking and water spotting. This is often done either in the store, at a small cost a yard, or at the factory. In case it is necessary to do the sponging at home, a large table covered with a soft padding, over which is placed unbleached muslin, is better than an ironing-board, as more surface may be covered at one time. The covering must be held firmly in place to prevent

PLATE XII.—Use of form in draping dresses before and after fitting.

wrinkles from marring the surface of the material. The material is placed face down on the pressing table, a wet cloth is laid over it, and a fairly hot iron is used. After enough pressing has been done to make the material nearly dry, the cloth is removed and a final pressing given directly on the wrong side of the material. In double-width material the same plan may be followed if the face of the cloth is folded in. The steam from the wet cloth is generally sufficient to wet all the material unless it is very heavy. Both sides of the double-width material should have a final pressing. Only a small portion of the material should be sponged and pressed at a time. If there is a nap, care must be taken to press the material with the nap. The motion of the iron is not a long sweep, but rather a slow motion of lifting and placing the iron.

Occasionally material may be sponged on the wrong side with a damp cloth, then hung over a door to dry. This is a more simple process but often destroys the finish of the material, giving it a slightly crêpy appearance.

Pressing.

Pressing may be done in much the same way as sponging, care being taken to lift and place the iron rather than to drag it along. The iron will often leave a shiny mark if placed directly on the material; therefore, if it is necessary to press a garment on the right side when it is being made, a cloth should always be placed between the garment and the iron.

A sample of the material should always be tested for the changing of color, when it is to be pressed.

A hot iron should never be used on silk, because it takes the life out of the silk; a warm iron is better. It is often a good practice in pressing seams of silk garments, to invert the iron and draw the seams over the iron. Velvets are very difficult to press and are more satisfactory if steamed (page 402).

When it is necessary to shrink out fullness at the top of a sleeve or around the waist, an oval cushion is essential (Fig. 61). A gathering thread must be run in the full part of the garment to hold the fullness in place. The cloth must then be dampened, pressed, and dampened again until the fullness has disappeared.

HOW TO TAKE MEASUREMENTS (FIG. 62)

Before using a commercial pattern it is best to test it to see whether it is approximately the correct size. The following

FIG. 62.—Method of taking measurements.

measurements should be taken and the pattern tested by several of them. It is not necessary to test the pattern by all these measurements, however, unless the figure is quite abnormal. The commercial patterns are very well proportioned; therefore, if the pattern is correct in the length of the waist and the bust measure, it will generally prove satisfactory. In the skirt the test measurements used are the waist, the hip-line 6 inches below the waist, and the length of the skirt in front.

Waist measurements:

Place a tapeline around the waist, and pin it securely. Adjust the tapeline until it is as nearly parallel to the floor as possible, and at the normal waist-line.

Bust measurement: Place the tapeline around the figure over the fullest part of the bust. An easy measurement is taken for a shirt-waist and a close measurement for a tight-fitting waist. Keep the tapeline rather high under the arms and straight across the back.

Width of back: Measure the width of the back from armhole to armhole. Divide the space between the base of the neck and the waist into fourths. Measure the width of the back at approximately the first quarter division below the base of the neck.

Width of front: Measure the width of the front 1½ to 2 inches below the hollow at the base of the neck across the widest part of the chest from armhole to armhole.

Waist: Take the measurement around the waist, keeping the tapeline as nearly parallel to the floor as possible.

Length of back: From the bone at the base of the neck in the back straight down to the lower edge of the tapeline around the waist.

Length of front: From the center of the hollow at the base of the neck straight down to the base of the tapeline placed around the waist. This is a rather loose measure.

Depth of dart: This measure is not often used except when testing or drafting a tight-fitting lining. It is taken from the base of the neck at the center front in a slanting line down to the point of the bust. It averages from 8 to 9 inches.

Length of under-arm: Take this measure carefully. For the shirt-waist one-half the length of the back may be used; but when a more careful measurement is necessary, the tapeline is folded over a pencil and the pencil slipped in under the arm and the measurement then taken to the bottom of a tapeline which is around the waist. The shoulder must be in a normal position with the arm lowered.

Neck or collar measurements:

Base of neck: This is a close measurement taken around the base of the neck. It is better to have this measurement taken too small than too large, because in the fitting of the waist the neck-line can easily be made larger.

Top of neck: This is a close measurement around the top of the neck just under the chin.

Height at back: From the base of the neck to the height required.

Height at front: From the base of the neck in front to the height required.

Height at side: Take this measurement just back of the ear from the base of the neck to the height required.

Armhole measurement: Take the measurement of the armhole where the arm joins the body. The curve of the line is rather deep at the lower front, and is a practically straight line in the back.

Sleeve measurements:

Length inside: Take this measurement along the inside of the arm from the little muscle where the arm joins the body to the bone in the wrist.

Length outside: From the point where the width of the back measure ended, over the outside of the arm to the elbow. Then bend the elbow and take the measure down to the bone in the wrist.

Size at elbow: Place the tape-measure around the elbow; bend the elbow, and take the measurement rather closely over the point of the elbow.

Wrist size: Close the hand as though it were to slip through a small hole with the thumb held in the palm. Take the measure then, very closely over the knuckles and thumb.

Skirt measurements:

Waist: Take this measurement in the same way as for the waist.

Hip: The first hip measurement is generally taken 6 inches below the waist-line. The second hip measurement is generally taken about 10 inches below the waist-line, or over the fullest part of the thigh. These two measurements are parallel to each other and parallel to the floor. There is generally a difference of 4 to 6 inches between them.

Length of front: From the waist-line to the floor, exactly at the center front.

Length of side: From the waist-line to the floor, directly over the fullest part of the hip. The tapeline should fall at right angles to the waist-line.

Length of back: From the waist-line to the floor, exactly at the center back.

KINDS OF PATTERNS

Patterns may be made in two ways: by drafting and by modeling. Drafting is impracticable for the average housewife but invaluable for the professional worker, in that it develops a fine feeling for line. Modeling is the ideal way in which to obtain a pattern, since the lines can be adapted to each figure; but ability to make patterns in this way comes only with long experience in working with patterns and materials. The most practical pattern for the average worker is the commercial one. These patterns are being perfected from year to year. It is now possible to obtain a pattern of almost any size to fit the normal figure. Generally only slight alterations are necessary.

How to buy a commercial pattern.

Only patterns of standard makes which contain very explicit guide charts should be purchased. A waist pattern for a normal figure should be bought by the bust size. If the bust should be abnormally full, it is still necessary to buy the pattern by the bust size and then make the required adjustments. A skirt pattern should be purchased by the hip size, unless the waist is large in proportion to the hips, in which case it should be bought by the waist size.

Before opening a pattern, the directions on the outside of the envelope should be read very carefully, seam allowances being noted and also the marks that are used to indicate the correct placing of the pattern. On opening the envelope, the pieces of the pattern should be looked over and compared with the guide chart. The pieces of the pattern to be used are then selected, any others returned to the envelope.

How to test a commercial pattern.

Using the individual measurements, the pattern may be tested for the size before placing it on the material. If it is necessary to make many changes, it is best to alter the pattern, cut it in cambric or unbleached muslin, and then try it on to see that all the lines are right before cutting it in the material for the garment.

To test the pattern, the back and front should be pinned together along the line of the shoulder seams.

Using the individual measurements, the neck-line is then tested. If it is large, it may be adjusted by raising the neck-line slightly.

With the shoulder seam still pinned, the armhole is tested and made approximately the correct size by raising or lowering the waist under the arm and tapering the line to the normal armhole. If this does not correct the fault, the under-arm seam may be made deeper.

Simple adjustments in commercial patterns.

The accompanying illustrations (Figs. 63–80) will make clear the ordinary adjustments necessary in commercial patterns. For the abnormal figure, the garment must be modeled on the figure after it is basted.

HOW TO ESTIMATE THE AMOUNT OF MATERIAL

No definite rules can be given for estimating the necessary amount of material for a garment because of the many influenc-

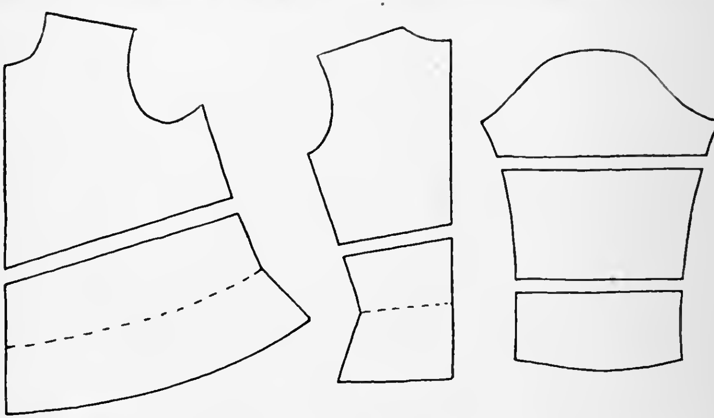

Fig. 63.—Method of lengthening shirt-waist pattern. The front and back of the waist pattern are generally cut about 2 inches above the waist-line for lengthening. For a figure that is very long from the shoulder to the lower curve of the armhole, the pattern may be lengthened by cutting it from the armhole to the center front. The shirt-waist sleeve may be lengthened in two places if necessary, depending on whether the arm is long from the shoulder to the elbow or from the elbow to the wrist. The sleeve pattern is generally cut about 2 inches above or below the elbow line.

ing factors, such as fashion, finish, width, and design of the material.

Pieces left from the cutting of the skirt and waist may generally be used for cutting the collars, cuffs, or any small decorations. In buying expensive material, it is always permissible to take the pattern to the store and quickly place it on the material to get an estimate of the amount necessary. If commercial patterns are used, the amount of material necessary for the making of the garment is generally stated on the outside of the envelope. This amount is often over-generous. Experience soon teaches one the minimum amount of material to buy for a garment.

For a skirt.

In estimating the amount of material necessary for a skirt, one must first decide on the width of the bottom of the skirt.

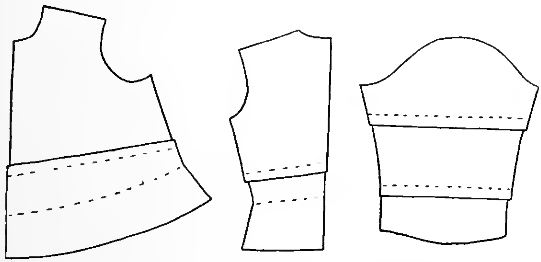

FIG. 64.—Method of shortening a shirt-waist pattern. To shorten the pattern a fold may be taken about 2 inches above the waist-line. To shorten the sleeve a fold may be taken about 2 inches above or below the line of the elbow depending on the proportion of the arm.

In plain material, as many full lengths of the material will be required as the number of times the measure of the width of the cloth is contained in the measure of the width of the bottom of the skirt. This is a very generous allowance, because often in placing gores, especially on plain material with no up or down, they may be fitted in so that much less material need be used. It is often helpful in estimating the amount of material needed, to place the pattern on a table in the position for cutting material of a definite width.

For a waist.

In general, once the length of the front, measured from the point of the shoulder nearest the base of the neck, to the waistline, and once the length of the back from the same point on the shoulder to the waist-line, plus once or twice the outside length of the sleeve, will give an idea of the amount of material required.

HOW TO PLACE THE PATTERN ON THE MATERIAL

After the pattern has been altered and tested, or after it has been cut in inexpensive material and modeled to the figure,

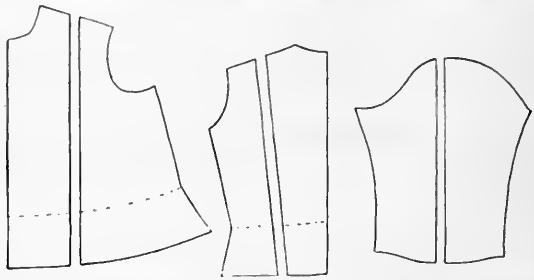

Fig. 65.—Method of cutting and opening a shirt-waist pattern to throw in fullness. This method of putting more fullness into a shirt-waist pattern also increases the length of the shoulder. The line of opening should extend through about the center of the shoulder. It is often necessary to increase the size of the arm-hole to make it correspondingly larger. The sleeve may be opened along the center.

it is ready to be placed for cutting on the material. A few general rules are here given but there are many exceptions to them.

1. Observe on the outside of the pattern envelope or on the guide chart contained in the envelope, the allowance for seams. In the case of the modeled pattern allow for seams, since the pattern has been cut apart exactly on the line of basting. In case the seam allowances have not been made, allow at least 3/8 inch on material which does not fray, and more on material that frays badly. If the pattern has not been used before, it is a wise precaution to make an allowance of at least 1 inch on all fitting seams, such as the shoulder seam and the under-arm seam of the waist, and the seams of the skirt which fall over the fullest part of the body. In making the extra allowance on the skirt seams, begin at the waist-line and taper down to the original allowance at a point from 12 to 14 inches below the hip-line.

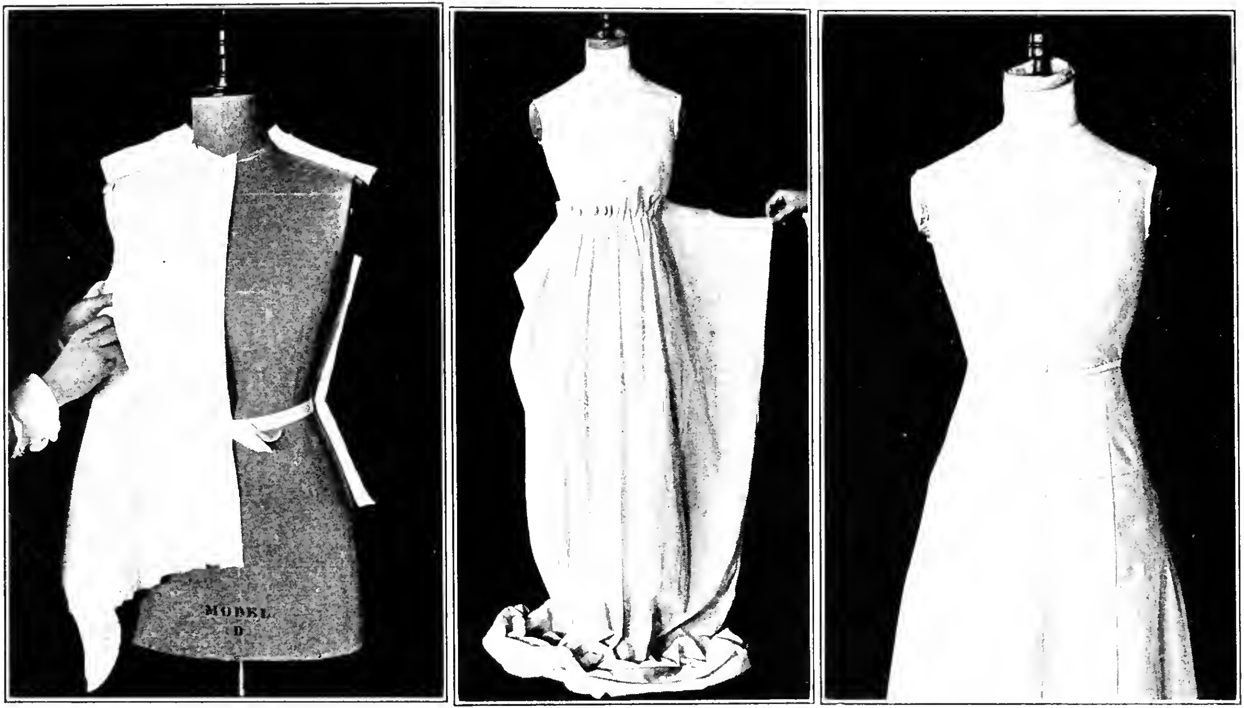

PLATE XIII.—Left, draping a simple waist; center, draping a simple skirt with cascade effect on sides; right, dress form used in draping, padded with tissue paper to fill out fitted lining.

2. Spread the material out as much as possible, and place the entire pattern on it, in order to determine the most economical way of cutting. This is always advisable for economy in cutting, and if it is necessary to piece the garment, the piecing may be planned to come in the least conspicuous place.

3. If the material is easily cut and does not slip when several thicknesses are cut at one time, it may be folded end to end and most of the pieces may be cut double. Care must always be taken not to cut two pieces for the same side. This difficulty may be obviated by placing the two right sides or the two wrong sides of the material together when cutting it. Then, when the two pieces of material are taken apart, one is for the right side and the other for the left. Folding the material together is not always the most economical scheme, for often the parts of the pattern may be fitted into irregular places if cut singly.

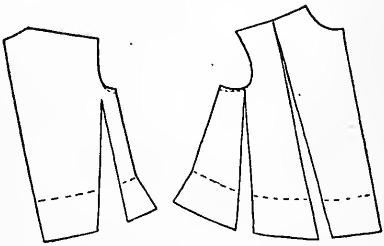

Fig. 66.—Method of increasing or decreasing the bust measure of a shirt-waist pattern without increasing the length of the shoulder. The opening should extend from the bottom of the waist in a straight line to the deepest curve of the armhole. In the front it is often better to make two slashes than to spread one slash too far. This method of adjustment necessitates lowering the armhole and, if the second slash is made, slightly lowering the tip of the shoulder near the armhole.

4. Always place the largest pieces of the pattern first with the largest end of the pattern toward the cut end of the goods. This is economical because it leaves the irregularly shaped pieces attached to the large piece of the goods. Often the smaller pieces of the pattern may then be fitted into these irregular pieces, which would be useless if detached.

5. Observe carefully the nap or design of the material, placing the pattern so that the design runs in the same direction, on all the pieces. The nap generally runs down, but velvet and velveteen are exceptions to this rule. Different color effects are produced if the surface of the material does not reflect the light in the same way.

6. A conspicuous design in the material, such as a plaid, must be identical on the two sides of the garment to prevent destroying the balance or introducing undesirable lines. Most important of all is keeping the grain of the material identical on both sides of the garment; otherwise the set of the garment will not be bi-symmetric.

7. After the pattern has been placed in the most economical manner, pin it carefully, trying not to lift the material and the pattern from the

table when pinning them. Do not use too many pins; they not only take time to place, but they often make noticeable holes in the material, especially in silks.

8. The actual position of the pattern on the goods depends largely on the pattern. When using a commercial pattern, read the directions carefully, and then locate the indicating marks which show the lengthwise, the crosswise, and the fold of the material. These indicating marks should be followed carefully.

For using a modeled pattern, or a pattern without indicating marks, the following guides are offered:

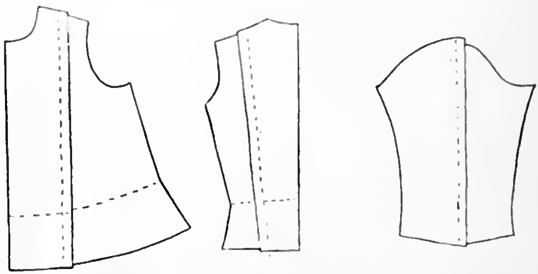

FIG. 67.—Method of decreasing the size of a shirt-waist pattern. Instead of cutting and spreading a pattern as in Fig. 65, the size should be decreased by making a fold in the pattern.

1. Lines of a simple pattern generally placed on the straight lengthwise grain, or the lengthwise fold, of the material:

In a waist:

a. Center front

b. Center back

In a sleeve:

Along the outer fold when the seam edges are brought together. Any sleeve after being basted should lie perfectly flat when folded.

In a yoke or collar:

a. Center front or center back of yoke or collar. The center back of a waist yoke or collar is generally cut on the lengthwise fold, although often the lower front edges are cut on the straight grain, causing a bias seam in the center back.

b. In a skirt yoke there may be all sorts of combinations in cutting. Probably the most successful way is to cut the material with the straight grain in the center back and the center front, giving a bias seam over the hip. Sagging may be disguised by making the yoke longer over the hip, if this gives a becoming line. The bottom line of a skirt yoke must be carefully considered with reference to the figure. Avoid allowing the lower edge to fall in a straight line around the fullest part of the body. Either an irregular yoke-line or the line joining a front or back panel is generally more becoming.

In a cuff:

The direction of the grain of the material in the cuff depends greatly on the design of the waist and of the material. For beauty of design, the cuff is generally cut with the lengthwise grain running with the depth of the cuff; for greater strength, however, the cuff is cut with the lengthwise grain running from fastening to fastening.

In a skirt:

a. Center of front panel. Generally the front edge of each succeeding gore, in order that a straight edge may be sewed to a bias edge. This method will help to keep a skirt from sagging. In skirts of two gores the center of each gore is often placed on the straight lengthwise fold.

b. If a rounding or tube-like effect is desired in a skirt of many gores, the center of each gore is placed on the straight lengthwise grain of the material.

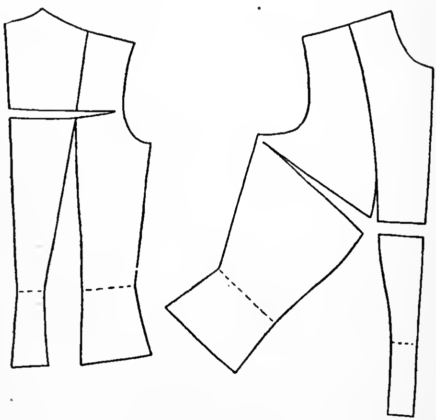

FIG. 68.—Method of lengthening a waist pattern for a very full bust or round shoulders. This method may be used on a shirt-waist, also, with slight alteration of the under-arm seam.

When great strength is desired, the lengthwise grain of the material is always used. Skirt-bands, apron-bands, neck-bands, bands in all under-garments, and cuffs, are cut with their longest measurement on the lengthwise grain of the material.

2. Lines of a simple pattern placed on the straight crosswise grain of the material:

In a shirt-waist:

a. Width of the chest

b. Width of the back

c. Waist-line of the under-arm piece of a tight-fitting waist

In a sleeve:

Generally around the fullest part of the arm.

In cuffs:
Depth of the cuff, when the design of the waist requires it.
In yokes:
Depth of the yoke, when the design of the waist requires it.
In skirts:
Skirts are seldom made with a construction line falling on the crosswise grain of the material. For children's dresses and for fancy silk dresses, a skirt is occasionally made on the crosswise grain of the material. Chiffons, georgette crêpe, net, or voile, on which there is a beautiful selvage edge, is often draped on the crosswise grain, and thus the making of a hem finish, which is often cumbersome on very light-weight materials, is avoided.

HOW TO MARK A GARMENT FOR BASTING

After the pattern is placed, the seam allowance and other necessary points should be marked by one of the suggested methods. The points or lines generally marked are: (1) waist line; (2) seams along the edge of a modeled pattern, or along the indicated line on a commercial skirt or waist pattern; (3) neck-line; (4) armhole; (5) center front of waist and skirt; (6) center back of waist and skirt; (7) waist-line of skirt; (8) hip-line; (9) hem-line; (10) lengthwise center of sleeve; (11) points indicating decorations, plaits, tucks, and gathers; and (12) notches.

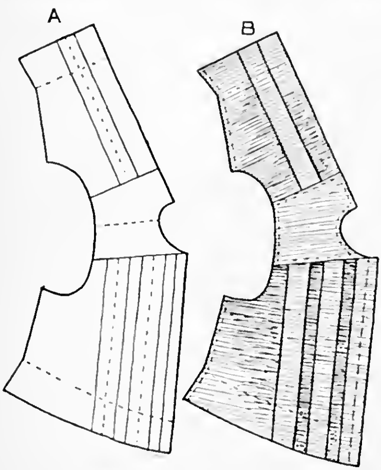

FIG. 69.—Method used in modeling garments over a flat pattern. *A*, the paper pattern is pinned together at the shoulder seam and the lines marked showing the design to be followed; *B*, the resulting waist designed on the original pattern.

The notches for the joining of seams should be indicated by a tack of thread or a chalk mark, never by cutting the notch, since this often ruins the final finish of a seam and does not allow for an increase in the size of the garment, if this is necessary.

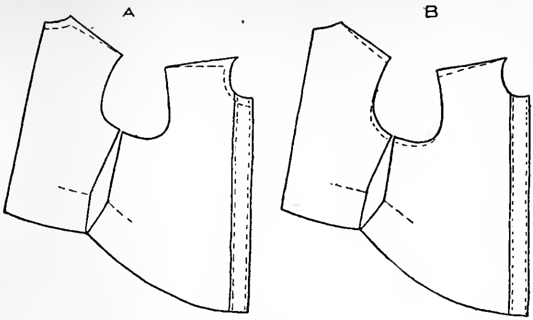

Fig. 70.—Adjusting pattern to fit shoulders. *A*, Alteration necessary for very square shoulders. It is often necessary to fit in the shoulder seam at the base of the neck. This seam should slope very gradually into the old shoulder seam at the tip of the shoulder. This adjustment often necessitates the lowering of the neck-line in both the back and the front. *B*, Alteration necessary for very sloping shoulder. It is necessary to take in the shoulder seam slightly at the tip of the shoulder near the armhole. The new seam should slope very gradually to the old shoulder seam at the base of the neck. This alteration necessitates lowering the armhole.

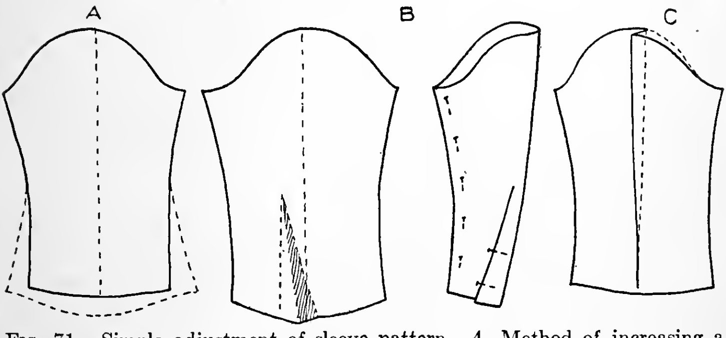

Fig. 71.—Simple adjustment of sleeve pattern. *A*, Method of increasing a sleeve pattern at the bottom. *B*, Method of adjusting a shirt-waist sleeve pattern to make a close-fitting sleeve at the bottom without changing the size at the top. A dart may be folded in the under side of the sleeve, taking out the excess fullness. This dart should extend from the bottom of the sleeve about to the elbow. The dart should fall nearer to the outside line of the sleeve than to the seam. *C*, Method of decreasing the fullness in a sleeve. To take fullness out of the top of a sleeve, fold a plait at the top along the center line, and let this plait decrease to nothing as it approaches the bottom of the sleeve.

The tracing wheel marks two thicknesses of material at once and is, therefore, a great convenience. It cannot be used on all kinds of material, however, for on very thick material the per-

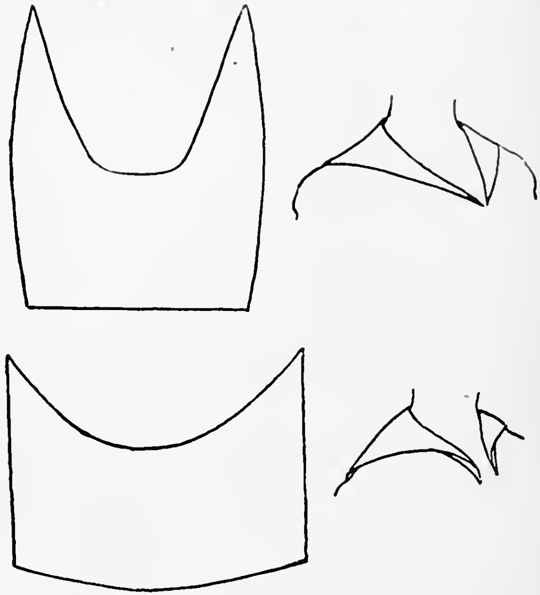

FIG. 72.—Method of cutting collars for flat or rolling effect. The more nearly the neck-line of a collar approaches a circle, the flatter the collar will lie. The curve for a collar should always be straightened slightly to fit the back of the neck.

forations do not show, and on very soft material the markings destroy the surface finish or threads.

Tailor's chalk may be bought at the notion counter of any dry goods store. The chalk marks only one surface at a time, and the marks may become obliterated before time to use them. On some materials they are very difficult to erase.

Tailor's basting is a very satisfactory way of marking materials. It requires more time than the other methods, but is more lasting and may be done through two thicknesses. A

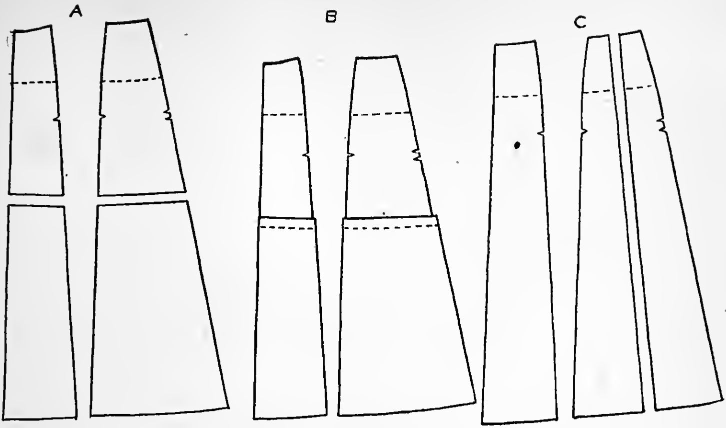

FIG. 73.—Changing length or width of skirt pattern. *A*, Method of lengthening. The pattern may be cut at a point about opposite the knee, and spread as desired. *B*, Method of shortening. The tuck may be taken in a pattern about opposite the knee. If the pattern is simply folded up at the bottom to shorten it, a great deal of fullness is removed. *C*, Method of increasing the width of a skirt pattern.

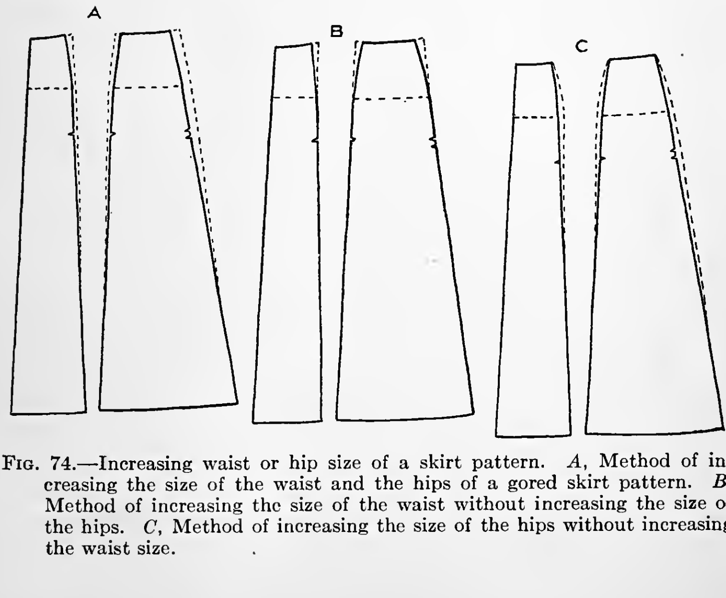

FIG. 74.—Increasing waist or hip size of a skirt pattern. *A*, Method of increasing the size of the waist and the hips of a gored skirt pattern. *B*, Method of increasing the size of the waist without increasing the size of the hips. *C*, Method of increasing the size of the hips without increasing the waist size.

long double thread is taken to make this tacking. Along the line which is to be marked, even basting stitches should be taken, leaving a generous loop of thread between each stitch. The pattern should be folded back when one is marking lines indicated by perforations in the pattern. The two edges of the material should be separated and the threads cut halfway between the edges. This leaves a marking line of stitches and ends along both edges of the material.

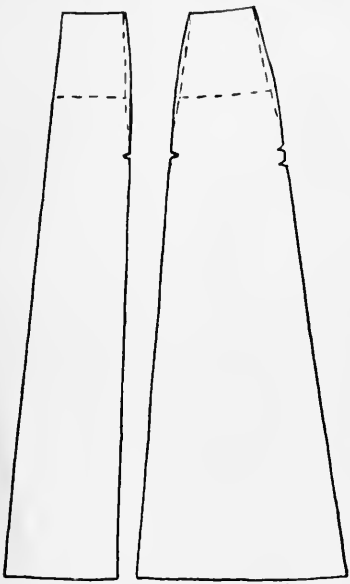

Fig. 75.—Method of decreasing the size of the hips of a gored skirt pattern without decreasing the size of the waist.

Tailor's tacks are made in much the same way as tailor's basting. At a point where a mark is desired, a stitch about ¼ inch long is taken leaving an end of thread. Over this stitch another stitch should be taken leaving a loop of thread. The thread is then cut from the material leaving another end. The two pieces of material are separated, and the joining threads cut, leaving a mark on each piece.

HOW TO CUT A GARMENT

In using a standard commercial pattern on which the seam allowance is made, the material should be cut close to the edge of the pattern. In using a modeled pattern, the material may be cut at the correct distance from the seam markings, a tapeline or cardboard measure being used to indicate the distance until the eye becomes trained. If tailor tacking has been used, the two pieces of the pattern should be pulled apart, and the threads cut, care being taken not to shake the parts of the garment and thus lose the marking threads. As soon as the various parts are cut, they are folded carefully to prevent stretching the very bias edges. When working on material that stretches badly, it is often a good plan to baste a piece of selvage or tape along the more bias edges, until that part is permanently sewed. This is true of the neck-line and arm-hole of the waist, and also of the center back and the waist-line of the skirt.

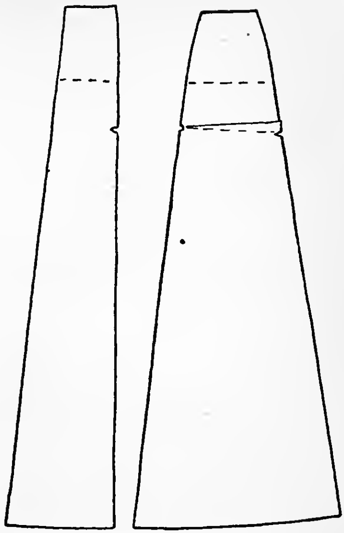

Fig. 76.—Method of adjusting a skirt pattern for a person who has a prominent abdomen or hips. For the former, the adjustment is made on the gores toward the front; for the latter, on the gores toward the back. A small tuck of not more than ¼ inch is taken at the back of the gore a few inches below the hip-line and allowed to run to nothing at the front of the gore. It is necessary to straighten the back edge of the gore after making this adjustment. As this is somewhat difficult, it is better if made on the figure.

HOW TO BASTE A SIMPLE GARMENT

Too much basting is almost worse than too little. It not only pulls the material and makes it unyielding, but it is very time-consuming. If pins are skillfully placed, much of the tiresome basting may be omitted.

Holding the material with seam-marking on seam-marking, the pins should be placed at right angles to the line to be made by the stitching. If pins are so placed, the basting thread will not tangle around them, and they are easily removed if the seam is to be stitched on the machine without being basted.

General rules for basting.

1. In basting garments of any size, keep the work on a table or a lap-board as much as possible. For very long seams, such as are in a skirt, the

basted edges will be much flatter if they are placed perfectly flat on a table and kept so while being basted.

2. When basting two edges together, the worker should always keep the more bias edge towards her.

3. When basting a gathered part to a straight edge, the worker should always hold the gathered part towards her. If an especially good line on the straight edge is desired, the work may be held with the straight piece toward one, as is often done when basting in a sleeve.

4. In basting bias edges, such as the edge of a gore, start the basting opposite the widest end of the gore, if possible. In this way, the hand will not ravel or push off the warp threads.

To baste a shirt-waist or other simple waist.

1. Baste and stitch all flat decorations, such as tucks, plaits, and set-in lace, before basting the seams.

2. Pin the seams before basting them, bringing together the corresponding points, such as the waist-lines and armholes of each. Whether the waist is basted with the seams on the right or wrong side depends on the kind of finished seam to be used. In the case of a tight-fitting waist, the seams are basted on the wrong side in order that the lines in the waist may be carefully observed when the garment is tried on.

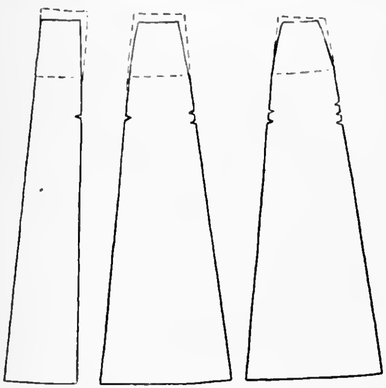

FIG. 77.—Another method of adjusting a gored skirt pattern for a figure with prominent abdomen.

3. In basting together parts of a simple waist, begin with the under-arm seam. Pin the parts together at the waist-line, keep the tracing or tailor tacking of the front and the back together, and pin the seam to the armhole and down to the bottom of the peplum. Baste the seam from the waist-line up to the armhole and from the waist-line down to the bottom of the peplum, using an even basting stitch.

If a yoke is to be used, read the directions under section 4. Baste the shoulder seams first and spread the garment out perfectly flat on the table. Pin the yoke into place, and baste it. Then baste the under-arm seam as already directed.

For a tight-fitting waist, pin the side-front seam from the waist-line up toward the point of the bust, and from the shoulder seam down toward the same point. This brings a slight fullness at the correct place over the fullest part of the bust. Divide this fullness through a space of about 2 inches. Adjust the shoulder seams last in this type of waist.

4. Pin the shoulder seams together, first matching the markings of the neck-line and then the armhole. Baste the seams, holding the back of the waist toward you. It is often necessary to stretch the front slightly to fit

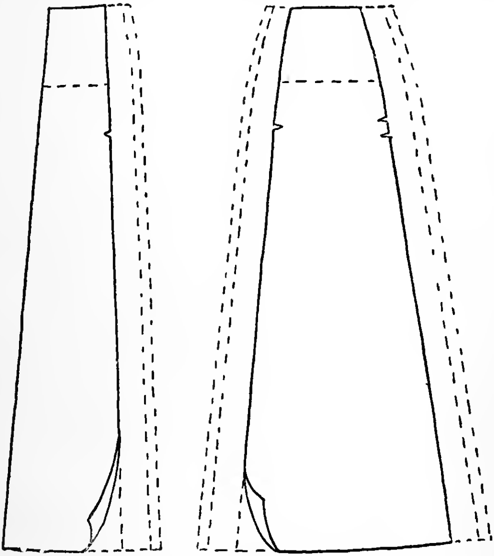

Fig. 78.—Method of adding material to a gored skirt pattern to form a tuck at the seam.

the back. This is desirable, since the waist will then naturally spring down to fit the curve of the shoulder.

To baste sleeves.

For a shirt-waist sleeve, make the placket and apply it before basting the sleeve. The placket is generally placed about 1 inch back of the center fold, made by folding the sleeve along the seam. After the placket has been placed and stitched, the seam of the sleeve is basted and stitched, and the cuff is sewed on. In adjusting the gathers at the bottom of the sleeve, leave the sleeve without gathers for a space of about 1 inch on each side of the seam. Gather the sleeve to fit the cuff.

For a simple cuff or a French cuff, place the two right sides of the cuff together, and stitch the cuff across the two ends and the bottom. Then miter the corners to remove the excess material. Turn the cuff right side out, crease it very sharply around the edge, and baste it perfectly flat. Across the top turn in ¼ inch toward the wrong side along both the right and the wrong side of the cuff, and baste down this allowance. Fold the cuff from end to end, and locate the center. One inch toward the end of the cuff which is to be sewed to the back of the sleeve, place the seam of

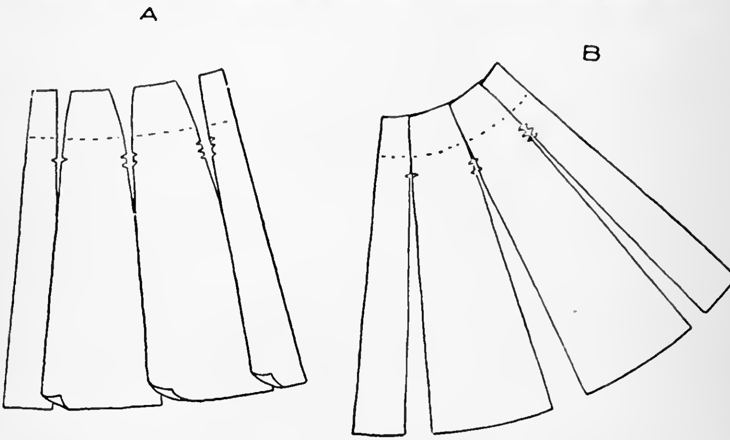

FIG. 79.—Designing narrow or full circular skirt pattern. *A*, Method of placing a six-gore pattern for a slightly circular skirt with gathers at the waist-line. In cutting a skirt of this kind, a seam may be placed in the center front, center back, or over the hips, as desired. *B*, Method of placing a six-gore pattern to make a circular skirt full at the bottom and fitting smoothly at the waist-line and hips. The gores may be spread apart and uneven amounts of fullness thus thrown in.

the sleeve. Insert the gathered sleeve between the upper edges of the cuff, pinning the indicated points together. Pin the gathers toward the front and the back of the cuff, adjusting them as suggested, and allowing the placket of the sleeve to remain perfectly smooth. Baste the right side of the cuff to the sleeve. Turn the sleeve to the wrong side, and baste the inner side of the cuff in place 1/16 inch above the outside basting in order that the inside will be caught by the stitching from the right side. Stitch entirely around the cuff 1/16 inch from the edge. Stitch again across the top ¼ inch below the first row of stitching.

For a close-fitting sleeve finished with a facing, baste the sleeve and try it on before stitching and finishing the bottom.

For a shirt sleeve, one similar to the sleeve of a man's shirt without gathers at the top, baste the sleeve into the waist before either the seam of the sleeve or the under-arm seam of the waist is joined. In this case the placket may be applied before the sleeve is set in, but the cuff cannot be placed.

To baste in a shirt-waist or a coat sleeve.

The following scheme of locating the sleeve proves satisfactory for almost any type of sleeve. This is of course only a general rule, since all sleeves must finally be adjusted to the person if they are to be truly artistic.

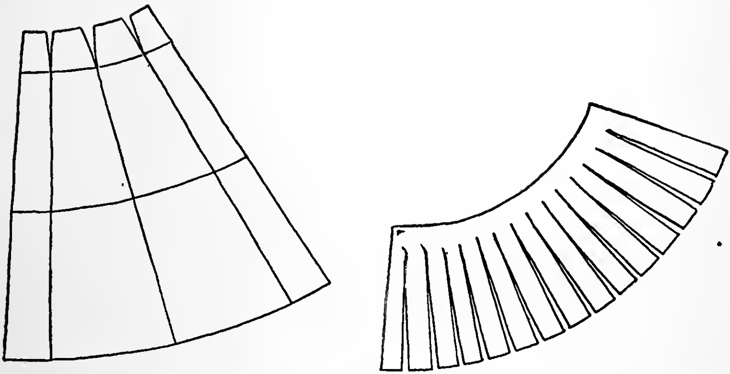

Fig. 80.—Method of cutting a pattern for a circular flounce. Fit together the gores of a six-gore skirt on top of a paper; trace around the lower edge of the skirt, the center front, the center back, and across the skirt where the flounce is to be attached; remove the pattern and cut along the tracing; from the bottom slash the flounce to within ½ inch of the top of the flounce, and spread it apart as desired. This flounce is very circular unless it is divided into sections, and if this is done, they should be so placed that a straight edge falls on a bias edge as in a skirt.

1. Measure 1 inch back of the shoulder seam at the armhole. Using this as the dividing point, fold the armhole in half. The point opposite this first point is the point at which to place the seam of the sleeve.
2. Pin the seam of the sleeve in place.
3. Bring the shoulder seam of the waist down to the under-arm seam of the waist, and fold the armhole flat. The two points thus located on the sides of the armhole are the points between which the gathers of the sleeve should be adjusted.
4. Pin the sleeve in place, working from the seam towards each of the points located. Then pin the remainder of the sleeve, holding the fullness easily between these two points. If there is too much fullness to pin in

place, gather it with one thread on the tracing, and a second thread slightly below, or toward the cuff of the sleeve.

5. Adjust the gathers to fit the armhole, making the center of the sleeve fall in a perfectly straight line from the highest point of the shoulder. If the gathers are allowed to fall forward rather than backward, a slight cup is formed in the front of the sleeve to fit over the point of the shoulder.

6. Pin and baste the entire sleeve in place.

To baste a collar or other decorations.

Baste all parts of the waist as far as possible, in order that they may be ready to try on after this first basting, and thus avoid repeated fittings.

To baste a skirt.

Pin the hip-lines, waist-lines, and hem-lines of the gores together. Place as many pins as necessary between these points. If it is necessary to baste the skirt before trying it on, observe the general rules (page 353). If the skirt is simple, it may be turned at this time on the line of the hem, and the hem may be basted into place. This will give a better feeling when the skirt is first tried on. At the placket extend the basting of the seam on each side, in order that a good line for the fitting may be observed. The placket is generally about 12 inches deep.

If a tuck opening is desired or a seam stitched on the outside, the gore edge or center front of the skirt is generally turned toward the wrong side on the line of marking, basted if necessary, and then pressed. The gore to which this edge is to be sewed is then placed perfectly flat on the table and the pressed edge of the first gore placed just to the line of marking on the second gore. The waist-line, the hip-lines, and the hem-lines of the gores must be made to coincide. Pin the gores carefully in place, and baste them.

In basting darts in a skirt, begin at the point of the dart and work toward the waist. Care must be taken to keep both sides of the dart smooth. When observed on the right side, the dart should form a line at right angles to the waist-line or a line with a slightly outward curve like the curve of the body. Darts should not be cut open until after the fitting.

KINDS OF SEAMS FOR GARMENTS

Many kinds of seams are possible in the various types of garments, some practical and some decorative as well. In this short discussion of the processes in dressmaking it will be impossible to explain how each kind of seam is made. In order to recall the different types of seams the following outline is made. The kind of seam to be used in making a garment should be decided before the garment is basted together, in order to avoid unnecessary basting.

For underwear and plain dresses: Plain seam; French seam; stitched fell; hemmed fell; overhand fell.

For lingerie dresses and waists: French seam; hemmed fell; seam made with entre-deux; standing fell; rolled seam.

For tailored wool or silk garments: French seam; stitched fell; welt seam; double-stitched welt; cord seam; plain seam; slot seam; strapped seam; lapped seam.

For silk and fine wool dresses: Plain seam; plain seam bound; plain seam made, edges turned to wrong side and sewed together with running stitch; piquot edge.

HOW TO MAKE A FOUNDATION BELT

For a dress or a skirt with a raised waist-line, a ribbed belting or a cambric belting stiffened with stays of featherbone should

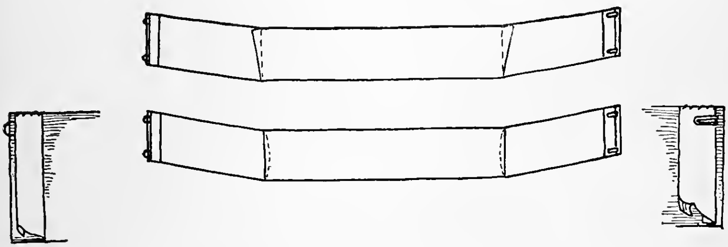

Fig. 81.—Method of making a foundation belt for a skirt or a dress. Two end finishes are shown.

be used. This belting should be as wide as the distance above the waist-line at which the line of the skirt is desired to appear. If the belt is wide, it may be fitted with darts (Fig. 81). The darts may extend from one edge of the belting to the other, the greater depth, about $\frac{1}{4}$ inch, being in the center of the belting, if one wishes the belt to extend slightly below the waist-line. Or the dart may be taken deep at the top and allowed to taper to nothing at the bottom, if the entire belt is to drop below the waist-line. These darts should be on the side of the belt placed next to the body. The ends of the belting are then turned in and a sufficient number of hooks and eyes sewed on to hold the belt in good position. The hooks should be sewed to the right-hand end of the belt and on the wrong side, the bill of the hook being set $^1/_{16}$ inch back from the end of the belting. The eyes should extend beyond the edge of the belting at the left-hand end the same distance that the hooks are slipped back. The two ends of the belt will exactly meet when it is hooked. The unfinished ends of the belting and the stitching holding the hooks and eyes in place is covered with a piece of taffeta seam-binding (Fig. 81); or if there is any excess material on each end it may be folded back ¼ inch on the outside; then the folded edge should be brought up under the bill of the hook on one end and over the loop of the eyes on the other end and hemmed into place. This last method of finishing the belt is very substantial but makes a much thicker finish. The center front, the center back, and the sides of the belt should then be marked with colored thread in order to facilitate adjusting the garment on the figure.

FITTING GARMENTS (PLATES XII AND XIII)

Two fittings for a simple garment, such as a house-dress, a plain shirt-waist, or a skirt, should be sufficient, if the garment has been properly prepared and the fitting is carefully done. Generally it is not necessary to fit more than the right side of a simple garment unless there is a great difference between the right and left sides of the figure. Too much fitting destroys the crisp freshness of new material.

To be properly prepared for the first fitting, a dress should have the seams basted, the sleeves basted into place, and the following markings or bastings, placed:

On the skirt: (1) Placket; (2) hem-line of the skirt, if possible; (3) center front; (4) center back; (5) hip-line, 6 inches below the waist-line; (6) waist-line, either raised or normal.

On the belt: (1) Center front; (2) center back.

On the waist: (1) Center front; (2) center back; (3) neck-line; (4) arm-hole line, if the sleeve is not basted in; (5) waist-line; (6) two gathering threads at the waist-line, one ¼ inch below the other.

On the sleeve: (1) Finished length; (2) two gathering threads in the bottom of the sleeve, one on the tracing and one ¼ inch below the tracing;

and gathering threads should also appear in the top of the sleeve between the indicated places; (3) line of finishing at the arm-hole of the waist; (4) the point of the elbow in a tight-fitting sleeve.

With these marks it should be very easy to adjust the waist and the skirt to the figure.

Directions for fitting a shirt-waist or a house-dress.

Place the fitted or made belt on the figure, being sure that the center back is at the center back of the figure.

Settle the waist well to the figure, and pin it at the center front exactly on the indicating lines.

Turn the shoulder and under-arm seams toward the front.

Make a general survey of the waist before proceeding further.

If the shoulders of the figure are very square or very sloping, alterations will probably be necessary (Fig. 70). If the shoulders are very square, the waist is likely to be lifted too much at the point of the shoulder, causing wrinkles across the waist. To correct this defect, take the shoulder seam deeper near the neck (Fig. 70), and cut away the surplus material. This may make the neck too small. If so, cut the neck-line larger by slashing it slightly until the correct size is obtained.

If the shoulders are very sloping, the waist drops at the end of the shoulder causing wrinkles from the neck to the armhole. To correct this defect, take up the shoulder seam at the point of the shoulder (Fig. 70). Then enlarge the armhole by cutting away the material under the arm. Taper it both in the front and back to the normal armhole. The shoulder seam should be about 1 inch back of the highest point of the shoulder. If this seam is too far back, it will narrow the back of the waist; if too far forward, it will give the shoulders a rounded appearance. A yoke-line should drop well forward from the normal shoulder-line. This adjustment depends entirely on the figure fitted.

In general, the collar-line should run in a good curve from the bone at the base of the neck in the back to above the two small bones at the front of the neck. Keep the neck-line close to the neck and rather high at the side just under the ear, unless the neck is very short, in which case, the side of the neck-line may be lowered slightly to give more length.

If the neck-line is too large, take up the shoulder seam. The fullness must never be taken out in the center front by lapping. This would cause the grain of the material to slope downward toward the center front. In a tight-fitting lining a dart is sometimes taken in the center front, to make the neck-line smaller and to take out extra fullness over the chest. Taking up the shoulder seams may necessitate lowering the armhole.

The under-arm seam should appear to be a continuation of the shoulder seam and should fall from the center under-arm straight down to the waist-line. If it is desired to narrow the appearance of the back width at the waist-line, the under-arm seam may be slanted slightly toward the back.

Adjust the fullness around the waist-line next. Pin the waist to a stiffened belt if it is to be a part of a dress, or to a non-elastic tape, if it is to be a separate garment. In either case the adjusting is about the same. Pin the center back of the waist to the center back of the belting at either the normal waist-line or the raised waist-line, depending on whether a skirt is to be made or not. Locate the under-arm seams, and pin them to the belting. Pin the center front of the waist to the center front of the belt. Draw the gathering threads tight, and adjust the fullness. To most figures a slight blousing is becoming. As far as possible, keep the lines made by the gathering at right angles to the waist-line. This gives the figure a straight appearance.

If the waist is too tight over the bust, it may be made slightly larger by letting out the under-arm seam; or in case the waist is being fitted in practice material, fullness at the bust may be allowed as shown in Figs. 65 and 66.

The armhole line is one of the most important lines in the waist. From the point of the shoulder, the line should drop almost straight to the front muscle of the arm. The line then curves to fit the underarm as closely as is comfortable and forms a nearly straight line along the armhole at the back.

The greater amount of fullness in the sleeve should fall over the shoulder bone which in most cases is from $\frac{3}{4}$ to $1\frac{1}{2}$ inches in front of the shoulder seam. The straight lengthwise grain of the material should fall straight down from the highest point of the shoulder. If the sleeve is too large or too small, it should be changed at the seam. Observe the length of the sleeve, and try on the cuff. If the sleeve puffs slightly at the back even when the elbow is bent, take the seam in the sleeve deeper, but not the seam of the waist.

If a collar-band is to be used, it should be tried on at this time.

A shirt-waist should fit loosely but smoothly. Overfitting takes away from the informal grace and style of the waist. After a plain shirt-waist has been satisfactorily adjusted, an excellent plan is to rip it apart and either cut a new pattern or correct the old one from it. If this is done, much difficult fitting may be avoided at another time.

After the waist has been fitted and before the sleeve has been removed, mark both the sleeve and the waist so that they will go together again without difficulty. Mark on the belt the points at which the under-arm seams fall, and also the line of the waist.

Re-baste the sleeve, finish the waist as nearly as possible at the bottom, and again baste it into the waist. Baste the collar-band into place, or if a fancy collar is to be used, baste it together, and try it on at the next fitting. Pin the waist again to the foundation belt.

Place the waist on the figure, and make any final adjustments.

Try the skirt on at this time. Place it on the figure right side out, and adjust it to the figure. Pin the center front of the skirt to the center front of the belting, and the center back of the skirt to the center back of the belting. The lines of all darts and gores may be more easily observed if the skirt is right side out, although the fitting is made more difficult. Pin up the skirt exactly on the indicated lines of the placket. Only the right side of the skirt need be fitted, but the whole skirt should be pinned to the foundation belt.

After adjusting the skirt to the foundation belt, take a general survey of the skirt, noting the lines of the gores. The skirt should fit smoothly from the waist-line to the hip-line, and below the hip it should fall in straight lines. All dart and seam lines should be at right angles to the line of the waist. The skirt should not stand out from the figure in one place more than in another. If this should be the case, turn to the illustrations of pattern adjusting (Figs. 74–77), and alter the skirt as there suggested.

The hip-line and the line at the bottom of the skirt should be parallel to each other and to the floor. In the case of a figure with prominent hips, the skirt may stand out at the sides. This may often be remedied by dropping the skirt slightly from the waist-line over the hip.

Simple fitting may be done by increasing or decreasing the depth of the seams; however, care must be taken to keep all lines of folds, placket, seams, or darts at right angles to the waist-line.

After the skirt has been fitted satisfactorily, always straighten both the hip-line and the finishing line at the bottom of the skirt.

Observe the waist-line very carefully to see that the waist blouses sufficiently for the arms to be raised easily, and also that the line made by the joining of the waist and the skirt is becoming. The waist-line should either be parallel to the floor or dip slightly in front.

Remove the garment from the figure, and mark all alterations and lines necessary for the second adjustment of the garment. Finish the waist except perhaps the final adjustment of some decoration, and fasten it to the foundation belt. Rebaste the skirt and finish the placket, and again baste it to the foundation belt.

Try on the garment for the final fitting. Adjust any decoration, such as collar, belt, or pockets. Note all lines, and turn the garment at the bottom. Finish the garment, without further fitting.

HOW TO MAKE A SKIRT EVEN AT THE BOTTOM

The following ways of making a skirt even at the bottom are suggested:

1. Put the skirt on, and place a yardstick perpendicular to the floor and close to the body. Mark the skirt at the top of the yardstick. Turn around, keeping the yardstick at the same distance from the body, and mark points around the skirt at the top of the yardstick. This gives a

line parallel to the floor. Spread the skirt out on a table, and measure down at right angles to this line the correct number of inches to make the skirt the desired length.

2. Chalk the end of a yardstick or ruler. Open the lower drawer of a dresser far enough to hold the stick, and keep the stick as nearly parallel to the floor as possible. Walk up to the end of the stick, and turn slowly letting the chalked end of the stick mark the skirt. Spread the skirt on a table, and measure down from this chalked line the correct number of niches to make the skirt the desired length.

HOW TO KEEP BIAS SEAMS FROM SAGGING

After a skirt has been basted and stitched, it is well to allow it to hang for a number of days in order to sag as much as it will. It may then be hemmed, and it will stay even for some time. If seams are stayed with a very firm piece of material, such as tape or selvage, they may creep up, or the bias material at each side of the seam may sag down. Better than to use a straight edge, is to use a binding on a different bias from that of the seam. This will keep the seam from sagging, but it will be sufficiently elastic to make a graceful seam.

SUGGESTIVE FINISHES TO BE USED BY THE HOME WORKER

Cuffs and collars.

The material in the cuffs and the collar should be the same, and both the cuffs and the collar should have the same general shape. For example, if the corners are rounded on the collar the same type of corner should appear on the cuffs. The best shape for the opening of the collar and the best outline depend entirely on the figure and the shape of the face.

The cuffs and collar may be made of a texture contrasting with that of the dress but of a color harmonizing with it. A garment is always more interesting if some contrast is introduced. The possible combinations of textures and colors with a gown depend to a great extent on the personality of the wearer. For example, one person may look well in white linen collars and cuffs on a blue serge dress, while another person who may be less tailored in appearance or whose complexion may be less clear, finds it necessary to wear georgette collars and cuffs to prevent the transition from the dress to the collar to the complexion from being too pronounced. Therefore, the smallest part of decoration must be studied in relation to the person who is to wear the garment.

Some suggestive combinations of materials are as follows:

To be used with wool:

1. Georgette crêpe will keep the gown all in a suede-like texture if combined with a dull material such as serge. It is a most becoming texture, because the light of its surface is broken up, and it is thin enough to allow the color of a dark gown to be seen through it, thus producing a gradual transition from the gown to the complexion. This is true of any of the thin materials.

2. Chiffon is more appropriate than Georgette crêpe, for formal materials such as broadcloth; it is more formal but not so universally becoming.

3. Wash satin. The texture of wash satin causes it to reflect the light in large masses, and in itself it is very attractive. Since it is of a rather heavy texture, it makes a harsh contrast between the dress, the collar, and the complexion. It should be studied carefully with the gown and the person who is to wear it, before being chosen.

4. Organdie or swiss is a little more crisp than Georgette crêpe and not so universally becoming. It gives a very fresh appearance to almost any wool gown excepting those made of the more formal materials, such as broadcloth.

5. Voile or handkerchief linen.

6. Linen or piqué. Either linen or piqué is very becoming to some persons but makes so harsh a contrast with the complexion that it is not becoming to all.

7. Novelty materials such as cretonne and suede, should be studied carefully before being combined with the average dress.

8. Broadcloth and serge. Woolen materials such as broadcloth and serge make interesting collars but add to the warmth of the garment.

To be used with silks:

1. Georgette crêpe. 2. Chiffon. 3. Panne velvet. 4. Bolting cloth. 5. Organdie. 6. Net.

To be used with cottons and linens:

1. Linen. 2. Piqué. 3. Poplin. 4. Voile. 5. Plain gingham or chambray, with plaid material.

Suggestive edge finishes for cuffs and collars:

1. Machine hemstitching or piquot. 2. Bias binding. 3. Hem turned to right side and held in place by a simple embroidery stitch (Fig. 82). 4. Hand scalloping. 5. Scalloped hem. 6. Scalloped facing. 7. Rolled hem made with colored threads. 8. Very small crocheted edge. 9. Footing.

10. Bermuda fagoting. 11. Hemstitching. 12. Wide facing of contrasting material. 13. Decorative machine stitching.

Waist-line finishes.

The following waist-line finishes may be used for the top of the skirt when it is sewed over the waist on the foundation belt.

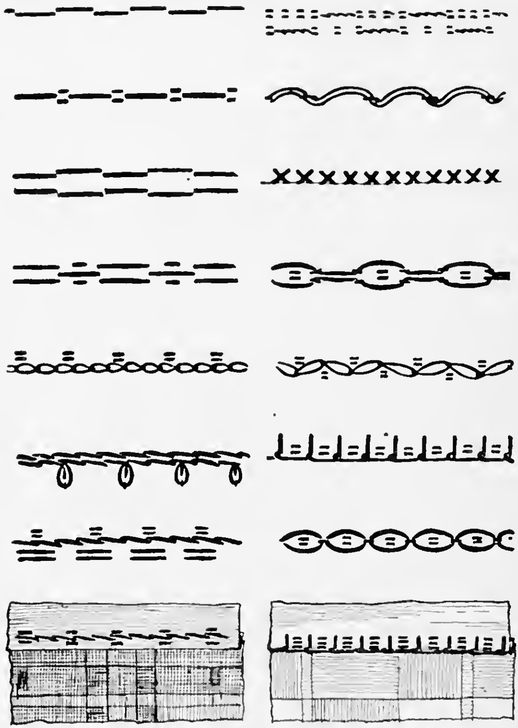

Fig. 82.—Combinations of simple embroidery stitches to be used in decorating collars, cuffs, aprons, and dresses.

1. The skirt may be turned ¼ inch to the wrong side and basted along the waist-line. It is then stitched 1/8 inch below the edge.

2. If an outside belt is to be used with the dress, the unfinished edge of the skirt may be placed on the waist-line and stitched into place. Taffeta seam-binding is then stitched over the unfinished edges.

3. The skirt may be finished with an inserted cord or piping of the same or a contrasting texture. In using piping or cord finishes, care must be taken not to create an unbecoming line or introduce too many definite lines. Color and texture must be considered.

Finishes for the bottom of the skirt.

The following finishes may be used for the bottom of skirts, overskirts, or flounces:

1. Hem. The skirt may be hemmed by hand or on the machine. In wool or silk it is generally preferable to have the hem slip-stitched into place.
2. Hem with one turning. The raw edge of the material may be catch-stitched into place and covered with Prussian binding. Any surplus fullness may be shrunken out, gathered, or placed in darts which must fall at right angles to the line of stitching. This kind of hem is often used in material which does not fray easily.
3. Fancy hem. The hem may be turned to the right side and finished with a cord or piping; it may be held in place by decorative machine stitching; or it may be scalloped.
4. Facing or false hem.
5. Bindings of various widths.
6. Machine hemstitching.
7. Piping or cording.

Simple designs in embroidery.

Simple designs is embroidery suitable for finishing cuffs and collars, holding hems in place, and decorating belts and pockets are shown in Fig. 82.

Set-in pocket.

The set-in pocket, suitable for shirt-waists, sport skirts, and middy blouses, is shown in Fig. 83.

Bound buttonholes.

Bound buttonholes also have their decorative value and are shown in Fig. 84.

Arrows.

If it is desired to use arrows, the making may be seen from Fig. 85.

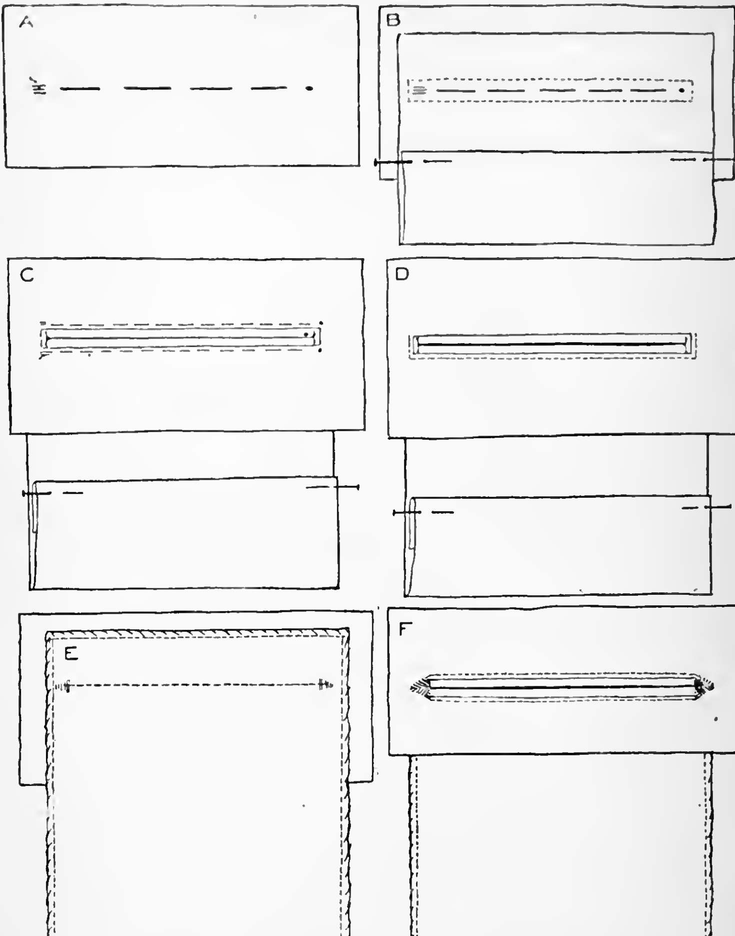

Fig. 83.—Set-in pocket. The binding piece must be made twice as long as the desired depth of the pocket, plus the amount of material to be used in the binding. This may be of a contrasting color or material, or a small piece of color, enough to bind the cut, may be placed between the garment and the pocket lining, stitched into place, and later fastened to the lining. *A*, Marking the garment for the pocket. *B*, Marking, basting, and stitch-

SUITABLE MATERIALS FOR VARIOUS TYPES OF DRESSES AND WAISTS

For house-dresses: Gingham, chambray, linen, poplin, crêpe.

For business or street dresses: Serge, poplin, gabardine, fine twilled material, dull satin.

For formal dresses: Broadcloth, velvet, crêpe de chine, satin, messaline, taffeta, charmeuse, chiffon, georgette crêpe, crêpe meteor.

For afternoon dresses: Batiste, swiss, voile, dimity, novelty material, linen, crêpe de chine, pussy willow taffeta, crêpe meteor, challis, nun's veiling, wool crêpe, henrietta.

For shirt-waists: Tub silk, heavy china silk, habutai, madras, flannel, linen.

For fancy waists: Handkerchief linen, voile, batiste, georgette crêpe, soft taffeta, chiffon.

SUGGESTIONS FOR ECONOMY IN DRESS

It will be found economical to select one color for a season and choose garments that will harmonize. A definite portion of the income should be set aside for clothing and this amount should not be exceeded.

It is economy to buy the very best possible material. Fewer clothes may be bought if necessary, but the material and texture should be good. Well-made garments that are bought are expensive; garments of equal quality can be made at home more cheaply, if a woman is skillful and if her time is not more valuable spent in some other way.

MAKING SIMPLE UNDERGARMENTS (JULIA GLEASON)

When making or buying undergarments, the points to consider are simplicity and durability of materials and design,

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ing the lining into place. The right side of the lining is placed to the right side of the garment, then basted and stitched. It is often better to taper the corners in stitching, if the material is at all heavy. *C*, Right side of garment. The lining is pulled through to the wrong side and adjusted as in the bound buttonhole. The upper and lower edges of the pocket should be basted to hold the material in place. *D*, The pocket is stitched on the machine close to the edge of the garment along the two ends and across the lower side. *E*, The lower end of the pocket is brought to the upper end on the wrong side of the garment and the two sides and ends stitched together and overcasted. *F*, The garment is turned to the right side, and the top of the pocket stitched across to correspond with the other stitching. Arrows may be used at the ends of the pockets to cover any fulling of the cloth.

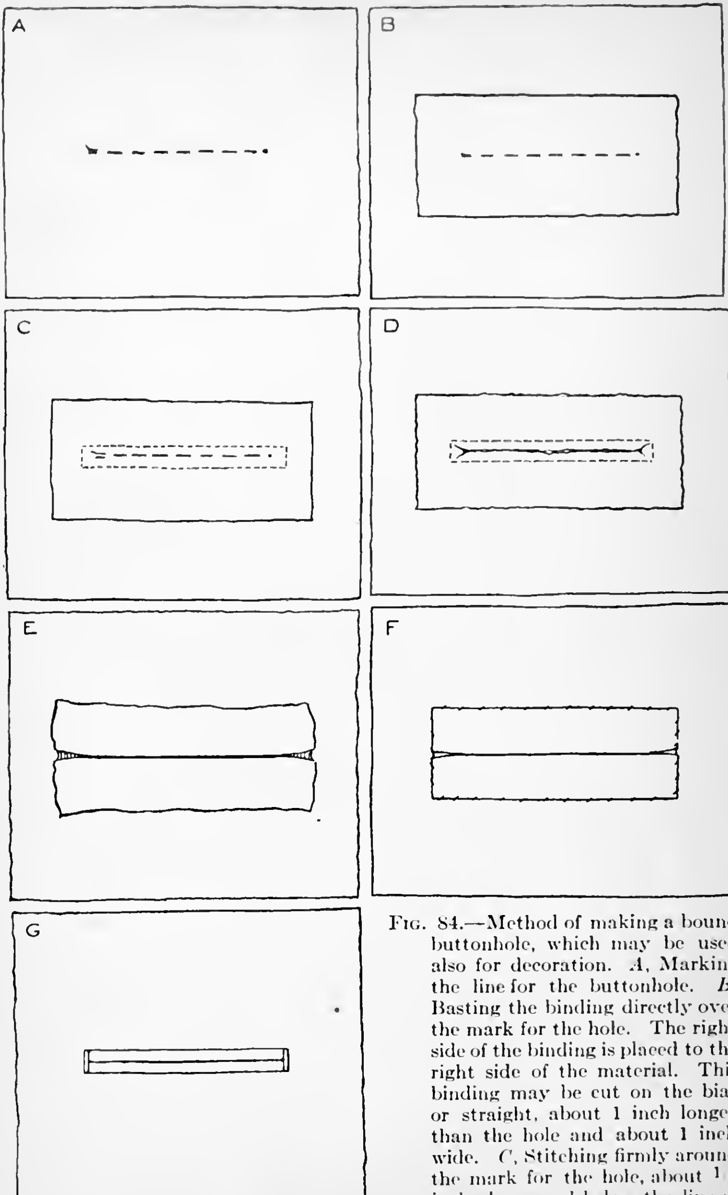

FIG. 84.—Method of making a bound buttonhole, which may be used also for decoration. *A*, Marking the line for the buttonhole. *B*, Basting the binding directly over the mark for the hole. The right side of the binding is placed to the right side of the material. This binding may be cut on the bias or straight, about 1 inch longer than the hole and about 1 inch wide. *C*, Stitching firmly around the mark for the hole, about 1/8 inch above and below the line of

with special reference to their laundering qualities. Cheap trimming is not in good taste, nor does it wear well. Trimmings

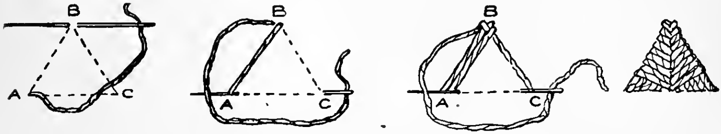

FIG. 85.—Method of making an arrow, a suitable finish for the ends of seams darts, plaits, bound buttonholes and set-in pockets.

of the same material as the undergarment save expense and produce attractive results.

Materials suitable for undergarments

Muslin: Heavy, firm cotton material of plain weave; very durable.

Longcloth: Firm, closely-woven cotton material with slightly fuzzy surface; finer than muslin, very durable, but difficult to work on by hand.

Cambric: Light-weight, plain cotton material of varying degrees of fineness; soft, smooth finish; wears and launders well.

Nainsook: Sheer, light-weight cotton material, loosely woven, of varying degrees of fineness; plain weave or crossbar; suitable for fine underwear.

Crêpe: Soft, crinkled cotton material; ironing unnecessary.

Rippleette: Soft cotton material with plain and crinkled stripes; ironing unnecessary.

Gingham: Colored cotton material, striped, checked, or plain; suitable for underskirts to wear with dark dresses.

Sateen: Soft, smooth-finished cotton material, white or colored, with twill weave; looks somewhat like satin.

Silk: Skinner's satin (silk or cotton back), lining satins, taffeta, crêpe-de-chine, and the like; used chiefly for underskirts to be worn with wool and silk dresses.

Flannel: Cotton or wool; used for warm underskirts and nightgowns.

Linen: Handkerchief linen or linen lawn; sheer, cool material; makes dainty garments but creases and wrinkles easily.

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marking. *D*, The buttonhole is cut along the line of marking through the facing and the garment. At the ends the material is cut diagonally towards each corner, as close to the stitching as possible. *E*, Wrong side of garment. Pull the binding through, the ends first, letting them form an inverted plait just opposite the cut, leaving only a roll at the ends on the right side. Adjust the sides of the binding so that the two edges just fill the buttonhole. *F*, Turn in the binding and hem or slipstitch it into place, taking great care not to catch through to the right side. *G*, Finished buttonhole. Careful pressing is necessary after each step.

Trimings suitable for undergarments

Trimmings should correspond in fineness with the material on which they are placed; they should be simple in design and sparingly used. A very little good lace is far better than a great deal of cheap lace.

Laces (edges, insertions, beadings).—The following laces are satisfactory for undergarments:

1. Valenciennes, or "Val," a fine cotton lace made by hand and imitated by machine. It may be made with a round mesh, German Val; a diamond mesh, French Val; or a square mesh, Fillet Val. Valenciennes laces are suitable for nainsook or fine linen undergarments, but they do not wear very well when used with heavier materials. In general, round and diamond mesh laces wear better than do square mesh laces.
2. Cluny, a linen lace made by hand and imitated by machine, varying in fineness of thread and design. Cluny laces are suitable for nainsook, linen, and cambric undergarments; the heavier qualities may be used on heavier materials. They are very durable.
3. Torchon, a linen lace made by hand and machine, suitable for all kinds of undergarments and very durable.
4. Crochet, a handmade lace of cotton or linen thread of varying degrees of fineness. Certain typical patterns made in Ireland are called Irish crochet. Crocheted laces are suitable for fine undergarments when made of fine thread and in dainty design. Clumsy, coarse yokes and edges of poor design are unattractive, particularly when seen through sheer outer garments; they are too rough to be comfortable when used on a nightgown.
5. Fillet, a square-mesh, linen, handmade lace, imitated by machine. It is suitable for fine undergarments.
6. Footing, a net trimming with finished edges like insertion. It is suitable for easings on fine underwear.

Tatting is a hand trimming made with a shuttle from thread of varying degrees of fineness. It is an attractive trimming for simple undergarments.

Embroideries (edges, insertions, beadings).—Embroideries of various kinds are suitable.for any type of undergarment. Entredeux is a seam beading.

Bias bands, bindings, and facings.—Plain, inexpensive, durable trimming may be made of bias bands, bindings and facings.

Braid.—Featherstitched finishing braid or scalloped braid makes a simple, effective trimming for plain undergarments.

Hand embroidery.—French embroidery, or satin stitch, and decorative stitches, such as featherstitching, chainstitching, and the like, may be used on fine linen or nainsook undergarments when time is not an object.

Machine hemstitching.—Machine hemstitching is effective for sewing in yokes, holding gathers in place, and the like. It is done at most sewing machine agencies for a small price a yard.

Construction of undergarments

Before making undergarments, a good commercial pattern of the correct size should be bought, and the amount of material that the pattern directs purchased. The directions should be read carefully, and the garment cut accordingly. The garment must be basted and fitted carefully, because patterns are not exactly correct for every type of figure.

Seams suitable for undergarments.

The following kinds of seams are suitable for undergarments:

1. Plain seam (Figs. 86, 87), the joining of two edges with one row of stitching. The edges may be finished by overcasting them together or separate, by binding them together or separate, or by turning them under and stitching them.
2. French seam (Fig. 88), a seam within a seam. A narrow seam is sewed on the right side of the garment, then turned to the wrong side, and a second stitching made just far enough from the edge to conceal the raw edges of the first seam.
3. Fell or felled seam, a flat, smooth seam. There are various kinds of fells:

A hemmed fell (Fig. 89) may be used in handmade garments. A plain seam is made on the wrong side. One edge is trimmed narrower than the other, and the wider edge is creased over the narrower. The seam is then laid flat and the folded edge hemmed down to the material.

A stitched fell is a tailored seam. A plain seam is sewed on the right side. One edge is trimmed narrower than the other. The seam is laid flat and basted and stitched down to the material.

A flannel fell (Fig. 91) is used in flannel garments. A plain seam is sewed on the wrong side. One edge is trimmed narrower than the other. The seam is laid flat and the raw edge catch-stitched down to the material.

A standing fell is used to sew a gathered edge to a plain edge. The gathered edge is first sewed to the plain edge in a plain seam on the wrong

FIG. 86.—Plain seam with edges overcast.

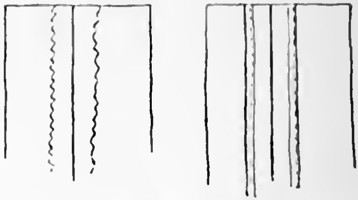

FIG. 87.—Plain seams. Left, pinked edges; right, bound edges.

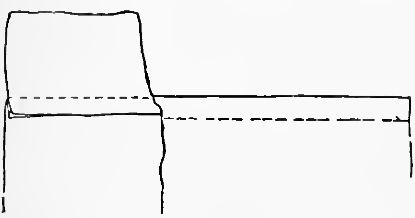

FIG. 88.—French seam.

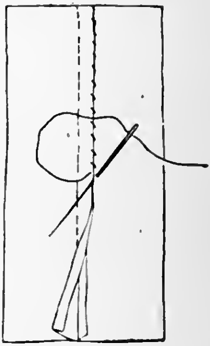

FIG. 89.—Hemmed fell.

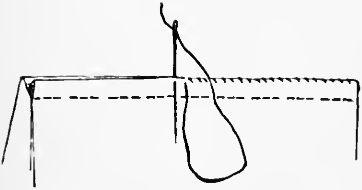

FIG. 90.—Overhanded or French fell.

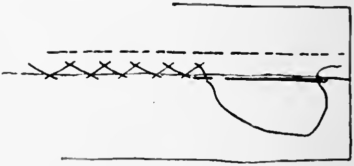

FIG. 91.—Flannel fell.

side of the material, the plain edge extending beyond the gathered edge and the line of stitching coming on the line of gathering. A narrow fold is made on the plain edge and folded a second time so that the first folded edge just covers the line of stitching. It is then basted and hemmed or stitched into place.

Uses of seams on undergarments.

Undergarments may be made with various kinds of seams: For a corset-cover or combination, the under-arm and shoulder seams may be hemmed fells, stitched fells, or French seams; for drawers and bloomers, the seams of the leg and crotch may be hemmed fells, stitched fells, or French seams; for a night-gown, the under-arm seam and the seam of the sleeve may be hemmed fells, stitched fells, or French seams, the armhole seam may be a plain seam bound, or seam beading may be used with a standing fell and French seam, or a stitched fell may be used in men's nightshirts; for a white cotton underskirt, a stitched fell or a French seam may be used; for a sateen or silk underskirt, a stitched fell, or a French seam may be used, or the edges of a plain seam may be overcast, bound, or opened, turned under, and stitched; for a flannel underskirt, a flannel fell may be used, or a plain seam may be opened and each edge catch-stitched down to the garment.

Top finishes for corset-cover, combination, or gown. (Plates XIV and XV).

The fullness at the top of corset-covers, combinations, or gowns may be arranged by:

1. Gathering. (a). The neck may be finished with embroidery ribbon beading, and lace edge, the gathers set into the beading with a standing fell (page 373), and the lace whipped to the beading by hand. (b) The edge may be gathered twice, and finished with featherstitched finishing braid and lace edge or tatting, or with bias facing or binding which may be featherstitched by hand. (c) The neck may be finished in either of the ways just suggested without being gathered. It may be drawn up with tape or ribbon. (d) The edge of the garment may be rolled and gathered and whipped to lace beading and edge. (e) Wide lace edge may be appliquéd to the garment on the line of the gathering, and finished with seam beading and a casing of either batiste or footing for ribbon.

2. Hand tucks. Hand tucks 1/16 inch wide and 2½ to 3 inches long may be used in several groups or in one large group. Featherstitching, chainstitching, and lazy daisies may be used in simple designs between the groups of tucks. The neck may be finished with: (a) a French hem, embroidery, beading, and lace edge, (b) embroidery edging used as a facing and edge, (c) lace beading and edge, and lace insertion appliquéd

in a simple design, (d) a bias fold or finishing braid, (e) a wide lace edge appliquéd to give a yoke effect, with a casing of footing or batiste, and entre-deux used between the casing and the lace.

3. Machine tucks. The same finishes may be used with machine tucks as with hand tucks, machine stitching taking the place of hand work wherever possible.

4. Smocking. Several rows of smocking may be used around the neck, or the smocking may be made in groups. The garment may be finished at the neck as for gathering.

5. Shirring. Several rows of gathering may be put in about ¼ inch apart and the lines of gathering featherstitched or chainstitched with crochet cotton. Machine hemstitching may be used to make the gathers secure. The garment may be finished at the top as for gathering.

6. Eyelets. Eyelets may be embroidered at intervals about ½ or ¾ inch below the neck line, and the fullness drawn up by a ribbon. The garment may be finished at the top with scalloping and French embroidery, or it may be rolled and have lace whipped to the edge.

7. Yokes. Fullness may be set into yokes with entre-deux, machine hemstitching, insertion, or beading. The neck of the yoke may be finished in any of the ways suggested, without fullness.

Finishes for nightgown with high neck and long sleeves.

A nightgown with a high neck and long sleeves may have the fullness set into a yoke, which may be decorated with tucks, featherstitching, and the like. The neck may be finished with a small collar having a featherstitched hem. The placket or front closing should be about 12 inches long. The sleeves may be gathered into a band at the wrist.

A shaped band may be used around the neck and down the front closing, and the sleeves may be gathered into a band. A small collar may be finished with a narrow ruffle of embroidery and cuffs made to correspond.

Finishes for lower edges of drawers (Fig. 92).

The lower edges of drawers may be finished with a narrow hem and lace edge; a narrow hem, insertion, and edge; a wider hem, with lace insertion set in above the hem; a featherstitched or fagoted hem, shaped or plain; a scalloped finishing braid; tucks and lace or a hem; a shaped facing; a casing for ribbon to be drawn up like bloomers; ruffles of embroidery edge or of

Plate XIV.—Finishes for nightgowns.

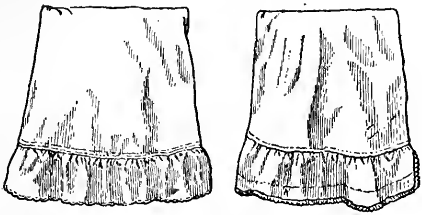

FIG. 92.—Methods of finishing the bottom of drawers. Left, simple embroidery ruffle set on with seam binding; right, ruffle with featherstitched hem and lace edge.

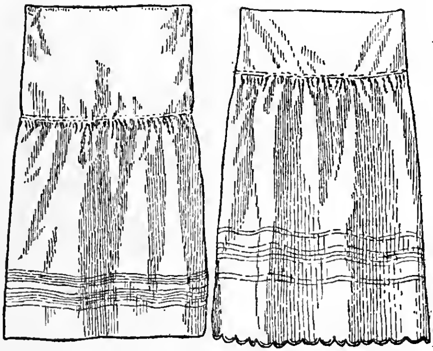

FIG. 93.—Methods of finishing the bottom of an underskirt. Left, tucked flounce; right, tucked flounce with embroidery edge.

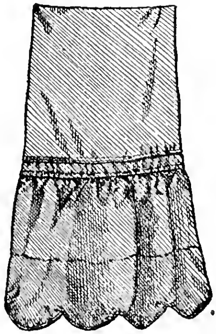

FIG. 94.—Sateen underskirt with cotton-backed satin flounce finished with scalloped facing.

the material finished in any of the ways just suggested, applied with seam beading or a tuck finish.

Finishes for bottom of underskirt (Figs. 93, 94).

For the bottom of a white cotton or gingham underskirt without a flounce or a dust ruffle, the following finishes may be used: a plain hem, a shaped hem or facing, tucks and a hem, scalloped finishing braid, a hem and rickrack trimming, a hem and heavy lace edge, hand scalloping.

For the bottom of a silk or sateen underskirt without a flounce or a dust ruffle, the following finishes may be used: a plain hem, a shaped hem or facing, tucks and a hem, hand scalloping.

For a flannel underskirt without a flounce or a dust ruffle, a featherstitched hem or hand scalloping may be used.

An underskirt with a flounce should have the flounce set on the skirt with beading or a tuck or a felled seam.

A white cotton underskirt with a straight gathered flounce may be finished with an insertion and hem, a scalloped hem with featherstitching, a shaped facing, insertion and edge, rows of lace edge sewed together, tucks and a hem, embroidery flouncing, tucks and embroidery edging, hand scalloping, a net flounce with bias bands of gingham.

A white cotton underskirt with a circular flounce may be finished with a plain circular flounce finished at the bottom with lace edge and insertion, or with sections or panels joined with insertion or entre-deux, scalloped or straight at the bottom.

A silk or sateen underskirt with a straight gathered flounce may be finished with a plain hem, tucks and a hem, a scalloped hem or facing, hand scalloping, or an accordion- or knife-plaited flounce with a hem.

A silk or sateen underskirt with a bias flounce may be finished with a bias strip which is finished with a hem, with one bias ruffle sewed to another, or with one bias ruffle trimmed with several small ruffles or puffings.

An underskirt may be finished with both a flounce and a dust ruffle. A dust ruffle 3 or 4 inches wide may be used on a white cotton skirt or a silk or sateen skirt; or if desired, the bottom of the skirt may be finished with a hem instead of a dust ruffle. The dust ruffle may be finished at the bottom with a narrow hem or with rickrack or finishing braid, and the bottom of the flounce finished to correspond with it.

Finishes for waist-line.

A corset-cover may be gathered into a straight band cut lengthwise of the material. A circular peplum may be set into the lower edge of the band.

For a combination, the corset-cover may be gathered into a straight band cut lengthwise of the material, and the drawers set into the lower edge of the band.

Drawers may be finished with a straight band cut lengthwise of the material, with a bias facing for a flat, smooth finish, or with a yoke.

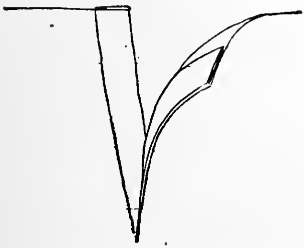

Fig. 95.—Bound placket.

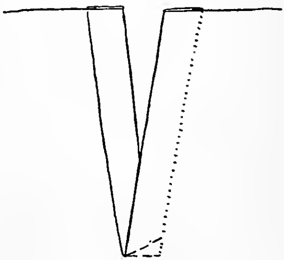

Fig. 96.—Bound and faced placket.

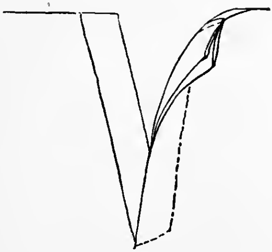

Fig. 97.—Continuous bound and faced placket with fly.

An underskirt may be finished with a straight band cut lengthwise of the material, with a bias facing for a flat, smooth finish, or with a yoke.

Plackets and closings for undergarments.

A corset-cover may have a plait $^3/_4$ to $^7/_8$ inch wide on the right side for buttonholes, and a hem $^5/_8$ to $^3/_4$ inch wide on the

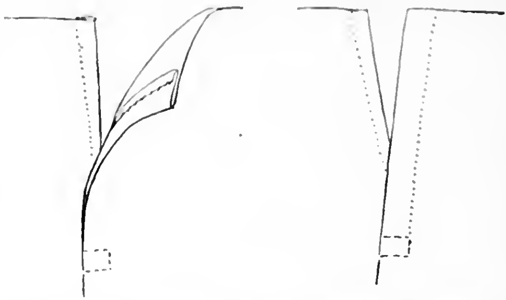

Fig. 98.—Two methods of making a hemmed placket.

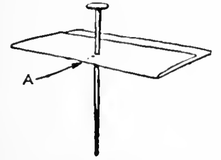

Fig. 99.—Methods of marking positions of buttonholes.

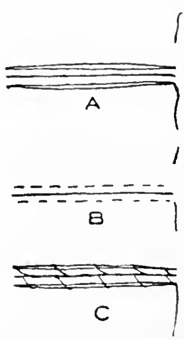

Fig. 100.—*A* and *B*, Methods of stranding buttonholes; *C*, overcasting a buttonhole.

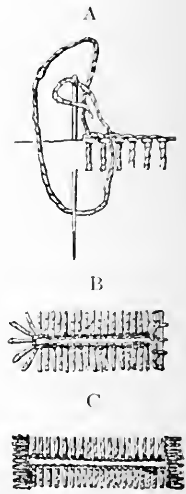

Fig. 101.—*A*, Buttonhole stitch; *B*, buttonhole with fan and bar; *C*, double-bar buttonhole.

left side for buttons; or it may have a plait and fly for buttonholes on the right side and a hem for buttons on the left side.

Open drawers may be finished with bias facings. Closed or circular drawers may be finished with a continuous bound placket (Fig. 95), a continuous bound and faced placket (Fig. 96), or a continuous bound and faced placket with a fly (Fig. 97).

An underskirt may be finished with a continuous bound placket, a continuous bound and faced placket, a continuous bound and faced placket with a fly or a hemmed placket (Fig. 98).

Fastenings for undergarments (Figs. 99–101).

Buttonholes and buttons are the best fastenings for most undergarments because they launder well, wear well, and may be an interesting part of the design of the closing of a garment.

Single-bar buttonholes are fan-shaped at one end and have a bar finish at the other. They are generally used where there is a strain; the button rests in the fan-shaped, or rounded, end of the buttonhole.

Double-bar buttonholes have the bar finish at both ends. They are generally placed vertically in the garment and are used where there is not much strain and where the button slips up and down in the buttonhole.

To sew on buttons, the stitches should be taken over a pin placed on the top of the button. The pin should then be removed and the thread wound several times around the stitches between the button and the garment to make a thread neck or shank which holds the button up from the material, making room for the buttonhole and giving the fastening greater strength.

CLOTHING FOR CHILDREN (BY JULIA GLEASON)

The children's garments described in this chapter are chosen because of simplicity and durability of design and material, and economy of time and money in making them.

In making or selecting garments for children of any age the following points should be considered:

1. Hygiene. The garment should be such that it can be easily cleansed, it should not restrict body development in any

way, and it should be light in weight in order not to tire the child. If it is an undergarment, it should be knitted or loosely woven to allow for evaporation of the body moisture and thus keep the skin dry and clean. If it is an outside garment, it should be such that it will keep out the cold air and hold in the body warmth.

2. Suitability of design and material. Garments for children should be easily made, easily laundered, attractive in line and color, durable, and suitable to the child's environment and activities.

3. Economy. The garment should be the most satisfactory one that can be obtained for the expenditure of the given amount of time, energy, and money.

Materials suitable for infants' clothing.

Materials that are suitable for infants' clothing are as follows:

For a nightgown: nainsook, cotton flannel, wool flannel, and wool and cotton flannel.

For a petticoat: nainsook, batiste, handkerchief linen, cotton flannel, wool flannel, and cotton and wool flannel.

For a slip: nainsook, batiste, handkerchief linen.

For a dress: nainsook, batiste, handkerchief linen, and fine dimity.

For a sack: flannel, challis, cashmere, henrietta cloth. A sack may also be knitted or crocheted.

For a coat: challis, cashmere, henrietta cloth, or corded silk; china silk for linings.

For a bonnet: batiste, handkerchief linen, and silk materials of various kinds.

For a kimono: flannel and challis.

Suggestions for making and decorating infants' clothing.

Infants' garments are most suitable and appropriate when made of fine materials by hand and with very little trimming. The very narrow laces—¼ to ½ inch wide—fine tatting, tiny embroidery beadings, featherstitching, fagoting, hemstitching, and simple French embroidery may be used for decoration.

A nightgown may be made kimono style or with set-in sleeves. The seams should be hemmed fells; and the hem should be made by hand. The neck and sleeves should be finished with bias facing for tape, and they may be featherstitched. A hemmed placket may be used.

Petticoats are generally made on an underwaist, the neck and armhole of which may be finished inconspicuously with a tiny hem or narrow lace edge. The seams on the white petticoat may be hemmed fells or French seams; on the flannel petticoat, flannel fells. The bottom of the white petticoat may be finished with lace insertion and edge, lace edge alone, a ruffle of fine embroidery of dainty design, or a featherstitched or hemstitched hem. The bottom of the flannel petticoat may be finished with a featherstitched hem, hand scalloping, or crocheting.

A simple slip (Fig. 102) is most serviceable for constant wear. It may be made kimono style or with set-in sleeves. The

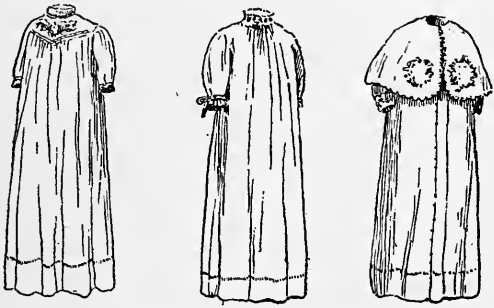

Fig. 102.—Suitable designs for an infant's dress, slip, and coat.

seams may be hemmed fells or French seams. The hem may be plain, hemstitched, or featherstitched, and the placket hemmed. Tiny embroidery beading and tatting or fine linen lace may be used for neck and sleeves. A few tiny tucks, shirring, or smocking may be used if fullness is desired.

A few dresses a little more elaborate (Fig. 102) than the slip may be made for occasional wear. The seams may be hemmed fells, or French seams, or they may be joined with seam beading. The hem may be hemstitched, featherstitched, or fagoted in a straight line; or it may be featherstitched, chainstitched, or fagoted in scalloped or Greek key design; a lace edge or lace insertion and edge may be used. The entire skirt may be made of fine embroidery of dainty design. The placket may be hemmed. The neck and sleeves may be finished with lace or embroidery beading, and lace edge or tatting. The sleeves may be set in with seam beading. A round, square, or shaped yoke may be set in with seam beading and decorated with featherstitching, fagoting, or French embroidery in simple design. A yoke effect may be secured by means of groups of hand tucks alternating with a simple embroidery stitch such as featherstitching, or by smocking or shirring.

The sack may be made kimono style, and the edges finished with hand scalloping, crochet, or ribbon binding.

The coat (Fig. 102) may be cut with a large cape collar and may be very plain or decorated with simple embroidery or featherstitching.

The bonnet may be cut with a flange to turn from the face, and decorated with tiny ruffles of lace, rows of featherstitching and hand tucks, or a lace edge whipped to a scalloped edge. The same decoration may be used on a bonnet without a flange.

A kimono may be made with hemmed fell or French seams, and finished around the neck and down the front with a shaped facing which may be secured with featherstitching or chainstitching in one of the dainty shades of blue or pink; or it may be bound with ribbon which may be secured with featherstitching or chainstitching.

Designs and materials for garments suitable for girls from three to five years of age.

The one-piece dress hanging free from a yoke or very short waist, or belted in with a loose belt in a long-waisted effect is a good style for the child from three to five years of age (Fig. 103). The following materials are suitable:

For rompers: kindergarten cloth, chambray, gingham, galatea, percale.
For dresses with bloomers to match: kindergarten cloth, chambray,

gingham, galatea, poplin, madras, percale, dimity, Swiss, batiste, voile, India linon, and the like.

Designs and materials for garments suitable for girls from six to ten years of age.

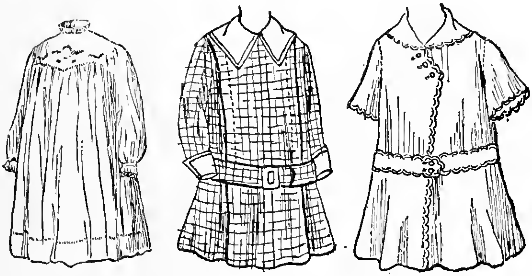

Fig. 103.—Suitable designs for dresses for children from three to five years.

The simple one-piece dress with a belt is a satisfactory style for children from six to ten years of age (Fig. 104). The wool dress may be worn with a washable guimpe in order to keep it

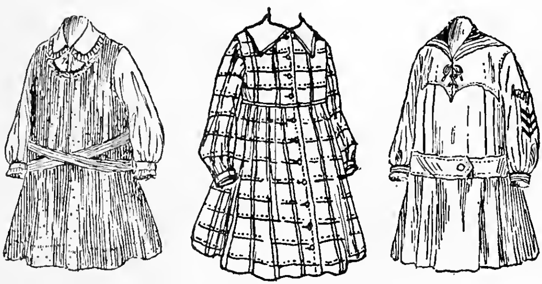

Fig. 104.—Suitable designs for dresses for children from six to ten years.

fresh and clean (Fig. 104). The following materials are suitable:

For dresses: kindergarten cloth, galatea, piqué, percale, chambray, gingham, poplin, madras, Indian head, dimity, voile, India linon, batiste, and the like. Wool challis, henrietta cloth, albatross, and cashmere are serviceable light-weight woolen materials suitable for winter wear when the laundry problem makes the wearing of wash dresses throughout the year impracticable.

For bloomers: If possible, the bloomers should be of the same material as the dress. Sateen may be used for bloomers with wool dresses.

Designs and materials for garments suitable for girls from ten to twelve years of age.

The washable middy blouse with the cloth skirt (Fig. 105)

Fig. 105.—Suitable designs for dresses for children from ten to twelve years.

and sateen bloomers is a satisfactory combination for the school frock; or the middy, skirt, and bloomers may be made of the same cotton material. The straight plaited skirt is a good design. The one-piece dress in gingham or galatea is also satisfactory (Fig. 105).

Knit underwaist and drawers or knit union suits have been found by many to be the most satisfactory undergarments for children from three to twelve years of age. The bloomers may be made on a waist or may fasten on the underwaist. The following materials are suitable:

For a middy blouse: middy twill, galatea, poplin, Indian head, khaki, linen, serge.

For a skirt: Any of the materials suggested for a middy blouse, or gabardine, rep, or wool suitings of various kinds.

For a dress: Gingham, chambray, percale, galatea, piqué, poplin, cotton gabardine, voile, batiste, and the like.

For bloomers: Any of the materials suggested for a dress or skirt, or sateen—black, white, or colored.

Fig. 106.—Suitable designs for dresses for children from twelve to sixteen years.

Designs and materials for garments suitable for girls from twelve to sixteen years of age.

A middy blouse and skirt or a middy dress may be made of any of the materials suggested for younger girls. The same material may also be used for a wash dress. Suggestive designs are shown in Fig. 106.

A school dress or a street dress of serge, wool poplin, gabardine, whipcord, tweed, or homespun is suitable and practical for a girl of this age.

PATCHING *

Patching is the art of repairing or restoring worn places in garments and household articles. In order to make the patch as inconspicuous and as strong as possible, several things should be observed. All of the worn or torn part should be cut away, making the hole either square or oblong. Sometimes round patches are made, but they are more difficult. If possible, a piece of the material which is as worn or as faded as the garment should be used, thus making it less conspicuous. To fade a piece of new cloth, it should be dampened and laid in the sun. When the material is figured, the pattern in the patch should match that in the garment. If there is a nap, it should run in the same direction on both patch and garment. Warp and woof threads should match also.

There are two kinds of patches, hemmed and overhand, and one must use judgment as to which to use in repairing articles.

Hemmed, or set-on, patch.

The hemmed patch is the stronger and is used on garments and articles which are often laundered or are subjected to hard wear. Hence it is used on household linens, undergarments, and aprons. The directions for making it follow:

(1) Cut a square or oblong patch large enough to cover completely (at least 1 inch beyond) the worn place in the garment. If a sampler is used for practice, make a tear such as might be torn in a garment. (2) After matching the figures, crease from diagonally opposite corners on both garment and patch to obtain the centers. (3) Turn in the edges of the patch to the right side slightly less than 1/4 inch. Crease or baste down. (4) Place the right side of the patch to the under side of the opening with the centers over one another, and the figures in the patch and the garment exactly matched. (5) Baste into position. (6) Hem with fine hemming stitches. (7) Cut away all the torn portion of the garment, making the shape of this opening conform to the shape of the patch, and allowing at least 5/8 inch between the edges of the patch and the opening. (8) Make cuts on the diagonal creases 1/4 inch deep. (9) Turn in the edges slightly

* Ext. Circ. 14, Coll. of Agr., Univ. of Ill.

less than ¼ inch, following a thread of the material. If the material is a plaid or a stripe, turn on the edge of a stripe, never through the middle of one. Also the patch will be less conspicuous if the turning is on a dark rather than on a light stripe. (10) Baste into position, using great care to have stripes or figures match exactly. (11) Hem with fine hemming stitches. (12) Remove the bastings, dampen and press.

Overhand, or set-in, patch.

The overhand patch is less conspicuous, so it is used more often for outer clothing. It is less serviceable, for it is joined to the opening with only one seam, and the corners are held by a single thread. It is made in the following way:

(1) Cut a square or oblong piece large enough to cover completely the worn place. (2) After matching the pattern, crease from diagonally opposite corners in both garment and patch to obtain the centers. (3) Turn in the edges of the patch ¼ inch, on the wrong side of the material, turning on the warp and woof threads. (4) Lay the wrong side of the patch to the right side of the garment with centers and figures matched. (5) Baste with short stitches very close to the turned edges. (6) Beginning a little distance from one corner, overhand the edge of the patch to the garment with close, shallow overhanding stitches. Be very careful at the corners not to take the stitches too deep, as this will cause the corners to be puckered, or to catch in the two middle thicknesses. (7) Continue overhanding around the four sides. (8) Remove the basting. (9) On the wrong side, cut diagonally from the center of the hole in the garment to the four extreme corners of the patch. (10) Crease the seams open on the overhanding. (11) Trim the edges until they are parallel to the edges of the patch and ¼ inch wide. (12) Cut off the corners of the patch diagonally, so that they do not overlap. (13) Overcast separately, with short overcasting stitches, the edges of the seams.

CLOTH DARNING *

Darning is the repairing of cloth by the weaving in of threads to replace torn or worn warp and woof threads. Knitted fabrics, also, are mended in this way. Darning is a less conspicuous method of repairing than patching, although on garments which are subjected to very hard wear or to much laundering, it is not so satisfactory. In woolen garments darning is usually preferable to patching, since it is less bulky and woolen clothes are not so often laundered.

* Ext. Circ. 14, Coll. of Agr., Univ. of Ill.

To make the darn as inconspicuous as possible, a raveling of the material is used, or if this is not strong enough, a silk thread is split into thirds, and one of these strands is used. When only one set of threads has been severed, whether it be warp or woof, this set alone needs to be supplied. If both warp and woof are broken, they must both be woven in. The stitch which is used is a short, loose running stitch, and, as far as possible, the darning is done on the wrong side. The edges of the tear must be neatly joined together by passing over and under them in the alternate rows of sewing. The distance which the stitches are carried outside the tear depends on the strength of the surrounding material. If it is very much worn, the darning must be made to cover the thin places. To form a guide for the darning stitches, a basting thread should be run just outside the area to be darned.

The three forms of tears which most often occur are straight, diagonal, and three-cornered, or hedge. Sometimes there is a hole which is too large for ordinary darning, and it can be repaired best by placing a patch underneath and darning the edges down over it. The method of repairing these tears follows:

Straight tear.—The tear may be across either warp or woof threads, so the missing ones should be woven in. Start the running stitches as far above the cut, and carry them as far beyond, as it is necessary, in order to reinforce the worn part. When the tear is reached, pass over and under the two edges in alternating rows, so that they are firmly held together. Be very careful not to draw the threads too tightly as this will cause a puckered appearance.

Bias or diagonal tear.—In a bias or diagonal tear both the warp and woof threads are severed, and so they must be supplied. The running stitches should follow the warp and woof threads of the cloth, not placed at right angles to the cut. The warp threads should be put in first as far beyond the tear as necessary, and the woof threads then woven in. The woof threads may be laid farther apart than the warp. As this tear is on the bias, care must be used not to stretch it.

Three-cornered or hedge tear.—In the three-cornered tear, also, both the warp and the woof threads are severed, but not often on the bias. The darning is first done following the warp threads from one end to the corner, then the woof threads are replaced in the same manner. At the corner, there will be a square darn where the supplied warp and woof threads should be interlaced.

Large hole or worn place.—Cut a piece of the cloth large enough to cover the hole or worn place, and to extend far enough beyond to reinforce it. If the material is figured or has a nap, it should be matched. Baste the right side of this patch to the wrong side of the garment with the warp and the woof threads matching. On the right side darn over the raw edges, without turning them under. If the ragged edges are not entirely trimmed away, the unevenness of the edges will make the darned place less conspicuous. Do not carry the running stitches across the patch if it is a large one. The edges of the patch on the wrong side may be sewed down with long hemming stitches.

STOCKING DARNING*

A hole in a stocking is repaired by a woven darn. In place of being woven in a loom as cloth is, stockinet is made on a knitting machine and consists of a series of interlocked loops of a continuous thread or yarn. In darning, the loose loops should be caught to prevent further raveling.

Method of stocking darning.

Guide line for the stitches.—As a guide line for the work, outline with basting the space to be darned. Make the darn diamond-shaped, large enough to reinforce all the weakened part surrounding the hole.

Materials to be used.—Use darning cotton to match the color and the size of the yarn in the stocking. For the average weight stocking, except thin lisle and silk, two strands of the ordinary four-ply darning cotton is used. Use a needle which is just large enough to carry the thread, and do not knot the thread. If the hole is too large to hold over the first two fingers of the left hand, a darning-ball may be placed inside of the stocking. Be very careful in using a darner, however, not to stretch the edges of the hole.

Lengthwise darning stitches.—Darning is done on the right side of the stocking. Start at the right side of the hole just inside the basting which serves as a guide line. Put in first the lengthwise stitches (those parallel to the ribs in the stocking), using short, running stitches. In turning from one row of stitches to the next, loops must be left in the darning cotton to allow for the possible stretching of the stocking and the shrinkage due to washing. When the hole is reached, take up on the needle the loose loop at the edge to strengthen the darn and carry the thread across the hole, taking up the loop opposite. Continue until the inclosed area is filled with these lengthwise stitches.

Crosswise darning stitches.—Start in the same manner from the top putting in crosswise stitches. Interweave these stitches with the length-

* Ext. Circ. 14, Coll. of Agr., Univ. of Ill.

wise ones, and when the hole is reached weave the woof threads over and under alternate warp threads. In the next row, pass under the threads which were passed over in the preceding row. Continue until the space is completely filled. The finished darn should be smooth so that it will be comfortable on the foot.

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CHAPTER XVI

MILLINERY

By Beulah Blackmore

Hats should be analyzed, and the peculiar defects of every unsatisfactory hat should be exactly noted. In this way a group of principles may be mastered, which should be followed regardless of the season's vagaries in shape and trimming.

HOW TO SELECT A HAT

No definite statement can be made as to what should or should not be worn. In selecting a hat, the arrangement of the hair, the shape of the face and its coloring, the relation of the hat to the head and of the head to the whole figure must be considered.

Proportion and balance.

Of first consideration in the study of hats is the relation both of the hat to the head and of the head, including the hat, to the entire figure. Since the figure may be seen from all sides, the hat should look well, not only from the direct front view, but from every possible point of view. In general, the crown and the brim should be in good proportion to each other, and the hat should be in proportion to the head and to the whole figure.

To make broad shoulders appear less broad, the crown of the hat should be fairly high, while the brim should be fairly wide in order to balance the hips. This is but a single example of the relation of the hat to the figure. A hat that is too large gives a top-heavy appearance and thus disturbs the proportions of the human figure. A sufficient sense of balance is inherent in the average person to guide her judgment in selecting a hat, if she studies in a long mirror its relation to her full-length figure.

Small hats, such as toques and turbans, should be carefully related to the head, and therefore, set securely and squarely on the head. Nothing has a more misfit appearance than a toque so large that is seems to be burdensome, or so small that it seems to be insecurely perched on the head. The toque generally should not be worn by a person with a large face or with high color, because it tends to emphasize both feature and color. It is designed for a person of delicate features and moder-

Fig. 107.—Correct size of a crown, shown by the heavy line.

ately pallid complexion. The hair should show slightly around the face.

A hat with a brim sets the face somewhat in the shadow and retires any unduly prominent features. If it is desired to lessen the prominence of a single feature, an interesting color or line of construction may be so arranged as to divide the attention called to the feature. As an example, for a face with a prominent nose, trimming that tends to lengthen the line from the nose to the back of the hat should be avoided. Instead, the interesting spot on the hat should be placed at the front or the side front in order to break the line and divide the center of interest.

The test for the correct size of the crown is that it shall be neither less than the width of the face, nor greater than the contour of the hair (Fig. 107). If the hair is puffed considerably at the sides, an elongated crown placed crosswise on the hat may be used.

The crown should not be set so low on the head that the eyebrows, which give the dark contrast to the face, are covered. The hat should be large enough and low enough, to give the appearance of being firmly placed on the head, not perched on the hair (Figs. 108, 109). The crown should be placed squarely on the head; if a tilted effect is desired, it may be accomplished by tilting the brim only (Fig. 110).

Fig. 108.—Incorrect size of crown. The crown should be sufficiently large to be set well down on the head; otherwise, the hat may appear to be insecurely placed as here shown.

In general, the front line of the crown should continue the line of the forehead (Figs. 107–109). At the back, the line should not extend beyond the hair. If the hair extends far beyond the head, the back line of the crown should fall between the contour of the hair and the head. In no case should the back line of the crown fall inside the line of the head. The tam o'shanter crown should bear at its base the same relation to the head as should any other crown.

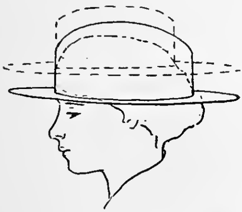

Fig. 109.—Correct placing of a hat, shown by the heavy line.

A turban should be placed well on the head, not allowed to hang off at the back (Fig. 111), and thus destroy the balance of the whole figure.

Brims are intended as a protection for the eyes, but they are usually extended at the sides and the back for balance. The brim of a hat should not under any circumstances extend beyond the shoulders. A brim may be tilted in any becoming way if the balance of the hat is not destroyed or if the balance is restored by the use of trimming. A brim should not be so drooping that the eyebrows are covered, or so upturned that a becoming shadow for the face is lost.

Hats of straw and other light-weight textures may be larger than those of velvet and other heavy materials. A hat that is light in color always has the effect of being larger than a dark one of the same size. If a dark hat is desired and dark colors are unbecoming, the hat may be faced with a light color.

FIG. 110.—The prominent lines of the hat should harmonize with the lines of the face. If it is desirable to have the brim tilted it may be bent as desired, but the crown should be kept squarely on the head.

Line and form.

Already exaggerated features or undesirable lines of the face should not be accented by a pronounced repetition of the direction of these lines in the hat. For example, if there are heavy downward lines about the mouth, the brim of the hat should not repeat these lines (Fig. 112). Again, if the eyes slant up toward the outer corner, a hat with an abrupt upward curve of the brim should not be worn. The effect may be neutralized by the use of opposing lines. The opposition, however, must not be carried too far, because entire lack of harmony in line will produce the same effect as does strong parallelism of line.

A person with a square face needs an irregular brim, because a straight brim only emphasizes by contrast the angles of the face. A round face or one of regular features requires the opposite treatment from the square face. A severe, straight brim or upstanding crown may be worn in this case. An oval face needs a curved, irregular line. Rather long curves are most suitable.

FIG. 111.—Correct placing of a turban shown by the heavy line.

In order to be practicable, these suggestions necessitate that the hair be arranged to suit the face. Moreover, when buying a hat, one should be sure that it does not require a special arrangement of the hair to suit it; the hat should suit the customary arrangement of the hair. A softening line of hair should always come between the harsh edge of the hat and the forehead. From time to time extreme forms of hair-dressing come into vogue. A beautiful face may or may not be affected by them, but the peculiar types must avoid extremes in shape, whether in area or contour. Neither the round nor the narrow

FIG. 112.—The outline or decoration of a hat should not repeat or parallel undesirable lines in the face. Similarity of line may accentuate either good or bad lines.

face should have the hair drawn back from the temples. The long oval head needs to have the hair done low in the back, while the person with a round face may wear the hair high.

At its best, the hair grows around the face in a graceful line; but when this line is not attractive, the hair may be arranged to supply the deficiency. There is a legitimate use for false hair, if it serves to beautify the proportions and the contour of the head or to create fine surfaces, such as soft waving effects. Any arrangement of the hair that does not tend to augment the attractiveness of the face, such as extreme changes of contour, or fussy, kinky effects, is poor design and is in bad taste. For short, broad faces, both round and square, the form as a whole should be built high, as against wide, in shape. The hair should not be pressed close to the temples. The hair should not be brought low but should be kept away from the forehead except at the corners where the short oblique lines suggest softness of contour against the face. The square-faced person needs rounding contours in the hair-dressing; the round face needs crisp reverse curves in contour to counteract the round suggestions elsewhere.

For long, thin faces, the hair should be arranged to make the head appear as broad as possible, care being taken not to create too great a contrast, however, between the width of the hair and of the face, lest the hair serve merely as a frame to emphasize, rather than correct, the narrowness. The hair should be brought low both horizontally and obliquely. The space left between the oblique side lines, however, should not be too narrow. This would only emphasize the length of the face by introducing a long vertical line. The hair should never be piled high over a long, thin face.

The face that is more or less triangular needs the same treatment as the square face. This type should avoid oblique lines that are produced by parting the hair in the middle, because this repeats in exaggerated form the lower shape of the face. The head should not be unduly broadened in such a way as to create an extreme triangular shape.

Color.

Color is discussed on pages 45 to 47. It may be said here, however, that in selecting a hat one should be sure that it is in harmony with the other outer garments with which it is to be worn. In general, if the costume is striking in color, a hat of neutral tone, especially white or black, furnishes a desirable contrast; while if the costume is somber, a bright touch of color in the hat is most interesting. A hat is seldom satisfactory when it is of the same color, value, and texture as the costume. A contrast in value, if not in color, is always to be desired.

Trimming.

The foregoing discussion of the principles of design applies also to the trimming of hats. The following suggestions apply to that considered in relation to the entire costume and the wearer, not as an isolated article of clothing.

The function of trimming, in addition to its decorative value, is to effect slight changes that may add to the becomingness of hats. Trimming should aid in emphasizing the good points of the face and hair of the wearer and should mitigate any unfortunate elements. By the addition of a bow, a feather, or other ornament, the lines of a hat may be changed and adapted to the wearer.

Trimming should be so placed that it gives the impression of being rightly distributed. Color must be reckoned with when balance is being considered: a small bit of intense color may balance a larger mass of a more subdued color. The prevailing fashion may present difficulties, but no fashion should undermine good judgment.

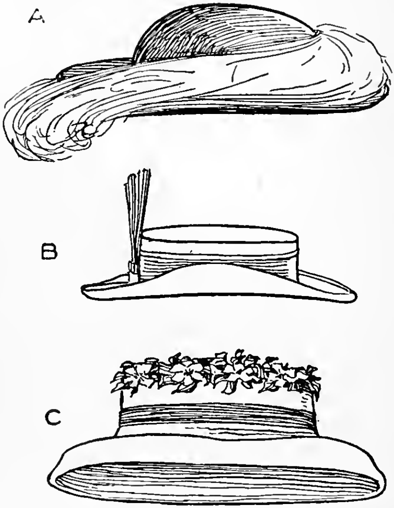

Fig. 113.—The decoration should strengthen the structural lines of the hat. There should be but one center of interest and all decoration should appear to converge to that point (*A* and *B*). Some contrast in line is always interesting (*B*). The proportion of space covered by the decoration should have an interesting relation to the uncovered surface (*B* and *C*).

There should be one general direction of line and a center of interest to which all trimming should appear to converge or to be subordinate (Fig. 113). Cross lines in trimming should be avoided. More than one point of interest, unless these points are perfectly balanced, produces a confused appearance and causes the eye to jump from one spot to another. The center of interest in the trimming should not be so conspicuous in color or size as to detract from the face, which after all is the picture for which the hat serves as the frame.

If the hat is too heavily trimmed in the back, there is a tendency to bend the head and shoulders forward in an effort to balance the trimming. If it is too heavily trimmed in front, it gives the undesirable appearance of pitching forward, or creates a tendency to place the hat too far back on the head. This is likely to make the most graceful line unbecoming and disturbs the balance of the figure. Hats with the bulk of the trimming at one side may appear to be burdensome.

RENOVATING MATERIALS

When looking over an old stockof hats, the home worker finds that brims change in shape more slowly than do crowns. Crowns may often be remodeled, however, by the use of ribbon or silk. Trimming may sometimes be so placed that it changes the line of the crown and gives the effect of a different shape. Good materials should never be thrown away.

Storing.

At the end of each season when hats are to be stored for another season, they should be examined carefully. Hats to be used in the same way at another time should be well dusted and spots that might tempt moths should be removed (page 283). The hats should be wrapped carefully.

If the hat is not to be used in its original shape again, it should be ripped apart. Any wire should be rolled and ribbons and velvet cleaned. All covered wire should be saved, since it is not always easy to obtain a piece of wire when needed. If millinery material is cleaned and rolled instead of folded it may offer a much greater suggestion for remodeling than when it is soiled and crushed.

The frame material is not often good enough to be used again, but if it is in fair condition it may be improved by dampening and repressing. Good pieces may be saved for making buckles, backs for ribbon decorations, or for piecing out another frame.

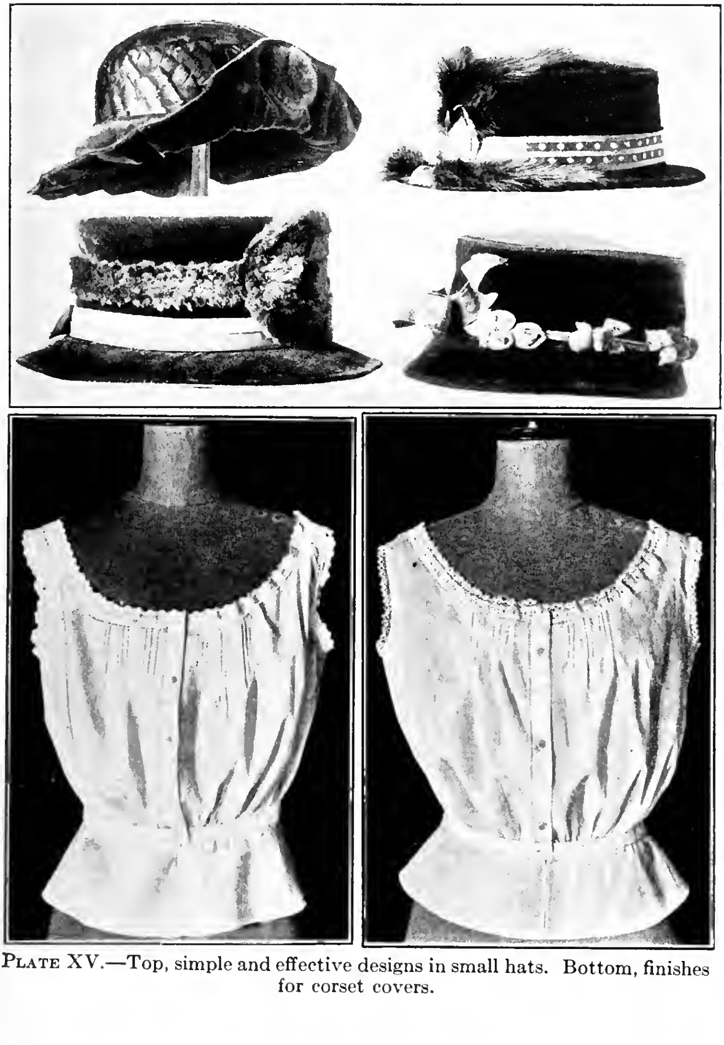

PLATE XV.—Top, simple and effective designs in small hats. Bottom, finishes for corset covers.

Straws.

If straw braid on a hat is faded, the hat may be ripped apart and the braid dyed and sewed into a new shape. Several good color liquids that dye the straw instantly and finish it in one operation are now on the market. Sometimes an old hat that has faded and lost its stiffness may be freshened for another season with a coating of color liquid. Brushing with alcohol will often brighten a black straw hat.

A straw hat may be bleached by being exposed in a closed chamber to the fumes of burning sulfur. An old flour barrel is often used for this purpose by milliners. The sulfur is ignited on a fire shovel or a metal dish placed on the ground. The hat, which has been sponged well in water, is hung in the barrel, and the barrel is turned over the burning sulfur for a few hours.

To clean leghorns, panamas, milans, and other fine straws, a solution of oxalic acid may be used in the proportion of one teaspoon of oxalic acid to one pint of water. The straw should be brushed thoroughly and rinsed immediately in clear hot water. As much moisture as possible should be wiped off, and the hat hung to dry in the heat or fresh air. When it is nearly dry, it should be pressed in shape with a hot iron, muslin being placed between the iron and the hat. If a mushroom shape is desired, the hat should be held with the crown up during the pressing, and the brim should be stretched slightly while being pressed, bit by bit. If a flat brim is desired, the hat should be pressed flat on the edge of a table, the crown being allowed to come below the table top. Afterwards it should be laid flat on the table, weights should be placed on the brim, and it should be left until it is perfectly dry. Crowns should be pressed with a small iron on the inside. A sleeve-board is very convenient for this pressing. A white straw that has been sun-burned may be made yellow by being placed for a few moments in a strong solution of soda and water. The hat should then be shaken to remove the water and pressed under a thin cloth until it is dry.

Flowers.

Flowers may be trimmed along the edges and retouched with water color paints or oil paints mixed with gasoline. Flowers made of silk, muslin, sateen, or velvet can be freshened by being shaken gently over a steaming cloth.

Ribbons.

Ribbons may be cleaned with gasoline or washed with soap and water. If they are to be washed, they should be stretched on a clean table, scrubbed with a soft brush dipped in neutral soapsuds and rinsed in clear water. In the rinsing, the ribbon should be kept smooth and straight, and the water should be pressed out by running the hand down the ribbon. The ribbon should then be stretched on the table again and allowed to dry. Ribbons washed in this way need only a slight pressing with a warm iron.

Velvet.

Velvet may be cleaned by being sprinkled thoroughly with magnesia or cornmeal and allowed to stand for twenty-four hours. It should then be brushed with a soft brush. A second application of the cleaning agent may be necessary.

Another way of cleaning velvet is to steam it. This also removes any folds. A hot iron is placed so that it rests on the handle, and the base is covered with a wet cloth. The velvet is then passed over the iron, the wrong side of it being held next the wet cloth. In this way the steam is forced up through the pile. As the steam is passing through, the velvet should be brushed gently with a soft brush.

Laces.

Laces should be washed according to the directions given on page 272. Ecru lace may be washed in the same way as white lace, but it should be rinsed in a weak infusion of tea or coffee. Gold or silver lace may be freshened by brushing it with alcohol or gasoline.

Feathers.

Feathers may be washed satisfactorily in a good suds of white soap and water. The feather should be drawn through the hand from the stem to the tip with a regular stroke. It should then be dried by shaking it in the air. Before being curled, it should be steamed by being held with the back toward the steam from the spout of a teakettle. The feather should not be allowed to become wet. While it is damp, the stem may be shaped in any desired way. The feather should be held with the right side up. It is then curled by having three or four fibers at a time drawn over a dull knife, with a quick downward and inward curving stroke. Work should progress from the large end toward the tip.

Veils.

Veils may be washed in warm soapsuds in the same way as laces are washed. Black veils should be rinsed finally in a strong infusion of black tea to which gum arabic has been added in the proportion of two teaspoons of powdered gum arabic to one pint of water. Veils should be stretched in shape, pinned, and dried.

Chiffon.

Chiffon should be washed in a light suds in lukewarm water. It should not be rubbed, but shaken and squeezed lightly in the suds. It should be stretched to dry, and when nearly dry should be pressed with a warm iron on the wrong side.

Chiffon may also be washed in pure alcohol and stretched to dry.

White felt.

A white felt hat can be cleaned satisfactorily with cornmeal or magnesia. The hat is covered with the substance, and left for two days. The meal or powder is then brushed off. It may be necessary to repeat this process.

Art gum removes spots that are not of long standing.

SIMPLE HANDMADE TRIMMINGS

The ability to trim a hat artistically is a gift. The placing of trimming should be practiced before a mirror and the general principles of design thus studied. Ideas may always be obtained from magazines. Pleasing color combinations in pictures and in nature are often the origin of good effects in

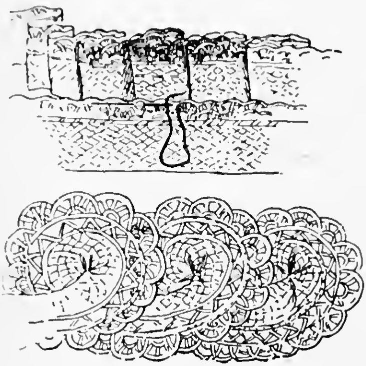

Fig. 114.—Simple decorations possible in straw trimming.

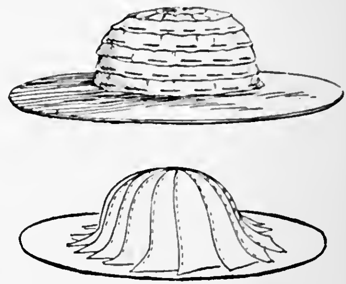

Fig. 115.—Simple use of ribbon to decorate or change a crown slightly. The ribbon may be held in place by a basting stitch of worsted or silk thread in a contrasting color.

hats and costumes. Examples of simple hats are shown in Plate XV.

Trimming should always be sewed with as few stitches as possible in order to avoid a stiff appearance. Large pins can often be used to advantage. Milliners' glue may be used instead of stitches for holding the fabrics of trimmings in place.

Buckles.

Effective buckles can be made by first cutting a shape in buckram and covering it with shirred ribbon, silk, or velvet. The buckles may be padded slightly with sheet wadding and wound with a lacquered braid. Two such buckles may be placed back to back, inclosing the edge of a plaited ribbon.

Lace straw.

Lace straw may be plaited and sewed to the edge of a straight strip for trimming (Fig. 114). The edge of lace straw may be drawn up to make a series of loops (Fig. 114).

Ribbons.

There is a wide range in the variety of ribbons. Vegetable silk ribbons are very satisfactory, because they hold their color better than do those made of real silk, and they keep their shape

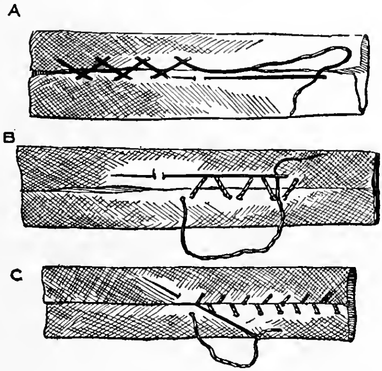

FIG. 116.—Stitches for folds, for sewing down facings, and for decoration. *A*, catch stitch; *B*, lacing stitch· *C*, saddler's stitch.

better. They are woven as a heavy grosgrain ribbon or with long, overshot threads.

The whole crown may be covered with horizontal rows of ribbon, or vertical rows may extend from the tip of the crown to the brim (Fig. 115).

Folds.

Folds made of velvet have many uses. They are more easily manipulated if made on the true bias than with the grain of the material. For the simple milliner's fold (Fig. 116), the velvet is cut twice the desired width of the finished fold. The raw edges are brought together and held with a saddler's stitch or a catch-stitch. The stitches should not be drawn so tight that they will show on the right side.

The French fold (Fig. 117) is slightly more decorative than the milliner's fold. A strip is cut three times as wide as the finished width. One-third of the strip is folded up to the wrong

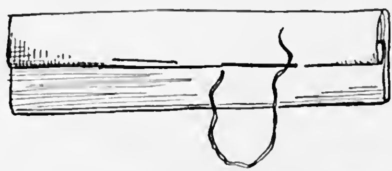

FIG. 117.—French fold, used for decoration around crowns and brims

side. The other edge is folded in and brought down to meet the first edge. The strip is then folded once more on the line where the two edges meet. It is sewed in place with a slip-stitch. Care must be taken not to pull the thread so close that a dent is made in the edge of the velvet.

The fold must be kept even. A stitch taken through the fold will cause it to twist. Measures for the length of folds are taken in the same way as for bindings, in order that the joining may be made first.

Bows.

In general a bow is much more effective when tied than when cut and sewed. In making bows, one should always work from side to side, and should always bring the end of the ribbon through the knot in the direction in which the end was lying before the knot was made.

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PART IV

FOODS AND NUTRITION

CHAPTER XVII

PLANNING THE DAILY MEALS

BY FLORA ROSE

ANY person who has to choose the food that he is to eat himself or that is to nourish others should know at least a few simple principles of food selection. Food is too important in human welfare to be chosen in a haphazard way. Fortunately, recent scientific work on foods has done much to make it comparatively easy to acquire at least a practical simple working knowledge of food values.

The daily meals must supply three things:

1. Fuel. The body must be kept warm, and it must have some source of energy for the work which it must do. The greater the amount of work which the body has to do, the greater is its need for fuel. If the food does not supply sufficient fuel to do the work of the body, some of the body's tissue will be burned as fuel. If too much fuel food is eaten, the body may store some as fat or it may become upset by it.

2. Building materials. All the tissues of the body—muscles, nerves, bones, blood-cells—must receive a constant supply of those substances from which they are built. Children cannot grow without a liberal supply of building materials, and the tissues of grown persons will deteriorate if they are not furnished with sufficient building material to keep them in good repair.

3. Body regulating substances. The body not only needs fuel and building material, but it must also be supplied with substances which regulate its various activities and keep its

machinery in good running order. These regulating substances are necessary to make the fuel burn normally, to help set the building materials in place, to aid in eliminating the wastes of the body, to enable the body to grow, and to keep its machinery running at all. If no foods were included to supply body-regulating substances in the daily meals, the body would soon become damaged.

GOOD FOODS FOR SUPPLYING THE BODY'S NEEDS

To supply these three needs of the body, different foods are necessary. The housewife should know the function of the various food materials in order to make up a balanced and healthful ration.

Fuel foods

Foods rich in starch.

These foods should supply most of the body's energy, because starch is the cheapest and most abundant of all fuel foods, and furthermore the body can use more of this fuel than any other without danger of injury. All the starch eaten is changed to a form of sugar called glucose, before it reaches the blood stream. This change occurs slowly, and under normal condition the machinery of the body is amply able to handle and transport to the tissues the small amounts of sugar produced at any one time.

The starch-rich foods are: Cereals and cereal foods of various kinds, such as breakfast foods—oatmeal, cornmeal, wheat, rice, rye, barley—and breads; macaroni, tapioca, and other manufactured foods; legumes, such as dried peas, beans, and lentils; vegetables rich in starch, such as the potato and the dasheen.

Foods rich in fat.

These foods should supply a part of the day's energy. Fat seems to be necessary for two reasons: because it helps to regulate the rate at which food passes along the digestive tract; and because certain fats are carriers of a body-regulating substance necessary for growth. Children particularly need this type of fat.

Fat-rich foods which carry growth-promoting substances are:

milk, cream, butter, eggs, cod-liver oil, meat fat, to a certain extent, and fat in soybeans.

Other fat-rich foods are: bacon, lard, drippings, fat meats, vegetable oils or food rich in oils.

Foods rich in sugar.

Foods containing much sugar may furnish a part of the day's energy. Sugar as such is not an altogether necessary food, though it is very desirable because it adds palatability to the day's meals and it is a quick fuel. It is not entirely necessary, since all the starch eaten is gradually changed to a form of sugar, glucose, before it reaches the blood. Large quantities of sugar eaten at one time may seriously damage the body, since its machinery is not adequate to care for large amounts at one time. Little children receive all the sugar that is necessary for them if they have a quart of milk a day. If more sugar than is contained in one quart of milk is used, it should be diluted with other foods and should not be used as candy except occasionally as a dessert. Large quantities of sugar may be injurious both to adults and to children. Foods containing sugar are more wholesome than sugar as such.

Foods rich in sugar are: milk, sweet fruits and vegetables, honey, molasses, sirups, sugar as such, preserves, desserts, candy.

Foods rich in protein.

Protein foods must always furnish a part of the day's energy, from 10 to 15 per cent, not because the protein is needed for the energy which it furnishes but because it has value as building material for the body. The energy which it gives is a by-product. Although protein gives energy, it should not be used as a main source of fuel, since it is more scarce and, therefore, more expensive than other fuels, and large amounts may overtax the powers of the body to care for it.

Building foods

There are many building materials needed by the body. Four of these play most conspicuous parts and should be considered in planning the day's meals.

Protein.

Protein is a name given to a large variety of substances in foods. Casein in milk, albumin in egg, milk, and meat, gluten in wheat, are illustrations of types of protein. Protein is a substance necessary to the building of all living parts of the body.

All proteins have not the same value. Some are much inferior to others as tissue builders, and in some foods the proteins are of such poor quality that they cannot build tissue until a food containing a better quality of protein is combined with them.

Some of the day's protein should be supplied by animal foods, as these contain the best quality of protein. Animal foods used for their protein may replace one another and will supplement the poor quality of less valuable protein foods. Animal foods that are valuable sources of protein are milk, eggs, cheese, and meat.

Much of the remainder of the protein may be supplied by certain plant foods. None of the foods here listed, with the exception of the soybean and the peanut, may be regarded as complete substitutes for an animal food, since they contain an inferior quality of protein. Some animal food should be used with them to improve the quality of their protein. Plant foods that may be used to supply part of the day's protein are: cereals of various kinds, such as breakfast foods, breads, macaroni; legumes, such as dried peas, beans, and lentils; and nuts.

A part of the day's protein should be supplied by fruits and vegetables. The quantity of the protein supplied by vegetables is small, but it helps to improve the quality of proteins from plant foods mentioned above.

Lime.

Lime is a necessary building material. Many dietaries are low in this substance. If it is not supplied in sufficient amounts, the bony structures of the body suffer and the welfare of other tissues is also interfered with. It is possible that the hard water of many localities helps to protect the body against the nutritive disaster of a lime-poor diet. This should not be depended on, however, Many children, and adults also, suffer from poor teeth because of a lack of lime in the diet.

The most valuable lime foods are: milk, the cheapest lime food (a glass of milk contains more lime than a glass of saturated solution of lime); cheese; and eggs.

Next in lime value are leaves and stems of plants, such as spinach, Swiss chard, lettuce, celery, onions, cabbage. The disadvantage of using these latter foods as a main source of lime is that they are too bulky to be eaten in the needed amounts.

Iron.

Iron is a necessary building material. An iron-poor diet means a poor quality of blood, weakened tissues, and a rundown body. Many dietaries are poor in iron.

The most valuable iron foods are: green vegetables, the most valuable source; fruits and vegetables in general; breakfast foods and breads made from meals which include the whole cereal grain, the cheapest source; eggs, which are excellent but expensive; meat, rich in iron, but the value of its iron has been questioned.

Phosphorus.

Phosphorus is a necessary building material. If enough animal food, whole cereal grains, and legumes are used in the dietary, it will not lack phosphorus.

Foods that are best to supply phosphorus are: milk, eggs, meat, breakfast foods and bread made from the whole grain, dried peas, beans, and lentils.

Regulating foods

Just as much attention should be paid to selecting body-regulating foods as to fuel and building foods. Fortunately there is an overlapping of all three of these needs, and a single food often supplies several.

Regulating foods should be selected from each of the following groups: Foods containing laxative substances, as fruits and vegetables, breakfast foods and breads made from the whole grain; foods containing needed salts, acids or flavors, as fruits and vegetables; foods containing two unknown factors, which have been called vitamines and growth-promoting factors, both of which are necessary for health and for growth.

Growth-promoting factors

The first unknown factor, or vitamine, essential for growth and health, often called the fat-soluble growth-promoting substance, is found, in amounts sufficient for human needs, dissolved in the fat of certain foods such as milk, butter, cream, eggs, meat (if enough of it is eaten), cod-liver oil, soybeans. The following foods contain this unknown substance, or vitamine, in amounts which will help; they are too bulky to be used as its main source by the human being, but as a class they are the main source of this important substance in the diet of most of the domestic animals: leaves and stems of plants, such as spinach, Swiss chard, dandelion greens, cabbage, onion, celery.

The second unknown factor, or vitamine, essential for health and growth is soluble in water and is found in amounts sufficient for human needs in milk, eggs, breakfast foods and breads made from the whole cereal grain, peas, beans, and lentils. In fact, this substance is found in practically all naturally occurring foods. It is often called the water-soluble growth-promoting substance.

HOW TO ESTIMATE THE DAILY NEED OF FUEL

It is not possible in any simple way to estimate the daily fuel need with entire accuracy. The approximate fuel need may be easily estimated, however. To do this, it is necessary to have some understanding of the unit which measures the energy value of foods. Many units of measure are familiar to the average person: the ounce and pound as units of weight, the pint and quart as units of volume, the inch and foot and yard as units of distance, the degree as a unit of temperature. These units are used again and again until the mind remembers the approximate amounts they measure. The same must be true of the unit of measure for the fuel value of foods. It is a basis by which one may compare one food with another and with which one may measure the individual fuel needs.

The unit of measure for the fuel value of foods is the calorie. If a given portion of food has a fuel value of 100 calories and in a day 2,000 calories are needed, one immediately begins to appraise the fuel value of that food. For all practical purposes the following tables are very serviceable in giving an approximate estimate of daily fuel needs.

The average adult person spends about the following amounts of energy under stated conditions:

Asleep	½ calorie an hour for each pound of body weight
Sitting (reading, sewing, knitting)	3/5 calorie an hour for each pound of body weight
Standing	¾ calorie an hour for each pound of body weight
Light exercise (dish-washing, cooking for small family, bed-making, sewing by foot power, walking at moderate pace on level road)	1 calorie an hour for each pound of body weight
Moderate exercise (cooking for large family, sweeping, ironing, scrubbing by hand, work of carpenters, meat carvers, house workers)	1¼ to 1½ calories an hour for each pound of body weight
Active exercise (cooking for large groups, ironing and scrubbing with heavy implements, work of farmers, masons, blacksmiths)	1¾ to 2 calories an hour for each pound of body weight.
Severe exercise (heavy muscular exercise, such as that done by lumbermen, excavators, and stevedores)	3 or more calories an hour for each pound of body weight

The average child spends about the following amounts of energy:

	Calories a pound each day
For first 3 months	45–50
For second 3 months	40–45
For third 3 months	40
For fourth 3 months	35–40
For 2d year	40
For 3rd and 4th years	35–40
For 5th year	35–37
For 6th year	34–35
For 7th year	32–34
For 8th year	30–35
For 10th to 12th years	28–32
For 12th to 14th years	25–30
For 14th to 17th years	20–25

A simple way of estimating adult needs is as follows:

The average adult spends:

	Calories a pound each day
At complete rest	14–16
Light exercise	16–18
Moderate exercise	18–20
Hard exercise	20–23

The 100-calorie portion is the short cut in dietary calculations. With the knowledge of 100-calorie portions of common foods, it is very simple to estimate the fuel value of a given meal or of a day's meals. Plate XVI and Tables XVI to XXI will be of service in learning to make this estimate.

HOW TO ESTIMATE THE DAILY NEED OF PROTEIN

The average daily allowance of protein may be estimated in two ways. Both have disadvantages as well as good points.

One way of estimating the protein allowance is on the basis of the actual amount of protein needed in a day. The average adult probably needs daily about 2 or 3 ounces of protein. Or to state the matter in a more accurate way, the protein in the day's meals should furnish daily 2 to 2½ calories for each pound of body weight. If animal proteins are generously represented, the lesser amount may be adequate. For economy not more than one-third of the total protein in the adult diet should be furnished by animal foods. Less than this may be used. One egg, one glass of milk, and an ounce of cheese or a small piece of meat, give a liberal amount of animal protein in a day. Less than this may be sufficient. If plant proteins predominate largely, the greater amount may be needed. About one-third of the daily protein should be taken from the cereal grains—wheat, corn, rye, oats, rice, barley. After the allowances for animal and cereal proteins have been made, the remainder of the protein may come from nuts, legumes, and fruits and vegetables. If wise combinations of animal and plant proteins are made, the amount needed will probably lie between the two extremes.

Another way of estimating the protein allowance is on the basis of the proportion of total calories which protein should furnish. The average adult should receive daily from protein 10 to 15 per cent of the total calories in his food. If plant proteins predominate, 15 per cent of the total calories should be furnished by protein. If the number of calories needed is great because of much exercise, only 10 per cent, or even less, of the total calories need be furnished by protein.

The tables of 100-calorie portions (Tables XVI–XXI) may be used in estimating the amount of protein food that is required to meet the needs of the body, since one column states the number of calories a given food supplies in the form of protein.

HOW TO ESTIMATE THE DAILY NEED OF LIME, IRON AND PHOSPHORUS

It is more difficult to estimate the daily need for lime, iron, and phosphorus than for energy and protein. Yet these are no less important than energy and protein, and some quantitative estimates have been made.

In general, however, if liberal amounts of foods that contain lime, iron, and phosphorus are included in the daily meals, it is unnecessary to make any quantitative estimates. The following figures are given as a matter of interest and general information:

Average family per capita allowance of lime a day	0.70 to 1.0 grams
Average family per capita allowance of iron a day. .	0.13 to .15 grams
Average family per capita allowance of phosphorus a day	2.75 to 3.0 grams

TABLE XVI.—100-CALORIE PORTION OF FOODS RICH IN STARCH [1]

Food materials	*Approximate measure of 100-caloric portion*	*Number of calories furnished by protein*	*Weight in ounces as bought*
Beans, dried	2 tablespoonfuls	26.1	1.0
Bread			
Average white	Slice 1 x 3 x 3 inches	14.0	1.3
Whole wheat	Slice 1 x 3 x 3 inches	15.8	1.4
Corn			
Starch	3 tablespoonfuls	0.0	1.0
Meal	3 tablespoonfuls	10.4	1.0
Flakes	1¼ cupfuls	6.1	1.0
Hominy	3 tablespoonfuls	9.4	1.0
Puffed	1¼ cupfuls	6.0	1.0
Macaroni	¼ cupful	14.8	1.0
Oats, rolled	1/3 cupful, scant	16.1	.9
Peas, dried	2 tablespoonfuls	27.7	1.0
Potatoes			
White	1 medium	10.6	5.3
Sweet	1 small	5.8	3.6
Rice			
Polished	2 tablespoonfuls	9.1	1.0
Puffed	1 1/3 cupfuls	9.1	1.0
Wheat			
Cracked	2½ tablespoonfuls	12.3	1.0
Shredded	1 biscuit	14.0	1.0
Puffed	1 2/3 cupfuls	15.0	1.0
Wheat flour			
Patent	¼ cupful	12.7	1.0
Entire	¼ cupful	15.4	1.0
Graham	¼ cupful, scant	12.7	1.0

[1] Some of the measurements in Tables XVI to XX were made by Miriam Birdseye, while others were compiled from various sources including Feeding the Family, by Mary Swartz Rose. The other data in these tables are based on the table of 100-calorie portions in Food Products, by Henry C. Sherman.

PLATE XVI.—Showing 100-calorie portions of some common foods. Top, reading from left to right: 1 and 2, whey; 3, evaporated milk; 4, condensed milk (sweetened); 5 and 6, skimmed-milk; 7, whole milk; 8, 18-per-cent cream; 9, 40-per-cent cream. Center, reading from back to front: spinach, cream, olive oil, peanut butter, butter, lard, cocoa, chocolate, potato, shredded codfish, egg, gelatin, Cheddar cheese, navy beans, rolled oats, bread, crackers, shredded wheat, macaroni, wheat flour, rhubarb, molasses, cranberries, oranges, onions, carrots, lettuce, bananas, prunes, dates, raisins, sugar. Bottom, 100-calorie portions of foods, raw and cooked. Sugar has not been added to the foods ordinarily requiring it. Foods in rows 1 and 3 are cooked; those in rows 2 and 4 are raw. Reading from back to front: gelatin, cornmeal, tapioca, macaroni, rolled oats, cream of wheat, navy beans, spinach, rhubarb, cranberries, onions, apples, prunes, lima beans.

TABLE XVII.—100-CALORIE PORTIONS OF FOODS RICH IN SUGAR

Food materials	*Approximate measure of 100-calorie portion*	*Number of calories furnished by protein*	*Weight in ounces as bought*
Apples, fresh	1 large	2.6	7.5
Bananas	1 medium	5.3	5.5
Dates	4 large	2.4	1.1
Figs, dried	1½ large	5.4	1.1
Grapes	Medium bunch	5.4	4.9
Honey	1 tablespoonful	.5	1.1
Lemons	3 large	9.0	11.4
Molasses	1½ tablespoonfuls	3.3	1.2
Oranges	1 very large	6.2	9.5
Peaches	3 large	6.8	10.5
Prunes	4 large	2.8	1.4
Raisins	¼ cupful	3.0	1.1
Strawberries	1 1/3 cupfuls	10.2	9.5
Sugar			
Granulated	2 tablespoonfuls, scant	0.0	.9
Lump	3½ lumps	0.0	.9

TABLE XVIII.—100-CALORIE PORTIONS OF SUCCULENT VEGETABLES

Food materials	*Approximate measure of 100-calorie portions*	*Number of calories furnished by protein*	*Weight in ounces as bought*
Beets	3 medium	13.9	9.6
Cabbage	¼ medium head	20.3	13.3
Carrots	3 medium	9.7	10.1
Celery	4 cupfuls of ¼-inch pieces	23.7	23.7
Chard, Swiss		33.5	9.2
Cucumbers	2 large	18.4	23.5
Lettuce	2 large heads	25.1	22.3
Onions	3 medium	13.2	8.0
Parsnips	1½ medium	9.9	6.8
Peas			
Fresh shelled	¾ cupful	28.0	6.4
Canned	¾ cupful, drained	26.1	6.4
Rhubarb	4 cupfuls of 1-inch pieces	10.4	25.2
Spinach, edible portion	2 quarts, approximately	35.2	14.8
Squash		12.2	15.6
Tomatoes			
Fresh	4 small	15.8	15.5
Canned	1¾ cupfuls	21.2	15.6
Turnips	2 cupfuls of ¼-inch cubes	13.2	12.9

TABLE XIX.—100-CALORIE PORTIONS OF FOODS RICH IN FAT

Food materials	*Approximate measure of 100-calorie portions*	*Number of calories furnished by protein*	*Weight in ounces as bought*
Bacon			
Raw	2 thin slices	6.7	.6
Cooked	4 thin slices		
Butter	1 tablespoonful	.5	.5
Chocolate, unsweetened	½ square	8.4	.6
Cocoa	3 tablespoonfuls	17.4	.7
Cream, 18.5 per cent	¼ cupful	5.1	1.8
Cream, 40 per cent	1 1/3 tablespoonfuls	2.3	.9
Lard	1 tablespoonful, scant	0.0	.4
Oil			
Olive	1 tablespoonful, scant	0.0	.4
Cottonseed	1 tablespoonful, scant	0.0	.4
Corn	1 tablespoonful, scant	0.0	.4
Peanut	1 tablespoonful, scant	0.0	.4
Olives	6 to 8	1.5	1.6
Peanut butter	1 1/5 tablespoonfuls	19.4	.6
Walnuts, shelled California	8 to 16 nuts	10.4	.5

TABLE XX.—100-CALORIE PORTIONS OF FOODS RICH IN PROTEIN

Food materials	*Approximate measure of 100-calorie portions*	*Number of calories furnished by protein*	*Weight in ounces as bought*
Beef, lean round		54.5	2.5
Cheese			
Dairy (cheddar)	1-inch cube	24.2	.8
Cottage	1/3 cupful	76.2	3.2
Chickens, broilers		79.6	5.5
Codfish			
Salted		97.3	4.4
Dressed fresh		96.0	7.6
Eggs in shell	1 very large or 1 1/3 average	36.2	2.7
Fowls		34.5	2.1
Ham			
Smoked		29.7	1.5
Fresh lean		44.0	1.6
Lamb			
Fore quarter		24.2	1.4
Hind quarter		31.4	1.7
Milk			
Whole	2/3 cupful, scant	19.0	5.1
Skimmed	1 1/8 cupfuls	37.0	9.6
Salmon			
Canned	½ cupful, scant	44.5	2.4
Fresh		43.3	2.5
Veal, lean		51.1	3.0

TABLE XXI.—Table of 100 Food Units [1]

Name of food	*"Portion" containing 100 food units (approx.)*	*Wt. of 100 calories (oz.)*	*Calories furnished by protein*
Cooked Meats			
Beef, round, boiled (fat)	Small serving	1.30	40
Beef, round, boiled (lean)	Large serving	2.20	90
Beef, round, boiled (med.)	Small serving	1.60	60
Beef, 5th rib, roasted,	Half serving	.65	12
Beef, 5th rib, roasted,	Small serving	1.20	25
Beef, 5th rib, roasted,	Very small serving	.88	18
Beef, ribs, boiled,	Small serving	1.10	27
Beef, ribs, boiled,	Very small serving	.87	21
Calves'-foot jelly		4.00	19
Chicken, canned	One thin slice	.96	23
Lamb chops, boiled av	One small chop	.96	24
Lamb, leg, roasted	Ord. serving	1.80	40
Mutton, leg, boiled,	Large serving	1.20	35
Pork, ham, boiled (fat),	Small serving	.73	14
Pork, ham, boiled,	Ord, serving	1.10	28
Pork, ham, roasted (fat),	Small serving	.96	19
Pork, ham, roasted (lean),	Small serving	1.20	33
Turkey as purchased canned	Small serving	.99	23
Veal, leg, boiled,	Large serving	2.40	73
Uncooked Meats, Edible Portion			
Beef, loin, av. (lean)	Ord. serving	1.80	40
Beef, loin, av. (fat)	Small serving	1.10	22
Beef, loin, porterhouse steak, av	Small steak	1.30	32
Beef, loin, sirloin steak, av	Small steak	1.40	31
Beef, ribs, lean, av	Ord. serving	1.80	42
Beef, round, lean, av	Ord. serving	2.20	54
Beef, tongue, av	Ord. serving	2.20	47
Beef, juice		14.00	78
Chickens (broilers) av	Large serving	3.20	79
Clams, r'nd in shell, av	12 to 16	7.40	56
Cod (whole)	Two servings	4.90	95
Goose (young) av	Half serving	.88	16
Halibut steaks, av	Ord. serving	2.80	61
Liver (veal), av	Two sm. servings	2.80	61
Lobster (whole), av	Two servings	4.10	78
Mackerel (Span.), whole, av	Ord. serving	2.00	50
Mutton leg, hind, lean, av	Ord. serving	1.80	41
Oysters in shell, av	One dozen	6.80	49
Pork, loin, chops, av	Very small serving	.97	18
Pork, ham, lean, av	Small serving	1.30	29
Pork, bacon, med. fat, av	Small serving	.53	6
Salmon (Cal.), av	Small serving	1.50	30
Shad, whole, av	Ord. serving	2.10	46
Trout, brook, whole, av	Two small servings	3.60	80
Turkey, av	Two small servings	1.20	29
Vegetables			
Artichokes, av., canned		15.00	14
Asparagus, av., canned		19.00	33
Asparagus, av., cooked		7.19	18
Beans, baked, canned	Small side dish	2.66	21
Beans, lima, canned	Large side dish	4.44	21
Beans, string, cooked	Five servings	16.66	15
Beets, edible portion, cooked	Three servings	8.70	2
Cabbage, edible portion		11.00	20
Carrots, edible portion, fresh		7.60	10
Carrots, cooked	Two servings	5.81	10
Cauliflower, as purchased		11.00	23
Celery, edible portion		19.00	24
Corn, sweet, cooked	One side dish	3.50	13

[1] Irving Fisher, The Journal of the American Medical Association, 48:16.

TABLE XXI.—TABLE OF 100 FOOD UNITS—*Cont'd.*

Name of food	*"Portion" containing 100 food units (approx.)*	*Wt. of 100 calories (oz.)*	*Calories furnished by protein*
Cucumbers, edible portion		20.00	18
Eggplant, edible portion		12.00	17
Lentils, cooked		3.15	27
Lettuce, edible portion		18.00	25
Mushrooms, as purchased		7.60	31
Onions, fresh, edible portion		7.10	13
Onions, cooked	Two large servings	8.40	12
Parsnips, edible portion	One one-half servings	5.30	10
Parsnips, cooked		5.84	10
Peas, green, canned	Two servings	6.30	25
Peas, green, cooked	One serving	3.00	23
Potatoes, baked	One good sized	3.05	11
Potatoes, boiled	One large sized	3.62	11
Potatoes, mashed, (creamed)	One serving	3.14	10
Potatoes, steamed	One serving	3.57	11
Potatoes, chips	One-half serving	.60	4
Potatoes, sweet, cooked	Half av. potato	1.70	6
Pumpkins, edible portion		13.00	15
Radishes, as purchased		17.00	18
Rhubarb, edible portion		15.00	10
Spinach, cooked	Two ord. servings	6.10	15
Squash, edible portion		7.40	12
Succotash, canned	Ord. serving	3.50	15
Tomatoes, fresh as purchased	Four av. servings	15.00	15
Tomatoes, canned		15.20	21
Turnips, edible portion	Two large servings	8.70	13
Vegetable oysters		9.62	10
Fruits (Dried)			
Apples as purchased		1.20	3
Apricots as purchased		1.24	7
Dates, edible portion	Three large	.99	2
Dates as purchased		1.10	2
Figs, edible portion	One large	1.10	5
Prunes, edible portion	Three large	1.14	3
Prunes as purchased		1.35	3
Raisins, edible portion		1.00	3
Raisins as purchased		1.10	3
Fruits (Fresh or Cooked)			
Apples as purchased	Two apples	7.30	3
Apples, baked		3.30	2
Apples, sauce	Ord. serving	3.90	2
Apricots, edible portion		5.92	8
Apricots, cooked	Large serving	4.61	6
Bananas, edible portion	One large	3.50	5
Blackberries		5.90	9
Blueberries		4.60	3
Blueberries, canned		5.80	4
Cantaloupe	Half ord. serving	8.60	6
Cherries, edible portion		4.40	5
Cranberries as purchased		7.50	3
Grapes as purchased, av		4.80	5
Grape fruit		7.57	7
Grape juice, small glass		4.20	0
Gooseberries		9.20	5
Lemons		7.57	9
Lemon juice		8.77	0
Nectarines		5.18	4
Olives, ripe	About seven	1.31	2
Oranges as purchased, av	One very large	9.40	6
Oranges, juice	Large glass	6.62	0
Peaches as purchased, av	Three ordinary	10.00	7

TABLE XXI.—TABLE OF 100 FOOD UNITS—*Cont'd.*

Name of food	*"Portion" containing 100 food units (approx.)*	*Wt. of 100 calories (oz.)*	*Calories furnished by protein*
Peaches, sauce	Ord. serving	4.78	4
Peaches, juice	Ord. glass	4.80	0
Pears	One large	5.40	4
Pears, sauce		3.98	3
Pineapples, edible portion, av		8.00	4
Raspberries, black		5.18	10
Raspberries, red		6.29	8
Strawberries, av	Two servings	9.10	10
Watermelon, av		27.00	6
Dairy Products			
Butter, ordinary pat		.44	0.5
Buttermilk	1½ glasses	9.70	34
Cheese, Am. pale	1½ cubic in.	.77	25
Cheese, cottage	4 cubic in.	3.12	76
Cheese, full cream	1½ cubic in.	.82	25
Cheese, Neufchatel	1½ cubic in.	1.05	22
Cheese, Swiss	1½ cubic in.	.80	25
Cheese, pineapple	1½ cubic in.	.72	25
Cream	¼ ord. glass	1.70	5
Kumyss		6.70	21
Milk, condensed, sweetened		1.06	10
Milk, condensed, unsweetened		2.05	24
Milk, skimmed	1½ glass	9.40	37
Milk, whole	Small glass	4.90	19
Whey	Two glasses	13.00	15
Cakes, Pastry, Puddings, and Desserts			
Cake, chocolate layer	½ ord. sq. piece	.98	7
Cake, gingerbread	½ ord. sq. piece	.96	6
Cake, sponge	Small piece	.89	7
Custard, caramel		2.51	19
Custard, milk	Ord. cup	4.29	26
Custard, tapioca	Two-thirds ord.	2.45	9
Doughnuts	Half a doughnut	.80	6
Lady fingers		.95	10
Macaroons		.82	6
Pie, apple	One-third piece	1.30	5
Pie, cream	One-fourth piece	1.10	5
Pie, custard	One-third piece	1.90	9
Pie, lemon	One-third piece	1.35	6
Pie, mince	One-fourth piece	1.20	8
Pie, squash	One-third piece	1.90	10
Pudding, apple sage		3.02	6
Pudding, brown betty	Half ord. serving	2.00	7
Pudding, cream rice	Very small serving	2.65	8
Pudding, Indian meal	Half ord. serving	2.00	12
Pudding, apple tapioca	Small serving	2.80	1
Tapioca, cooked	Ord. serving	3.85	1
Sweets and Pickles			
Catchup, tomato, av		6.00	10
Honey	Four teaspoons	1.05	1
Marmalade, orange		1.00	0.5
Molasses, cane		1.20	0.5
Olives, green, edible portion	5-7 olives	1.10	1
Olives, ripe, edible portion	5-7 olives	1.30	2
Pickles, mixed		14.60	18
Sugar, granulated	Three heaping teaspoons or 1½ lumps	.86	0
Sugar, maple	Four teaspoons	1.03	0
Sirup, maple	Four teaspoons	1.20	0
Nuts, Edible Portion			
Almonds, av	Eight to fifteen	.53	13

TABLE XXI.—TABLE OF 100 FOOD UNITS—*Con'td.*

Name of food	*"Portion" containing 100 food units (approx.)*	*Wt. of 100 calories (oz.)*	*Calories furnished by protein*
Beechnuts		.52	13
Brazil-nuts	Three ord. size	.49	10
Butternuts		.50	16
Cocoanuts		.57	4
Chestnuts, fresh, av		1.10	10
Filberts, av	Ten nuts	.48	9
Hickory-nuts		.47	9
Peanuts	Thirteen, double	.62	20
Pecans, polished	About eight	.46	6
Pine-nuts (pignolias)	About eighty	.56	22
Walnuts, California	About six	.48	10
Cereals			
Bread, brown, av	Ord. thick slice	1.50	9
Bread, corn (johnny cake), av	Small square	1.30	12
Bread, white, homemade	Ord. thick slice	1.30	13
Corn flakes, toasted	Ord. cereal dish	.97	11
Cornmeal, granular, av		.96	10
Cornmeal, unbolted, av		.92	9
Crackers, graham	Two crackers	.82	9.5
Crackers, oatmeal	Two crackers	.81	11
Hominy, cooked	Large serving	4.20	11
Macaroni, av		.96	15
Macaroni, cooked	Ord. serving	3.85	14
Oatmeal, boiled	1½ serving	5.60	18
Popcorn		.86	11
Rice, uncooked		.98	9
Rice, boiled	Ord. cereal dish	3.10	10
Rice, flakes	Ord. cereal dish	.94	8
Rolls, Vienna, av	One large roll	1.20	12
Shredded wheat	One biscuit	.94	13
Spaghetti, av		.97	12
Wheat flour, ent. wheat, av		.96	15
Wheat flour, graham, av		.96	15
Wheat flour, patent, family, and straight, grade, spring wheat av	Four tablespoons	.97	12
Zweibach	Size of thick slice of bread	.81	9
Miscellaneous			
Eggs, hen's, boiled	One large egg	2.10	32
Eggs, hen's, whites	Six whites	6.40	100
Eggs, hen's, yolks	Two yolks	.94	17
Omelet		3.30	34
Soup, beef, av		13.00	69
Soup, bean, av	Very large plate	5.40	20
Soup, cream of celery	Two plates	6.30	16
Consommé		29.00	85
Clam chowder	Two plates	8.25	17
Chocolate, bitter	Half a square	.56	8
Cocoa		.69	17
Ice cream (Phila.)		1.60	5

SOME RULES FOR PLANNING MEALS

The balanced dietary.

To balance the dietary means to supply in the meals of each day, in a form best suited to the individual, enough energy for the day's activities, all the substances needed to build the tissues —bone, muscle, nerve, blood—and those substances which keep the body in good working order.

The choice of foods.

The main part of the meals of each day should consist of simply prepared, mild-flavored, non-stimulating, and easily digested foods. Well-cooked cereals, thoroughly baked, sweet-flavored bread, potatoes, milk, eggs, fresh, succulent vegetables and fruits should constitute the background of the dietary. Meats and meat soups, candies, preserves, desserts, cakes and other sweets, rich sauces, pickles, and condiments should be used in moderation to give color and interest to the dietary; they should not furnish the bulk of the food at any one meal.

Milk should be used liberally in order to replace a part of the meat in the average dietary, and because, of all foods, it is richest in lime. Milk is the cheapest animal food; and since some animal food is necessary, milk should be the first to be considered. It has building materials which are of special value for constructing young human tissue. No other food contains as much lime. It is also the most important source of two necessary growth-promoting factors (page 412). It tends to hold in check abnormal changes in the intestine. It is mild in flavor and lends itself to a variety of uses. When it undergoes normal souring, it still is of value and may be used in many ways.

If possible, provision should be made to supply each child in the family with a quart of clean, wholesome milk every day. A pint of milk for each adult is desirable if the meat consumption is low. If it is impossible to supply as much milk as this for both children and adults, the children should receive a pint of milk each, while the amount for the adults may be reduced to a cupful apiece. If the milk supply for the family must be reduced still further, the milk should be given to the children, since the adults can eat coarser foods. Less than a pint of milk a day for each child is a very small allowance and is likely to result in some form of malnutrition. No milk at all for the child means, without doubt, malnutrition, unless knowledge and skill are combined in planning a correct and much more expensive dietary.

If it is impossible to obtain whole-milk, skim-milk is better than no milk, even for little children, although the child on a skim-milk diet will not grow so normally as one fed on whole-milk. The milk may be used as a beverage, or it may be cooked in various ways. The correct amount, not the form in which it is used, is the important point. If the family must economize, the amount of butter may be reduced, but the amount of milk should at the same time be increased to insure the correct total of the fat-soluble growth-promoting factor.

Clean, sweet, skim-milk is as valuable as whole-milk for its supply of lime, its good type of protein, its water-soluble growth-promoting factor and for a part of its fat-soluble growth-promoting factor. Skim-milk has a lower energy value than does whole-milk because of the loss of its fat. Half of its fat-soluble growth-promoting factor is lost with the fat; therefore, skim-milk has not the same growth-promoting power as whole-milk, although it still contains growth-promoting properties. For this reason, children should have whole-milk instead of skim-milk.

Buttermilk has the same food value as skim-milk. Some persons digest buttermilk more easily than skim-milk because the casein is clotted by the acid in the milk. It is believed that when the casein of milk is clotted before it reaches the stomach, either by natural souring or by the addition of orange, lemon, or other fruit juice or junket, it does not form the large firm clots sometimes formed in the case of sweet milk. The nutritive value of the milk is unchanged, and the clotting may make the milk more easily digested by some persons.

Cottage cheese, made of the curd of milk, is a valuable food. It contains most of the protein of the whole-milk and is a good source of this important building material. It contains a part of the lime and the phosphorus of the whole-milk, and part of the growth-promoting factors, though little can be said as yet concerning the comparative amounts of these substances present in it. As a protein food, it is a valuable meat substitute.

Whey also has nutritive value and should never be discarded. It contains the water-soluble, and a small part of the fat-soluble, growth-promoting factors, much of the lime, part of the phosphorus, and it may contain most of the carbohydrate of the original milk. It should find many uses in the dietary in the form of breads and cakes, gelatin desserts, frozen desserts, and pudding sauces.

The American Cheddar, or cream, cheese made from whole-milk contains both the protein and the fat of the milk. Pound for pound, cheese is considerably richer than meat in both protein and fat. Cheese is rich not only in protein and fat but also in lime, phosphorus, and growth-promoting substances. When cheese is served as a meat-saver, that is, cooked in combination with other foods, it is generally easily digested; it is probably the serving of cheese with pie at the end of a hearty meal that has given it the undeserved name of being difficult to digest.

Cream, as well as the butter and ice cream made from it, has a definite place in the daily food because of growth-promoting substances and the high energy value of the fat. The souring of cream does not change its nutritive value any more than does the souring of milk. One pound of butter is equivalent to five quarts of milk in energy value; but counting the proteins, lime, and growth-promoting factors that milk contains, three quarts of milk will give as much total food as a pound of butter. It is said that not only should three quarts of milk be used in place of every pound of butter given up, but when a pound of butter costs more than the three quarts of milk, it is wise economy to use the milk instead of the butter. In a family where there are three or more little children, no money should be spent for a pound of butter or of meat until after an allowance has been made for three quarts of milk.

Butter substitutes are made up more or less of vegetable oils, which give energy but which do not contain the necessary growth-promoting factors of butter-fat. Beef-fat contains a small amount of the fat-soluble growth-promoting factor; but even when beef-fat is used in the making of butter substitutes, the quantity of it and of the small amount of butter added, varies so greatly that the butter substitute should not be allowed wholly to replace butter in children's food. Butter substitutes in which vegetable oils are the only fat, are entirely lacking in this growth-promoting factor. If butter substitutes are used, extra milk is necessary in order to keep up the supply of these essential growth-promoting factors.

Boiling is believed to increase the ease of digestion of milk by preventing the formation of large firm curds in the stomach. Brief boiling is thought not to injure seriously the value of either of the growth-promoting factors. Boiled milk seems in the case of many persons to have a constipating effect, which may be offset by the use of fruit juices. This may be found to explain the cause and cure of scurvy. Boiled milk has all the energy value of fresh milk. Boiling does not seem to affect the value of the protein sufficiently to be of any serious disadvantage. Any injury to the value of the protein by boiling is probably due, in part at least, to the coagulation of the albumen of the milk. Increasing the amount of milk fed, if milk is the only food, seems to correct any damage which might be produced by boiling, either on the protein or on the growth-promoting factors.

If, as occasionally happens, milk reacts on the individual as a poison, a special study should be made in order to include in the dietary foods other than milk that are rich in lime. Many times, however, a dislike for milk may be confused with inability to use it. If it is merely distaste that prevents its use, milk may be included in the dietary by being cooked with other foods. Eggs will replace milk, if it is impossible to use the latter. Milk is a valuable substitute for meat.

Eggs should be used as long as they can be afforded. When possible, one egg a day should be used for each child in the family, and, if available, one or two for each adult. The children and women of the family should have the eggs first, since they need the most iron. If the cost of eggs makes their use impossible, thought should be given to increasing the use of other foods that are rich in iron. The cheapest of these are breakfast foods or breads made from the whole cereal grain. Frequently it is objected that milk and eggs cause biliousness. If this happens, it is in most cases due not to the use of milk and eggs, but rather to the absence of fruits and vegetables in the dietary. Eggs are not only valuable sources of iron, they are also rich in lime, rich in both of the unknown substances (so-called vitamines) necessary for growth and health, and the protein of eggs is of the efficient type. Eggs may be used to replace meat or milk.

Meat is not a necessary food if other animal foods are used in the dietary. Its greatest advantage over other animal foods is its palatability. Meat in the diet of little children is always questionable. The protein of meat is very subject to putrefaction, and the digestive tract of the child is particularly susceptible to this condition. The protein of meat is a valuable type but not necessary if milk, cheese, or eggs replace it. Meat contains stimulating substances not desirable for the normal child. It has a high iron content, but the susceptibility of meat to putrefaction may often destroy its value as a carrier of iron. Iron may often be introduced better in the diet through other foods. Meat lacks lime and has a much more limited quantity of the growth-promoting substance that is carried by certain fats than has either milk or eggs. It contains the second growth-promoting substance (page 412). The protein substitutes for meat are milk, cheese, eggs, and to a lesser extent soybeans and peanuts. Other legumes are not good meat substitutes unless used with milk, cheese, or eggs.

Fruits and vegetables should be used liberally in the dietary, for they are among nature's best body-cleansing and regulating agents. They furnish substances which stimulate the activity of the intestine, neutralize the harmful acids produced by the tissues, and keep both intestine and blood in good condition. Fruits stimulate digestion and are appetizing additions to the day's food. Complaint is often made that at certain seasons fruit and vegetables are too expensive to be used liberally. However, their value is not comparable to the loss of efficiency resulting from a diet that lacks natural laxatives and iron. When apples are cheap they should be baked or made into apple-sauce and should be canned for use during a season of scarcity. Carrots, beets, turnips, cabbage, onions, and parsnips are cheap at a time when other vegetables are expensive, and if carefully prepared they are easily digested; they not only give variety to the dietary, but also furnish the much-needed vegetable material.

A diet enriched by fruits and vegetables has a tendency to prevent or correct anæmia, to prevent constipation and its attendant ills, and to improve general health conditions in that it increases the amount of iron furnished to the blood and helps to prevent a putrefactive condition in the intestine. The leaves and stems of plants are particularly valuable additions to the dietary in that they supply lime and fat-soluble growth-promoting substances.

Those cereals and cereal foods that contain the larger part of the grain should be given preference in the dietary. While such a cereal food as white flour retains all the original energy-yielding ingredients and most of the protein, it has lost in the milling process the substances occurring in the outer layers, which stimulate the activity of the intestines, which help in such body functions as bone-building and the formation of red blood corpuscles, and one of which promotes growth.

White bread is entirely wholesome if thought is given to including in the meals, in forms other than bread, the substances lost by the flour during the milling process. This may be accomplished by using fruits and vegetables for their laxative properties, milk for its lime and growth-promoting substances, and eggs for their iron. The proteins in the cereal grains are not of the efficient type and must be supplemented in the diet with animal proteins. Cereal grains also lack both lime and the growth-promoting substance soluble in fat.

Sweets in the dietary are unquestionably desirable, but they should be served in such a manner as not to reduce the appetite for other foods and not to satisfy the appetite with sweet foods only. Fruits and vegetables, simple desserts of various kinds, jam with bread at the close of the meal, and candy occasionally in place of other desserts, are the best ways of using sugar. The craving for sugar between meals generally indicates a badly controlled appetite or a poorly fed individual; or it may be the outcome of some diseased condition of the body.

Candy or other sweet foods eaten between meals result in poor appetite. Sugar is an abundant source of energy, is easily digested and absorbed, and rightly used it has its place in the dietary. It lacks altogether any building foods, and, if used in large quantities, is very irritating to the mucous membrane. Therefore, it should not be eaten to the exclusion of other foods. The candy-fed child, refusing as it does other foods at meal-times, is very likely to have poor, decayed teeth, weak bones, flabby muscles, and a disordered stomach. The rule should be to use sugar with other foods and at the close of the meal.

Enough water should be consumed each day to maintain the body in a clean, wholesome condition. It is just as necessary to bathe the body inside as outside. Many cases of serious bodily disorder are directly traceable to neglect of the needs of the body for water. Constipation is frequently the result of insufficient water in the dietary.

The dietary should be planned to meet the needs of all members of the family. The main part of the meal may be made suitable for all, and to this the foods especially needed by each individual may be added. Little children should not eat all foods that are allowable for adults, nor should the grown members of the family be limited to the same simplicity of diet as the children, for children have undeveloped digestive organs that will be overtaxed by heavy foods. The strength of food in the diet of the child should be increased only as the muscles of digestion strengthen and develop. Foods that are too strong overtax the immature digestive tract, and foods that are too weak fail to develop it.

Persons working hard outdoors eat more food than those whose work is of a light, indoor character. Not only are they able to digest easily foods that are rated as difficult to digest, but they may actually need food that will require at least moderate work on the part of the digestive tract. They may have a disagreeable feeling of hunger, even when sufficiently fed, if the food consumed does not "stay by" them for a certain period of time. Just the reverse is true of the indoor worker who uses his muscles but little. These facts are often overlooked, and frequently the entire dietary is shaped to the needs of one member of the family. Hard muscular work increases the need for energy-producing foods but does not materially affect the need for other types of food.

Examples of desirable food combinations

Some simple combinations will serve to show how few foods may be put together and yet answer all requirements.

Menu I
- Whole-wheat bread
- Whole-milk
- Prunes

A dietary must be built on broad lines even if it is simple, and care must be taken not to err by a simplicity which excludes any needed food constituent.

There are many persons who have acquired a distaste for milk unless it is served in some cooked form. When this is the case and when warm food is desired, a meal but little less simple than the one just suggested may be prepared by making the "hearty dish" a vegetable cream soup. Such soups, which are easy to make, nutritious, and very delicious if well cooked and seasoned, are too little used in the family dietary.

Menu II
- Cream of potato soup, or any vegetable soup having a milk foundation
- Bread and butter
- Fruit or a succulent vegetable

Any one of the following combinations makes a well-balanced meal if sufficient amounts of the food are consumed. This does not indicate that they are ideal for all conditions. Babies, small children, and persons who have a weakened digestive system would not be given baked beans and brown bread, or bread and cheese.

Menu III
- Eggs
- Bread and butter
- Fruit or some vegetable

Menu IV
- Oatmeal, with sugar and thin cream or whole-milk
- Fruit

Menu V
- Baked soybeans
- Brown bread
- Cabbage salad with egg dressing

Menu VI
- Bread and cheese
- Onions

Menu VII
- Meat
- Bread and butter
- Green vegetables

While the food combinations just given theoretically answer all dietary requirements, they may not be practical in those cases in which food habits of long standing lead the individual to demand a greater variety. The appetite accustomed to stronger fare might pall if stimulated only with such simple mixtures.

A basis for more elaborate menus is as follows:

Menu VIII
- Cream soup
- Bread and butter
- Meat
- Potatoes
- Cabbage
- Baked apples and cream

FOOD FOR THE PROSPECTIVE MOTHER

The woman's food needs are very little increased during the first months of the growth of the child. Even if the appetite is small and trouble is experienced with nausea, the actual growth of the child is so little as not to be seriously effective at this time, in most cases. During the later months of pregnancy the increase in food needs of the mother are still comparatively small, probably not more than 15 to 20 per cent above normal. This does not mean that the food for the prospective mother is unimportant. It is highly important that she should have an adequate and well-balanced dietary. She needs it to keep her efficiency and to produce an efficient child. It should be her problem to maintain a normally efficient diet, increasing it toward the close of the period.

Foods needed by the prospective mother are: (1) Milk. From a pint to a quart of milk a day should be used to supply lime, efficient protein, and the two growth-essential substances. (2) Cereals made from the whole grain should be used to supply energy, protein, and iron, and to increase the laxative substances in the diet. (3) Fruits and vegetables. To give flavor, needed salts, lime, iron, and laxative substances, fruits and vegetables are essential. Green vegetables are especially valuable for the iron that they supply. (4) Meat or eggs or cheese. Once a day meat, eggs, and cheese may be used, although they are not needed if the mother receives fully a quart of milk. (5) Bread and butter. The dietary may be completed with bread and butter. It is of especial importance that the diet of the prospective mother should be laxative if she has any tendency to constipation.

FOOD FOR THE NURSING MOTHER

The food need of the nursing mother is increased in proportion to the amount of milk she produces and the child consumes. It has been estimated that her food needs are increased as follows:

For the first 3 months about 90 calories for each pound of the baby's weight

For the second 3 months about 85 calories for each pound of the baby's weight

For the third 3 months about 80 calories for each pound of the baby's weight

For the fourth 3 months about 70 calories for each pound of the baby's weight.

This means a marked increase in the mother's energy needs. For example, if the baby weighs 10 pounds when it is a month old, the mother must increase the calorie value of her diet 10 times 90 calories, or about 900 calories. A quart of milk, an egg, two pieces of bread, and an extra allowance of vegetables will accomplish this.

The mother's diet must supply not only more energy but also more protein of good quality, more lime, more phosphorus, more iron, and more of the two essential unknown growth-promoting substances, or so-called vitamines. If the diet of the mother does not supply efficient food, she cannot manufacture sufficient milk of good quality to meet the needs of the baby.

Two of the best foods to increase the amount of protein, lime, phosphorus, and growth-promoting substances in the diet are milk and eggs. Eggs give in addition considerable iron.

The diet of the nursing mother should be laxative, and consequently fruits, mild-flavored vegetables, and breakfast foods and breads made from the whole cereal grain should play an important part. There is no truth in the old superstition that fruits in the diet of the mother produce colic in the baby.

FORMULAS FOR INFANT FEEDING

If a baby cannot be fed by its own mother, the next best thing is the milk of some other animal. A study of the food needs (pages 407 to 412) will soon show why milk is practically an essential food for little children. The following simple formulas may be of service to mothers who are unable to nurse their own babies.

First week

First day: 1 to 2 ounces of water every 4 hours.

Second to fourth days: Mix 3 ounces of milk, 7 ounces of water, and 2 teaspoons of milk-sugar, and divide the mixture into seven feedings.

Fifth to seventh days: Mix 4 ounces of milk, 7 ounces of water, and 3 teaspoons of milk-sugar, and divide the mixture into seven feedings.

First week to third month

Mix 5 ounces of milk, 9 to 11 ounces of water, and 3 tablespoons of milk-sugar, and divide the mixture into six or seven feedings. Gradually increase the amounts until at the end of the period the mixture contains about 16 ounces of milk, 14 to 18 ounces of water, and 4½ tablespoons of milk-sugar.

Third month to sixth month

Mix 16 ounces of milk, 14 to 18 ounces of water, and 4½ tablespoons of milk-sugar, and divide the mixture into five or six feedings. Gradually increase the amounts until at the close of the period the mixture contains about 24 ounces of milk, 9 to 13 ounces of water, and 4½ tablespoons of milk-sugar.

Sixth month to ninth month

Mix 24 ounces of milk, 9 to 13 ounces of water, and 4½ tablespoons of milk-sugar. Divide this mixture into five feedings. Gradually increase the amounts until at the end of this period the mixture contains 30 ounces of milk, 8 ounces of water, and 3 tablespoons of milk-sugar. Cook 2 or 3 tablespoons of barley flour with the water used in the mixture.

Midway between the two morning feedings give 1 to 2 tablespoons of strained, diluted orange juice.

Ninth month to twelfth month

Mix 30 ounces of milk, 6 to 8 ounces of barley gruel, and 3 tablespoons of milk-sugar. Divide this amount into five feedings. Give 1 to 2 tablespoons of strained orange or prune juice between the two morning feedings. Gradually increase the milk until at the close of the period the child is receiving a quart of milk and a pint of barley gruel. Increase the amount of orange juice to 3 tablespoons. Half of a soft-cooked egg may be fed at this time. A piece of stale or twice-baked bread may be given the child to chew.

THE PART MILK SHOULD PLAY IN THE DIET DURING GROWTH

Food for a child 12 to 18 months old

Breakfast: 6 to 8 ounces of warm milk; 1 or 2 tablespoons of thoroughly cooked, strained cereal with top milk.

Mid-morning lunch: 6 to 8 ounces of warm milk; piece of twice-baked bread.

Dinner: 6 to 8 ounces of warm milk; thin piece of crisp toast or twice-baked bread; slightly cooked egg.

Mid-afternoon lunch: 2 or 3 tablespoons of orange juice or other mild fruit juice.

Supper: 6 to 8 ounces of milk; 1 or 2 tablespoons of thoroughly cooked, strained cereal with top milk.

Type of meals for children 18 months to 2 years old

Breakfast (6:30–7:30 A. M.): Warm milk with lightly buttered bread; or cereal with thin cream, glass of warm milk; or lightly cooked egg, lightly buttered bread, glass of warm milk.

Mid-morning meal (10 A. M.): Glass of milk with slice of bread.

Dinner (1–2 P. M.): Mashed potato with dish gravy, bread and milk, very small serving baked apple or prune pulp; or lightly cooked egg, bread and milk, small serving baked apple or prune; or mashed spinach, carrots, or similar vegetable, bread and milk, small serving very simple junket or rice pudding or similar simple dessert.

Mid-afternoon meal: tablespoon of orange juice or scraped apple.

Supper (5–6 P. M.): Bread and milk or milk toast.

Although the child may be at the family table from about the third year, he should not be allowed the freedom of the family dietary. It is far better for the child to learn that certain foods are not for his consumption. There is no better lesson in self-control or temperance than the one that may be taught in this simple way.

Type of meals for children 2 to 4 years old

Breakfast (7–8 A. M.): Cereal with thin cream, milk to drink, or lightly cooked egg with toast and milk.

Mid-morning meal (10–11 A. M.): Bread and milk.

Dinner: Lightly cooked egg, buttered baked potato, bread, milk, stewed fruit; or mashed vegetables, such as spinach, purée of peas, or carrots, bread, milk, light pudding, such as rice or bread pudding or junket, or occasionally a simple ice cream; or bread and milk, baked potato and one other vegetable, small serving of pudding.

Supper (5–6 P. M.): Bread and butter, milk; or cereal mush and milk; or bread and milk, and stewed prunes or apple-sauce.

Type of meals for children 4 to 8 years old

Breakfast (7–8 A. M.): Stewed fruit; cereal with whole milk or thin cream, bread and milk; an egg may be added to this meal.

Mid-morning meal: Milk with thin slice of bread and butter.

Dinner (12–1 P. M.): Lightly cooked egg, spinach or peas or beans well mashed, baked potato or boiled rice, stewed fruit or light pudding.

Supper: Well-cooked cereal with thin cream, milk to drink, stewed fruit; or lightly cooked egg, bread and butter, milk to drink, baked apple.

Type of meals for children from 8 to 12 years old

Breakfast: Cereal with thin cream; eggs, poached, boiled, or scrambled; milk with bread and butter; fruit may be eaten at this meal.

Mid-morning meal: Glass of milk and a cracker.

Dinner: Small piece of steak or roast, fish or chicken; potato, rightly cooked cabbage or other vegetable; bread and butter and milk; some simple dessert, such as custard, bread and jelly, or fruit.

Supper: Eggs or cream soup or milk toast, bread and butter, milk, stewed fruit or bread and jelly.

Type of meals for boys and girls 12 to 16 years old

Breakfast: Stewed or fresh fruit; well-cooked cereal with thin cream or whole milk; bread and butter; milk or cocoa; eggs, if available.

Luncheon or supper: Scalloped hominy and cheese; bread and butter; milk or cocoa; fruit, raw or cooked.

Dinner: Small serving of meat (a meat substitute may be used); mashed, baked, boiled or creamed potatoes; a liberal serving of some succulent vegetable; bread and butter; milk; a simple dessert.

CHAPTER XVIII

MARKETING FOR THE HOUSEHOLD

By Anna Hunn

The housewife has the duty and privilege of spending for food on an average of about 30 or 40 per cent of the family income. Hers is the tremendous responsibility of seeing that the family is supplied with food necessary for its growth and maintenance at its highest efficiency. Good buying is based on knowledge. This knowledge may be obtained only through practice and study. The housewife should, therefore, be alert and quick to seize every opportunity to know more of the production, the marketing, the nutritive value, and the cost of the vast number of articles which she has to buy. She is expected to be expert in the buying of not only one article, but hundreds. She has an unlimited field for study.

A good buyer plans for the present and for the future. She carefully considers the material in the storerooms, ice-boxes, and gardens, and plans to buy only that which will supplement or enable her to use the food already on hand. The next step is to visit the markets. The good buyer rarely telephones. The exceptions to this rule would be an emergency call or the buying of standard products, such as sugar, cereals, spices, or known brands of goods.

The housewife uses the senses of sight, touch, taste, and smell in her final judgment of food. It is quite as essential that she should use the same senses in buying food. To do this it is necessary that she should go to market. For buying commodities it might be well to have the following points in mind: A definite amount should be ordered in pounds or definite measure; the unit price of the commodity should be ascertained; correct scales and measures should be used and the full amount paid for delivered. To check the measures and weights, correct scales and measures should be a part of every kitchen equipment (page 129).

BUYING FRESH OR STAPLE FOODSTUFFS

Kind of food.

The kind of food which the buyer seeks is based on the family's standard of living. Such as may quite properly be bought by those who can afford it, may not be at all suitable for those with a smaller income.

In order to choose wisely between two or more foods, the housewife should know the nutritive value, the proportion of edible and non-edible material, and the cost. This knowledge comes only through study and comparison.

Grade of food.

After the buyer has decided on the kind of food to buy, the next step is to select the grade best suited to individual needs. To be able to judge of grades, it is necessary to know the standard products, or to know the qualities that enhance and the qualities that decrease the value of the food.

In the case of fresh fruits and vegetables, the standard product should be well-matured, sound, free from blemish, uniform in size and shape, of good color, fresh, clean, and well packed. Most of these qualities may be determined by the eye, some by the touch, and others by the odor and the taste. Among grades, as among foods themselves, there are differences in nutritive value, in proportion of edible and non-edible material, and in cost. These differences may be determined only by study and comparison. Selection of meat is discussed on page 510, and canned foods on page 445.

Up to the present time, most food has been graded from the point of view of the producer rather than of the consumer. Few foods have been graded and labeled so that the consumer and the merchant can talk on the same basis. Until this is done, it will be difficult for the housewife to buy intelligently. She should, however, read carefully the labels on all packages showing the net weights and the composition of the contents.

Amount to be bought.

After the kind and grade of food have been decided on, it is next necessary to determine the definite amount to buy, which depends primarily on such factors as the following: The amount allowed for one person (this amount is the basis of good buying and if properly estimated insures enough food for all and eliminates to a great degree the problem of left-over food [see Table XXII]); the number to be fed; the number of times the food is to be served; the keeping qualities of the food (the amount bought should be small enough to prevent depreciation); the available storage facilities; the amount of money available to invest (interest on the money invested in food should be added to the cost of the food); the terms of contract; the relative advan-

TABLE XXII.—Servings of Vegetables in One Pound

Vegetable	*Approximate size of serving*	*Number servings in one pound*
Asparagus	½ cup	4
Beans, dry	½ cup	8–9
Beans, string	½ cup	4
Beets	½ cup	4–5
Cabbage	¾ cup	3
Carrots	½ cup	4–5
Cauliflower	¾ cup	3
Celery	½ cup	4
Onions	½ cup	4
Parsnips	½ cup	4
Potatoes	¾ cup	3
Salsify	½ cup	3
Brussels sprouts	½ cup	5–6
Spinach	½ cup	4
Squash, summer	½ cup	1–2
Squash, winter	½ cup	2–3
Sweet potatoes	1 potato	3–4
Swiss chard	½ cup	3–4
Tomatoes	½ cup	3–4
Turnips	½ cup	4–5

tages of buying in large quantities; the season of the year (it is best to buy large amounts of food for storage when the new crops come in; this is especially true of dried fruits and many grain products, which come on the market but once a year); the cost.

Bulk or unit package.

When the amount to be bought has been determined, the housewife must decide whether to buy in bulk or package, and, if in package, the size of the unit. It is generally cheaper to buy in bulk than in package. (See Table XXIII.) The package costs more because of the container and the labor involved in packing and handling. The package, on the other hand, has the merit of being air-tight and dirt-proof. For these and other reasons it is preferred by some persons. It is possible, however, for the grocer to keep food in bulk in a satisfactory and sanitary condition. Buying in bulk usually necessitates storage in moist-

TABLE XXIII.—COMPARISON OF COST OF FOOD BOUGHT IN PACKAGE AND IN BULK

Food	*Cost of package*	*Weight or measure of contents of package*	*Amount obtainable in bulk for the same money*
Bacon	$.50	9 ounces	13.3 ounces
Cocoa	.38	16 ounces	30.4 ounces
Cocoanut	.04	3.5 ounces	5.75 ounces
Codfish	.24	16 ounces	20 ounces
Coffee	.35	16 ounces	17.5 ounces
Crackers (soda)	.05	24 crackers	35 crackers
Crackers (graham)	.10	33 crackers	48 crackers
Ginger snaps	.05	5 ounces	8 ounces
Ginger	.075	4 ounces	6 ounces
Macaroni	.10	12.5 ounces	16 ounces
Peanut butter	.30	20 ounces	27 ounces
Peas (a can)	.18	2 cups	4 cups cooked
Raisins	.135	15 ounces	16 ounces
Rolled oats	.13	20 ounces	23 ounces
Saltines	.15	45 crackers	96 crackers
Starch	.09	16 ounces	19.5 ounces
Tapioca	.25	16 ounces	19 ounces
Vinegar	.24	1 quart	2 quarts

ure and vermin-proof receptacles. Such receptacles accumulate in every household and should be saved for this purpose.

Units of sale.

Most commodities are sold by the pound. The tendency is to increase the number thus sold, since the pound is an exact

TABLE XXIV.—UNITS IN WHICH VEGETABLES ARE SOLD IN NEW YORK STATE

Vegetable	*Unit*
Asparagus	Bunch varies from ½ to 2½ pounds
Beans, string	Pound; 25-pound hamper
Beans, lima	Pound in pod; quarts when shelled
Beets	Pound; bunch
Brussels sprouts	Quart
Cabbage	Pound
Cabbage, Chinese	Pound
Cauliflower	Pound; crate; hamper
Carrots	Pound; bunch
Celery	Bunch, 12 stalks in a bunch
Corn	Dozen ears
Cress	Pound
Cucumbers	Piece; dozen; hamper
Eggplant	Piece; crate; hamper
Horse-radish root	Pound
Kale	Pound
Kohlrabi	Pound
Leeks	Pound
Lettuce	Head; dozen heads
Mushrooms	Pound
Onions	Pound
Parsley	Bunch; dozen bunches
Parsnips	Pound
Peas	Bushel measure
Peppers	Piece; dozen; barrel
Potatoes	Pound
Pumpkin	Piece
Radishes	Bunch; dozen bunches
Romaine	Pound
Squash	Pound
Tomatoes	Pound; standard ½ bushel crate
Turnips	Pound
Salsify (vegetable oyster)	Bunch; dozen bunches

TABLE XXV.—UNITS IN WHICH FRUITS ARE SOLD IN NEW YORK STATE

Fruit	*Unit*
Apples	Pound; standard barrel (3 bushels)
Apricots	California crate, 22 pounds
Bananas	Pound
Berries	Quart; crate of 32 quarts
Cantaloupes	Pound; crate according to size
Cranberries	Pound; 100 pounds in a barrel
Grape fruit	Piece; box of from 46 to 96 grapefruit
Grapes	Pound
Lemons	Dozen; box of from 300 to 360 lemons
Oranges	Dozen; box of from 96 to 250 oranges
Peaches	Pound; standard ½ bushel peach basket
Pears	Pound
Pineapples	Piece; case
Plums	Standard ½ bushel basket
Quinces	By measure
Rhubarb	Pound
Watermelon	Piece

measure, whereas the bunch or basket or other container is too often unstandardized. (See Tables XXIV and XXV.)

Price.

The price to pay depends on market conditions. The market and crop conditions may be learned by a study of the market reports in the daily newspapers. These prices, however, are generally wholesale prices, and since the latter are not always reflected in the retail market, they serve only as a guide. Local crop and local market conditions may be such as either to lower or raise the retail price. In order to obtain the best price, it is necessary for the housewife to study the prices at the local stores and then, if possible, compare them with prices of some out-of-town firm.

Where to buy.

The question of where to buy may be settled by buying where the maximum value can be obtained for the minimum price. This place can be determined by a study of markets. It is always advisable to know the sanitary conditions surrounding the production and marketing of the products. There is also to be considered the factor of discounts, generally based on the amount bought, the time and place of delivery, and the delivery charges. When buying from out of town, it is necessary to consider the cost of freight and cartage. Cheapness does not always mean good quality or full weight. Every food at a reduced price is offered for one of two reasons: because the market is oversupplied; or because the owner is afraid to risk further depreciation. In most cases this depreciation has already set in, and it is unwise to buy such food unless it can be used immediately. If the dealer is selling goods below the market price, the goods are generally below the market standards. Only an expert can know a bargain.

Inspection of goods on delivery.

On arrival at the house, goods should be opened and examined as to grade and condition. If not acceptable, they should be returned at once. The goods should be checked with the invoice for quantity and weight, price of units, and total costs. The invoice should be filed to check with the weekly or monthly bill.

Records.

In the case of staples, it is often desirable to keep a stock

STOCK RECORD—SUGAR

Date	*Amount (Pounds)*	*Price a pound (Dollars)*	*Total cost (Dollars)*	*Inventory (Pounds)*	*Yearly consumption (Pounds)*
1916					
8/17	5	.09	.45		
8/28	10	.08	.80		
9/5	25	.05	1.25		
9/20	15	.07½	1.14		
1917					
2/10	50	.05	2.50		
4/15	25	.05	1.25		
	130		7.39		
9/7				18	112
9/21	100	.09	9.00		

record. The form of record as here suggested for sugar enables one to tell at a glance the date, the amount bought, and the price paid for the article in question. The housekeeper has in these stock cards a basis on which to buy for the coming year. In case no other records (page 177) are kept, it is desirable to include the name of the firm from whom the goods were bought.

Storage.

The proper storing of food is very important, because only by having good storage conditions can there be profit in buying in large quantities. It is desirable to have cool, dry, and well-ventilated store-rooms (page 583). Fresh vegetables, fresh fruits, and dried vegetables and fruits should be kept in such a storeroom, and should be so packed as to allow free circulation of air. The exceptions to this rule are sweet potatoes, which should be stored in a dry, warm place, and bananas, which should never be allowed to chill since this causes them to blacken. Staples, such as cereals, flours, sugars, and other dry products should be kept in dry, moderately cool, well-ventilated storage. Meat, fish, butter, and milk may be kept at a lower temperature, 36° F., or lower.

Low temperature and lack of moisture both tend to retard the growth of micro-organisms that cause spoilage. Most storage foods should be well matured before being stored and should be looked over at certain intervals for the removal of any decayed or spoiled portions.

BUYING CANNED FOODS *

Grading fruits and vegetables for canning.

Before one can distinguish the relative values of market grades of canned goods, it is necessary to know how these are determined by the packer. For fruits and vegetables the lines of quality determination are much the same and as follows:

* The following discussion of canned foods is condensed from Canned Foods, Fruits and Vegetables, by Florence R. Corbett, Tech. Education Bull. 18, Teachers College, Columbia University.

Locality in which the fruit or vegetable is grown.—Naturally the fruits and vegetables produced in sections where expert gardening or fruit-raising prevails and which naturally favor such crops, will be superior in quality. Of the most common and widely used, those grown in the northern states are superior in texture and flavor to those grown in the South, and because of the firmer texture "stand up" better in packing.

Size of the fruit or vegetable.—The larger the fruit, provided it is uniform and good in other respects, the higher it will be graded. The smaller vegetables are graded highest, since they are generally younger and tenderer, juicier, and sweeter.

Flavor is an important factor to the consumer, but does not take precedence of size, texture, and color in grading either fruits or vegetables, because the buyer is generally influenced by the handsome appearance of fruits or the delicate appearance of immature vegetables which may be quite lacking in flavor. The public's preference is taken into consideration, and fine-flavored products, not notable for size or color, may be graded lower than those of pleasing appearance and inferior flavor. A striking illustration of this is found in the preference for very small peas which consist principally of skins, water, and a little sugar. Because of public preference, these are graded higher than the larger peas of rich flavor and higher nutritive value.

Texture.—Fine texture is a characteristic of high-grade fruits and vegetables. Tough peas and beans, fibrous okra and asparagus are graded low.

Color.—The natural color of the product when at its best is the standard of the high-grade pack. Unfortunately, the attempt to emulate nature has been overdone by some packers to the point where most of the public have come to regard copper-greened peas and beans as superior to those of nature's green. Now that the law requires that the facts regarding the use of coloring matter be stated on the package, the public is in a position to choose between the natural and the artificial, the safe and the possibly harmful. Fortunately, it is the fancy grades of vegetables which receive the copper treatment, such as the very small peas and beans in which the nutritive value is low and the price prohibitively high to the average buyer. Even when the natural color of the vegetable after cooking is the standard sought, grading of the product is still done on color lines. Peas that have an occasional yellow one in the lot are graded lower than those uniformly green, while if many are yellowish the lot is graded lower still. String beans containing an occasional brown or rusty pod are graded lower than those uniformly green.

Form, whole or cut.—The fruit or vegetable of suitable size which is sufficiently perfect—free from bruise and spots of decay—to can whole is of the highest grade, provided it grades high on other points. Those cut in halves grade next highest, such as peaches, apricots, pears, and apples, and those in slices next, such as sliced peaches. Smaller pieces, sometimes referred to as chips, grade lower yet. Pineapple slices afford the highest grade in that fruit, the chunks and cubes grading next and the chipped, grated, and crushed pineapple respectively lower.

Preparation; peeled, unpeeled, pitted, cored.—Those fruits which are improved by peeling are left unpeeled only in the lowest grades. The same is true of pitting and coring, except when the fruit is handsome in appearance but unsound at the pit or core.

Medium of packing.—Fruits packed in water are of the lowest grade and generally known as "pie" fruit. Those packed in sirups are graded according to the density of the sirup, 35° to 40° sirup being used for preserves, such as strawberries, 30° to 34° for fancy peaches, plums and other fruit for table sauce; 25° to 28° for high-grade fruits for table sauce; 20° to 25° for a still less rich grade of table sauce, and 10° to 20° for very light sirup suitable only on sweet fruits or those to which more sugar will be added in preparation for the table. Juicy vegetables such as tomatoes are now by law required to be packed in their own juice. Other vegetables must be packed in as little water as is necessary to immerse them completely. A little salt and sugar are allowed in the liquid.

Trade terms.

"Pie fruit" is the lowest class of fruit. In peaches there are two grades, the unpeeled and the peeled, the latter bringing the higher price.

The "standard" grade of fruit ranks next. It has the lightest sirup and consists of the relatively inferior fruits in size, color, flavor, and texture.

"Extra standard," "extra," and "fancy" are terms applied to grades increasingly good. If fruits grade high as to variety, color, size, flavor, texture, and are packed in heavy sirup, they will be graded as Fancy, and fruits less good will fall into the other group grades according to the degree in which they approximate the grade called Fancy, and according to the weight of sirup used. That it is quite impossible under this system to depend on the term Fancy representing the same quality of fruit year after year is easily seen, for the crops yielded of various fruits are seldom of the same standard in successive years. The same is true of any grade. In a good year the trade known as Standard may prove better than the Extra Standard in a poor year. This makes for uncertainty on the part of the purchaser, and any buyer of large quantities of canned goods finds it necessary to see the contents of tins selected as samples and to order according to sample as well as by grade and trade name. The small buyer is at a great disadvantage in being unable to do this.

The trade terms for grades of vegetables are in general the same as for fruits. The poorest of southern-grown produce and the trimmings of northern-grown are graded below standard. In tomatoes these sub-standard grades are sometimes known as "pulp" and "purée." In peas they are known as "seconds" and "soaked." This last term refers to peas that have grown too hard for canning purposes, but have been soaked in water from twelve to thirty-six hours and then canned.

Quality of canned goods.

On opening the can the volume of the contents in relation to the capacity of the can should be noted. The contents should fill the can; any considerable space between the top of the can and the surface of the contents should count against the grade of the product.

Any excess of liquid, that is, more than is necessary to immerse the solids, lowers the grade of the package.

The presence of any foreign material such as drops of solder or bits of paper, which indicate careless methods in packing, should be looked for.

Peas.—In canned peas, a very cloudy or starchy liquid probably indicates that the peas have been "soaked." This would be confirmed by the peas being mealy, large, and with skins easily loosened in the can. Since peas are graded according to size, those known as "sifted," whatever the size, are higher in price than the unsifted, sometimes known as "the run of the garden." A large number of yellowish peas in a can indicates inferior quality and flavor.

String beans.—The smaller string beans, less than two inches in length, are high priced and more decorative than nutritious. Those over three inches in length are coarse. Those between two and three inches are generally satisfactory. The "cut" beans are cheaper but not uniformly good in flavor and texture.

Lima beans.—The smaller lima beans, bush limas, are higher in price and generally of a better color than the large beans, pole limas.

Corn.—Canned corn that is very milky or full of liquid may be sweet, but it does not grade so high as the dry packs and does not keep so well.

Okra.—Young okra is tender and the pods are canned whole. This brings a better price than the older pods which are cut before being packed.

Spinach.—Good spinach is packed whole, that is, the leaves are not cut. The chopped packs lack the fresh flavor of the other and their quality is less certain.

Tomatoes.—Tomatoes "hand packed" and "cold packed" are put whole into the cans while raw and steamed, so that they are cooked in their own juice. If any additional juice is required to fill the crevices, it is supposed to be tomato juice.

Tomatoes so packed are superior to those cooked before the cans are filled, and will be found practically whole when the can is opened.

Fruits.—All large fruits are more expensive in tins than are small fruits, because the tins are more solidly filled with the latter and more portions can be served from a tin of given size. Of the large fruits canned whole or in halves, neither the largest nor the smallest are the most economical investment, but rather the medium size. This is because portions are made by the piece rather than the spoonful and the very large pieces are few to the tin, while the very small necessitate two or more pieces being served to the portion. Large fruits bought in the cut form, for example, peach slices, peach chips, and pineapple chips, are most economical of all, for the same reason that small fruits are economical.

Safe and unsafe tin cans.

"Sanitary" cans.—Until the last few years it was the general custom to seal tin cans by soldering. It was inevitable that some small portion of the solder should be exposed to the action of the contents of the can, and frequently drops of solder were lost among the contents of the can. The "sanitary" can is now used by the best packers. In this can the food is hermetically sealed without the use of solder by a clever mechanical device which folds and compresses the overlapping edges of the top and sides of the can. Such cans are stamped "Sanitary" on one end, and the consumer should discriminate in their favor for his own safety and to encourage the use of the best methods in packing.

Lacquer-lined cans.—To prevent the undesirable reaction between acid fruits and vegetables and the metal of the cans, all tins employed for packing foods of strongly acid character should be lacquer-lined by a heat-resisting varnish. This is especially important since the cost of tin has advanced and the tin covering of sheet metal used for the manufacture of cans has become very thin.

Rusted cans.—Cans rusted on the exterior are not evidence of deteriorating contents, but cans rusted on the interior may have an undesirable effect on the food. Experience shows that soldered cans are often so rusted at the soldered end.

"Swells."—Imperfectly sterilized foods often produce gas, which bulges the ends of cans and sometimes causes the can to burst. This is more likely to occur in the case of those foods that contain the least acid and are most difficult to sterilize, such as corn. Reputable distributors will accept such goods, known as "swells," if the swelling has occurred within a time limit set at the date of sale, and will reimburse the buyer to the amount of the bill. It is difficult for the small buyer to return such packages to the retail dealer for credit unless he can prove that he has had the goods but a short time and has kept them in a cool place. Quantities of swelled cans are returned constantly to packers and distributors, and unscrupulous handlers of such goods are known to have returned them to the market by the process of puncturing the can along the side to allow the escape of gas, then re-heating, re-sealing, and re-labeling. Such practice may be detected on opening the can by the presence of the punctured and soldered spot. Needless to say the use of food so processed is most unsafe.

Labels and trade names or brands.

The interests of the consumer necessitate that the label shall declare the name of the packing company, the place of packing, the weight of contents, the amount of liquid, the medium of the pack (water or sirup), the grade of the product, and the name and address of the distributors or jobbers. All this should appear whether the goods are packed in the state where they are sold or in another state. The date when packed should be stamped in the tin, as the word "sanitary" now is in some cans.

In order that the statement regarding grade of goods may not be misleading, it is necessary that trade names of grades have uniform significance for packers and that the use of the uniform grading methods and nomenclature be required by law. At present only experience enables one to know just how good is the "best" grade of any given packer's product. All "best" grades are not now by any means equal. If the definitions of the grades are printed in fine type on the label, it is helpful to the buyer. The consumer might be aided further by the color of the label declaring the grade of the package contents. Thus a white label might be used for products of the highest grade, and red, blue, green, yellow in the order of decreasing quality. The business of determining grades would necessarily be an annual matter, and could probably best be done by a joint-committee representing the producers, the packing interests, and the Federal government.

Quantity value.

Among dealers the sizes of packages of canned goods are designated by terms that refer to weight expressed in pounds. The common sizes or capacities are 1, 2, 2½, 3, and 10 pounds, and are briefly designated as 1s, 2s, 2½s, 3s, and 10s. Doubtless at some time in the past the packages contained the weight of food indicated by the numerals assigned to the cans. But keen competition and the demand for low-priced articles have gradually shrunk the capacity of the cans, while the descriptive numerals have remained unchanged. Thus a can known as No. 2 size may actually weigh 1 pound and 6 ounces. A No. 3 can generally weighs about 2 pounds and 8 ounces. A No. 10 can is above the average if it weighs 8 pounds.

It may be that no harm is done to distributors and large buyers when every one understands the situation and no one is deceived. But the average retail buyer not only has not this knowledge of conditions but does not even know whether he is buying by weight or measure. To him canned peas are graded as 25-cent cans, 22-cent cans, 20-cent cans and 18-cent cans. When he chooses the larger of two cans at the same price, he does not know whether it is the heavier can. If it is the heavier, he does not know until he opens it whether the extra weight is due to an excess of liquid, or solidity of pack, or excessive weight of tin can and solder. Such buying is of course absurdly extravagant.

TABLE XXVI.—COMPARISON OF QUANTITY VALUE OF SIX BRANDS OF CANNED TOMATOES

Label of sample examined	*Weight of can unopened*	*Weight of empty can*	*Weight of total contents*	*Measure of liquid*	*Weight of solid fruit*	*Cost of can*	*Cost of one pound of solid fruit*
Sample U							
Extra fancy tomatoes. Contents guaranteed to weigh at least 2 lbs., 2 oz....	2 lbs., 8½ oz.	5¾ oz.	2 lbs., 2¾ oz.	15¼ oz.	1 lb., 3½ oz.	*Cents* 15	.1216
Sample V							
Extra fancy tomatoes..............	2 lbs., 8 oz.	6 oz.	2 lbs., 2 oz.	1 lb., 2 oz.	1 lb.	15	.15
Sample W							
Hand packed.......................	2 lbs., 12½ oz.	5½ oz.	2 lbs., 7 oz.	12 oz.	1 lb., 11 oz.	15	.088
Sample X							
Fancy. Contents guaranteed 2 lbs., 2 oz.	2 lbs., 9½ oz.	6 oz.	2 lbs., 3½ oz.	10¼ oz.	1 lb., 9¼ oz.	12	.0752
Sample Y							
Hand packed. Guaranteed pure. Contents 1 lb., 3 oz..............	1 lb., 3 oz.	3½ oz.	15½ oz.	7½ oz.	8 oz.	10	.20
Sample Z							
N. Y. choice......................	2 lbs., 4 oz.	5¼ oz.	1 lb., 14¾ oz.	1 lb., 2¼ oz.	12½ oz.	10	.128

Suggestions for the consumer.

In buying canned goods, one should not choose the cans because of the pictures on the labels.

One should not hesitate to require of the dealer as much information regarding the quantity and quality of canned food as regarding a purchase of food in any other form.

Influence should be used to obtain legislation that will require uniform standards for all packers in all states; uniform laws regarding labeling for all packers in all states; and labels declaring accurately the quality and quantity of the contents of the can, and giving the weight of solid materials and the measure of liquid.

References

U. S. Dept. of Agr., Farmers' Bull., 203.

U. S. Dept. of Agr., Bur. of Chem., Circ. 54, Analysis of Canned Peas and Beans.

U. S. Dept. of Commerce and Labor: Census Bull. on Manufactures, 1902. Bull. 61, Census of Manufactures, 1905.

CHAPTER XIX

FOOD FOR THE SICK

By Flora Rose

Only such directions for feeding the sick will be given as may be of service in minor illnesses treated without the advice of a physician or as may aid in carrying out the directions of a physician in more serious illnesses.

In all sickness the diet should be a matter of some consideration. A change from the comparative activity of health to the comparative passivity of most cases of sickness means in itself a readjustment of dietary habits. Many disorders are caused partly by diet and are in turn much affected by dietary changes. Colds, constipation, indigestion, and some cases of fever are of this nature.

Sick persons need as much energy as well ones who live under the same conditions. Moreover, fever patients are using up considerably more energy than well persons. Nevertheless, at the beginning of any illness which may have been affected by food eaten, it is generally desirable to rest the digestive tract by a day or more of fasting and by several days of moderate diet. If there is prospect of a protracted illness, a fasting period is usually limited to one day. If the illness is brief and particularly if food aggravates it, the fasting period may be extended over two or even three days, depending on the response and vigor of the patient.

FLUID DIET

Generally illness means that the body is below par and cannot stand the strain of even normal conditions. This necessitates reducing all kinds of work which the individual would normally do. The digestive organs, as well as other parts of the body, must have rest. The food should therefore be reduced in total amount and should be of a kind that is readily digested and absorbed. Foods in a fluid or soft condition meet this requirement most satisfactorily. They are dilute and have as a rule a rather low food value. A fluid diet has in general a food value lower than actual body needs. This is desirable in most cases in which rest for the digestive organs is of prime importance. A fluid diet may be so constituted, however, as to meet actual food needs. The food value of the fluid diet must depend on the condition and needs of the patient.

TABLE XXVII.—Foods for a Fluid Diet

Kind of food	*Qualifications as food for the sick*	*Proportions for making*	*Comparative fuel value*
Broths, clear soups, beef tea	Agreeable to taste, stimulating, comforting. Good as carriers of extra nutrition, such as cereals and eggs. Low in food value.		1 cup gives 25 calories
Beef juice	Easily digested protein food. Expensive.	1 pound meat gives ½ cup juice	1 cup gives 50 calories
Milk	Most valuable sickroom food. Has all-round nutritive value. Is a good carrier of other nutrients, such as eggs, cereals, sugar, cream		1 cup gives 150 calories
Cereal gruels	Good when appetite and assimilation are poor. Rapidly digested and absorbed. Easily enriched. If cereal dextrinized, easy way of increasing nutritive value because the amount of cereal in gruel can be increased.	1 ounce cereal to 1 qt. water 2 ounces cereal to 1 qt. water 1 ounce cereal to 1 qt. milk 2 ounces cereal to 1 qt. milk 6 ounces dextrinized cereal to 1 qt. water 6 ounces dextrinized cereal to 1 qt. milk	1 cup gives 25 calories 1 cup gives 50 calories 1 cup gives 175 calories 1 cup gives 200 calories 1 cup gives 600–800 calories 1 cup gives 750–900 calories
Eggs	Valuable to increase nutritive value of other foods, such as eggnogs, egg with fruit juice, egg with broth or gruel. A valuable all-round food.		1 egg gives 60 to 100 calories 1 egg white gives 13 to 14 calories 1 egg yolk gives 77 to 86 calories

A typical meal plan for a temporary fluid diet having low food value.

The following diet is low in calorie value and must be increased as soon as possible. Food should be given every two hours.

1st meal: 1 cup cereal gruel made with milk or ½ cup coffee with ½ cup milk.
2nd meal: Fruit juice with egg (½ cup fruit juice, 1 to 4 teaspoons sugar, 1 egg white, ½ cup water).
3rd meal: 1 cup broth or beef tea.
4th meal: 1 cup cereal gruel made with milk.
5th meal: ½ cup fruit juice diluted with ½ cup water.
6th meal: 1 cup cereal gruel made with milk.
7th meal: 1 cup broth.
8th meal: ½ cup milk mixed with 1 egg and sweetened with 1 teaspoon sugar.
9th meal: 1 cup broth or beef tea.

A typical meal plan for a fluid diet for a lasting illness.

The following diet may be planned approximately to meet the food needs of the patient. If the illness is to be of long duration, this is necessary. Food should be given every two hours.

1st meal: 1 cup cereal gruel made with milk.
2nd meal: 1 cup cocoa or milk flavored with coffee.
3rd meal: Albuminized fruit juice (½ cup fruit juice, 1 to 3 teaspoons sugar, 1 egg, ½ cup water).
4th meal: Cream soup, with egg added.
5th meal: 1 cup cereal gruel flavored with beef extract.
6th meal: 1 cup milk flavored with orange juice.
7th meal: 1 cup albuminized fruit juice.
8th meal: 1 cup cereal gruel.
9th meal: 1 eggnog.

SOFT OR SEMI-SOLID DIET

Many sick persons thrive better on a soft diet than on a fluid one. This is particularly true for those persons who dislike milk. A soft diet is the first step after the fluid diet and may, if necessary, replace it.

Foods for a soft or semi-solid diet are: Toast made with milk, cream, water, or beef juice; custards, whips, junket, gelatins, soft puddings; omelets, soft-cooked eggs; thoroughly cooked, strained cereals.

LIGHT OR CONVALESCENT DIET

Light diet should be given in convalescence following the fluid and soft diets, and in those cases not needing special dietary consideration. It is the normal diet for the passive condition of the resting or inactive person. The nature of the light diet must depend on the nature of the disease and the vigor of the patient. In general the following food would be included. Three meals a day are given in a light diet.

Foods for light diet are: Fruits: fruit juices or cooked fruits. Cereal foods: well-cooked cereals, strained if necessary; rice and macaroni; thin dry toast. Vegetables: fresh spinach; celery; strained peas; potatoes, baked, boiled, or mashed. In some cases vegetables must be omitted altogether, as in acute indigestion; in others they should be included. Fats: butter, thin cream. Meats: not more than one small serving a day of broiled chop or steak; meat broths. Milk: plain, in eggnog, in cream soups, in simple desserts. Eggs: soft-cooked, omelets, soufflés, custards. Simple desserts; custards, junket, ice cream, gelatin desserts, cooked fruits or cereal puddings.

CARE AND FEEDING FOR INCIPIENT COLDS

If colds are recognized and treated at the very beginning, they may generally be controlled soon. They are most often the result of fatigue, overeating, and a run-down condition, and can be suppressed by rest and careful diet. As soon as a person feels any symptoms of cold, the following treatment is recommended:

1. *A mild cathartic.* An effective cathartic if taken on an empty stomach is composed of 1 slightly rounding teaspoon of salt (7 grams), to 1 quart of water. The entire amount should be taken. On rising in the morning is the best time, since the stomach is then normally empty.

2. *A period of fasting.* Eat no food except water and a little fruit juice for 24 hours, or until the cold has been broken.

3. *Water.* Drink ½ glass of water every hour or half hour during the day. A little lemon juice may make this easier to drink.

4. *Rest.* Stay at home for at least 24 hours, and rest and sleep as much as possible during that time in a well-ventilated but comfortably warm room. Avoid drafts and changes in temperature.

5. *Food.* When the cold begins to yield, as it will in most cases in 12 to 24 hours, break the fast with a light meal of milk toast. Begin then with a light laxative diet of low fuel value. Fruits and mild vegetables, fruit juices, crisp toast, and well-cooked cereals, lightly cooked eggs, milk, milk soups or gruels.

CARE AND FEEDING FOR CONSTIPATION

Many serious illnesses may be caused by chronic constipation. Liver, kidneys, pancreas, and even the heart may become damaged by continued absorption of the poisonous products of a clogged intestine. It is always dangerous to allow a chronic condition to become established in which day after day intestinal wastes accumulate. They may ferment or putrefy and produce poisons which damage the body seriously.

Use of drugs.

Whereas it is probably better to empty the intestines with some medicine rather than to retain the waste material, this is nevertheless a poor makeshift. The continued use of laxative drugs is certainly not advisable. If a person suffers from chronic constipation, every effort should be made to locate the cause and to correct the difficulty. The cathartic should be used as an emergency measure only.

Use of salt water.

Perhaps the simplest and least harmful way of cleaning out the intestine of an adult is by the use of what is known as a physiological salt solution—1 slightly rounding teaspoon of salt (7 grams) to 1 quart of warm water. The entire quart may be necessary, and it should be taken on an empty stomach. One-half hour or more before breakfast satisfies this condition. Slightly more or less salt may be needed in some cases to make this solution effective.

Causes of constipation.

Constipation is in many cases due to the following conditions:

failure to establish regularity in emptying the intestines; lack of proper exercise; wrong diet; and insufficient water. Its cure, in these cases, must be: taking time to cultivate the habit of emptying the intestine at a regular hour each day; exercising in such a way as to strengthen the abdominal muscles (rapid walking is good for this); following a laxative diet; drinking more water.

Laxative foods.

Laxative foods include most fruits and vegetables, and cereal foods and breads containing the whole of the cereal grain. Bran is inadvisable if a finer meal will accomplish the result. Continued use of over-coarse foods is unwise.

Hygienic treatment and diet for constipation.

The following treatment is recommended for persons suffering from constipation:

Before breakfast: On rising drink two glasses of water, or take the salt solution suggested on page 459. Take light exercise for several minutes to strengthen the abdominal muscles.

Breakfast: Stewed prunes, or figs, or other fruit; oatmeal, or other whole cereal, and milk; eggs, if desired; graham, or whole wheat, or oatmeal bread; water to drink, if desired.

Between breakfast and lunch or dinner: Soon after breakfast make the beginning of establishing the habit of emptying the intestines daily at this hour. Allow 20 to 30 minutes for this purpose, if necessary. Drink one or two glasses of water. Take a brisk walk.

Dinner: Meat, or meat substitute; potatoes; a liberal serving of boiled onions or cabbage or some succulent vegetable; bread made from whole-cereal meal; two glasses of water to drink; stewed fruit or graham pudding or some fruit dessert.

Between dinner and supper: Drink one or two glasses of water; take some brisk exercise; if hungry, eat some fruit but nothing else.

Lunch or supper: Macaroni and cheese or a cream soup or similar dish; some coarse bread; fruit salad; oatmeal cookies; two glasses of water to drink.

After supper: Allow a short period of brisk exercise; eat an apple, orange, or other fruit, if hungry, but no other food; drink one glass of water during the evening.

DIET DURING A CONDITION OF INTESTINAL PUTREFACTION

A number of causes may contribute to a condition of intestinal putrefaction. It is generally, though not always, associated with constipation. Since putrefaction means decomposition of the proteins and the consequent production of abnormal, easily absorbed, but detrimental, products, efforts should be made to conquer the condition as soon as possible.

The diet must be regulated to eliminate a part of the total protein but particularly to reduce those proteins most subject to putrefation, namely, meat and eggs. The animal protein included may be in the form of milk or mild American (Cheddar) cheese. Foods that check putrefaction by fermenting slightly should be given. These are in general, fruits and vegetables. If constipation exists, it must be corrected. Drinking water liberally helps to reduce intestinal putrefaction. If the condition is acute, a day of fasting, with salt solution (page 459) to cleanse the intestine, followed by a light laxative diet with eggs or meat eliminated, may be advisable.

CARE AND DIET FOR INDIGESTION

By indigestion is meant a more or less acute irritation of the digestive tract. It may be caused by fatigue, worry, rapid eating, wrong foods, too much food, badly prepared foods, too little exercise, overwork, eating when weary, or a run-down condition. Its treatment consists in eliminating the cause and relieving the difficulty.

Rest of body, mind, and digestive tract are often necessary. A moderate amount of outdoor exercise, combined with changes in diet, improvement in sleeping hours, and proper regulation of all habits is important in helping to overcome indigestion.

If indigestion is chronic, the meals should be limited to three simple, easily digested meals daily (see light diet, page 458), and nothing eaten between meals. Any habit of constipation must be corrected by right regulation of diet. Fatty and over-sweet foods must be avoided and one should determine whether any special foods are causes of the difficulty, and avoid them. If indigestion is acute, to fast with complete rest for a day or two is the best procedure. If this seems a severe program, small amounts of fruit juice or clear meat broth may be used several times a day during this time. When food is resumed, a limited fluid diet should be followed for two or three days (see fluid diet, page 455) and gradually changed into a light diet. Underfeeding should be the rule until the digestive organs have resumed their balance.

DIET IN FEVER

The old adage, "stuff a cold and starve a fever" has been completely reversed. Colds are now starved, while fevers are starved only long enough to rest the digestive organs. Thereafter effort is made to supply sufficient food to keep the body from any considerable loss of tissue. This is particularly well illustrated in the modern treatment for typhoid fever.

General directions for feeding fever patients.

1. Rest the digestive tract for a day or longer by a reduction of total food. Gradually increase the amount of food.
2. At all times give only those foods which are readily digested and absorbed. A fluid diet may be best.
3. Give a small quantity of liquid very frequently since thirst is great at this time and should be relieved.
4. Give food in small quantities at frequent intervals, from 1½ to 2 hours. The outline of a fluid diet of high fuel value (page 456) will give some idea of the needs of fever patients and ways of meeting these needs.

Foods which may be used in fever.

1. *Milk* may be used up to 1½ to 2 quarts a day. It may be modified by diluting it with water, or by adding cooked cereal, cream, milk-sugar, egg, or malted milk. Its taste may be modified by adding beef extract, cocoa, coffee, or tea.
2. *Clear soups* such as broths, beef tea, and beef juice may be used.
3. *Eggs.*—Fresh eggs may be used up to 4 or sometimes 6 a day. They may be fed raw, in milk or fruit juice, or they may be very slightly cooked.
4. *Cream* may be used in moderate quantities, and must be used with caution since fat is likely to overtax the digestive organs.
5. *Sugar.*—The best sugar is milk-sugar, since it is only slightly sweet. Up to 6 or 8 ounces may be used daily.
6. *Cereals.*—Well-cooked cereals may be steamed and given in milk as gruels.

7. *Soft toast* may be used in those cases in which difficulty is experienced with a fluid diet.

Diet for typhoid fever.

A diet high in fuel value is now used for typhoid patients, the condition of the patient governing the amount of food given. The following modified milk diets illustrate high calorie possibilities of a simple fluid diet.

MODIFIED MILK DIETS FOR TYPHOID FEVER *

	Calories
For 1000 calories a day:	
Milk, 1000 c. c. (1 quart)	700
Cream, 50 c. c. (1–2/3 oz.)	100
Lactose, 50 gm. (1–2/3 oz.)	200
This furnishes eight feedings, each containing:	
Milk, 120 c. c. (4 oz.)	80
Cream, 8 gm. (2 dr.)	15
Lactose, 6 gm. (1½ dr.)	24
For 2000 calories a day:	
Milk, 1500 c. c. (1½ quarts)	1000
Cream, 240 c. c. (8 oz.)	500
Lactose, 125 gm. (4 oz.)	500
This furnishes seven feedings, each containing:	
Milk, 210 c. c. (7 oz.)	140
Cream, 30 c. c. (1 oz.)	60
Lactose, 18 gm. (4½ dr.)	72
For 3000 calories a day:	
Milk, 1500 c. c. (1½ quarts)	1000
Cream, 480 c. c. (1 pint)	1000
Lactose, 250 gm. (8 oz.)	1000
This furnishes eight feedings, each containing:	
Milk, 180 c. c. (6 oz.)	120
Cream, 60 c. c. (2 oz.)	120
Lactose, 30 gm. (1 oz.)	120

FOOD FOR TUBERCULOSIS PATIENTS

Tuberculosis is almost always accompanied by fever. Unfortunately lack of appetite may be associated with the increased food need that is due to fever and wasting tissue. The problem is, therefore, threefold: (1) to increase the appetite

* Coleman, American Journal of Medical Sciences, January, 1912.

by fresh air and mild exercise; (2) to plan a diet which is easily digested and which will meet the increased food needs at the same time; and (3) to build the body by rest. Liberal use of milk, eggs, cream, butter, green vegetables, fruits, and whole cereal grains is desirable. Fats are especially needed, since they have a high fuel value for a limited bulk. Cream, butter, whole-milk cheese, vegetable oils, cod-liver oil, bacon, and meat-fats of various kinds are useful. The real problem is to provide a tempting, well-balanced, high calorie, easily digested diet.

CHAPTER XX

BEVERAGES

By Frances Vinton Ward

Coffee and tea have no nutritive value aside from the cream and sugar that may be served in them as beverages. Cocoa and chocolate contain starch and fat and consequently are real foods; moreover, they are generally made with milk, which gives them added nutritive value.

COFFEE

The standard kinds of coffee include Mocha, Java, Maracaibo, Santos, Rio, and Bogota.

Adulteration.

Adulterants are seldom found in coffee that is unground, or in the whole berry. Ground coffee is sometimes adulterated with cereal or chicory root. A mild coffee is improved by the addition of dried chicory root, roasted. Unadulterated ground coffee should be free from dust and chaff. When a teaspoon of ground coffee is stirred into a half glass of cold water, there should be little discoloration of the water and few grains should sink to the bottom.

Care.

Coffee gives best results when bought in the whole grain and ground just before using. If bought ground, it must be kept in an air-tight container which is never left with the cover off. To freshen a stale or weak coffee, the grounds should be stirred in a hot frying pan until they are well dried but not scorched.

Composition.

The substances found in coffee include: caffein, a mild stimulant; volatile oils, which give flavor and odor; coloring matter, developed in roasting; and tannin, present only in very small quantities, except in the chaff.

Development of flavors.

Bitterness is brought out by boiling. It is also dependent on the proportion of coffee used. The roasted flavor is brought out by fresh roasting and quick making. The aroma from the volatile oils is brought out by slow heating without boiling or the escape of steam.

Directions for making.

Weak, medium, or strong coffee may be made according to the following proportions:

Weak coffee: 1 level tablespoon of ground coffee to 1 measuring-cup of water (½ pint).

Medium coffee: 1 rounding or 2 level tablespoons of ground coffee to 1 measuring-cup of water.

Strong coffee: 3 level tablespoons of ground coffee to 1 measuring-cup of water.

Some of the more common methods of making coffee are as follows:

1. Cold-water process. Use coffee ground medium fine. Pour the cold water over the coffee, cover it carefully, and plug the spout. Heat the coffee very slowly to the boiling point, and boil it gently for not more than 3 minutes. Settle it by pouring in a little cold water slowly. Set the pot in a warm place for 8 minutes to allow the grounds to settle and the flavor to ripen. Serve the coffee without further delay.

2. Hot-water process. Use coffee ground medium fine. Pour boiling water over the coffee and proceed as in the cold water process.

3. Quick cold-water process. Use coffee ground medium fine. Pour about one-fourth of the cold water over the coffee, heat it slowly to the boiling point; then add the remainder of the water boiling hot, set the pot in a warm place for the flavor to ripen, and serve the coffee promptly after 8 minutes.

4. Large-quantity process. Tie the coffee, ground fine, loosely in a muslin bag, allowing space equal to the bulk of the coffee for swelling. Drop the bag in the kettle of cold water, heat the water to the boiling point, and boil it for not more than 3 minutes. Remove the bag, allow the coffee to stand for 8 minutes, and serve it when needed. Be sure that the coffee does not boil while it is being kept hot, and that it is covered.

5. Percolator process. Use powdered coffee. Heat the water, pour it

through the grounds in the percolator, and continue heating it for about 5 minutes. Serve it at once.

6. French drip coffee. Use powdered coffee. Pour the boiling water through the grounds, reheat the liquid, and pour it through a second time. If a very strong coffee is desired, this process may be repeated.

7. Café au lait (coffee with milk). Two methods are commonly used: (a) Use coffee ground very fine. Add cold milk instead of water. Heat it slowly to a temperature just under the boiling point, strain it, and serve it at once. Another method is: (b) Use coffee ground medium fine. Add one-fourth the usual amount of water. Heat this slowly to the boiling point, strain it, and add hot milk to make up the other three-fourths of liquid.

8. Iced coffee. Make coffee by any of the methods suggested, pour it off the grounds at once, chill it, and serve it when desired. The best results will be obtained from café au lait poured over chopped ice.

Clearing the liquid.

It is necessary to clear the liquid only when the grounds are steeped in the water loose, not inclosed in a bag. The following methods may be used:

1. Egg-white: (a) Add an egg-white to the dry grounds; stir the mixture well. Use the cold-water or the quick cold-water method of brewing. Add a beaten egg-white to a pound of freshly ground coffee, mix it well, spread it out to dry; then put it in a tight container till it is used. This treatment will also aid in preserving the strength of the coffee. Use the straight cold-water process for this coffee, and soak the grounds for a few minutes in the water first if possible. Coffee so prepared should never be put in a percolator, since it clogs the sieve. Strength of flavor cannot be obtained if the hot-water method is used. (c) Add 1 raw eggshell to each pint of water, and make coffee by the cold-water process.

2. Sifting. A coffee which gives much trouble from muddiness may be sifted dry through a strainer, the coarse part used for boiled coffee and the fine part for drip or percolator coffee.

3. Cold water. Remove the coffee from the fire as soon as it is cooked; pour slowly into it a small quantity of cold water, not more than ¼ cup to 2 cups of the beverage, and set it aside to settle.

4. Hot coffee. Pour out a little of the coffee into a cup; return the clear part of this to the pot through the spout. Repeat this process two or three times till no grounds appear in the cup. Allow it to stand for a few minutes to settle.

Coffee-pots and their care.

Pots for boiled coffee are best made of agate or aluminum. Tin pots of good quality give satisfaction until the tin wears off on the inside. An aluminum pot is the most durable. Agate pots should be boiled in a soda solution once a week and tin or aluminum pots in mild soapsuds; any seams or grooves should be carefully wiped afterward, and a rag string run through the spout.

TEA

Teas may be classified as follows: 1. Black tea: tea that has been fermented in the process of drying; it is supposed to contain less active tannin than green tea. 2. Oolong: tea that has been partly fermented in drying and is midway in color and quality between black and green tea. 3. Green tea: tea that has been promptly dried with care taken to preserve the natural green color. This tea is supposed to contain more active tannin than do the other varieties. Formerly it was sometimes colored with copper.

The best known kinds of tea are given in the following classification:

From China

1. Green
   - a. Gunpowder
   - b. Imperial
   - c. Young hyson
   - d. Hyson
2. Black
   - a. Congou
   - b. Souchong
   - c. Scented
3. Oolong

From India

1. Black
   - a. Assam
   - b. Darjiling
2. Green

From Ceylon

1. Black
2. Green

From Japan

- Green
  - a. Pan-fired
  - b. Basket-fired

From Formosa

- Oolong

Grades.

There are six grades of tea, standardized as follows:

1. Flowery pekoe: tip of the stem and buds. This grade seldom reaches this country. 2. Orange pekoe: first open leaf. 3. Pekoe: second leaf. 4. First souchong: third leaf. 5. Second Souchong: fourth leaf. 6. Congou: fifth leaf.

How to judge tea leaves.

Dry fresh tea leaves should be free from dust, broken bits, and stems. When the leaves are steeped, they may be judged by their size; the smaller leaves are best. Tea that consists of leaves that are very much broken, or that has many stems or midribs in proportion to the remainder of the leaf, is of low grade. However, tea containing many midribs may be satisfactory and inexpensive.

Storage.

The container used for tea should be of metal or glass, and should be air and water-tight.

Composition.

Tea contains: tannin, a bitter astringent substance; aromatic oils, substances that furnish the spicy taste and odor; and thein, (caffein), a mild stimulant.

Directions for brewing.

The aims in properly brewing tea are: 1. To extract the aromatic oils but to prevent their escape from the liquid. The best temperature for this result is just under the boiling point; the best time, 3 minutes. 2. To extract the thein. The best temperature is just under the boiling point. 3. To prevent the extraction of tannin. Tannin is extracted by boiling or by continued steeping (over 3 minutes).

One level teaspoon of tea should be used for each cup of water. Any of the following methods may be used:

1. Heat the teapot, drop into it the tea, and pour the freshly boiling water over this. Steep the tea in a warm place for just 3 minutes; do not allow it to boil. Pour the beverage off the grounds immediately, and serve it hot. A tea-cosy, or quilted cover which fits the teapot, helps to keep the tea hot.

2. Place the tea in a large tea-ball or tie it in a muslin bag. Put this in the pot, and proceed according to Method 1. Remove the ball at the end of 3 minutes.

3. Place ½ teaspoon of tea in a silver tea-ball, previously heated. Lay this in a serving cup, and pour boiling water over it. Steep it for just 3 minutes; then remove the ball. Replace the leaves with fresh ones before brewing a second cup. This method is generally unsatisfactory from the standpoint of quality.

4. Russian tea, for serving a large quantity. Measure out the tea in the proportion of 1 cup to sixty servings. Pour over this in a hot covered kettle 3 quarts of boiling water, and steep the tea for 3 minutes. Pour the liquid off the leaves, set it in a warm place, and dilute it as needed, using one part of tea to three parts of hot water.

5. Iced tea. Any of the following methods may be used: (a) Brew fresh tea using more tea in proportion to water than for hot tea. Fill tumblers half full of cracked ice, place a slice of lemon and 2 teaspoons of sugar on top, and pour the hot tea over this. Serve the tea as soon as it is chilled. (b) Cool tea, and chill it either by the addition of cracked ice or by placing it where it will be cold. Dissolve the sugar in the tea before cooling it, or add a sirup. (c) Pour cold water over the tea leaves, and let them soak for several hours.

6. Tea punch. Tea that is to be used as a foundation for fruit punch should be made in the proportion of 1½ teaspoons of tea to 1 cup of water. To make the punch, use cold tea in place of one-fourth to one-half of the water, according to the flavor desired. The use of tea of approximately the same color as the fruit juice is best; a dark tea may be used to color the liquid. Test the tea for clouding before using it.

Clouding.

Some teas, expecially some black kinds, cloud on cooling and standing. Re-heating will clear them temporarily, but these teas are not suited for serving as iced teas or in punches. To test a tea for clouding, it should be brewed and the liquid allowed to stand overnight at room temperature. Clouding is not an indication of inferior quality.

Points in judging the beverage.

In judging tea, the color, the taste, the flavor, the pungency, and the body must be considered.

Serving.

Black tea is generally best suited for serving with cream and sugar because of its color and flavor. Green teas are generally served plain or with lemon and sugar.

COCOA

Cocoa is found on the market in the following forms: 1. Cocoa nibs: chocolate beans, cracked. 2. Chocolate cake: chocolate beans ground fine and pressed. 3. Cocoa-shells: the thin inner shells of the cocoa bean, cracked off. Very little nutriment is contained in them. 4. Cocoa: chocolate from which some of the fat (cocoa butter) has been removed.

Composition.

Chocolate and cocoa contain fat, starch, tannin and theobromine, which is similar to caffein but much milder in its effects. The fat-content of chocolate is much higher than that of cocoa.

Directions for making.

1. Chocolate nibs: Use ¼ cup of nibs to 3 cups of water. Pour the boiling water over the nibs, steep them gently, without boiling, for 2 hours. Strain the beverage, and serve it with cream and sugar.

2. Cocoa-shells: Use from ½ to 1 cup of shells to 4 cups of water. Simmer the mixture for 2 hours, strain it, and serve it with cream and sugar.

3. Chocolate: Use ½ ounce of chocolate, ½ cup of water, ½ cup of milk, 2 teaspoons of sugar, and salt. Melt the chocolate in a double boiler, add the sugar, the salt and the water. Heat the mixture to the boiling point, letting it bubble well. Add the milk, and set it in the double boiler to heat. When it is hot, beat it with an egg-beater till the top is covered with a fine froth. This will prevent the formation of a film. To make a somewhat heavier beverage, add from ¼ to 1 teaspoon of cornstarch mixed with the sugar.

4. Cocoa. (a) Thin cocoa. Mix 2 teaspoons of cocoa, 2 teaspoons of sugar, salt, and add ½ cup of hot water, stirring the mixture to a smooth paste. Boil the mixture at least two minutes. Add ½ cup of milk, and heat the mixture in a double boiler. Beat it with a Dover egg-beater till the top is covered with fine bubbles, to prevent the formation of a film. (b) Thickened cocoa. Mix 2 teaspoons of cocoa, 2 teaspoons of sugar, salt, ½ teaspoon of cornstarch, a little cinnamon, and ½ cup of water, stirring the mixture to a smooth paste. Boil it till it thickens, add ½ cup milk, and place the mixture in a double boiler to heat. Beat it with an egg-beater to prevent the formation of a film. (c) Cocoa paste (prepared cocoa.) Mix 2 cups of cocoa, 3 cups of sugar, and 3 cups of hot water, and stir this to a smooth paste. Place the mixture in a double boiler, and simmer it for 2 hours. Keep the paste in a cool place and use it as needed. To use the paste, heat 1 cup of milk in a double boiler, and stir into it 1 tablespoon of the paste. (d) Iced chocolate and cocoa. Chill cocoa, and pour it over cracked ice in tumblers. Serve it with whipped cream on top.

FRUIT JUICES

By Miriam Birdseye

The principal charm of a fruit drink lies in the smooth blending of the various flavors. Unless the fruit juices have been well sweetened before bottling (page 619), the needed sugar should be supplied in the form of a sugar sirup; otherwise the juices and the sugar must be mixed and allowed to stand together for several hours before being served. For the sirup, 1 cupful of sugar should be allowed for each cupful of water, and the mixture boiled for about 10 minutes. It saves time and fuel to make a quart or so of this sirup at a time and bottle it boiling hot in sterilized pint jars for subsequent use.

A small amount of some strongly acid juice should always be added to the fruit drink to give it the proper degree of acidity. The juice of rhubarb or barberries is sufficiently sour to take the place of lemon juice for this purpose. Orange juice may be substituted for lemon juice by adding to it a small quantity of cider vinegar.

Enough of the sugar sirup should be added to the fruit juices to sweeten them, enough acid juice to contribute the desired zest, and the whole diluted to taste with shaved ice or with ice water.

Green tea makes a good foundation for a fruit punch.

Well-scrubbed skins of pineapples, oranges, and lemons may be covered with water, a little sugar added, and the mixture allowed to stand for several hours to draw out the flavoring matter. This thin juice may be used immediately to make fruit drinks.

CHAPTER XXI

BATTERS AND DOUGHS

By Mary F. Henry

When flour and liquid are mixed in such proportions that the resulting mixture can be beaten, it is called a batter. When the mixture is so thick that it cannot be beaten, but must be made smooth by kneading, it is called a dough. The essential ingredients of batters and doughs are flour, liquid, and leavening. Shortening, eggs, sugar, and salt are not essential but they contribute to flavor and texture. "Light breads" can be made from wheat flour because it contains certain materials which when moistened form a sticky elastic substance called gluten. When a mixture containing gluten is heated, the moisture and the air which may be incorporated, expand and stretch the gluten. If the temperature is sufficiently high, the gluten hardens and forms a framework surrounding whatever other ingredients are contained in the loaf. However, it is not safe to rely solely on the expansion of the moisture or whatever air happens to be present in the mixture, either as the result of beating a plain batter or of adding well-beaten eggs. In most batters and doughs a gas which expands on heating is introduced by means of the growth of yeasts or by chemical leavening agents. This gas acts more powerfully than does air or steam because it is more abundant. Yeast doughs are discussed in Chapter XXIV.

CLASSIFICATION

Pour batters.—Mixtures of about equal parts of flour and liquid, such as those used in making popovers and pancakes, are called pour batters because they can be poured.

Drop batters.—Mixtures of about two parts of flour to one part of liquid, such as those used for muffins and cakes, are called drop batters, because they drop from a spoon.

Soft doughs.—Mixtures of about three parts of flour to one part of liquid, such as biscuits, are called soft doughs.

Stiff doughs.—Mixtures of about four parts of flour to one part of liquid, such as yeast bread, are called stiff doughs. (See Chapter XXIV.)

INGREDIENTS

Flour.

A good grade of flour should be used for all doughs and batters (p. 495). Pastry flour is better than bread flour for quick-bread mixtures and cake, since it gives a more tender product than does bread flour. Pastry flour may be made at home according to the suggestions on page 490. When other flours are substituted for wheat flour in a recipe, it should be on the basis of weight, since there is much variation in measure.

Liquid.

Sweet or sour milk, sweet or sour buttermilk, sweet or sour cream, whey, molasses, water, potato water, rice water, and various other liquids may be used in doughs and batters. Sour milk, sour cream, sour buttermilk, whey, and molasses require soda to neutralize their acid (p. 475). Sour milk gives a texture that is slightly more tender than that produced with sweet milk. Both eggs and fat serve as part of the liquid. An average-sized egg may be regarded as supplying two tablespoons of liquid; fat may be regarded as entirely liquid. This fact must be taken into consideration if changes are made in a standard recipe. If cream is used, its fat-content must be considered (p. 477).

Soda.

When baking soda comes in contact with an acid in the presence of moisture, it liberates a gas called carbon dioxide. The acid may be cream of tartar, or such acids as are contained in sour milk or molasses. The amount of soda to be used is determined by the amount of sour milk used and its degree of acidity, and not by the amount of flour as is the case when baking powder is used. Soda may be added in two ways: (1) It may be stirred into the milk, in which case it does not act so decidedly as a leavening agent, but serves to sweeten the milk. In the process some of the gas is liberated and the leavening power is lost to such an extent that it generally becomes necessary to use baking powder as additional leavening agent. (2) The soda may be sifted with the flour, in which case the gas is liberated chiefly during the baking process. When it is added in this way, no additional baking powder is used if the milk is sufficiently sour to require soda in such amount as to give a proportion of ½ teaspoon of soda to 1 cup of flour.

No absolute statement can be made, however, as to the correct amounts of soda to use, since sour milk and molasses differ greatly in their degree of acidity. In general it may be said that from ¼ to ½ teaspoon of soda should be used for each cup of sour milk, and more nearly ½ teaspoon should be used for each cup of molasses. Experience in cooking with sour milk and soda will best teach correct amounts to use. If soda is added to the milk, the taste may serve as a guide for determining correct amounts, a brackish taste indicating that too much soda has been used, a sour taste indicating that too little has been used. Tests may be made with red and blue litmus paper: if, after the soda has been added, blue litmus paper turns red, the amount of soda has been insufficient to neutralize the acid; if red litmus paper turns blue, too much has been added. If neither red nor blue litmus paper changes color, the acid of the milk has been just neutralized.

Instead of using soda alone as a leavening agent when sour milk or molasses is used as the liquid, some persons choose to use baking powder also in the proportion of 1 teaspoon of baking powder to 1 cup of flour. This is advisable especially if the milk is only slightly sour, and the amount of soda required to neutralize the acid is not sufficient to furnish enough gas to make the mixture light. If eggs are used in the mixture, baking powder is not so necessary.

Baking powder.

Baking powder is a mixture of soda and an acid which will yield a gas when liquid is added. The acid constituent varies with the type of the baking powder. It may be an acid tartrate, a phosphate, or an aluminum salt. Most commercial baking powders contain a third ingredient, starch, which absorbs moisture and so prevents any premature reaction between the soda and the acid. All baking powders, whether home-made or commercial, should be kept in a closely covered jar.

Baking powder is generally used in a mixture in which sweet milk is used as the liquid. Two teaspoons of baking powder will leaven one cup of flour if no eggs are used. If eggs are used, the total amount of the baking powder may be decreased ½ teaspoon for each egg used.

It is possible to make baking powder at home by combining cream of tartar and soda in the correct proportions. It is not, however, entirely practicable, because of the difficulty in being accurate in measuring and thorough in mixing. The correct proportion, by measure, to combine is 2½ parts of cream of tartar to 1 part of baking soda and ½ part of cornstarch; or by weight, $2^2/_{10}$ parts of cream of tartar, to 1 part of soda and ½ part of cornstarch. The ingredients should be very carefully measured and thoroughly mixed by sifting.

Yeast.

Yeast is discussed under yeast breads, page 497.

Eggs.

Eggs give firmness of texture, lightness, and richness to batters and doughs. Also they act as a leavening agent by entrapping air as they are beaten. When heated, the albumen, like the gluten of wheat flour, hardens and helps to form a framework to hold up the other ingredients. The tendency is opposite to that of fat, since eggs tend to bind together the ingredients, and fat tends to separate them. Preserved eggs that have a good flavor and odor may be used. One egg may be considered the equivalent of ½ teaspoon of baking powder in leavening power.

Shortening.

Fats, such as butter, butter substitutes, lard, lard substitutes, tried-out meat fats, chicken fat, and olive and cottonseed oils, are used for shortening. Fat makes the texture of batters and doughs more close-grained and more tender than they would otherwise be. It also improves the flavor in most cases. Mutton fat may be used satisfactorily under certain conditions (page 521). Fat necessitates the use of more leavening, since it oils the particles of flour and makes it easy for the gas to escape. A cake made with a small amount of fat will be porous and will dry out quickly. Too much fat will make the cake heavy and cause it to crumble. If melted fat is added to a cake batter, it should not be hot, since hot fat is likely to make a cake tough, coarse-grained, and heavy.

Since fats vary in their water-content, proper substitution cannot be made by using equivalent amounts.

One cup of butter is equivalent to: 1 cup of lard or lard substitute minus 2 tablespoons; 1 cup of chicken fat; 1 cup of cottonseed or olive oil minus 2 tablespoons.

If cream is used in place of milk, the fat-content must be allowed for in measuring the shortening. One cup of 18 per cent cream is equivalent to ¾ cup of milk plus 3½ tablespoons of fat. One cup of 40 per cent cream is equivalent to ½ cup of milk plus 7½ tablespoons of fat.

Sugar.

Sugar gives flavor to a mixture. It also acts as a liquid. A fine granulated sugar gives a better texture than does a coarse sugar. Powdered sugar is sometimes used for a very close-grained cake. If either powdered or brown sugar is used in place of granulated, the substitution should be made by weight, not measure. Molasses is used in some recipes for part of the sugar as well as part of the liquid. Corn sirup may be used in the same way; however, to give sufficient sweetness it should generally be combined with some sugar or molasses. Too much sugar results in a heavy, coarse-grained texture, or a gummy product.

METHODS OF MIXING

The method of combining the ingredients in flour mixtures is determined somewhat by the ingredients, and there is no hard and fast rule to be followed. However, experience has shown that the following methods give good results:

Method of mixing batters.

The following method may be used in making griddle cakes, popovers, and muffins. Even cake may be mixed in this way with excellent results. 1. Mix and sift the dry ingredients. 2. Add the milk to the beaten egg, and stir this mixture into the dry ingredients. 3. Add the melted butter and beat the mixture well.

Method of mixing doughs.

Biscuits and pie crust are best made by the following method: 1. Mix and sift the dry ingredients. 2. Cut the shortening into the dry materials with two knives, or mix it lightly with the finger tips. 3. Add the liquid, mixing it in with the knives and stirring the mixture as little as possible.

Method of mixing cakes.

Cake is generally mixed by the following method, if a cake-mixer is not used.

1. Sift together the flour, the baking powder, and the salt. 2. Work the butter with a spoon until it becomes soft and creamy. 3. Add the sugar gradually, creaming it with the butter. 4. Add the well-beaten egg-yolks. 5. Add the milk and the flour in thirds or fourths, alternately. 6. Fold in the well-beaten egg-whites.

UTENSILS FOR BAKING

Kinds.

Popovers are best if baked in iron or pottery. Tin may be used, but it is not so satisfactory. Iron baking pans should be heated before the batter is poured into them.

Muffins may be baked in either iron or tin baking pans.

Cake is best baked in tins. The tube pan allows a current of hot air to rise through the center of the cake, and hence promotes even baking. A broad, shallow pan generally gives a lighter, drier cake than does a deep narrow pan.

Biscuits may be baked on tin or on Russia iron sheets.

Preparation.

The baking pans should be greased before the ingredients are combined. The fat should be melted, and applied to the pans with a soft piece of paper, a swab, or a brush kept for the purpose. The product may often be prevented from sticking by lightly sprinkling the greased pan with flour, inverting it, and tapping it to remove any excess.

FILLING THE PANS

A pan should never be filled more than two-thirds full of batter. When a cake batter is put into the pan, it should be brought up against the sides by using a spoon or spatula, so that before baking the center of the cake may be lower than the sides.

BAKING

The pan should be placed on the lower grate of the gas-oven and on the floor of the oven of a coal range so that the greatest amount of heat will reach it from underneath and force it to rise to its fullest capacity before the crust is formed on top.

The oven door should not be opened during the first ten minutes of the baking process. When it is opened, it should be closed gently, since a sudden jar or draft may cause the mixture to fall. If a mixture is baking unevenly, it may be turned in the oven before the top crust begins to harden; if it is turned after the crust is formed, the cake may fall and will not rise again.

The stages in baking are as follows: The mixture begins to rise; it continues to rise and begins to brown in spots; it rises in the center and browns over the top; it settles to a level and shrinks from the sides of the pan.

Oven temperatures.

A correct oven temperature is very important in baking. The correct temperature depends on the size of the loaf and the constituents used in the mixture.

The following classification of temperatures for baking various mixtures is suggested: *

1. Slow oven (250° to 350° F.), for custards and meringues.
2. Moderate oven (350° to 400° F.), for bread, gingerbread, plain cake, cookies, all molasses mixtures.
3. Hot oven (400° to 450° F.), for Parkerhouse rolls, and popovers. In baking popovers, the oven should be cooled to moderate heat after the first ten minutes.
4. Very hot oven (450° to 550° F.), for pastry. After the first six minutes the temperature should be lowered to "hot."

Sponge cake should be baked in an oven with a temperature between "slow" and "moderate."

Baking powder biscuits should be baked in an oven with a temperature between "hot" and "very hot."

The following tests for oven temperatures may be used: 1. When glazed white paper placed in an oven becomes

TABLE XXVIII.—Time-table for Baking Batters and Doughs

Mixture	*Time required (minutes)*
Biscuits, baking powder or soda	10 to 15
Rolls, raised	10 to 20
Bread, yeast	45 to 60
Cake, layer	15 to 30
Cake, loaf	35 to 60
Cookies	5 to 10
Corn cake, thick	30 to 40
Muffins, baking powder	20 to 25
Popovers	40 to 50
Tarts	10 to 12
Pies	30 to 60

* May B. Van Arsdale. Some Attempts to Standardize Oven Temperatures for Cookery Processes, Tech. Education Bull. 22, published by Teachers College, Columbia Univ.

brown in five minutes, the oven is moderate (350° to 400° F.); 2. when glazed white paper placed in an oven becomes dark brown in five minutes, the oven is hot; 3. experience will make the hand a fairly reliable tester for oven temperatures; 4. an oven thermometer is essential in learning to bake with the minimum of failures.

Tests for determining when breads and cakes are done.

Any of the following tests may be used to determine when a mixture is done: 1. When the color is a rich golden brown; 2. when the mixture shrinks away from the sides of the pan; 3. when the sides of the pan sizzle when touched with a damp finger; 4. when a clean toothpick inserted comes out free from any particles of the mixture; 5. when a cake springs back if pressed gently on top.

TABLE XXIX.—FORMULAS FOR BATTERS AND DOUGHS (BASED ON ONE CUP OF FLOUR)

Mixture	*Flour (cups)*	*Liquid*	*Chemical leavening (teaspoons)*	*Shortening*	*Eggs*	*Sugar*	*Salt (teaspoons)*
Popovers	1	¾ to 7/8 cup		1 teaspoon to 1 tablespoon	1 to 2		¼ to ½
Griddle cakes	1	¾ to 1 cup	1½ to 2	1 to 2 tablespoons	1	1/3 to 1 tablespoon	¼ to ½
Muffins	1	3/8 to ½ cup	1 to 2	2 to 1 tablespoons	1 to 2	1 to 2 tablespoons	¼ to ½
Baking powder biscuits	1	1/3 cup	2	2 to 4 tablespoons			¼ to ½
Light cake	1	½ cup	2	1-1/3 tablespoons	1/3	½ to 2/3 cup	1/6
Rich cake	1	1/3 cup	1-1/3 to 1-2/3	4 tablespoons	1 to 2	1/3 to ½ cup	1/6
Sponge cake [1]	1	1 to 4 teaspoons lemon juice			4 to 6	1 cup	¼

[1] Hot water sponge cake may be made by reducing the number of eggs, and by increasing the amount of liquid by 2 tablespoons and the baking powder by ½ teaspoon for each egg deducted.

CHAPTER XXII

CAKES

Cakes may be divided into three classes: cakes made with yeast, sponge cakes, and butter cakes, or cakes made with shortening.

CAKES MADE WITH YEAST

The points which are essential for success in bread-making (page 495) should be observed in mixing cakes lightened with yeast. Since sugar, butter, and eggs have a tendency to retard fermentation, they should be added either to the light sponge or to the light dough. Brioche and raised doughnuts are examples of cakes made with yeast.

SPONGE CAKES

Sponge cakes are really a variation of a soufflé or puffy omelet. They are made without fat. They may be leavened with eggs alone, or with baking powder and eggs. Plain sponge cakes, choux paste, lady-fingers, macaroons and meringues are examples of this type of cake. Sponge cakes should never be cut with a knife. They should be broken or separated with two forks by placing the backs of the tines together and gently pulling the cake apart.

Method of mixing.

(1) Separate the whites of the eggs from the yolks; (2) beat the yolks until they are thick and lemon-colored, scraping them down from the sides with a spatula to prevent their drying on the bowl; (3) add the sifted sugar gradually, beating the mixture constantly; (4) add the flavoring, if it is to be used; (5) beat the whites until they will stay in the bowl when it is inverted, that is, until they are stiff but not dry; (6) fold the whites quickly into the first mixture, until they are not visible in large amounts; (7) sift the salt and the flour several times. If baking powder is used, sift it with the flour and the salt; (8) fold the dry ingredients carefully into the mix-

ture. It should not be beaten, because the air bubbles that make the cake light may thus be broken, but it should be cut and folded until no dry flour is visible.

Method of baking.

The pans for sponge cake should be perfectly clean. They should not be greased. The pans should be filled according to the directions on page 479. Sponge cakes should be baked in a slow oven from 1 to 1½ hours. When the cake is done it will begin to shrink from the sides of the pan, and it will rebound when pressed lightly on top with the finger. Sponge cakes should not be removed from the pan until cold. The pan should be inverted on a cake-rack and the cake should be allowed to cool gradually in a place that is free from a draft.

BUTTER CAKES

Recipes for butter cakes call for various proportions of materials. Results produced by such variations are discussed briefly on pages 474 to 477. With a fair understanding of the possibilities of substituting one material for another, cake recipes may be varied to make the best use of the materials on hand or to produce the desired result in lightness or richness. Formulas that are good to use as a basis for substitution are given on page 482. Because of the difference in grades of flour, it is difficult to give the exact amount of flour required to produce the best result. Butter cakes include cup cakes, pound cakes, cookies, and wafers. They may be plain or may contain fruit or nuts. Directions for mixing and baking butter cakes are given on pages 478 and 479. Directions for filling the pans are given on page 479.

INGREDIENTS USED IN CAKES

A discussion of the essential materials used in cakes is given on pages 474 to 477. Following are suggestions on certain accessory materials.*

* Mills, Katherine H. Making Cake. Part I. Cornell Reading-Course for the Farm Home, Bull. 73.

Several types of fruit are commonly used in making cake; first, dried fruits and candied fruits, such as currants, raisins, citron, cherries, pineapple; second, fresh raw fruits, such as blueberries, and cherries; third, cooked fruit pulp, such as apple-sauce and blackberry jam. As a general rule it may be said that when fruit is used in making cake, the batter will need to be stiffer than for ordinary cake, the stiffness depending on the weight of the pieces of the fruit to be held in place. A cake dough containing raisins will need to be stiffer than one containing blueberries, and a cake dough containing blueberries will need to be stiffer than one made with apple-sauce or jam. The presence of particles of dried fruit increases the difficulties in baking cake, as fruit scorches easily and some of the fruit will be at the surface of the cake. Rich fruit cakes should, therefore, be baked in a very slow oven. This not only prevents scorching, but also improves the flavor, since the fruit flavor blends with that of the other ingredients.

Chocolate contains a hard fat which adds richness to cake, but which tends to make it stiff as it dries out or if the cake is kept in a very cold place. Chocolate cake that is made with sour milk and soda is usually softer and darker in color than that made with sweet milk and baking powder. Chocolate contains starch which thickens the batter, so that less flour is needed for chocolate cake than for white cake. Alkali darkens a chocolate mixture, and a little soda added to the melted chocolate before putting it into the batter will not only darken the cake, but also neutralize any free fatty acid in the chocolate and help to make the cake light. The large amount of soda in some recipes for chocolate cake serves the same purpose.

Cocoa should be substituted for chocolate by weight instead of by measure. In manufacturing cocoa nearly all of the fat has been removed from it, so that cakes made by substituting cocoa in a recipe calling for chocolate are likely to be bready unless a small quantity of additional fat is added (the equivalent of about ½ tablespoonful of butter for each ounce, or ¼ cupful, of cocoa used).

Nuts are lighter than fruit and are not likely to settle to the bottom of the tin; therefore they do not need to be floured. They contain fat, and, when added to rich cake, the amount of fat in the recipe should be decreased in proportion to the richness added by the nuts. From 1 to 1½ tablespoonfuls less of fat to each cupful of nuts is usually sufficient. A good method of preparing nuts for cake is to grind them through the coarse knife of the food chopper. When English walnuts or other nut meats are bought already shelled, they should be washed and dried in the oven before being used.

Cakes made of good materials require no additional flavoring. If flavoring is desired, fresh fruit juices or other fresh flavors are preferable to commercial extracts.

CAKE FILLINGS

A layer cake should be arranged if possible in such a way that the bottom of the layers will receive the filling, because the bottom is more porous than the top and consequently takes the filling better. Fillings may be classified as cream fillings, fruit fillings, and pastes.

CAKE FROSTINGS

A cake may be merely dusted over the top with powdered sugar and the layers put together with a cream filling. The sugar will stick to the cake better if the white of an egg or fruit jelly has been brushed over the top first. Fruit or nuts, and sugar may be sprinkled over the top of a cake before it is baked.

Frostings which are made of sugar and liquid and which completely cover the surface of a cake, may be either cooked or uncooked. Various kinds of sugar may be used, and nuts or fruit if desired. Uncooked frostings should be made of confectioner's sugar. The sugar should always be sifted. The rules for sugar cookery (page 576) should be followed in making cooked frosting.

For cutting a frosted cake, a knife dipped in boiling water should be used in order to prevent breaking the frosting.

In frosting a layer cake, it has been found helpful to pin a strip of glazed paper about an inch higher than the cake around it. This will serve as a retainer when the frosting is poured on the cake. After the frosting has set, the strip of paper should be removed, using a thin-bladed knife that has been wet in hot water.

*Boiled frostings.**

In making boiled frosting, just as in making cake, it is possible to vary the amounts of ingredients used in proportion to the time of cooking. There are three ingredients essential to the making of any so-called boiled frosting, water, sugar, and white of egg. Cream of tartar may be used with good effect, for it gives the frosting a creamy consistency, but if none is at hand the same effect may be produced by substituting vinegar or by increasing the amount of water and thus prolonging the time of cooking. When the amount of white of egg used in a recipe is increased, the temperature to which the sugar solution is cooked should be increased.

Recipe

1 cup sugar	1/16 teaspoon cream of tartar
½ cup water	White of 1 egg

This is the old standard recipe and it makes a rather dense, sweet frosting. The addition of another egg-white will make a more fluffy frosting. Since eggs vary in size, $^1/_6$ cup of white of egg may be used to give a definite result. This recipe will make sufficient frosting for the top of a cake about nine inches in diameter.

Method I.

Dissolve the sugar and cream of tartar in the water over the heat, stirring the mixture only until the sugar is dissolved. If one egg is to be used, let the sugar mixture boil until it reaches the soft-ball stage (238° F.), or until it forms threads when some of it is dropped from the tines of a fork. If two eggs are to be used, boil the sugar mixture until it reaches a higher temperature, about 244° F., the hard-ball stage. Do not move the dish or stir the sirup during the remainder of the period of cooking. Cover the pan during the first few minutes that the sugar solution is

* Mills, Katherine H. Making Cake. Part II. Cornell Reading-Course for the Farm Home, Bull. 75.)

boiling, so that steam may collect on the sides of the pan. This will help to prevent the formation of large crystals that would cause the sirup to crystallize in coarse grains and that would spoil the texture of the frosting. After removing the cover of the pan, insert the candy thermometer and wash from the sides of the pan any crystals that may form, using a brush or cloth that has been wet with cold water. When the sirup is cooked, pour it slowly on the beaten white of the egg, using a Dover egg-beater and beating continually while pouring. Continue beating until the frosting is cooled and is stiff enough to spread on the cake and remain in place. If the mixture does not thicken properly, it may be cooked again by Method II, twice-cooked frosting.

Method II.

Dissolve the sugar in the water and boil the mixture without stirring until it reaches the hard-ball stage (246° F.), or until the sirup when dropped from a spoon will form a long thread with short threads branching from the main one. Remove the sirup carefully from the fire, and allow it to cool while the whites of the eggs are being beaten until they are stiff and dry. They should be beaten in the upper part of the double boiler, as this will save utensils, materials, and time. Pour the sirup slowly over the beaten whites of the eggs, beating the mixture as long as possible with a Dover egg-beater and after that with a spoon, until the mixture is light and stiff. Set the dish containing the frosting over hot water, and allow the mixture to cook. Beat it constantly until it is light and fluffy, rises slightly in the pan, and as it is stirred begins to give a slight scraping sound against the sides of the dish. This scraping sound may be learned only through experience, but it is easily detected. Remove the dish of frosting at once from the hot water. If the frosting is cooked too long over the hot water it will be granular. The frosting will probably be stiff enough to spread at once; if it is not, stir it until it has reached the proper consistency. This frosting may be piled on a cake to any desired thickness, or it may be used in a tube to make ornamental frosting. When it is properly made this frosting will be very light, fine grained, soft and springy. After it has been spread on a cake, it will form a thin crust on top and will keep moist and soft underneath for several days. This method makes a frosting known as twice-cooked.

Variations.

1. Allow a thin layer of melted sweet chocolate to flow over the top of the frosting after it has been spread on the cake and a thin crust has formed on the top.

2. Brown or maple sugar may be substituted for white sugar. The sirup must be boiled to a higher temperature (250° F.) before the mixture will reach the soft-ball stage.

3. Use ¼ cup of dark-colored strained honey and ¾ cup of granulated sugar, or use ½ cup light-colored strained honey and ½ cup granulated

sugar. Add 3 tablespoons of water, and boil the mixture until it reaches the soft-ball stage (240° F.), or until it begins to form threads when some of it is dropped from the tines of a fork. Add the sirup to the white of egg in the manner described in Method I. This frosting stiffens but does not grain, and should be spread on the cake immediately before using.

4. Freshly grated cocoanut may be liberally sprinkled on the top of a cake immediately after the frosting has been spread on it.

5. Chocolate frosting may be made by Recipe I for boiled frosting by adding 2 squares (2 ounces) of chocolate to the sugar and water mixture before it has been cooked. The directions given under Method I may be followed. Another method is to add melted chocolate to the white frosting after it has been beaten and is stiff enough to spread. The amount of chocolate may be varied to suit the individual taste.

6. One-half cup of chopped nuts, figs, raisins, dates, or any combination of nuts and these fruits, may be added to the frosting just before spreading it on the cake.

CHAPTER XXIII

PASTRY

By Winifred Moses and Lucile Brewer

Pastry is a shortened dough, a mixture of flour, shortening, and liquid put together in different ways, according to the purpose for which it is to be used. Three kinds are in common use: (1) Plain pastry, in which the shortening is worked into the flour by cutting or chopping; (2) puff pastry, in which the shortening is worked into the paste by folding and rolling; (3) flaky pastry, in which the shortening is worked into the flour by a combination of these two methods.

INGREDIENTS

Flour.

Pastry flour, made from winter wheat, makes the best pastry. It differs from ordinary bread flour made from spring wheat in that it contains less gluten and more starch; it is softer, whiter, and more velvety. One of the best tests for winter wheat flour is that it easily retains the impress of the fingers, while spring wheat flour tends to fall apart as quickly as the pressure is removed.

Bread flour may be made to approximate pastry flour in effect by substituting two tablespoons of cornstarch for two tablespoons of flour in each cup.

Liquid.

Water is used as the liquid in making pastry. It should be as nearly ice cold as possible, except when beef drippings and warm water are used. To make pastry tender, the smallest possible amount of water that will hold the ingredients together is used. The actual amount depends on the water-absorbing quality of the flour, and on the amount of fat used—the more fat, the less moisture required.

Fat.

The following kinds of fat may be used: butter, oleomargarine, vegetable fat, lard, lard substitutes, beef drippings, chicken fat, and suet. When suet is used, it is melted over boiling water and stirred while hot into the flour. The paste is then kneaded and rolled into a rather thick sheet and shaped in a mold. The effects of the various fats are as follows: lard: a soft, tender crust; cottolene: a soft, tender crust, slightly darker in color than if lard is used; vegetable oils: a less flaky crust and darker in color than if lard is used; suet: a more compact and firm crust than if lard is used. It has been found by experiment that more butter than lard is required and more lard than lard substitute, and that less shortening is needed when pastry flour is used than when bread flour is employed.

For 1 cup of bread flour one should use: $^1/_3$ cup of lard; $^1/_3$ cup plus 1 tablespoon of butter; $^1/_3$ cup minus 1 tablespoon of lard substitute.

For I cup of pastry flour one should use: ¼ cup of lard; ¼ cup plus $^2/_3$ tablespoon of butter; ¼ cup minus $^4/_5$ tablespoon of lard substitute.

Lard makes the tenderer crust, but butter gives the better flavor. For equivalent measures of various fats see page 477.

Baking powder.

Baking powder may be used to help leaven the crust, in the proportion of ¼ teaspoon to 1 cup of flour. Usually the only leavening agents used in pastry are the air and water which expand when heated.

Salt.

If an unsalted fat is used, salt should be added in the proportion of ¼ teaspoon of salt to 1 cup of flour.

CHARACTERISTICS OF GOOD PASTRY

Lightness depends on the amount of air incorporated, on the expansion of that air, and on the presence of baking powder.

If the materials used are cold and the manipulation is carried on in a cold room, or if the paste is chilled by being placed in a refrigerator, the expansion of the inclosed air is greater during the baking process.

Flakiness results when the ingredients are so mixed as to make layers. To accomplish this, fat is not thoroughly mixed into the dry ingredients, but is left in pieces by being cut in with a knife or rubbed in with a spoon.

Tenderness depends on the relative amounts of fat and water used and on the manipulation. The more fat and the less water used, within limits, the tenderer will be the crust. Handling the paste develops elasticity by developing gluten, and so makes a tough crust. If the fingers are used to mix the fat with the flour, the heat of the fingers melts the fat and causes it to act as liquid; thus more flour is required, which tends to make a tough paste.

DIRECTIONS FOR MAKING PLAIN PASTRY

Recipe for plain pastry.

1 cup flour	¼ teaspoon salt
¼–1/3 cup shortening	Water

(1) Mix the flour and salt; (2) cut in the fat, and add only enough water to hold the ingredients together; (3) turn the mixture onto a slightly floured board and turn it with a spatula to cover it evenly with flour; (4) if two crusts are to be made, cut the paste in two portions and roll them separately and lightly with a rolling-pin, using motions outward from the center; (5) keep the dough as nearly the desired shape and as uniform in thickness as possible, roll it until the paste is very thin; (6) after each few rolling motions, loosen the dough from the board to prevent sticking.

One-crust pie.

Place the crust in the pie pan, being careful that it is smooth, but not at all stretched. A perforated pan of tin or agate ware is best. The pan should never be greased. With scissors cut around the edges, leaving a margin of about ½ inch. Turn this slightly under, and press it into fancy edges with the fingers. Fill the crust, and bake it in a moderate oven for 40 minutes. Fillings for one-crust pies are made with milk and egg foundations, such as custard, cream, and pumpkin, or from cooked fruit, such as apple-sauce. These liquid fillings are likely to soak into the pie crust during the process of baking, making a soggy crust. This may be avoided by brushing over the crust with white of egg and placing the unfilled crust in a hot oven long enough to coagulate the egg-white, thus forming a coating to prevent the filling from soaking into the crust. Or instead of heating the crust in the oven, the filling may be heated separately to such a temperature that on adding it to the crust it will coagulate the white of egg.

Crust baked without filling.

The crust is sometimes baked first and then filled with a cooked filling. Many persons prefer this kind of pie since the crust is crisp and well baked. Invert a pie plate, cover the outside with pastry, fit it carefully to the plate, and press the edge well to the edge of the plate. Trim the edge if necessary, set the pie plate on a tin sheet to prevent the edge of the paste from touching the floor of the oven. Prick the crust well with a fork, and bake it from 12 to 15 minutes, or until it is thoroughly baked. Slip the crust from the outside of the pan, and put it in place as an under crust. Use any cooked filling, and place over the top strips or figures of baked pastry, or a meringue.

Two-crust pie.

The lower crust is placed in the pie pan as for a one-crust pie, but in this case the edges should be cut close and evenly with a knife. The flavored filling is then added. The upper crust should be rolled rather thick, brushed with butter, and lightly sprinkled with flour. Slits should be cut in the crust to allow for the escape of steam. The edges of the lower crust are then moistened with water and the upper crust laid over the pie, care again being taken not to stretch the crust. The edges then are cut and pressed firmly together into a fancy shape with the fingers or a fork. Allow water to run over the top of the crust to make a flaky finish. If a shiny finish is preferred, brush over the top with a mixture of slightly beaten white of egg and water, without buttering and flouring the top. If the filling is of a juicy type, a paper tube inserted in one of the slits in the crust will allow the steam to escape readily and prevent the juice from running out. Bake the pie in a moderate oven (page 480) for 40 minutes.

DIRECTIONS FOR MAKING FLAKY PASTRY

Flaky pastry made half of washed butter and half of other shortening is used for pie crusts, turnovers, cheese straws, and tarts.

Recipe for flaky pastry.

3 cups flour	½ cup shortening
½ teaspoon salt	½ cup washed butter
	3/8 to ¾ cup water

(1) Wash the butter until it is creamy and free from milk; (2) sift the flour and salt twice; (3) cut the ½ cup shortening into the flour with a

knife; (4) add cold water gradually, mixing it with a knife to a paste as for plain pastry; it must not be sticky; (5) knead it slightly; (6) cover it, and set it in a cool place for 5 minutes; (7) pat it with a rolling-pin, and roll it out into a rectangular sheet; (8) spread half the butter on half the surface and fold, press down the edges so that no air nor butter can escape, then spread the remainder of the butter on half again and fold, pinching the edges tightly together; (9) set it in a cool place again for 5 minutes; (10) roll the pastry two or three times, allowing it to cool between each turn; (11) roll it out to 1/8 inch thickness, and bake it in a hot oven (page 480).

DIRECTIONS FOR MAKING PUFF PASTRY

Puff paste is used when pastry of great flakiness and lightness is desired, as in patty shells, tarts, fruit rolls, tea cakes, Florentine meringues, and the like.

Recipe for puff pastry.

1 pound washed butter
1½ pounds pastry flour
1 cup ice water

(1) Wash the butter until it is creamy and squeeze out all the liquid; (2) separate the butter into six parts; (3) take out ½ pound of the flour; (4) cut one piece of butter into the pound of flour, add ice water, and mix the ingredients into a paste with as little handling as possible; (5) knead the dough until it is smooth and elastic, cover it, set it in a cool place for 5 minutes; (6) roll the paste, outward from the center, into a rectangular piece; (7) place one piece of the butter on one-half the surface, fold the pastry over, and pinch down the edges to keep in the air; (8) fold the right edge two-thirds of the way back, fold the left edge back over this, pinch down the edges again so that no air or butter can escape, cover the paste, and let it stand in a cool place for 5 minutes; (9) roll it out into another rectangle, and repeat the former process with the next pat of butter, being sure to press the edges each time to keep in both the air and the butter; (10) repeat this process until all pats of butter have been used; each time before rolling the paste, turn it halfway round in order to roll from another side, and always roll from you; (11) after the final rolling, the paste must be chilled on ice or in a very cool place for an hour or two; (12) bake it in a hot oven (page 480) with the heat coming from below, and set it on the floor of even a gas oven for the first 5 minutes.

Puff pastry when baked should be eight times as thick as when put into the oven. It is very rich and has a surface that is light, flaky, and rather shiny.

CHAPTER XXIV

YEAST BREAD

By Claribel Nye

The making of yeast bread has a certain fascination because success depends largely on the proper control of living organisms, or yeasts. If dough is left for too long or is kept too warm, the yeast plants become weakened; then the bacteria that may be present grow and produce an acid, making the bread sour. The milk is scalded in order to kill any bacteria present. Proper baking of bread kills all bacteria, yeasts, and molds, and insures its keeping, if it is carefully handled and stored afterwards.

INGREDIENTS

The essential ingredients for yeast bread are flour, yeast, liquid, and salt. Other ingredients often added for flavor, texture, or keeping quality are sugar, shortening, and potatoes. In place of the customary wheat, corn, barley, oats, rice, potatoes, peanuts, or breadcrumbs may be used.
In place of some of the wheat ordinarily used, corn, barley, oats, rice, potatoes, peanuts, or breadcrumbs may be used.

The cereals may be ground and added with the flour, or they may be cooked to a mush before they are added to the batter.

Flour.

The best bread flour is called strong flour and is made from hard spring wheat. This wheat is grown in the Dakotas, Minnesota, a part of Iowa, Nebraska, northern Kansas, northern Colorado, Wyoming, and Montana. A strong winter wheat is grown in a limited number of states, notably Kansas. A strong bread flour is slightly granular, has a creamy color, and gives bread of maximum volume.

Wheat and rye flours are particularly adapted to bread-making because they contain materials which, when moistened, form an elastic substance, called gluten. The gluten expands with the pressure of heated gases in baking and forms a framework surrounding the other ingredients. A good yeast bread generally contains some wheat or rye flour, although other cereals can well be used to a certain extent.

The present complex standardized process of milling wheat is the result of a gradual remarkable development which began in the days when women were millers, the mill consisting of two stones between which the grain was ground. The patent, or roller, process now used produces a flour different in color, composition, and bread-making qualities. Although wheat milled by the roller process yields a flour that gives a white loaf and consequently makes its appeal to the eye, the flour contains less of the entire wheat kernel than that produced by the other method.

The patent reduction, or roller, process is so named because the wheat is reduced to flour by being put through a series of steel rollers. The wheat is first cleaned, and then gradually reduced to flour as it passes through a series of steel rollers, each pair adjusted to give a finer product than the preceding. As the wheat passes through each set of rollers, a little of it is reduced to flour and the remainder is called middlings. The middlings are then carried through the next roller; each time the result is flour and middlings. The bran cannot be reduced to flour but is flattened by the steel rollers and separated from the flour. The quality of the flour that results from the blending of the flours obtained from the different rollers depends on the skill of the miller.

Flour is sometimes said to be 80 per cent patent. This usually means that 80 per cent of the flour obtained from the wheat in the different stages of milling has been blended for market. The term "patent" flour came into use when the roller, or patent, milling process was introduced; its meaning at the present time is not uniform throughout the country.

Graham, from whom graham flour received its name, believed that the entire wheat kernel should be used for food and developed a milling process by which all the kernel, with the exception of the outer inedible coats, was used. At the present time, most graham flour is made by combining bran and white flour.

Whole-wheat flour does not contain so large a percentage of the entire wheat kernel as does graham. However, graham, because of its coarseness, may be irritating to the digestive tract of some persons.

White flour contains less of the wheat kernel than does either whole-wheat or graham.

Yeast.

Yeasts are very small plants, having a diameter of about 3/1000 inch. In bread-making, yeast serves two functions: (1) by its action on the sugar of the flour it forms carbon dioxide gas, which makes the dough light; (2) it gives the characteristic flavor which is found in bread only when yeast is used.

Before yeast was sold commercially, women used to obtain it by exposing batter to the air for several hours. The difficulty with this method was that various yeast plants, as well as other organisms present in the air, might enter, whereas only one type of yeast is best for bread-making. Thus the flavor of the bread was not always desirable. Old-fashioned liquid yeast, or potato yeast, represents the housekeeper's method. The yeasts grow and multiply rapidly in potato water to which salt and sugar have been added. This mixture is then kept in a cool place until needed for bread-making. The disadvantage of liquid yeast is that other yeasts and organisms find their way into the mixture and may give the bread a peculiar flavor.

For the commercial product, one form of yeast is grown under very carefully standardized conditions. The yeasts are mixed with cornmeal and the mixture pressed into cakes and dried; or the yeasts are mixed with starch or tapioca flour, pressed into cakes, and sold in the form of compressed yeast. In the dried form they will keep in fairly good condition for months;

compressed yeast keeps for only a few days, but the yeast is much more active than it is in the dry cakes and, therefore, bread can be made more quickly from it.

Liquid.

The liquid used in bread-making may be water, whole milk, skimmed milk, whey, potato water, rice water, or the like. Increased nutritive value, as well as better flavor and texture, are points in favor of using milk in some of its forms instead of water.

MIXING AND KNEADING

Milk for making bread is scalded in order to kill any organisms that might develop under the favorable conditions offered and thus give the bread a bad flavor.

The best temperature for the growth of yeast is 75° to 90° F. Below 40° to 60° F. yeast will not grow. It is killed at 140° F. Therefore, the liquid is cooled until it is lukewarm before the yeast is added.

Sponge method.

For the sponge method of mixing bread, sufficient flour is used to make a batter. This is 1½ cups of flour to 1 cup of liquid. The mixture is set aside until the surface is covered with bubbles. Sufficient flour to make a dough is then added. The sponge method is followed frequently when dry yeast is used. Yeast plants grow rapidly in a thin batter, and as they are not in an active state in dry yeast cakes, the batter makes possible a quick growth of yeast. With compressed yeast the sponge method is unnecessary.

Straight-dough method.

For the straight-dough method, sufficient flour to make a dough is added as soon as the yeast has been added to the liquid. The dough is removed to a floured board and is kneaded until it is smooth and elastic, and until it will not stick to an unfloured board. Kneading is for the purpose of thoroughly mixing all the ingredients, developing the elasticity of the gluten, and incorporating air into the dough.

Mixing bread by a machine.

If three or more loaves of bread are being made, a bread-mixer saves time and labor. If the correct proportion of flour to liquid is used, and the mixing is continued until the dough is smooth and elastic, the same result will be obtained by machine-mixing as with equal care by hand-mixing. Frequently too much flour is used. This causes slow rising, and if the dough is made into loaves before the rising is complete, the resulting bread will be compact and inferior in other respects.

FERMENTATION

The rising of dough until it goes into the pan is called fermentation. The best temperature for the growth of yeast is 80° to 87° F.

If a strong or good grade of bread flour is used, the dough should treble its original size in the first rising. If a weak or poor grade of flour is used, the dough will only double its original size.

The texture and the flavor of bread is improved by a second rising of the dough. The dough should increase its original size by only one-half during the second rising.

SHAPING DOUGH

No flour should be used in molding loaves. The dough is molded by folding the sides under several times. It is placed in a greased tin with the crease on the bottom. The tins should be only half filled with the dough.

PROOFING

The rising in the pan is called "proofing."

This rising can be more rapid than in fermentation. Commercially, loaves are proofed at a temperature about 10° above that of fermentation.

BAKING

Loaves are ready to be baked when they have doubled their original size.

The baking temperature depends somewhat on the amount of sugar and shortening used in the dough. With an increase in sugar and shortening, there should be a decrease in temperature. The best temperature for plain bread dough is from 380° to 400° F. Loaves weighing 1½ pounds should be baked from 50 to 60 minutes at from 380° to 400° F.

A uniform temperature during the entire baking period gives good results, although many authorities believe the temperature should be increased after the first 15 minutes. Dough should rise, or spring, during the first 5 minutes it is in the oven. At the end of 15 minutes it should begin to brown, and as baking continues the bread should draw away from the sides of the tin and brown on all sides.

If a soft, shiny crust is desired, the loaves should be greased 5 minutes before baking is completed.

Bread should be removed from the pans as soon as it is taken from the oven. The loaves should be cooled quickly, in circulating air and not covered.

"ROPE" IN BREAD

A condition in bread that causes considerable trouble and financial loss in bakeries and occasionally in home baking is called "ropiness," and the bread is known as "ropy bread." Such bread for several hours after baking looks, smells, and tastes like any well-made bread; then there quickly develops a most disagreeable odor. When the loaf is broken, the interior is slimy, sticky, and stringy. Such bread, of course, is not fit for food.

"Rope" is the result of the action of a form of bacteria which, if present, is found in the flour. It develops only in very hot weather. The organism chiefly responsible for ropiness is said to be generally distributed in the soil. The best flours may be infected, and it is impossible in buying flour to know whether the organism is present.

When the difficulty is found, all utensils and containers used for flour, bread-making, or storing bread should be sterilized by boiling. In making bread from the remainder of the flour on hand or from additional flour of the same brand bought during the hot weather, vinegar should be added to the liquid in the proportion of two per cent of the amount of flour, or about 1 tablespoon to each pound of flour. In all other respects the bread should be made in the usual way. The bread will not have as good a bloom as under normal conditions, but otherwise it is not inferior.

RECIPES

White bread (2 loaves)

2 tablespoons sugar—brown or granulated—honey, molasses, or corn sirup. (The sugar may be omitted.)
2 tablespoons any kind of shortening. (The shortening may be omitted.)
2½ teaspoons salt
2½ cups liquid—water, scalded milk, rice water, or whey
¼ to 2 cakes dry or compressed yeast, or 2/3 to 2 cups potato yeast
6 to 8 cups white bread flour

The amount of flour varies slightly. A smaller quantity of good bread flour than of poor, is required. If the flour is damp, more must be used than if it is dry. The shortening and the sugar may be omitted. If the bread is to be made in 8 hours, only ¼ cake of dry or compressed yeast or 2/3 cup of liquid yeast need be used. If the bread is to be made in 4 hours or less, 2 cakes of dry or compressed yeast or 2 cups of liquid yeast are needed.

General directions for mixing and baking bread

(1) Add the hot scalded milk or other liquid to the sugar, the salt, and the shortening; (2) when this is lukewarm, add the yeast, which has been softened in a small amount of lukewarm water (this water is included in the amount of liquid given in the recipe); (3) add one-half the amount of flour called for in the recipe; beat the mixture well and add the remainder of the flour slowly until the dough is stiff enough to knead; (4) knead the dough, using as little flour as possible on the board, and adding only enough flour to keep the dough from sticking; continue kneading until the dough is smooth and will form a ball that does not flatten out when it stands on the board; when the dough does not stick to the board, on which there is no flour, it has been sufficiently kneaded; (5) moisten the top of the dough with water or fat to prevent a crust forming on it, cover the dough with a towel, and set it aside to rise in a warm place at a temperature of about 85° to 90° F.; (6) when the dough has risen until it is

twice its original size, work it down by folding the sides under four times; (7) cover the dough again, and allow it to rise until it has increased its size by one-half; (8) shape the dough into loaves, and place them in greased pans, filling the pans about half full; (9) allow the loaves to rise until they are double in bulk when the dough will begin to follow the shape of the pans; (10) bake the loaves for 50 to 60 minutes in a moderate oven at a temperature from 380° to 400° F.; the bread should begin to brown at the end of 15 minutes; (11) remove the bread from the pans at once, and place the loaves where they will cool quickly; do not cover the bread while it is hot; (12) if a soft, shiny crust is desired, grease the crust 5 minutes before the baking is completed.

Variations

For variation in kind of bread, use the recipes and directions for making white bread, substituting, according to the following suggestions, other flour or cereals for part of the white flour. The substitutes may be used in larger proportions than are here indicated, but the loaves will not be so light or so similar to white bread.

Entire wheat bread: 6 cups entire wheat flour, 2 cups white bread flour. Follow the general directions.

Graham bread: 6 cups graham flour, 2 cups white bread flour. Follow the general directions.

Rolled oats bread (not kneaded): 1½ cups rolled oats, 5¾ cups white bread flour. Pour boiling milk or other liquid over the oats, the salt, and the sugar. When the mixture is lukewarm, add the yeast. Add the flour, and beat the dough well. When it has doubled in bulk, beat it well. Turn it into greased bread tins. When it has doubled in bulk, bake it for 1 hour. Generally molasses or brown sugar is used instead of granulated sugar.

Rolled oats bread (kneaded): 2 cups rolled oats, 6 cups white bread flour. Add the boiling liquid to the rolled oats, the salt, the sugar, and the shortening; when the mixture is lukewarm, add the yeast. Then add the flour, knead the dough, and proceed according to the general directions.

Rice bread: 2 cups cooked rice, rice water for liquid, 3 cups graham flour, 5¾ cups white bread flour. Boil ½ cup of rice in 2 quarts of unsalted water for from 15 to 20 minutes. Drain the rice, and dry it somewhat. Follow the general directions.

Wheat bread (breadcrumbs): 2 cups breadcrumbs, 5½ cups white bread flour. Add the boiling liquid to the breadcrumbs, sugar, shortening, and salt. When the mixture is lukewarm, follow the general directions.

Wheat bread (home-ground wheat): 4 cups home-ground wheat, 4 to 4½ cups white bread flour. Follow the general directions.

Potato flour bread: 2 cups potato flour, 5½ cups white bread flour. Follow the general directions.

Rye bread: 3 cups rye flour, 4½ cups white bread flour. Follow the general directions. Since the dough is soft and sticky, it is difficult to knead; but do not let this tempt you to add more white flour.

Barley bread: 4¼ cups home-ground barley meal, 4½ cups white bread flour. Follow the general directions. One cup of barley makes 1¾ cups of barley meal.

Corn bread: 2 cups cornflour, 7 cups white bread flour. Follow the general directions.

*Combination yeast breads (3 loaves).**

Directions for making these combination breads follow the recipes.

WHITE BREAD (Basic recipe)

13 cups flour
2 tablespoons corn sirup
5 teaspoons salt
2 cakes compressed yeast
1 quart water

CORN BREAD

8 cups flour
1½ cups cornmeal, uncooked
5 teaspoons salt
2 tablespoons corn sirup
2 cakes compressed yeast
5 cups water

ROLLED OATS BREAD

8 cups flour
2¾ cups rolled oats, uncooked
2 tablespoons molasses
5 teaspoons salt
2 cakes compressed yeast
5 cups water

RICE BREAD

8 cups flour
1 cup rice, uncooked
2 tablespoons corn sirup
5 teaspoons salt
2 cakes compressed yeast
5 cups water

POTATO BREAD

8 cups flour
2 pounds, or 1½ quarts potatoes, uncooked, diced
7 teaspoons salt
2 tablespoons corn sirup
2 cakes compressed yeast
4 cups water

BEAN BREAD

8 cups flour
1 cup beans, uncooked
2 tablespoons corn sirup
5 teaspoons salt
2 cakes compressed yeast
5 cups water

BARLEY BREAD

7 cups flour
1 cup barley, uncooked
2 tablespoons molasses
5 teaspoons salt
2 cakes compressed yeast
5 cups water

BREADCRUMB BREAD

8 cups flour
4 cups breadcrumbs
2 tablespoons molasses
5 teaspoons salt
2 cakes compressed yeast
4 cups water (or milk and water)

(1) To prepare the substitute, soak beans or barley overnight, drain off the water, measure it, and add sufficient water to make 1 quart, then cook the beans or barley in this until they are soft; cook the cereal in 1 quart of

* Charles Taylor.

the water called for in the recipe and the potato in 3 cups until it is soft; mash the potato; grind the bread in a chopper, adding 3 cups of lukewarm water; (2) combine the hot mush or mashed potato or breadcrumbs, the salt, and the sweetening, stirring the mixture often enough to avoid the formation of any film, until it has cooled to blood heat; (3) when it is lukewarm, add the yeast which has been softened in 1 cup of water, reducing the yeast one-half, and increasing the salt one-fourth if the bread is set overnight; (4) add the flour, and knead the dough thoroughly, using as little flour on the board as possible; (5) let the dough rise for 3½ hours, or until it has doubled in bulk at the approximate temperature of 75° F.; (6) work it down, and let it rise again for 1½ hours, or until it has increased its size by one-half; (7) mold it, place it in pans, and let it rise until it has almost doubled in bulk; (8) bake the loaves for 50 to 60 minutes in a moderately hot oven, or at a temperature of 360° to 400° F.; (9) remove the bread from the pans at once, and cool it quickly.

On account of the reduced amount of gluten in these breads, they must be molded and handled with great care.

Wheatless yeast breads. *

Quick rising seems to give best results with wheatless yeast breads. Therefore, a larger proportion of yeast is used than is necessary when the dough is allowed to rise overnight.

The best loaf is made from dough which is so soft that it must be stirred, not kneaded.

Only part of the flour should be added at the beginning. When the sponge has risen for about 20 minutes, it should be beaten or stirred thoroughly; then the remaining flour should be added and the dough turned into the pan. It should be allowed to rise in the pan for about 30 minutes, or until it rounds up slightly. These doughs never double in bulk in the rising as do wheat doughs.

Small loaves made from these heavy cereals are likely to have a better shape and texture than large ones, although one loaf may be made from the recipes given.

Slow baking gives the best results. From 1¼ to 1½ hours in a fairly slow oven is the time recommended.

Barley, oat and rice flour bread (2 small loaves).

2½ cups barley flour	2 teaspoons salt
½ cup rice flour	1 tablespoon corn sirup
1½ cups ground rolled oats	1 cake compressed yeast
1 cup milk	¼ cup lukewarm water

Soften the yeast in the lukewarm water. Scald the milk, and add the salt and sirup. When the mixture is lukewarm, add the yeast, then the barley flour and rice flour, sifted. Beat the dough well, and allow it to rise until it is light. Add the sifted oat flour, and turn the mixture into

* Lucile Brewer.

greased pans. Allow it to rise for 20 or 30 minutes, and bake it in a moderate oven from 1 to 1¼ hours.

Barley and rice bread (2 small loaves).

4 cups barley flour
1 cup boiled rice
1 cup milk
2 teaspoons salt
1 tablespoon corn sirup
1 cake compressed yeast
¼ cup lukewarm water

Soften the yeast in the lukewarm water. Scald the milk, and add the sirup and salt. When the mixture is lukewarm, add the yeast.

SALT-RISING BREAD

An old-fashioned bread, the making of which is almost a lost art to-day, is called salt-rising bread. No yeast is used. Gas from a certain type of bacteria found in cornmeal is the leavening agent. Dough made from freshly ground cornmeal rises much more rapidly than that from old cornmeal; in fact, failure generally results unless fresh cornmeal is used.

The bread is handled in the same way as yeast-raised bread, except that the entire process can be carried on at a somewhat higher temperature than is possible with yeast bread.

The odor of salt-rising bread during fermentation and proofing is characteristic. No other dough is like it.

Salt-rising bread is finer in texture than yeast bread, and some persons believe it is more easily digested.

Recipe for salt-rising bread (3 loaves).

(1) In the evening make a mush of 2 tablespoons of cornmeal and about ½ cup of scalded milk. Keep it in a warm place overnight. (2) In the morning mix together 1 cup lukewarm water, ½ teaspoon salt, ½ teaspoon soda, 1½ cups flour, cornmeal mush. (3) Cover the mixture, and place the dish in warm water until the mixture is light. (4) To 2 cups lukewarm water add 2 teaspoons of salt and 3 cups of flour. Add to this the cornmeal leavening mixture. Allow the mixture to rise until it is light. Then add sufficient flour to make a dough. Knead it until it is smooth, make it into loaves, place it in tins, and allow it to rise until it is double in bulk. Bake it according to the general directions.

CHAPTER XXV

COOKING OF CEREALS

By Mary F. Henry

Cereals in general are a cheap source of energy but there are wide differences in the cost of the various cereals themselves. Rolled oats, the whole-wheat grain, and cornmeal are, under ordinary conditions, the cheapest energy-yielding foods. The ready-to-eat and the partly cooked cereals are from two to ten times as expensive as the raw cereals. Attention given to the proper cooking of the raw cereals and to simple variations in serving them will, therefore, help to keep the food bills low, while at the same time the family is provided with a nutritious and appetizing food.

Proportion of cereal and water.

No rule for the proportion of cereal and water can be given that will apply to all kinds of cereals, or that will give a consistency which will satisfy every taste. The kind of cereal, the method of manufacture, and the method of cooking affect the amount of water that should be used. Cereal cooked in a fireless cooker requires less water than that cooked in a double boiler because there is less evaporation. Cereal cooked in a double boiler requires less water than that cooked directly over the fire, for the same reason. The table here given suggests proportions of water and cereal that may be used. Modification may be made to suit the taste.

The proportion of salt should be ½ to 1 teaspoon for every cup of water.

Time required for cooking cereals.

Cereals require long, slow cooking to make them palatable and digestible. Just as the various cereals call for different proportions of water, so they require different lengths of time for cooking. The whole grains and the ground grains containing large amounts of cellulose, such as whole-wheat, oatmeal, or Ralston's breakfast food, require a longer time for cooking than the grains that naturally or because of the process of manufacture contain less cellulose, such as rice or cream of wheat. The time of cooking may be reduced considerably by soaking the cereal for several hours, or even as long as overnight, to soften the cellulose. This soaking may be especially desirable in the case of whole cereals. Since the cereal in this way absorbs a considerable amount of water, an equal amount should be deducted from that used in cooking the cereal.

Utensils for cooking cereals.

A fireless cooker is particularly well adapted for cooking cereals, since it gives the desirable long, slow cooking and makes possible a saving in attention and fuel. A double boiler is the next most convenient utensil. Cereals may be cooked directly over the fire if the temperature is kept low, but since there is a tendency to shorten the time of cooking because of the attention required to prevent burning, this method is in general not recommended. Even if stirred, cereal cooked in this way is likely to stick to the kettle and make it difficult to wash.

Directions for cooking cereals in a double boiler.

(1) Measure the water, and bring it to the boiling point in the upper part of a double boiler; (2) when the water is boiling vigorously, sprinkle the dry cereal into it slowly in order not to stop the boiling, as this will prevent lumping; (3) stir the cereal only slightly to prevent sticking and allow it to boil from 5 to 10 minutes, or until it thickens; (4) cover the container, and place it over the lower part of the double boiler, which is filled one-third full with boiling water; (5) cook the cereal for the required length of time, keeping the water in the lower part of the double boiler constantly boiling.

Directions for cooking cereals in a fireless cooker.

(1) Cook the cereal in the fireless cooker container over direct heat for 5 or 10 minutes according to the directions just given for the use of a double boiler; (2) when the cereal has boiled 5 or 10 minutes, cover the container and place it as quickly as possible in the fireless cooker and

allow it to remain overnight. If a hot soapstone is used, 4 or 5 hours' cooking may be sufficient. If necessary, reheat the cereal over direct heat or in a container of boiling water before serving it.

TABLE XXX.—COOKING OF CEREALS

Kind of cereal	*Measure (cups)*	*Amount of water*[1] *(cups)*	*Time of Cooking*			*Amount after cooking (cups)*
			Over direct heat (minutes)	*Double boiler (hours)*	*Fireless cooker*	
Pettijohn's......	1	2 to 2½	5 to 10	3	Overnight	2 scant
Rolled oats.......	1	2 to 2½	5 to 10	3	Overnight	2
Cream of wheat...	1	4 to 5	3 to 5	1	Overnight	4 scant
Farina...........	1	4 to 5	3 to 5	1	Overnight	4 scant
Cornmeal........	1	4	5 to 10	2 to 3	Overnight	4 scant
Entire grain wheat.	1	4	5 to 10	6 to 8	Overnight	3½
Ralston's.........	1	4	5 to 10	3	Overnight	4 scant
Oatmeal	1	4	5 to 10	6	Overnight	3½
Hominy grits.....	1	4	5 to 10	6 to 8	Overnight	3½ scant
Samp............	1	4	5 to 10	5 to 6	Overnight	4
Wheatena........	1	4	5 to 10	1 to 2	Overnight	4 scant
Rice.............	1	3½ to 5	5 to 10	3	Overnight	4½

[1] If the fireless cooker is used, from ¼ to ½ cup less water should be added than is given in this table.

Variations in cooking and serving breakfast cereals.

Cereals may be cooked in milk, or in a combination of milk and water. Slightly more milk is necessary than when water alone is used. The use of milk in cooking cereals offers a way of increasing the milk-content of a meal and makes the dish more nutritious. Figs or raisins may be chopped fine and stirred in a few minutes before serving. Bananas, berries, or other fruit may be served with the cereal. Combinations of two or more kinds of cereals are good for variety.

Uses for left-over cereals.

Left-over cereals may be served in various ways. The cereal may be poured into individual molds and served as pudding with fruit sauce or cream. Dates, figs, or other fruit may be added before it is molded. If the cereal is sufficiently stiff, it may be molded in a loaf, sliced, browned in a small amount of fat, and served with sirup or tomato sauce. Left-over cereal may be used for a part of the flour in muffins, pancakes, or other breads, and in scalloped dishes or croquettes.

*How to pop corn.**

For good results in popping, the main requisites are good corn and a good hot fire. In popping, certain precautions may be observed to good advantage. Too much pop-corn should not be taken at one time, not more than enough barely to cover the bottom of the popper one kernel deep. The popper should be held high enough above the fire or heat to keep from burning the kernels or scorching them too quickly. The right degree of heat for best results in popping should make good corn begin to pop in 1½ minutes. This should give the maximum volume increase in popping. If it begins to pop in less time or if a large quantity of corn is put into the popper, it will not pop up so crisp and flaky. If it takes much longer for the popping to begin, the heat is probably not great enough or the pop-corn is of poor quality, or there may be other interfering causes, such as drafts of cold air.

To preserve the snowy whiteness of the popped kernels, the flame must be kept from striking them. This can be done by placing a plate of iron or a stove lid between the corn and the fire if a wire popper is used or by using a pan popper if popping directly over a flame.

If the pop-corn is in first-class condition and the heat properly applied, 1 pint of unpopped corn should give 15 to 20 pints of popped corn.

* Hartley, C. P., and Willier, J. G. Farmers' Bull. 553. U. S. Dept. of Agr.

CHAPTER XXVI

MEAT AND POULTRY

By Lucile Brewer

Although meat is not a necessity in the diet (page 410), the estimate is that in the United States about one-third of the total expenditure of money for food is for meat. This country shows the highest per capita consumption. Doubtless one of the reasons for this large consumption is that meat has an appetizing flavor and is easily cooked, especially the tender cuts. American cooks have not yet acquired the skill of European and Oriental cooks in flavoring foods, nor do they, under ordinary conditions, devote sufficient time and thought to the preparation of meat-substitute dishes. However, with the rising cost of meat, more attention is being paid to the tough, and consequently, cheaper, cuts and to the complete utilization of all meat bought.

SELECTION OF MEAT BY APPEARANCE

Beef should be firm and fine-grained in texture. It should have a bright red color and be well mottled with fat. The fat of beef should be firm and of a yellowish color. Suet should be dry and should crumble readily. For cuts of beef, see Fig. 118.

Veal should be of a pinkish color. The fat should be firm and white.

Mutton should be a bright pink color and fine-grained. The fat of mutton should be hard and flaky. The outside skin should come off easily. For cuts of mutton, see Fig. 119.

Lamb.—The bones of lamb are reddish in color while those of mutton are white.

Pork.—The skin of pork should be white and clear. The flesh should be of a pinkish tint. For cuts of pork see Fig. 120.

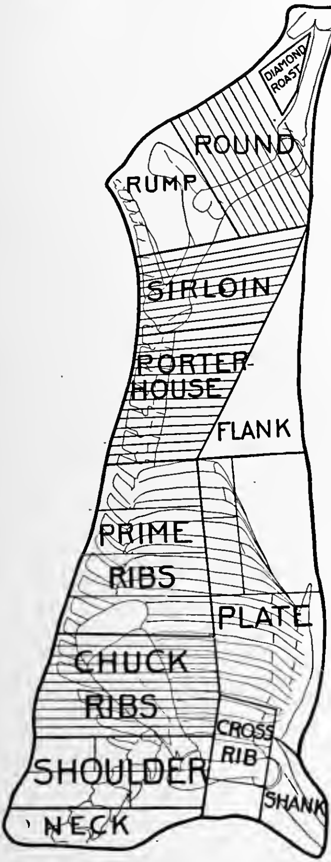

Fig. 118.—Cuts of beef.

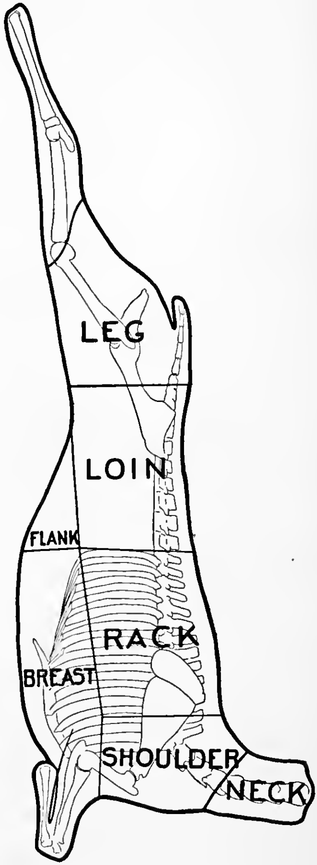

Fig. 119.—Cuts of mutton.

Poultry.—Chickens should have soft feet, a smooth skin, and soft cartilage at the end of the breast bone. An abundance of pin feathers indicates a young bird. Long hairs indicate age.

The feet of fowls are hard and dry, with coarse scales. The cartilage at the end of the breast bone has become ossified. A good turkey should be plump; its legs should be smooth, and the cartilage at the end of the breast bone should be soft and pliable. (Page 524).

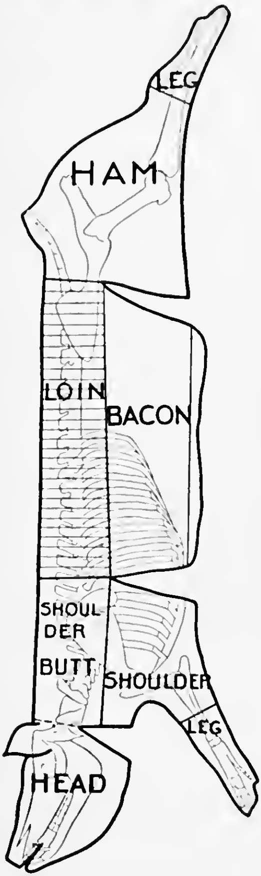

FIG. 120.—Cuts of pork.

GENERAL RULES FOR COOKING

Meat is cooked to soften connective tissue, to develop flavor, to improve appearance, and to destroy bacteria or other organisms.

The cuts of meat may be divided into two classes, the tough and the tender. Although the tough cuts are as nutritious as the tender and are cheaper, more skill and ingenuity are required to make them palatable.

Both nutritive material and flavor are retained in meat by searing over the surface at the beginning of the cooking period. This may be done by plunging it into boiling water or hot fat, or by placing it in a hot oven or over an open fire as in broiling, thus using direct heat.

Tender cuts.

Only the tender cuts should be cooked with dry heat. After the meat has been quickly seared with intense heat to retain the juices, the temperature should be lowered during the remainder of the cooking. Even the tenderest cuts of meat may be toughened by cooking at too high a temperature. The tender cuts are fine grained and require less time for cooking than do the tough cuts.

Broiling and roasting, which develop a fine flavor, can be used only for tender cuts. The best cuts for broiling are porterhouse, sirloin, cross cut of rump steak, and the second and third cuts from the top of the round. Porterhouse and sirloin steaks are the most expensive because of the loss of bone and fat. Round steaks are juicy, but they have a coarser fiber and are not so tender as porterhouse and sirloin.

Steaks should be cut at least one inch thick; they may be as thick as two or three inches.

Most of the fat on steaks should be tried out, clarified, and used for shortening.

The best cuts for roasting are the middle of the sirloin, the back of the rump, and the first three ribs. The tip of the sirloin and the back of the rump make large roasts that are more economical than the sirloin. Rib roasts contain more fat and are somewhat cheaper than other roasts.

Tough cuts.

The tough cuts are the ones containing muscles which the animal has used most actively and include the shin, knuckle, and round of the leg, the neck, and the shoulder.

Methods of making tough meats tender are chopping, adding fat, marinating with oil and vinegar, long slow cooking in moist heat at a low temperature, and breaking the fibers by pounding them with a sharp instrument. Tough cuts of meat require long, slow cooking to be made tender and palatable. Tough ends of the tender cuts, such as porterhouse steak, should be cut off and specially cooked in such a way that they can be utilized, instead of being cooked in the same way as the tender part and then discarded because of their toughness. If it is desired to extract some of the nutritive material and flavor for soup, sauce, or gravy, the meat should be put into cold water and heated slowly. Tough cuts that are to be used for stew may be cut in small pieces and browned before the long, slow cooking, if this browned flavor is liked. Meat cooked for a stew may be drained, rolled in egg and buttered crumbs, and browned for variety. The broth may be thickened and served as gravy.

Swiss steak

$1\frac{1}{2}$ pounds round steak, $1\frac{1}{2}$ to 2 inches thick	$\frac{1}{2}$–1 cup flour
	3 slices bacon
1 small onion	Salt and pepper

Pound the flour into both sides of the piece of steak. Cook the bacon and sliced onion until brown. Add the meat, brown each side, and add water or tomato juice barely to cover the steak. Cover and simmer it on the stove or place it in the oven. When it is half done, season with salt and pepper.

GENERAL DIRECTIONS FOR SOUP-MAKING

Soups may be classified as follows: Soups with stock, as bouillon, brown stock, white stock, consommé, lamb stock; soups without stock, as cream soups, purées, bisques; and chowders. Only soups with stock will be considered here. Cream soups have white sauce as a basis (page 552). Since the purpose in making soup is to draw out as much food substance and flavoring material as possible, the bones or meat should be placed in cold water and should be heated slowly.

Bones are likely to be better utilized if a receptacle is kept for soup materials only; then every few days the soup kettle may be placed on the stove. If the soup kettle is always kept on the stove and especially if the amount of material is large, as in the case of hotel soup kettles, there is danger of food poisoning because the repeated heating and cooling of the meat and broth furnishes excellent conditions for the growth of certain harmful microörganisms. If sparingly used, fresh pork and ham bones make good additions to soup. If there is a small amount of soup stock on hand, it may be used with the water from boiled potatoes, rice, celery, and the like, to make a delicious soup. Soup stock may be used in white sauce or brown sauce to improve the flavor.

If clear soup is wished, only bones should be used, because meat would have to be strained out and would probably be wasted. Meat that has been used for making soup has lost its flavor but not its nutritive qualities; consequently, if a housekeeper wishes to be thrifty, she will boil the soup meat for a shorter time, or until it is tender, and serve it with the soup.

A soup made in this way with the addition of rice, pearl barley, macaroni, or vegetables makes an appetizing luncheon dish.

Bouillon

4 pounds of meat without bone	¼ teaspoon pepper
4 pints cold water	½ teaspoon sweet herbs
1½ teaspoons salt	Bay leaf
10–12 peppercorns	1½ tablespoons each of carrot, onion, celery
4 cloves	
1 cup canned tomato, if desired	

To make bouillon: (1) Use a kettle with a tight-fitting cover to keep in the flavors; (2) wipe the meat with a damp cloth; (3) trim off undesirable portions; (4) cut in small pieces; (5) place the meat in the kettle; (6) cover it with cold water and allow it to stand ½ hour; (7) bring it to the simmering point, 180° F., and cook it for 5 or 6 hours, never allowing the soup to boil; (8) add the vegetables and seasonings 1 hour before serving; (9) strain off the liquid and set it away uncovered to cool.

Brown soup stock

6 pounds shin of beef	1 sprig marjoram
3 quarts cold water	3 sprigs parsley
½ teaspoon peppercorns	Carrots, Turnips, Onion, Celery — ½ cup of each cut in dice
6 cloves	1 tablespoon salt
½ bay leaf	
3 sprigs thyme	

To make brown soup stock: (1) Wipe the beef; (2) cut the lean meat in cubes; (3) brown one-third of it in a frying pan in marrow from the marrow bones; (4) put the remaining two-thirds with the bone and fat in the soup kettle; (5) let it stand for 30 minutes; (6) add the browned meat, and heat it gradually to the boiling point; (7) remove the scum; (8) cover the kettle and cook the meat slowly for 6 hours; (9) add the vegetables 1 hour before it is done; (10) strain the stock; (11) cool it as quickly as possible; (12) clarify it.

White soup stock

4 pounds of knuckle of veal	1 large stalk celery
1 pound lean beef	½ teaspoon peppercorns
2 quarts boiling water	½ bay leaf
6 slices carrot	2 sprigs thyme
1 onion	2 cloves

Follow the directions for bouillon.

TABLE XXXI.—MEATS FOR SOUP AND BROTH

Meat	*Weight in pounds*
Shin soup bones	1–1
Hind shank soup bones	1–5
Knuckle soup bone	3–7
Oxtail	1–2
Beef neck	1–3
Beef shoulder clod	1–2
Beef round	1–2
Shoulder of mutton	1–2
Neck of mutton	1–2
Shanks of mutton	1–1½

CARE OF MEAT

Meat should be removed from the wrapping paper as soon as it comes from the market, since the paper absorbs some of the juices.

Before meat is cooked, it should be wiped with a cloth wrung out of cold water. It should never be allowed to stand in a pan of cold water, since the juices are in this way drawn out.

Meat must be kept cool in a refrigerator, a cool cellar, a spring-house or a well. It must also be carefully protected from flies.

Since broth offers excellent conditions for the growth of bacteria, it should be drained off meat that is to be kept for any length of time before being served.

If conditions for keeping meat are very unfavorable, it may be dipped into a large quantity of boiling water. This does not seriously affect its flavor, and it tends to prevent the meat from spoiling. Veal and pork may be partly cooked before being stored.

When canned meats are opened, they spoil more quickly perhaps than fresh meats; therefore, they should be consumed with as little delay as possible. Under no circumstances should they be left in a tin can after it is opened.

TABLE XXXII.—Cuts of Beef and Veal

For Quick Cooking		For Moderately Quick Cooking		For Slow Cooking	
Name of cut	*Weight (pounds)*	*Name of cut*	*Weight (pounds)*	*Name of cut*	*Weight (pounds)*
				For boiling	
Porterhouse steak	1½–3	Prime ribs (first cut)	4–12	Shoulder clod	3–6
Club steak	1–2	Prime ribs (last cut)	4–12	Rib ends	2–6
Sirloin steak	2–5	Shoulder block roast	4–8	Cross ribs	2–5
Round steak	2–5	Chuck rib roast	4–10	Brisket	3–8
Top round steak	1½–3	Rump roast	4–12	Corned rump, flank, plate, or brisket	2–8
Chuck roast	2–4	Tenderloin fillet	2–6	Fresh tongue	3–5
Flank steak	1–2	Veal loin	3–6	Smoked tongue	2–3
				For stewing	
Veal steak	1–2	Leg of veal	3–12	Plate	3–6
Veal chops	¼–¾	Shoulder of veal	3–8	Flank	2–6
Veal cutlets	¾–1½			Drop tenderloin	1–2
				Beef skirts	1–2
				Neck	1–3
				Shin	2–5

TABLE XXXIII.—CUTS OF PORK AND MUTTON

For Quick Cooking		For Moderately Quick Cooking		For Slow Cooking	
Name of cut	*Weight (pounds)*	*Name of cut*	*Weight (pounds)*	*Name of cut*	*Weight (pounds)*
				For boiling	
Pork steak	1–1½	Pork loin	2–8	Leg of pork	3–12
Pork chops	¼–½	Leg of pork	3–12	Smoked ham	3–12
Salt pork	1–3	Smoked ham	3–12	Pork shoulder, fresh	3–8
Fancy breakfast bacon	1/16–1/8	Pork tenderloin	½–¾	Pork shoulder, smoked	3–8
Medium to fat bacon	1/8–¼	Shoulder of pork	2–5	Pork hocks	1½–2½
Mutton chops	½–¾	Spare ribs	½–1	Back bones and neck bones	2–8
Lamb chops	1/5–1/3	Leg of mutton	6–9	Leg of mutton	6–9
		Loin of mutton	3–6	Shoulder of mutton	3–6
		Shoulder of mutton	3–6	Shoulder of lamb	3–4
				For stewing	
		Leg of lamb	3½–6	Breast of mutton	2–4
		Loin of lamb	2–4	Breast of lamb	1–2½
		Shoulder of lamb	3–4		
		Crown roast of lamb	3½–6		
		Hindquarter spring lamb	5–8		
		Forequarter spring lamb	5–8		

KEEPING MEAT *

After slaughtering, the meat undergoes several changes. Immediately after being killed, the flesh, especially in young and well-nourished animals, is juicy and tender. On account of the clotting of the myosin, after a short time *rigor mortis* ensues and the meat becomes stiff and hard. In the third stage to which the meat soon passes, it becomes again soft and tender, owing in part to the action of lactic acid on the sarcolemma and connective tissue. This process should not, however, be allowed to go too far, or the meat will become "high" and have a disagreeable odor and flavor.

This development of the lactic acid rendering the meat tender, is called "ripening" of the meat. Refrigeration retards this process, hence meats can be kept fresh for a considerable time at a low temperature (below 40° F.). The experiments by P. F. Trowbridge,† show that as long as the amount of lactic acid continues to increase, the meat appears to be improving in quality. At a certain stage, however, basic bodies begin to separate, which neutralize the lactic acid and thus cause a decrease in the amount of this free acid. The meat is still edible after this decrease has begun, but whenever enough basic bodies are liberated to neutralize the lactic acid, the meat has then reached a stage of incipient putrefaction and is no longer fit for food.

Game is often allowed to "hang" until the changes of decomposition are well marked and in this condition it is highly relished by epicures.

USE OF MARKET TRIMMINGS AND MEAT FAT IN COOKING ‡

Market trimmings vary with the customs of the locality and the character of the cuts bought, but it is certain that a saving can be made if the trimmings are brought home and used in cooking or for other purposes.

* Bailey, E. H. S. The Source, Chemistry and Use of Food Products.

† Missouri Agr. Exp. Sta.

‡ Usher, Susannah. Waste of Meat in the Home. Part II. Cornell Reading-Course for the Farm Home, Bull. 109.

After being tried out and clarified, all sweet suet from market and home trimmings of beef and mutton, drippings from roasts, bacon fat, fresh pork fat, and sausage fat can be combined or used singly in cooking. For frying croquettes, breaded chops, French fried potatoes, and the like, a mixture of various fats, such as beef, mutton, and bacon, is excellent. The cracklings from tried-out suet are good for shortening in corn cakes and suet puddings.

In buying suet separately, it should be remembered that fats from all parts of the animal do not melt at the same temperature. For example, cod suet melts at a lower temperature and is, therefore, a softer fat than is kidney suet For some kinds of cooking the softer fat is much to be preferred.

In general, fats are almost completely digested, although experiments indicate that fats with low melting points, such as butter and olive oil, are digested more completely than those with high melting points, such as mutton fat and beef fat.

Temperature of cooking.

More important, however, than the kind of fat eaten, is the method of treatment of fat in the process of cooking. Fat foods that are badly cooked or other foods that are poorly cooked in fat are often unsuspected sources of digestive troubles. Overheating fat, that is, heating it to the point where blue smoke is visible, causes decomposition with the formation of substances that are irritating to the digestive tract. It is suggested that the absorption of certain of these materials into the blood stream may cause disturbances more far-reaching than is yet known.

On the other hand, cooking food in fat at too low a temperature is not without ill effects, as it causes the fat to be soaked up and the food to be covered with layers of fat; this retards the action of the digestive juices and causes delay in the reasonably prompt passage of food from the stomach.

Flavor and hardness.

Two objections are usually offered to the utilization in cooking processes of the harder fats, such as beef and mutton, namely, the flavor and the hardness. The hardness may be overcome by mixing them with softer fats, such as lard and cottonseed oil. The flavor may be modified by careful rendering and by disguising it as in savory fat.

Various combinations of fats may be used; for example, one part of bacon fat and two parts of mutton fat, one part of lard or fresh pork drippings and two parts of mutton fat, one part of sausage fat and two parts of mutton fat. Many housekeepers say that they do not have time to mix the fats together in accurate proportions; they therefore mix their hard and soft fats in any amounts that happen to be at hand, generally with good results. Of course, such a mixture is softer than either mutton or beef fat alone.

If the harder fats are used for shortening, they must be kept in a warm place for some time before they are used, in order that they may become soft; otherwise, extra time and strength are expended in order to work them into the flour for biscuits and pastry and to cream the shortening and sugar for cake. Under any circumstances, it seems a little more difficult to work them into the flour than is the case with butter. In ginger cookies and gingerbread, where the shortening is melted before it is added, this difficulty is not apparent.

If other fats are substituted for butter, salt must be added to take the place of the salt in the butter.

Mutton fat.

Mutton fat combined with the softer fats is most satisfactory for all kinds of biscuits, muffins, and cakes that are to be served hot, or at least on the same day on which they are baked. The "furry" feeling in the mouth that comes from eating hard fats is less noticeable if the products are eaten with hot drinks or fruit sauces. Lemon juice added for part of the liquid in cakes also lessens this "furry" feeling.

Mutton fat is excellent in all cases in which a small amount of shortening is used and when spices and molasses help to mask the mutton flavor. In cakes made with mutton fat, vanilla and chocolate are successful flavors. Cakes do not have so fine a grain and do not keep so well when they are made with mutton fat as when they are made with butter.

Certainly mutton fat can be utilized to a greater extent than is generally thought. If handled skillfully in the preparation, the products are not only satisfactory but excellent.

Tests for the use of mutton fat gave the following results: *

"It would make for economy if mutton fat were more commonly used in the kitchen. For this reason, tests were made of different ways of modifying the flavor so that the mutton fat might be more generally used in cooking. The most satisfactory method found was to mix some leaf lard with the suet and render with milk. The suet and leaf lard mixture was finely divided by passing it through a meat grinder, and was heated in a double boiler with about one-half of its weight of whole milk. The fat was quickly released from the tissues, and, when allowed to cool, formed a cake on the surface of the liquid, which was easily removed. Mutton suet and leaf lard, fresh and of good quality, 'tried out' in this way, possessed little, if any, of the characteristic mutton odor and flavor. The best results were obtained with a mixture of two parts of mutton suet and one of leaf lard, finely ground, rendered with whole milk in proportion of one-half pint to two pounds of the mixed mutton and lard. This fat had an exceptionally good odor and flavor, which it retained when kept for weeks in an ordinary refrigerator. It was also of good color and texture, being softer than the mutton fat alone, owing to the milk fat and lard which it contained. If such fats are rendered in an open kettle, a moderate heat is desirable, since they 'burn out' very readily. Rendering in a double boiler is much more convenient. In numerous tests, such fat proved satisfactory either alone or with a little butter for use in cooking vegetables and for other purposes."

Clarified fat.

Various methods are used to clarify fat. A pinch of baking soda whitens the fat and also helps to keep it sweet. Baking

* Langworthy, C. F., and Hunt, Caroline L. Mutton and its Value in the Diet. Farmers' Bull. 526, U. S. Dept. of Agr.

soda is used to whiten lard in the proportion of about 1½ ounces to 100 pounds of lard. It is stirred into the hot lard after the cracklings are strained out.

The following directions may be found useful in clarifying fat:* "Excepting when the purpose of clarifying fat is to remove flavors, a good method to follow is to pour boiling water over the fat, to boil thoroughly, and then to set it away to cool. The cold fat may be removed in a solid cake and any impurities clinging to it may be scraped off, as they will be found at the bottom of the layer. By repeating this process two or three times a cake of clean, white fat may be obtained."

"A slight burned taste or similar objectionable flavors often can be removed from fat by means of potatoes. After melting the fat, put into it thick slices of raw potatoes; heat gradually. When the fat ceases to bubble and the potatoes are brown, strain through a cloth placed in a wire strainer."

Savory fat.†

"Savory fat may be easily prepared. For each pound of the carefully rendered mutton fat, allow an onion, a sour apple, and a teaspoonful of ground thyme or mixed herbs tied up in a small piece of cloth. Cook these in the fat, at a low temperature in the oven or on top of the stove, until the onion and apple are thoroughly browned. Then strain off the fat, which will be found well seasoned and may be used in place of butter or other savory fat for seasoning or for warming of potatoes, cooking vegetables, and in other ways. Winter or Hubbard squash cooked in the mutton fat until it is brown was also found in this laboratory to impart a savory flavor. The savoriness produced by the use of fruits and vegetables in this way seems to be due to the solution in the fat of specific flavoring bodies present in the fruits, vegetables, or herbs, and to the fat taking up some of the caramelized carbohydrate formed when the fruit or vegetable browns."

* Langworthy, C. F., and Hunt, Caroline L. Economical Use of Meat in the Home. Farmers' Bull. 391, U. S. Dept. Agr.

† Farmers' Bull. 526.

CHICKENS AND FOWLS (FRANCES VINTON WARD)

Chickens have soft, smooth legs and feet, a soft flexible breast bone, pin feathers, few hairs, a tender skin, and they are lean.

Fowls have hard scaly feet, a hard breast bone, long hairs, a tough, thick skin, and the intestines are surrounded by fat.

Dressing and cleaning poultry.

Poultry must be prepared for cooking by careful cleaning and dressing. The following directions may be carried out:

Pick out all stray pin feathers. Singe the bird by holding it over a flame until the hairs are burned off. Slip the point of the wings behind the shoulder blades, to give steadiness to the body while working with it. Cut off the head, push back the skin, and cut the neck close to the body. Through the neck opening, loosen the crop from the skin which surrounds it. If the crop is full, lift it and cut the tube connecting it with the gizzard, reaching down between the breast bones as far as possible. An empty crop, loosened from the breast skin, may be drawn out with the intestines. If dressing a fowl, cut a lengthwise slit about one inch long in the skin of the leg just below the leg joint. Insert a skewer, and pick up the white tendons, one at a time, pulling each away from the hip toward the foot until it breaks loose. When all are loosened, cut around the leg through the skin just below the joint, bend the joint backward till it breaks, and cut through the cords to remove the leg. Cut a lengthwise slit through the skin and fat at the rear just below the breast bone and toward the vent. Cut around the vent. With the fowl lying on its back, insert the hand in this opening, passing it over the intestines, between them and the breast bone. Press the hand forward until the heart can be felt, curving the fingers around the internal organs including the heart; pull strongly, holding the fowl in place with the other hand, until the organs are drawn out. Slip the heart from its sack, and cut it free from its blood vessels. Cut the intestine close to the gizzard. Cut across the white tendon on one side of this, being very careful not to cut the inner lining, and turn the outer muscular coat inside out, away from the inner coat with its contents intact. With a sharp knife peel off the interlining, and cut away the outer tendons. Cut away the liver in two lobes, discarding the part discolored by the gall bladder. Be careful not to cut the latter. Should this occur, every part of the meat which has been touched by it must be cut away, after carefully washing the knife which cut it. The bitter taste is very persistent. Find the lungs, attached to the ribs on the upper side of the body near the head, and remove them carefully. A small amount left will cause discoloration and give an unpleasant flavor. Remove the very dark glands lying in hollows close to the backbone near the tail. Wipe the bird thoroughly, inside and out.

Cooking poultry.

Chicken may be stuffed and roasted, but fowl should be stewed slowly for a long time, preferably in a fireless cooker.

To roast chicken.—Make a stuffing of dried breadcrumbs, moistened with as much milk as it will absorb and seasoned as desired with 1 tablespoon of butter, ½ teaspoon of salt, a little pepper, and sage or poultry seasoning to each cup of crumbs. Fill the crop region about two-thirds full, and tie the end of the skin of the neck. Fill the body region about two-thirds full, and fasten the opening by sticking tooth picks across it through both flaps of the skin, then lacing string across the tooth picks. Insert two long skewers through the chicken, one just beneath the legs, the other through the wings (now released from their position behind the shoulder blades) and the breast. Tie the legs together, and draw them down by means of the string to the tail, continuing the string to fasten around the skewers and the legs. Cross the strings over the back, and wind them around the skewers under the wings, tying them together over the back. Note that there is no string across the breast, and a fowl served breast side up, with the string removed, shows no mark of the string. Place the chicken in a covered roasting pan with a little water in the bottom. If the chicken is not very fat, butter or oil the skin, sprinkle it with salt, pepper, and flour, and bake it from 1 to 1½ hours in a moderately hot oven. Wash the breast, gizzard, neck, and liver. Stew them in sufficient water to cover them, adding the liver after cooking the others an hour.

To stew chicken.—If chicken is to be cut up before being cooked, as in stewing, the dressing is much simplified. After cutting the lengthwise slit into the abdominal cavity, bend out the leg and cut the skin between it and the body, following the outline of the thigh up to the hip bone. The leg will separate from the body and when bent far enough back, the hip joint will break and the leg may be cut free. When both legs have been removed, lay them skin down and feel for the joint between the thigh and "drum stick." Cut across this through the tendon and break the joint, separating the two parts by cutting through the flesh. Cut from the mid point of the slit in the abdomen through the thin muscle which underlay the hip straight to the hip joint. Bend back the back of the chicken, breaking the backbone near this point. The organs may now easily be removed as before. Lift the wing, and cut from the under side up, dislocating the bone to find the joint. Note the cartilaginous joints in the ribs at each side, and cut through these regions to the shoulder, to separate the back from the breast, dislocating the shoulder blade from the breast bone at the forward end and cutting the two apart. Remove the lungs and glands. Wipe the fowl as before. Cook the giblets separately. Add enough boiling water just to cover the fowl, simmer it 15 minutes, add 1 tablespoon of salt, and place it in a fireless cooker for 5 or 6 hours. Remove it and if not yet tender, reheat it and cook it again. To serve meat cooked in this way, thicken the gravy and make dumplings, serving the meat in the gravy; or remove the meat, sauté it, and serve the thickened gravy separately. The meat may be removed from the bones and skin and ground. The liquor may be cleared, well seasoned, and thickened with gelatin, using 1 tablespoon of gelatin to 1 pint of liquor. Stir in the meat as the gelatin begins to thicken, and serve it in slices, cold.

CHAPTER XXVII

FISH AND OYSTERS

By Winifred Moses

Fish is an excellent animal food. Many kinds of sea fish that have heretofore not been used are, through the efforts of the United States Bureau of Fisheries, coming into the markets. This is an economic policy, since fish is one animal food in the production of which food that might otherwise be used for human beings is not needed. Facilities for packing and shipping fish have been so improved within the last few years that it is now possible for almost all inland communities to obtain good sea fish. Some kind of fresh water fish is almost always available inland.

FISH

Fish may be divided into two classes according to the amount of fat contained in their flesh: (1) white fish, or fish with flesh that contains little oil, the fat being secreted in the liver —to this class belong cod, haddock, halibut, turbot, flounder, trout, whitefish, smelts, perch; (2) oily fish, or fish in which the fat is distributed throughout the flesh—to this class belong salmon, eels, mackerel, bluefish, swordfish, shad, herring, cusk.

Selection and care of fish

The freshness of fish may be determined as follows: (1) The flesh should be firm; (2) the eyes should be bright and bulging; (3) the gills should be red; (4) when placed in fresh water the fish should sink, not float.

To care for fish properly, it should be cleaned and drawn immediately, wiped dry, and kept on ice with the skin down, avoiding contact with other foods. Frozen fish may be thawed by placing it in cold water. Salt fish should always be soaked in cold water, skin side up.

Preparation of fish for cooking

To prepare a fish for cooking it must be cleaned, skinned and boned.

To clean a fish the scales should be removed by scraping the fish from the tail to the head with a small sharp knife, and the fins removed by making an incision as close as possible to each side of the fin. The tail should then be cut off. If the fish is to be baked, the head and tail are left on, but the eyes removed. The body is opened by cutting from the gills along the front to the tail, the entrails removed, the inside cleaned, scraped, and washed out with cold water, and the fish then wiped dry.

To skin a fish the fins should be removed and the skin slit along the back and around the head and tail. The hand should be dipped in salt to keep it from slipping. The skin is then loosened below the head and drawn from the head down to the tail on one side of the body and then drawn from the other side of the body.

To bone a fish it should first be cleaned and skinned as directed. One should then begin at the tail and with a sharp knife under the flesh close to the backbone follow the bone its entire length, making as clean a cut as possible. This removes the flesh from one side of the fish. The fish may then be turned and the flesh removed from the other side, and any small bones that remain may be picked out.

Methods of cooking fish

Boiled fish.

To boil small whole fish: (1) Clean the fish, leaving the head, tail, and fins, but removing the eyes; (2) weigh it; (3) place it on a rack in a fish kettle or coil it in a frying basket, and place it in an iron kettle; (4) cover it with warm water (Boiling water causes the flesh to contract and crack; cold water draws out the juices. Salmon, however, must be plunged in boiling water to preserve the color); (5) for each 2 quarts of water add 1 teaspoon of salt and 1 tablespoon of vinegar or lemon juice; (6) bring the water quickly to the boiling point; (7) simmer the fish until it is done, allowing from 5 to 8 minutes to the pound according to the thickness of the flesh;

or cook it until the flesh will separate from the bones; (8) drain it; (9) remove it to a folded napkin on a hot platter; (10) garnish it with parsley and lemon.

To boil pieces of fish cut from a large fish: (1) Clean the fish; (2) wrap it in a piece of cheese-cloth and tie it; (3) proceed as in boiling whole fish.

Court bouillon is used for boiling fresh water fish that have little flavor. Brown in 1 tablespoon of fat, 1 chopped carrot, 1 chopped onion, 1 stalk of celery; add 2 quarts of hot water, 1 cup vinegar, 3 peppercorns, 3 cloves, 1 bay leaf, 1 teaspoon salt and any fish trimmings; strain the liquid before putting the fish into it.

TABLE XXXIV.—Fish that may be Boiled, and Sauces, Garnishes, and Vegetables Suitable for Each

Fish	*Sauce*	*Garnish*	*Vegetables*
Haddock.....	Egg	Parsley, cress	Potato balls
Salmon	Tartar	Cress	Asparagus, carrots
	Hollandaise	Lemon	French beans
	Egg	Parsley	Rice
Halibut......	Béchamel	Cress	Potato croquettes
	Hollandaise	Parsley	Tomatoes, green salad
Cod.........	Butter		Mashed potatoes
	Caper		Carrots
	Shrimp		Turnips
	Oyster		Beets, greens
Mackerel.....	Caper		
	Parsley		
Flounder.....	Béchamel	Chopped parsley	Carrots, turnips
Trout........	Horse-radish		
Sole.........	Béchamel		Carrots, spinach

Baked fish.

To bake whole dry fish: (1) Clean the fish, leaving the head and tail on, but removing the eyes; (2) stuff the fish with any fish stuffing desired; (3) sew up the fish; (4) place the fish on a greased rack or fish sheet in a fish pan or if these are not obtainable, place buttered strips of cheese-cloth under the fish, by means of which the fish may be lifted from the pan without being broken; (5) truss the fish in the shape of the letter *S*, doing this by a means of a long skewer thrust through it from head to tail; (6) cut three gashes on each side of the fish; (7) insert a thin slice of salt pork in each gash; (8) dust the fish with salt and pepper; (9) sprinkle it with flour; (10) put it in a hot oven, and bake it, allowing 15 minutes for each pound; (11) baste it frequently; (12) remove the fish to a hot platter; (13) remove the slices of pork; (14) fill the gashes with parsley; (15) garnish the fish with lemon; (16) strain the fat to be used as a foundation for sauce.

To bake fat fish: Proceed as for dry fish, but omit the pork.

TABLE XXXV.—Fish that may be Baked Whole, and Sauces, Garnishes, and Vegetables Suitable for Each

Fish	*Sauce*	*Garnish*	*Vegetable*
Haddock	Drawn butter Egg Hollandaise	Lemon Parsley	Mashed potatoes
Bluefish	Shrimp	Potato ball Lemon Parsley Cucumber	
Cod	Oyster		
Mackerel		Lemon	
Shad	Lemon juice	Tomatoes Lemon	Mashed potatoes
Sea bass	Tomato	Parsley	Tomatoes
Tile fish	Maître d'hotel	Parsley	
Weak fish	Lemon juice		

To bake cutlets and fillets: (1) Wipe the fish dry; (2) dust it with salt and pepper; (3) season it with lemon juice, if desired; (4) sprinkle it with bits of butter; (5) add ½ cup of water or other liquid; (6) place the fish in a hot oven allowing from 5 to 8 minutes for each pound, according to the thickness of the fish.

TABLE XXXVI.—Fish that may be Baked in Steaks, Cutlets, or Fillets, with Sauces, Garnishes and Vegetables Suitable for each

Fish	*Sauce*	*Garnish*	*Vegetables*
Halibut	Hollandaise Tomato Brown	Purée of peas Tomatoes Oysters	Potato balls
Haddock	Oyster	Lemon	Onions
Salmon	Bernaise	Parsley Shrimps	
Flounder	Bercy	Sifted egg yolk	Green peas, potatoes
Cusk	Lemon juice		
Horse mackerel	Lemon juice		
Tile	Tomato		

Broiled fish.

To broil fish whole: (1) Clean the fish; (2) split large fish down the back, but do not split small fish; (3) if desired, remove the head and the tail; (4) brush the fish with melted butter or oil seasoned with salt and pepper; (5) place the fish, flesh side down on a well-greased broiler; (6) cook it for from 10 to 20 minutes according to the thickness of the fish, turning it often; (7) if the fish is thick, place the dripping pan under the broiler, and baste the fish with butter once or twice during the cooking and finish the cooking in the oven; (8) carefully separate the fish from the broiler, and slide it on to a hot platter; (9) spread it with maître d'hôtel butter.

To broil slices of fish: (1) Cut the fish into slices 1 inch thick; (2) wipe it dry; (3) season it, and proceed as in the case of broiled whole fish.

TABLE XXXVII.—Fish that may be Broiled, with Sauces, Garnishes, and Vegetables Suitable for each

Fish	*Sauce*	*Garnish*	*Vegetables*
Cusk			
Bluefish			
Horse mackerel			
Trout		Lemon	French fried potatoes
Cod	Melted butter Tomato	Parsley, lemon	Boiled potatoes, carrots, green peas, beans, beets, spinach
Halibut	Butter	Parsley	Peas, beans, beets, spinach
Tile fish			
Mackerel	Maître d'hotel	Lemon, cucumber	Mashed potato
Scrod			
Shad	Maître d'hotel	Radishes, parsley	Duchess potato
Smelts	Béchamel		
Sword fish	Cucumber, horse-radish		
Shad roe	Maître d'hotel	Lemon quarters	
Pompano	Fricassee of clams		Potato

Sautéd fish.

To sauté fish steaks: (1) Clean the steaks; (2) wipe them dry; (3) season them with pepper and salt; (4) dip them in granulated cornmeal; (5) try out slices of salt pork; (6) remove the scraps of pork; (7) sauté the steaks in the fat, until they are a delicate brown on both sides.

Fried fish.

To fry small whole fish and fillets of fish: (1) Clean the fish; (2) wash it; (3) dry it; (4) season it with pepper and salt; (5) roll it in flour; (6) roll it in egg; (7) roll it in breadcrumbs; (8) put in a frying basket; (9) dip it in deep hot fat (175° C.), and cook it for 60 seconds or until the fish is a delicate brown color; (10) drain it; (11) remove it to soft paper for further draining; (12) serve it on a folded napkin.

Carving fish

To carve a baked or boiled fish, a silver knife and fork should be used. The head of the fish should first be removed and then the length of the back cut down as close as possible to the bone, the nearer half of the fish being cut in thick slices. When all the flesh is removed from one side, the platter or the fish should be turned and the flesh removed from the other side.

OYSTERS

Oysters are among the most commonly used of the shell fish. The bivalves, including oysters, mussels, clams, and scallops, have white flesh and are easily digested. The crustaceans, including lobsters, crabs, and shrimps, have red flesh and are more difficult to digest than are the fish of white flesh.

Oysters are in season from September to May. They are wholesome but not so palatable during the other months. Although oysters are not very nutritious, they have a place in the diet since they serve as appetizers. The tough muscle and gills are not as easily digested as the remainder of the body. When these are removed, as they often are before cooking, the oyster is said to be bearded.

Selection and preparation of oysters

Only fresh oysters should be selected. Oysters are now transported in containers surrounded by ice. Preservatives are not used. When possible, oysters should be bought in the shell.

To open an oyster shell one should first wash the shells thoroughly with a brush and plenty of water. A thin flat knife may then be pushed under the upper valve, the muscle that holds it in the shell cut, and the upper shell or valve, raised and lifted off.

To clean the oysters after they have been opened, they should be placed in a colander, the colander placed over a bowl and cold water poured over the oysters, using ½ cup of water to 1 quart of oysters. Each oyster should be examined carefully, and any bits of shell removed. The liquor is then poured off carefully, and reserved for use in sauces.

Methods of serving oysters

Oysters may be served either raw or cooked. When raw they are served generally on the half shell, in cocktails, or with vinegar sauce. When cooked, they may be roasted, panned, broiled, sautéd, fried, served in sauces, scalloped, served in stews, in pastry cups, in croustades, or bread cases.

To serve oysters on the half shell.

(1) Use small varieties, such as blue points; (2) serve the oysters raw only when they are perfectly fresh; (3) open the oysters; (4) clean them; (5) chill them; (6) arrange a bed of cracked ice on each plate; (7) arrange from four to six of the deeper valves on this ice bed having the valve side toward the center of the plate; (8) place a chilled oyster on each shell; (9) in the center of the plate, place a quarter of a lemon on a sprig of parsley; (10) serve the oysters with salt, pepper, cayenne, horse-radish, tabasco sauce, or tomato catsup.

Oyster cocktail.

(1) Clean and chill oysters, allowing five oysters for each person to be served; (2) use tomato catsup or mix the following ingredients for sauce (to serve twelve persons):

1 tablespoon horse-radish
¼ teaspoon tabasco
2 tablespoons vinegar
3 tablespoons Worcestershire.
5 tablespoons lemon juice
3 tablespoons tomato catsup
1¼ teaspoon salt

(3) Place five oysters in a sherbet cup or sherry glass; grapefruit shells, lemon shells, tomato cups, green pepper cups, or cups of tomato jelly set in beds of ice may be used instead of sherbet cups; (4) add 1 tablespoon of the sauce.

Cooking of oysters.

(1) Oysters require very little cooking; (2) put them over the fire in their own liquor; (3) remove them as soon as they are plump, or the gills become curled, for longer cooking makes them tough; (4) cracker crumbs are better than breadcrumbs for mixing with oysters.

CHAPTER XXVIII

EGGS

By Winifred Moses

Eggs are one of the best meat substitutes, since they furnish animal protein and are easily prepared for the table. Moreover, they are especially valuable in the diet because of their high iron-content. Methods of preparing eggs are practically unlimited for almost any course in a menu.

In keeping eggs and in using them economically, the following suggestions may be useful:

Eggs should be kept in a cool dry place; they should always be washed just before being used; left-over egg-whites should be kept in a cool place in a covered dish; left-over egg-yolks may be beaten and kept in a covered dish; left-over egg-yolks may be dropped whole into hot water, cooked until they are solid, and set aside to serve in soup; cooked egg-yolk may be rubbed through a sieve as a garnish for a salad, or for the top of a dish of cream toast or of meat warmed in a sauce; the clean shells from uncooked eggs may be used to settle coffee, or to aid in clarifying fat or soups.

All egg dishes should be rinsed with cold water before they are washed. Hot water hardens albumen.

TESTS FOR FRESH EGGS

The following tests may be used to determine whether eggs are fresh: (1) The shell of a fresh egg is rough, not smooth and shiny; (2) a reasonably fresh egg will sink in salt water made by dissolving $^1/_3$ cup of salt in 1 quart of water while a stale egg will float; (3) when an egg is candled, that is, held against an opening in a shield around a bright light, a fresh egg will appear clear inside and the air cell will not be larger than a nickel; (4) a fresh egg makes no sound when it is shaken.

EGG COOKERY

Beating eggs.

To beat well, eggs should be cold and fresh. A few grains of salt added to the whites may hasten the process. In preparing egg-white for beating, one should be careful to have it free from every particle of yolk. If a close texture is desired, the Dover egg-beater should be used; it should rest lightly on the bottom of the bowl and the beating should be slow at first. If a loose texture is desired, a confectioner's whisk should be used; or, for a still looser texture, a flat egg-beater. Egg-whites are beaten stiff when the impression made by the beater is retained; they are beaten dry when the gloss has disappeared and flaky bits fly off as the egg is beaten.

For thickening.—When eggs are added to thicken a mixture, they should be beaten only until the whites and the yolks are well mixed, or until a spoonful of the mixture can be taken up and held in the spoon.

For leavening.—When eggs are added to insure lightness, the yolks and whites should be beaten separately; the yolks until thick and lemon colored, and the whites until stiff, that is, until the dish containing the beaten egg can be tipped upside down without losing the egg white.

Eggs cooked in the shell.

(1) Cover the eggs with boiling water, and cover the kettle; (2) remove the kettle from direct heat; (3) for a soft-cooked egg, allow the egg to stand in the hot water for 4 to 7 minutes; for a medium-cooked egg, 7 to 10 minutes; for a hard-cooked egg, from 45 to 50 minutes.

Poached eggs.

Method I: (1) Place in a shallow pan as many muffin rings as there are eggs to poach; (2) turn in enough boiling water to cover the rings; (3) when the water boils break an egg into each ring; (4) remove the pan from direct heat, and let the eggs remain in the water until the whites are jelly-like and translucent (from 10 to 15 minutes); (5) remove the eggs in the rings to a serving dish, with a skimmer or pancake turner; (6) remove the muffin rings; (7) season the eggs with salt and pepper; (8) garnish them with parsley, if desired.

Method II: (1) Add a dash of salt to the white of an egg; (2) beat the white to a froth; (3) put it in a shallow dish or in a glass; (4) drop the unbroken yolk in the center; (5) set the dish in a pan of boiling water; (6) cover the dish, and let the egg cook for 2 minutes.

Method III (French poached eggs, used for garnishes): (1) Fill a deep saucepan nearly full of water; (2) add 1 teaspoon of salt and 1 tablespoon of vinegar to 1 quart of water; (3) when the water is boiling violently, crack the shell of the egg, and holding it close to the water, drop the contents quickly where the water is boiling hardest; (4) when the egg is firm, remove it with a skimmer, draining off the water.

Shirred eggs.

(1) Butter individual baking dishes; (2) break an egg into each dish; (3) sprinkle salt on the whites but not on the yolks; (4) place the dishes in a shallow pan of hot water, and place the pan on the shelf in a slow oven; (5) baste the yolks with a little melted butter, while they are cooking; (6) cook the eggs until the white is set.

Variations: (1) Place chopped chicken, ham, mushrooms, or tomato purée in the bottom of the dish, before the egg is added; (2) serve the eggs on toast, broiled ham, minced meat, or stewed kidneys; (3) pour over the top cream, Béchamel or tomato sauce. (See *Sauces*, page 552).

Fried eggs.

(1) Place a little fat in a very clean frying pan; (2) when it bubbles, crack the shells, and drop in the eggs; (3) cook the eggs at a moderate temperature until the white is set. If hard-cooked eggs are desired, turn them and cook them on the other side.

Scrambled eggs.

(1) Beat the eggs lightly with a fork, just enough to break them; (2) to 4 eggs, add 2 tablespoons of milk, ½ teaspoon of salt, and a dash of pepper; (3) put ½ tablespoon of fat in the top of a double boiler; (4) turn in the eggs; (5) cook them, over hot water, stirring them constantly until they begin to thicken; (6) remove the double boiler from the fire, and continue to stir the eggs until they are of the proper consistency.

Variations: (1) When the double boiler is removed from the fire, add a teaspoon of chopped parsley, or a little tomato sauce or pulp, or minced chicken, ham, bacon, or mushrooms; (2) garnish the eggs with croutons or parsley.

Omelets.

French omelet: (1) Scour the omelet pan with salt and vinegar, and wipe it; (2) just before using the pan, scour it with salt; (3) beat the eggs just enough to break them (12 revolutions with a Dover beater); (4) to 3 eggs, add ½ teaspoon of salt, a dash of pepper, and ½ teaspoon of butter broken into small bits, adding a teaspoon of milk or not as desired; (5) heat the pan; (6) grease the pan with ½ teaspoon of fat; (7) turn in the eggs; (8)

with a fork break the cooked surface quickly, in several places around the edge, or press the egg away from the sides, letting the uncooked part run under; (9) when the egg is cooked, but still quite soft on top, lift the pan on one side, slip a knife under the omelet, and carefully fold it through the center; (10) let it cook a moment to thicken any of the egg that has run out; (11) place a hot dish over the pan, and invert the two in such a way that the omelet will fall in the proper place; (12) press it into good shape; (13) garnish it with parsley and serve at once.

Variations: (1) Sprinkle a little finely chopped parsley over the top; (2) turn tomato, Béchamel, or mushroom sauce on the dish around the omelet; sprinkle the top with chopped mushrooms, if mushroom sauce is used; (3) spread the omelet with chopped ham, oysters, or chicken before folding it, and serve it with a sauce; (4) spread the omelet with creamed peas or other vegetable before turning it, and serve it with white sauce; (5) spread the omelet with jelly or jam before folding it.

Puffy omelet: (1) Beat the whites of the eggs until they are dry (page 535); (2) beat the yolks until they are thick and lemon-colored; (3) add 3 tablespoons of water, ¼ teaspoon of salt, and a dash of pepper for each 3 yolks, and mix the ingredients thoroughly; (4) turn the mixture over the beaten whites; (5) cut and fold the whites into the yolk mixture; (6) turn the mixture into a hot buttered pan; (7) cook it for 2 minutes over moderate heat; (8) set it in the oven to cook the top slightly; (9) when a knife thrust into the center comes out nearly clean, remove the omelet from the oven, cut it across the center of the top at right angles to the handle, fold the part nearest the handle over the other part, and turn it on to a hot platter.

Variations: (1) To 3 egg-yolks, add the grated rind of 1 orange, 3 tablespoons of orange juice, and 3 tablespoons of powdered sugar, garnishing the omelet with sliced oranges and powdered sugar (this is a good chafing-dish recipe); (2) add 2 tablespoons of maraschino juice and ⅓ cup of chopped maraschino cherries to the beaten yolks, and garnish the omelet with strawberry jam and cherries.

Omelet with a starchy foundation: (1) Make 1 cup of medium white sauce (page 552); (2) stir into this the yolks of 5 eggs; (3) fold in the stiffly beaten whites of the eggs; (4) melt 1 tablespoon of butter in an omelet pan; (5) pour in the mixture, and cook it in the same way as a puffy omelet.

Variations: (1) Finely chopped ham, chicken, parboiled oysters, or mushrooms, may be added with the white sauce to the yolks of eggs; (2) 1 cup of grated pineapple, 1 teaspoon of lemon juice, and ¼ cup of sugar, may be added to the yolks; (3) oranges or strawberries may take the place of pineapple, the amount of sugar depending on the acidity of the fruit.

Firm custards.

Baked custard: (1) Allow from 4 to 6 eggs or 6 egg-yolks, ½ cup of sugar, ¼ teaspoon of salt, and a few gratings of nutmeg, to 1 quart of milk; (2) scald the milk; (3) beat the eggs slightly, and add the salt and the sugar; (4) stir the scalded milk slowly into the mixture; (5) turn the mixture into a pudding dish or individual cups; (6) grate a little nutmeg over the top; (7) set the dish in a pan of hot water, and bake it in a moderate oven; (8) test it by running a knife into the center. If the knife comes out clean, the custard is done.

Variations: (1) To each quart of milk, add ½ cup of caramel; (2) use left-over cocoa instead of milk; (3) to each quart of milk, add 3 ounces of melted chocolate.

Molded custard: For a custard firm enough to turn from a mold, use 2 eggs to each cup of milk.

Royal custard: For a custard that is cut in slices and served as a garnish use 1 egg to 1 tablespoon of milk.

Liquid custards.

Soft custard: (1) Allow 4 whole eggs or the yolks of 6 eggs, ½ cup of sugar, ¼ teaspoon of salt, and ½ teaspoon of vanilla to each quart of milk (if eggs are scarce, substitute ½ tablespoon of cornstarch for 1 egg-yolk); (2) scald the milk; (3) beat the eggs slightly and add the sugar and the salt; (4) stir the scalded milk slowly into the mixture; (5) cook the custard slowly in a double boiler, stirring it constantly, until it thickens and coats the spoon; (6) if the custard curdles, beat it with a Dover egg-beater; (7) add the flavoring; (8) cover the custard with a perforated tin until it is served, to prevent a film from forming.

Variations: (1) Just before removing the custard from the heat, fold in the whites of the eggs beaten until they are foamy; (2) caramel, coffee, or chocolate may be added to the milk before it is added to the eggs.

Uses of liquid custard: (1) Pour the custard over alternate layers of stale cake and sliced peaches, pears, bananas, or oranges; (2) pour the custard over sliced fruit. Garnish the dish with sliced bananas, dates, or nut meats.

English custard (for filling cream puffs and éclairs): (1) Allow for each pint of milk, 2 eggs or 4 egg-yolks, ½ cup of flour, ¾ cup of sugar, ½ teaspoon of vanilla, and ¼ teaspoon of salt; (2) mix and sift the dry ingredients; (3) slowly add the hot milk to them, stirring the mixture constantly; (4) cook the mixture until it boils; (5) cool it, stirring it constantly for 15 minutes; (6) add the egg-yolks, or eggs, and stir it until the egg is cooked. It may be necessary to return it to the heat.

Variations: (1) ¼ cup of black coffee may be substituted for ¼ cup of milk; (2) 1 ounce of chocolate cooked with 2 tablespoons each of sugar and water may be added to the milk.

Soufflés.

Plain soufflé: For 4 eggs, allow 1 cup of sugar and the juice and rind of 1 lemon, or its equivalent in liquid and other flavoring; (2) beat the yolks until they are thick; (3) add the sugar gradually, and continue beating; (4) add the lemon rind and juice; (5) cut and fold in the stiffly beaten whites; (6) turn the mixture into a buttered baking-dish set in a pan of

TABLE XXXVIII.—Recipes for Custard

Kind of custard	*Eggs*	*Sugar*	*Salt*	*Milk*	*Flavoring*	*Additional ingredients*	*Method of cooking*
Baked	4 to 6, or 6 yolks	½ cup	¼ tsp.	1 qt.	Nutmeg, or ½ cup caramel, or 3 oz. chocolate, melted		Set in pan of hot water in moderate oven
Baked cocoa	4 to 6, or 6 yolks	½ cup	¼ tsp.			1 qt. cocoa	Set in pan of hot water in moderate oven
Molded	4	¼ cup	1/8 tsp.	1 pt.	½ tsp. vanilla		Set in pan of hot water in moderate oven
Honey	5		¼ tsp.	1 qt.	1/8 tsp. cinnamon	½ cup honey	Set in pan of hot water in moderate oven
Soft, I	2, or 3 yolks	¼ cup	1/8 tsp.	1 pt.	½ tsp. vanilla		Cook in double boiler
Soft, II	2 yolks	¼ cup	1/8 tsp.	1 pt.	½ tsp. vanilla	½ tablespoon cornstarch	Cook in double boiler
Foamy	2	¼ cup	1/8 tsp.	1 pt.	Nutmeg		Add beaten whites after cooking custard in double boiler
Coffee	2	¼ cup	1/8 tsp.	1¾ cups	¼ cup coffee		Cook in double boiler
Chocolate	2	¼ cup	1/8 tsp.	1 pt.	½ tsp. vanilla	1½ oz. chocolate, melted	Cook in double boiler
English (for cream puffs)	2, or 4 yolks	¾ cup	¼ tsp.	1 pt.	½ tsp. vanilla	½ cup flour	Make white sauce, cool, stir, and add beaten egg
English chocolate	2, or 4 yolks	¾ cup	¼ tsp.	1 pt.	1 oz. chocolate cooked with 2 tablespoons sugar and 5 tablespoons water		Mix all ingredients but eggs, and heat to boiling point. Cool, stir, and add beaten egg
Cottage cheese *	1	1 tablespoon	1/8 tsp.	1 cup	½ tsp. vanilla	1 cup cottage cheese, 1 tsp. gelatin	Pour hot milk on egg yolk, salt and sugar, and cook till coats spoon. Beat white, add softened gelatin, cottage cheese, vanilla. Beat till stiff, and fold into custard

* Lucile Brewer.

hot water, and bake it from 35 to 40 minutes; (7) serve the soufflé at once, with or without sauce.

Fruit soufflé: (1) For the whites of 3 eggs, allow 3/4 of a cup of fruit pulp, drained and passed through a sieve, sugar as needed, and a few grains of salt; (2) heat the fruit pulp, and sweeten it; (3) beat the egg whites until they are stiff; (4) add the fruit pulp, sugar, and salt to them, and continue beating; (5) turn the mixture into buttered molds, filling them three-fourths full; (6) set the molds in a pan of hot water, and bake the soufflé in a moderate oven until it is firm; (7) serve it with or without sauce or whipped cream.

Vegetable soufflé: (1) Allow 3 eggs and 1 cup of vegetable pulp, rubbed through a sieve to 1 cup of thick white sauce; (2) beat the yolks until they are thick; (3) add them to the thick white sauce; (4) add the vegetables; (5) beat the whites until they are stiff; (6) fold them into the other mixture; (7) add the seasoning; (8) turn the mixture into a buttered baking-dish set in a pan of hot water, and cook it in a moderate oven until it is set.

Custard soufflé (for the main dish or dessert): (1) Allow 4 eggs, 1/4 cup of sugar if the soufflé is to be used for dessert, and 1/2 teaspoon of salt, to 1 cup of thick white sauce; (2) beat the yolks until they are thick; (3) add the beaten yolks and the sugar to the white sauce; (4) beat the whites until they are stiff; (5) fold them into the other mixture; (6) turn the mixture into a buttered baking-dish, and set it in a pan of hot water; (7) bake it for about 35 minutes in a moderate oven; (8) serve it at once with creamy or foamy sauce (see *Sauces*, page 560).

Fondues are made in the same manner as soufflés, milk with breadcrumbs being used instead of a white sauce. They are not so light as soufflés. Both fondues and soufflés should be baked by being set in a pan of hot water and placed in a moderate oven.

Meringues.

Meringues for pies and garnishes for desserts: (1) Allow 1 tablespoon of sugar to 1 egg-white; (2) chill the egg-whites; (3) add a pinch of salt to them; (4) beat them with an egg-whisk until they are stiff; (5) add the sugar gradually, and continue beating until the sugar is thoroughly dissolved; (6) add flavoring as desired; (7) cook the meringue in a very slow oven for about 15 minutes, increasing the heat somewhat toward the end of the period, if necessary, to brown the meringue.

Snow eggs: (1) Allow 1 ounce of sugar (2 tablespoons) to 1 ounce of egg-white (2 tablespoons); (2) beat the whites until they are nearly dry; (3) continue beating, and add half of the sugar gradually; (4) when the mixture is very firm, fold in the other half of the sugar; (5) dip a tablespoon in boiling water, fill it with meringue, and shape the meringue in the form of an egg; (6) remove the spoonfuls of meringue to a pan of gently simmering water, and let it stand where the water will keep hot; (7) poach the meringue until it is firm throughout; this requires from 10 to 14 minutes.

TABLE XXXIX.—RECIPES FOR SOUFFLÉS AND FONDUES

Soufflé or fondue	*Eggs*	*Sugar*	*Salt*	*Milk*	*White sauce*	*Flavoring*	*Additional ingredients*	*How served*
Plain soufflé	4	1 cup				Juice 1 lemon		As dessert, with or without a sauce
Fruit soufflé	3 whites	To sweeten	1/8 tsp.				¾ cup fruit pulp	As dessert, with or without a sauce or whipped cream
Vegetable soufflé	3				1 cup, thick		1 cup vegetable pulp	As main dish
Carrot soufflé	2		½ tsp.		1 cup, thick	1 tbsp. minced onion, paprika	1 cup carrots, boiled and mashed	As main dish
Custard soufflé	4	¼ cup	½ tsp.		1 cup, thick			As dessert, with creamy sauce
Cheese fondue	4		½ tsp.	1-1/3 cups		1 tbsp. butter	1/3 lb. grated cheese, 1-1/3 cups breadcrumbs	As main dish

Snow eggs may be poached in milk, and the milk may be used afterwards in making custards.

Meringues for desserts: (1) Allow 1 pound (2 cups) of sugar and 1/4 teaspoon of salt to 1/2 pound (1 cup) of fresh egg-whites; (2) chill the egg-whites; (3) add the salt; (4) beat them slowly at first, but faster as they grow stiff; (5) add 2 tablespoons of sugar and beat it in thoroughly; (6) add 2 tablespoons of sugar twice again, and continue beating until the mixture can be cut clean with a knife; (7) add the remainder of the sugar, folding it into the mass lightly and smoothly; (8) tack a piece of damp paper on a board 1 inch thick; (9) drop the mixture in spoonfuls on the paper, giving each spoonful an oval, or egg shape; (10) dust them with granulated sugar; (11) set them in a very slow oven to dry; (12) at the end increase the heat to brown them delicately, the baking requiring from 3/4 to 1 hour; (13) when they are baked, lift them from the paper, and take out the uncooked centers, returning the shells to the oven to dry out; (14) when the shells are cold, fill them with whipped cream, ice cream, or water ice; (15) serve the meringues at once.

Italian meringue.—Italian meringue is used for icing cakes and as a sauce. Directions for making it are given on page 488.

Variations: (1) Substitute 1/2 cup of grated pineapple juice and pulp for the water; (2) to 2 egg-whites, allow 1 pound of maple sugar cut into bits, and 1/2 cup of water in place of the granulated sugar and the water; (3) add 2 ounces of melted chocolate to the sirup when it reaches the thread stage.

CHAPTER XXIX

VEGETABLES

By Lucile Brewer

Although by means of proper storage, vegetables can be kept beyond their season, the price of products held in this way is necessarily higher than of those bought in season. Therefore, the general rule should be to use vegetables when they are in season (page 550).

Vegetables may be classified as follows according to the parts of the plants used:

Tubers.—Potatoes, Jerusalem artichokes.

Roots.—Beets, carrots, parsnips, radishes, sweet potatoes, salsify, and turnips.

Bulbs.—Garlic, onions, shallots.

Stems.—Asparagus, celery, chives.

Leaves.—Brussels sprouts, beet greens, cabbage, dandelion, lettuce, sorrel, spinach, water cress.

Flowers.—Cauliflower.

Fruit.—Beans, corn, cucumbers, okra, eggplant, peas, lentils, squash, tomatoes.

CARE OF VEGETABLES IN THE HOME

Summer, or green, vegetables should be cooked as soon as possible after being gathered. If they must be kept, they should be spread on the floor of a cool, dry, well-ventilated cellar, or placed in the ice chest. Lettuce should be sprinkled with cold water, and wrapped in heavy paper or cloth. If vegetables are wilted, they may be freshened by standing in cold water. Vegetables containing sugar lose some of the sweetness by standing. Corn and peas lose their flavor more quickly in this way than any others.

Winter vegetables should be stored in a cool dry place. Potatoes, carrots, and turnips should be kept in barrels or bins in order that as much air as possible may be excluded. Squashes should be spread apart in such a way that they will not touch one another. They should be watched carefully and when dark spots appear, should be cooked at once. Further directions are given on page 584.

Canned vegetables should be emptied from the can as soon as they are opened, turned into a bowl, and allowed to stand for at least one hour before being used, in order that the flavor may be improved by contact with the air.

Dried vegetables should be soaked in cold water overnight and cooked in the same water, more being added, if necessary.

COOKING OF VEGETABLES

Vegetables may be classified according to flavor into those with strong juices, and those with mild juices.

Strong-juiced vegetables.

Strong-juiced vegetables, such as cauliflower, Brussels sprouts, cabbage, onions, and turnips, should be washed in cold water and cooked until they are just tender, in boiling water in an uncovered kettle to allow the volatile oils to pass off in the steam. In this way the flavor is made more delicate, and the color is kept better. If strong-juiced vegetables are over-cooked, they become dark in color, strong in flavor, and may produce digestive disturbances.

Mild-juiced vegetables.

Vegetables with mild juices, which include the greater number, should be washed in cold water and cooked in boiling water in a kettle with the cover ajar until they are soft.

Salt.

If salt is added to the water in which vegetables are cooked, the flavor and color will be improved. Less mineral matter is dissolved out in cooking when salt is added at the beginning of the period than at the end. If the vegetables are wilted and likely to be tough, it may be better to add the salt just as they are done.

Soda.

The use of soda in cooking vegetables is a questionable practice if it is employed in a larger amount than is necessary just to neutralize any acid of the vegetable and thus prevent loss of color in cooking. If used in this small amount, it accomplishes the purpose and does not make the vegetable water unfit for use in soups and sauces. It is thought that the vitamines of vegetables may be destroyed if heated in an alkaline solution; therefore, only a very small amount of soda should be used. For soaking and cooking dried legumes, however, ¼ teaspoon of soda is recommended for each quart of water, to soften the water and the skins.

Blanching.

Vegetables may be made more delicate in flavor if they are blanched. To blanch vegetables, they should be covered with boiling water and allowed to boil for 5 minutes. They may then be drained, rinsed in cold water, and cooked as usual. Since blanching causes a loss of a certain amount of the food substance, it is not recommended.

Losses in cooking vegetables.

Boiling vegetables is a wasteful method of cooking them unless all the water is used in some way, such as in soups or sauces. Much of the nutrutive value, especially the mineral substances, is dissolved out by the water. In the average well-planned dietary, vegetables and fruits are depended on to furnish much of the mineral needed by the body; even though they may seem high in price compared with certain other foods, an effort is made to procure them. Therefore, a loss of these important mineral substances—iron, phosphorus, calcium, and magnesium—through careless cooking should be avoided. The loss of iron in boiling spinach, for example, has been found to be as great as 50 per cent under certain conditions. The percentage of loss is increased by paring the vegetables or cutting them in small pieces and thus exposing more surface, before cooking them, and also by putting them on to cook in cold water.

If vegetables are to be boiled, therefore, plans should be made for using the water in which they are cooked. Unless all the water is to be used, they should be cooked with the skins on, they should not be cut in small pieces, and they should be put on to cook in boiling water.

Steaming vegetables effects a great saving over boiling them. However, the most economical method of cooking those vegetables that allow it, is to bake them.

TABLE XL.—Tubers, Roots, and Bulbs Served as Food *

Vegetable	*Part of plant used*	*Points in buying*	*Preparation*	*Cooking*	*Time for boiling and baking*	*Serving*
Potatoes.....	Tuber	Choose smooth, medium-sized potatoes	Wash for baking or boiling. Scrape new potatoes. Pare if desired, for steaming. Drop into cold water	Rub with fat and bake in hot oven. Steam. Drop into boiling salted water and remove skins after cooking	Bake 40–50 min. Boil 20–30 min.	Serve boiled or steamed potatoes plain with seasoning on table; or mash, season with butter, milk, salt, and pepper
Beets........	Root	Fresh green leaves with dirt clinging to roots	Cut tops 2 inches from root. Wash, but do not break skin	Drop into boiling water, and cook until tender. Add salt in last half hour. Drain and peel by rubbing with a dry cloth	Young, 1 hr. Old, 4–5 hrs.	Slice large beets. Season with salt, pepper, and butter
Carrots.....	Root	Fresh green leaves and roots not too large	Wash, scrape, and drop into cold water	Drop into boiling salted water and cook until tender. Steam young carrots	20–60 min.	Season. Serve with green peas. Serve in a cream sauce
Sweet potatoes.....	Root	Choose good-sized smooth sweet potatoes	Wash or pare and drop into cold water	Bake. Steam. Drop into boiling salted water and cook until tender. Drain and remove skins if not already pared	Bake 30 min. Boil 20–30 min.	Serve plain with seasoning, or candy by reheating in oven with a sirup or butter poured over them.
Onions	Bulb	Choose medium-sized onions	Cover with cold water and peel under water. Drop into cold water	Drop into boiling salted water, cook uncovered. For very strong onions, drain off the water after the first 5 min. and cover with fresh boiling, salted water	40–60 min.	Serve in a cream sauce or with butter and seasoning

* Tables XL to XLII were compiled by Anna M. East.

TABLE XLI.—FRUITS OF PLANTS SERVED AS FOOD

Vegetable	*Points in buying*	*Preparation*	*Cooking*	*Time for boiling*	*Serving*
String beans....	Pods brittle; on breaking, strings tender and beans small	Wash, string, and snap, or cut into short pieces	Drop into boiling water to cover, bring to boiling again; or steam. Cook covered until last 15 min. Add salt during last hour	Young beans 1 hr. Older 2–3	Season with butter and pepper, and serve without draining.
Corn..........	Silk brown, ear well filled with kernels which give sweet milky juice when broken. Use as soon as possible after picking	Husk and carefully remove all silk	Drop into boiling water to cover, bring rapidly to boiling; or steam. Cook covered. Corn is done when the juice is set. Add no salt	5–15 min.	Serve with butter and salt, or cut from cob, season, and re-heat in milk.
Peas........	Pods green and brittle, peas small and green. Use as soon as possible after gathered	Wash pods and shell.	Drop into boiling water just to cover. Cover and let boil, or steam. Add salt during last 15 min., and remove cover to let water boil down	30–40 min.	Season and serve without draining, or drain
Squash......	Choose summer squash which are light yellow, and shell of which can be broken by finger nail. Choose winter squash having no soft spots	Wash, cut in pieces, and pare summer squash. Break winter squash with hatchet. Remove seeds	Steam over boiling water, or bake in hot oven	Steam 30–40 min. Bake 1–2 hrs.	Mash and season with salt, pepper and butter. Season and serve in shell, or scoop out mash, season and serve.
Tomatoes	Should be firm, smooth, of even color, no bruised or green spots	To peel, pour boiling water over them, and let stand 1 minute to loosen skin. Pour off hot water, cool with cold, and peel	Simmer in their own juice and season; or cut in halves with skin on and broil	15–20 min.	Season with salt, pepper, and butter, or with sugar. Serve broiled tomatoes well seasoned, on toast squares

TABLE XLII.—Leaves, Stems, Flowers of Plants Served as Food

Vegetable	*Part of plant used*	*Points in buying*	*Preparation*	*Cooking*	*Time for boiling*	*Serving*
Asparagus . . .	Stem	Freshly cut green stalks. Wrap in damp cloth until used	Cut off stalks in bunch as far down as they are brittle. Untie, wash, and re-tie in bunches of serving size	Stand heads up in deep kettle. Pour on boiling salted water nearly to cover. Steam. Cook covered	45 min.	Drain and butter, or serve on toast with melted butter poured over
Cabbage.	Leaves	Pick out heavy heads. Keep in cool cellar	Remove outer leaves. Soak in salted water head down for 30 minutes to draw out insects. Quarter, and cut out stalk	Drop into rapidly boiling salted water. Cook uncovered, drain as soon as tender	20 min.	Season with salt, pepper, and butter, or serve with a cream sauce
Spinach.	Leaves	Choose spinach with leaves fresh and dirty rather than shiny	Cut off roots, stems, and poor leaves. Wash by lifting from one pan of water to another till free from sand	Place in kettle with no water. Allow to heat gradually, then cook in its own juice, or steam. If old, cook in boiling salted water, covered; drain, chop and reheat	25 min.	Season with salt, pepper, and butter and serve with vinegar
Cauliflower. . .	Stem and flower	Choose white heads with fresh green leaves	Cut off end of stalk. Soak 30 min. in cold salt water, head down	Place head up in kettle, and pour on boiling salted water to cover; or steam. Cook with cover off	20–30 min.	Season with salt, pepper, and butter, or separate and serve in cream sauce. Leaves may be served as garnish at first meal, then chopped and warmed over in white sauce

TABLE XLIII.—VEGETABLES IN SEASON IN REGION ABOUT ITHACA, NEW YORK

Vegetable	*Jan.*	*Feb.*	*Mch.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
Asparagus					—	—						
Beans, string							—	—	—			
Beans, lima								—	—			
Beans, pole lima								—	—			
Beets							—	—	—	—		
Brussels sprouts										—	—	
Cabbage							—	—	—	—	—	
Carrot							—	—		—	—	
Cauliflower								—	—	—		
Celery								—	—	—	—	
Corn							—	—	—	—		
Cucumber								—	—	—	To frost	
Eggplant								—	—	—	To frost	
Endive								—	—	—	—	—
Kale									—	—	—	
Kohlrabi								—	—	—		
Lettuce						—	—	—	—	—		
Okra								—	—			
Onion, green					—	—	—						

TABLE XLIII.—VEGETABLES IN SEASON IN REGION ABOUT ITHACA, NEW YORK—*Cont'd*

Vegetable	*Jan.*	*Feb.*	*Mch.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
Onion, mature								—	—			
Parsley					—	—	—	—	—	—		
Parsnips	—	—	—	—					—	—	—	—
Peas, green						—	—	—	—	—		
Peas, sugar								—	—	—		
Potatoes							—	—	—	—		
Potatoes, sweet									—			
Pumpkin									—	—		
Radish					—	—	—	—	—	—		
Rhubarb					—	—	—					
Rutabaga turnip								—	—	—	—	
Salsify	—	—	—						—	—	—	—
Squash							—	—	—			
Spinach					—	—	—	—	—	—	—	—
Swiss chard					—	—	—	—	—			
Tomato								—	—	—		
Turnip						—			—	—	—	—

CHAPTER XXX

SAUCES

By Winifred Moses

Sauces are relied on in cookery as a basis for soups, croquettes, soufflés, certain desserts, such as cornstarch pudding, and as a means of making other foods more palatable or more nutritious. The few types of simple sauces can be varied almost without limit by the imaginative cook.

WHITE SAUCE

Thin sauce
Up to ¼ or 1 tablespoon fat
½ or 1 tablespoon flour
1 cup milk
Seasoning

Medium thick sauce
Up to 2 tablespoons fat
1½ to 2½ tablespoons flour
1 cup milk
Seasoning

Thick sauce
Up to 3 or 4 tablespoons fat
3 or 4 tablespoons flour
1 cup milk
Seasoning

Method I.

(1) Melt the fat in the top of a double boiler; (2) when the fat bubbles, remove the kettle from the heat, add the thickening agent, stirring the mixture until it is smooth; (3) add the cold liquid, return the mixture to the fire, and stir it constantly until it boils; (4) add the seasoning.

In this method nearly as much fat as flour should be used.

Method II.

(1) Scald the liquid in the top of a double boiler; (2) mix the thickening agent with a small amount of cold liquid, beat it free from all lumps

and thin it to the consistency of thin cream; (3) add this paste gradually to the scalded liquid, stirring the sauce constantly until it boils; (4) add the fat and the seasoning.

Fat may be omitted in this method, or varying amounts may be used.

If a large quantity of sauce is to be made, Method II is recommended because of the shorter time required. If the sauce is not to be used immediately, it may be kept hot over hot water. It should be kept covered to prevent a film forming on the surface. If lumps appear, due to a faulty method of making, they may be removed by beating the sauce with an egg-beater or by straining it.

BUTTER SAUCE

Method of making: (1) Melt half of the butter; (2) add the flour and seasonings; (3) stir the mixture over the fire until it bubbles; (4) remove it from the fire; (5) add the hot water gradually; (6) return the mixture to the fire and boil it, stirring it constantly; (7) add the remaining butter in small pieces.

BROWN SAUCES

Method of making: (1) Melt the butter in a saucepan; (2) add the flour and stir the mixture until it bubbles; (3) remove the mixture from the fire, and add the liquid gradually, stirring constantly to prevent lumps from forming; (4) return the sauce to the fire, and stir it until it boils; (5) brown stock, browned flour, kitchen bouquet, Worcestershire sauce, or caramel may be used to give a brown color; (6) when vegetables and herbs are used as flavoring, cut them very fine, cook them in the butter until they are a russet brown, strain the sauce before using it; (7) when raw mushrooms are used, peel them and clean them, simmer them in water until they are tender, or sauté them in butter; (8) when olives are used, cover them with boiling water, let them simmer for an hour, cut them from the seeds.

SAUCES THICKENED WITH EGG

Method of making: (1) Wash ½ cup of butter and put in a bowl; to wash butter, cover it with cold water and wash it with a wooden spoon until it is free from water and salt; (2) divide the butter into three parts; (3) put one piece in a saucepan with the unbeaten yolks of eggs and the lemon juice; (4) place the saucepan in hot water; (5) stir the mixture in the saucepan constantly until the butter is melted; (6) add the second piece of butter and continue the stirring; (7) add the third piece of butter and continue the stirring; (8) add the liquid and the other ingredients gradually, stirring the sauce constantly until it thickens.

TABLE XLIV.—Thin White Sauce with Variations

Sauce	*Liquid*	*Fat*	*Thickening agent*	*Flavor*	*Use*
White sauce, thin	1 cup milk	Up to 1 tbsp.	½ to 1 tbsp. flour	¼ tsp. salt, 1/8 tsp. pepper	Cream soups, creamed vegetables
Allemande	1 cup chicken stock	1 tablespoon	1 tablespoon flour	Yolk of 1 egg	Fish Vegetables
Asparagus	1 cup chicken stock	1 tablespoon	1 tablespoon flour	½ cup asparagus tips pressed thru sieve, yolk 1 egg	Broiled chicken or fish
Béchamel	½ cup chicken stock, ½ cup cream	1 tablespoon	1 tablespoon flour	1 tsp. lemon juice	Fish and egg dishes
Yellow béchamel	½ cup chicken stock, ½ cup cream	1 tablespoon	1 tablespoon flour	½ tbsp. lemon juice, yolks of 2 eggs, plus 2 tbsp. cream	Fish or egg dishes
Cauliflower	1 cup milk	1 tablespoon	1 tablespoon flour	½ cup cooked cauliflower, ½ tsp. butter	Boiled fowl
Caper	1 cup milk	1 tbsp. butter	1 tablespoon flour	¼ tsp. salt, 1/8 tsp. pepper, 2 tbsp. chopped capers	Boiled mutton
Celery	1 cup milk	1 tbsp. butter	1 tablespoon flour	½ cup chopped boiled celery	Boiled fowl
Chaufroid	1 cup chicken stock	1 tablespoon	1 tablespoon flour	¼ ounce gelatin	For covering cold meats and chicken
Red chaufroid	1 cup tomato sauce	1 tablespoon	1 tablespoon flour	¼ ounce gelatin	For covering cold meats and chicken
Yellow chaufroid	1 cup chicken stock	1 tablespoon	1 tablespoon flour	¼ ounce gelatin, yolks of 2 eggs	For covering cold meats and chicken
Cheese	1 cup milk	1 tablespoon	1 tablespoon flour	½ cup grated cheese, 1 beaten egg	Baked halibut or other white fish, or macaroni, or rice
Curry	1 cup milk	1 tablespoon	1 tablespoon flour	½ tbsp. curry,	Rice, macaroni
Egg	1 cup milk	1 tbsp. butter	1 tablespoon flour	1 hard cooked egg, 1 tsp. parsley	Boiled fish

TABLE XLIV.—Thin White Sauce with Variations.—*Cont'd*

Sauce	*Liquid*	*Fat*	*Thickening agent*	*Flavor*	*Use*
Egg velouté	1 cup water in which fish was boiled	1 tablespoon	1 tablespoon flour	1 small slice onion, 1 small carrot, 1 bay leaf	Boiled fish
Fish	1 cup milk	1 tbsp. butter	1 egg yolk 1 tablespoon flour	2 tbsp. court bouillon (page 529	Boiled fish
Horseradish	1 cup chicken stock	1 tablespoon	1 tablespoon flour	¼ cup hot cream, 1/3 cup grated horseradish	Mutton, corned beef
Lobster	1 cup milk	1 tbsp. butter	1 tablespoon flour	Chopped meat of ½ lobster, paprika	Boiled fish and fish timbales
Mushroom	1 cup chicken stock	1 tablespoon	1 tablespoon flour	¼ cup mushrooms	Steak, fillet of beef
Oyster	½ cup milk, ½ cup oyster broth	1 tbsp. butter	1 tablespoon flour	½ doz. scalded, chopped oysters	Boiled fish, boiled fowl, baked fish, fish timbales
Poulette	1 cup chicken stock	1 tablespoon	1 tablespoon flour	2 egg yolks, ½ cup cream, ½ tbsp. butter, ½ tbsp. chopped parsley	Chicken, sweetbreads, entrées
Soubise	1 cup milk	1 tablespoon	1 tablespoon flour	Boiled pulp of 4 onions and 2 stalks of parsley put thru a sieve	Lamb, mutton, or pork chops
Tomato	1 cup tomato juice	1 tablespoon	1 tablespoon flour	½ onion, 1 clove 1 stalk celery, 1 bay leaf cooked with the juice 20 minutes	Macaroni, rice croquettes, fish
Villeroi	1 cup chicken stock	½ tablespoon	1 tablespoon flour	Yolks of 2 eggs, ¼ cup cream, cayenne, nutmeg	Coating hard-cooked eggs, cold meats, oysters

TABLE XLV.—BUTTER SAUCES

Sauce	*Liquid (water or milk)*	*Fat*	*Flour*	*Flavor*	*Use*
Anchovy	1 cup	1/4 cup	2 tablespoons	3 anchovies pounded to a paste, juice of 1/2 lemon	Fish
Caper	1 cup	1/4 cup	2 tablespoons	1/3 cup capers	Boiled mutton
Cucumber	1 cup	1/4 cup	2 tablespoons	1/4 to 1/3 cup chopped cucumber pickles	Fish
Drawn butter	1 cup	1/4 cup	2 tablespoons	1/3 teaspoon salt, 1/8 tsp. pepper	Boiled fish, or baked fish
Egg	1 cup	1/4 cup	2 tablespoons	Beaten yolks of 1 or 2 eggs, 1 tsp. lemon juice	Fish
Egg	1 cup	1/4 cup	2 tablespoons	1 sliced hard-cooked egg	Boiled fish
German	1 cup	1/4 cup	2 tablespoons	Juice 1/4 lemon, 1/4 cup cooked spinach, 1 or 2 beaten egg yolks	Baked shad
Shrimp	1 cup	1/4 cup	2 tablespoons	1 egg yolk, 1/3 can shrimp	On toast, or baked or boiled fish

TABLE XLVI.—BROWN SAUCES

Sauce	*Liquid*	*Fat*	*Flour*	*Flavor*	*Use*
Brown, I	1 cup brown stock	2 tablespoons butter	3 tablespoons	¼ tsp. salt, ¼ tsp. pepper	Meats, meat sandwiches
Brown, II	1 cup brown stock	2 tablespoons butter	3 tablespoons	1 tbsp. chopped onion, 1 tbsp. chopped carrot, 1 sprig thyme, bay leaf	Meats, meat sandwiches
Currant jelly	1 cup brown stock	2 tablespoons butter	3 tablespoons	¼ cup currant jelly, 1 tbsp. lemon juice	Venison, mutton, lamb
Mushroom	1 cup brown stock	2 tablespoons butter	3 tablespoons	1/3 cup canned mushrooms	Beef steaks, fillets of beef
Olive	1 cup brown stock	2 tablespoons butter	3 tablespoons	½ dozen chopped olives	Roast duck
Piquante	1 cup brown stock	2 tablespoons butter	3 tablespoons	1 tbsp. onion, 1 tbsp. chopped parsley, 2 tbsp. vinegar; ½ tbsp. chopped capers, ½ tbsp. chopped pickle, cayenne to taste	Boiled beef
Spanish	2/3 cup brown stock, 1/3 cup strained tomatoes	2 tablespoons butter	3 tablespoons	1 tbsp. onion, 1 tbsp. carrot, 1 tbsp. raw lean ham, 6 peppercorns, cloves, sprig marjoram, ¼ tbsp. parsley	Egg dishes or cornmeal dishes, or croquettes
Tomato	½ cup brown stock, ½ cup tomato juice	2 tablespoons butter	3 tablespoons		Beef steak, cannelon of beef, macaroni

TABLE XLVII.—Sauces Thickened with Egg

Sauce	*Liquid*	*Fat*	*Thickening agent*	*Flavor*	*Use*
Hollandaise, I	1/3 cup boiling water, 1 tbsp. lemon juice or ½ tbsp. vinegar	½ cup butter	2 egg yolks	¼ tsp. salt, cayenne	Boiled fish, baked fish, fish timbales, asparagus, cauliflower
Hollandaise, II	1 tsp. water, 1 tbsp. lemon juice, ½ cup cream	½ cup butter	2 egg yolks	¼ tsp. salt, cayenne	
Horse-radish	1 tsp. water, 1 tbsp. lemon juice, ½ cup cream	½ cup butter	2 egg yolks	¼ cup grated horse-radish	Fish, mutton, eggs
Lobster	1/3 cup boiling water, 1 tbsp. lemon juice	½ cup butter	2 egg yolks	1/3 cup lobster	Eggs
Shrimp	1/3 cup boiling water, 1 tbsp. lemon juice	½ cup butter	2 egg yolks	½ cup shrimp	Fish or eggs

TABLE XLVIII.—SWEET SAUCES THICKENED WITH STARCHY MATERIAL

Sauce	*Liquid*	*Thickening agent*	*Flavor*	*Use*
Banana	1 cup boiling water	2 teaspoons cornstarch	½ cup sugar, 4 bananas, 3 oranges, 1 tart apple, chopped	Fritters
Chocolate	½ cup boiling water, ½ cup milk	2 ounces Baker's chocolate	½ teaspoon vanilla, ½ cup sugar	Vanilla ice cream, blancmange, steamed cake
Fruit purée	1 cup fruit pulp	1 teaspoon arrowroot	Sugar, as desired	Cornstarch pudding
Fruit	1 cup fruit juice	½ to 1 teasp. cornstarch	¼ to ½ cup sugar	Cornstarch pudding
Lemon or orange	1 cup boiling water	1 teaspoon cornstarch	1 cup sugar, 1 tbsp. butter, juice and grated rind of ½ lemon or orange	Fritters, puddings
Maraschino	1 cup boiling water	1 1/3 teaspoon arrowroot	1/3 cup sugar, 2/3 tbsp. butter, ¼ cup maraschino cherries, 1 tsp. lemon juice, ½ cup maraschino cherry juice	Baked bananas, apple fritters, custard soufflé, cottage pudding
Pineapple	1 cup chopped pineapple and juice	1 teaspoon arrowroot	Sugar, if necessary	Fritters, cornstarch pudding, rice pudding, batter pudding
Royal	1 cup boiling water	2 teaspoons cornstarch	½ cup jelly or jam, juice ½ lemon	Cottage pudding
Tutti frutti	1 cup boiling water	1 teaspoon cornstarch	¾ cup sugar, 1 tbsp. butter, 1 tbsp. lemon, ¼ cup blanched almonds, ½ cup raisins, ¼ cup citron	Baked bananas, fritters

TABLE XLIX.—SWEET SAUCES THICKENED WITH EGG

Sauce	*Liquid*	*Thickening agent*	*Flavor*	*Use*
Chocolate	½ cup hot milk, ½ cup double cream, whipped, added last; 2 tbsp. hot water	2 eggs	1/3 cup sugar, ½ ounce chocolate, ¼ tsp. cinnamon, ½ tsp. vanilla	Chocolate soufflé, vanilla soufflé, custard soufflé, hot pudding
Coffee, cold	½ cup coffee; ½ cup double cream, whipped, added last	2 eggs	¼ cup sugar, salt	Coffee soufflé, filling for cream puffs
Creamy	½ cup water and 1 cup sugar, combined and cooked to thread stage; 1 cup cream, whipped	1 egg white, beaten	As desired	Cake desserts
Foamy	½ cup strawberry or other fruit juice	2 egg whites, beaten	1 cup sugar	Steamed pudding
Jelly	½ glass jelly	2 egg whites, beaten		Light pudding or gelatin
Mock cream	1 cup milk	1 tsp. cornstarch, 1 egg white, beaten	1 tablespoon sugar ½ teaspoon vanilla	Boiled rice, in place of cream
Orange sabayon	¼ cup butter, ¼ cup cream	4 egg yolks	¼ cup sugar, ¼ cup orange juice, 1 tsp. lemon juice	Custard soufflé, cottage pudding, fruit soufflé

In all sweet sauces except hard sauce, corn sirup, maple sirup, or honey may be substituted for all or part of the sugar with slight adjustment.

SWEET SAUCES

Sweet sauces thickened with starchy material.

Method of making: (1) Mix the sugar and the cornstarch; (2) add the hot liquid gradually; (3) cook the mixture, stirring it constantly until it thickens; (4) continue the cooking over hot water until the uncooked flavor of the thickening agent can no longer be detected; (5) add any flavoring material that is to be used.

Sweet sauces thickened with egg.

Method of making: For sauces in which butter and sugar do not form the basis: (1) Beat the egg slightly; (2) add the milk, hot or cold; (3) add the sugar and the salt; (4) mix the ingredients thoroughly; (5) cook the mixture over hot water, stirring it constantly until it coats the spoon; (6) add any flavoring material that is to be used; (7) if the sauce curdles, beat it thoroughly with a Dover egg-beater.

For sauces in which butter and sugar form the basis: (1) Cream the butter; (2) add the sugar; (3) add the egg, well-beaten; (4) add the liquid gradually; (5) cook the mixture over hot water until it is creamy, stirring it constantly; (6) add any flavoring material that is to be used.

For sauces thickened with beaten egg whites: Add the egg whites to the other ingredients, which are cooked or uncooked as necessary, and beat the sauce until the ingredients are well combined.

Sirup sauces.

Method of making: Combine the sugar and the water, and put the mixture over the heat; stir it until the sugar is dissolved; boil it without stirring it until it forms a good thread when dropped from a spoon; add the flavoring or crushed fruit.

TABLE L.—SIRUP SAUCES

Sauce	*Ingredients*	*Use*
Sirup.	3 tbsp. boiling water, 2 cups sugar, 1 tsp. butter, fruit juice for desired flavor	Plain puddings, pancakes
Strawberry.	½ cup boiling water, ¾ cup sugar, 1 quart strawberries put through a sieve	Blanc mange, cottage pudding

Solid sauces.

Method of making: (1) Cream the butter; (2) add the sugar gradually; (3) add the other ingredients, working them well into the mixture; (4) place the sauce on ice to harden.

TABLE LI.—SOLID SAUCES

Sauce	*Ingredients*	*Use*
Hard, I	½ cup butter, 1 cup sugar, vanilla	Puddings
Hard, II	½ cup butter, 1 egg yolk, 1 cup sugar, vanilla	Puddings
Hard, III	½ cup butter, 1 egg white, 1 cup sugar, vanilla	Puddings
Strawberry	1/3 cup butter, 1 egg white, 1 cup powdered sugar, 2/3 cup strawberry pulp	Boiled rice
Cocoanut	½ cup butter, 2 egg yolks, 2 egg whites, 1 cup grated cocoanut, 1 cup sugar	Suet pudding, plain pudding, steamed pudding, hot rice pudding, hot tapioca pudding

CHAPTER XXXI

SALADS

By Miriam Birdseye

The word salad is derived from the Latin *salatus*, meaning salted. The original salad probably consisted of crisp leaf or stem vegetables dressed with salt. With the passage of years, the meaning of the term has been expanded to include any food or combination of foods served with an acid-bearing dressing, provided it is accompanied by some crisp salad-green as an important part of the dish itself or as a conspicuous garnish. The typical salad, however, remains a dish of crisp salad greens with some very simple dressing, sometimes only oil and salt.

Salads offer a palatable and attractive way of disposing of small quantities of choice left-over vegetables, fruits, or meats, and of introducing fruits and vegetables into the daily meals, especially green leaf-vegetables, which are known to be excellent sources of food-iron. Salads lend a strong color note, pleasantly acid flavor, and succulence to the menu. Probably no other type of dish solves as many of the menu-maker's problems as does salad; and this is the real secret of its popularity.

SALAD HERBS

To season salads and dressings.

The following herbs, except capers, may easily be grown in the home garden. For directions for cultivating them, see Bailey's "Standard Cyclopedia of Horticulture."

Capers: Used as a garnish for meat and fish salads, mixed with the salad itself, or chopped and added with other chopped seasonings to mayonnaise dressing. Capers are the buds of a shrub which is cultivated in European countries bordering the Mediterranean; they are generally pickled in vinegar and sold in small bottles.

Chervil: Chopped like parsley, sprinkled over endive or fish salads, or used to make chervil vinegar.

Chives: Chopped and sprinkled over potato or meat salads, or added to salad dressings. They are a small plant of the onion family and grow wild in many parts of the country. Cultivated chives may sometimes be bought growing in flat wooden boxes; they are slender onion-like leaves.

Garlic: The bulb or "clove" is sometimes used to rub the bottom of the salad bowl, but more frequently to prepare a chapon for green salads. A chapon is a thin piece of bread crust, about 1 inch wide and 2 inches long, sprinkled with salt and rubbed with a crushed clove of garlic. It is placed in the bottom of the salad bowl before the salad is put in, and remains during the mixing, but is removed before the salad is served.

Nasturtium: The flowers are used as a garnish; the leaves and young buds are chopped to give flavor. Sometimes young seeds are chopped and added to mayonnaise dressing with other chopped seasonings.

Onion: The cut side of an onion may be rubbed over the bowl before the salad is put in to give a slight onion flavor to a green salad. Oil for dressings to be used with vegetables, meat, or fish is sometimes flavored by allowing a slice of onion or a little onion pulp to lie in it for a few hours; onion juice may be added to the dressing itself if desired.

Parsley: Chopped fine and used with other chopped seasonings in both French and Mayonnaise dressings.

Sage: Chopped and used with meat salads.

Spearmint: Chopped and sprinkled over cold lamb salad; or used for flavoring vinegar to be served with lamb salad.

Sweet basil: Used with fish and shell-fish.

Tarragon: Chopped and sprinkled over salads, or used to make tarragon vinegar. Tarragon has a delicate flavor resembling that of anise.

Seasons for salad greens.

Spring: Lettuce (curly, Boston head, or Romaine varieties), water cress, upland or winter cress (charlock), black or white mustard, peppergrass, wild chives, young radish and turnip tops, sorrel, blanched dandelions, corn-salad (lamb's salad or fetticus), blanched wild chicory (succory).

Summer: Lettuce, water cress, sorrel, cabbage, nasturtium stems and young buds, endive (late summer).

Autumn: Lettuce, sorrel, endive, cabbage, celery.

Winter: Lettuce, French endive (witloof chicory), endive, cabbage, celery.

SALAD DRESSINGS

The apparently infinite number of salad dressings may readily be reduced to a few well-recognized types. These types with their best-known modifications are listed below in the order of their simplicity. It is believed that this classification will prove more suggestive than a large number of specific recipes.

Salt.
Suitable for a green salad.

Salt and oil.
Suitable for a green salad or for tomatoes.

Vinegar, sugar, and water.
Suitable for a green salad or for tomatoes.

Lemon juice, sugar, and water.
Suitable for a green salad, for tomatoes, or for fruit. Children are likely to enjoy this dressing.

Recipe.

Strained juice of 1 lemon,	1 teaspoon powdered sugar
An equal quantity of cold water	Salt

French dressing.
The most extensively used dressing; suitable for green salads, vegetable salads, fruit salads, egg, fish, or meat salads, although as a rule a thicker dressing is preferred for the last three.

Recipe.

3 tablespoons oil	¼ to ½ teaspoon salt
1 tablespoon vinegar or lemon juice	1/8 teaspoon pepper
	Dash of cayenne pepper

Mix the ingredients thoroughly, either by beating them with a fork till well thickened, or by shaking them in a jar or glass-stoppered bottle. If French dressing is made in quantity in a bottle, the amount needed may be poured out, and the remainder may be stored in a cold place for subsequent use. The dressing should be thoroughly shaken before it is used a second time. Special bottles for French dressing are now on the market.

Variations of French dressing.
1. Add ¼ teaspoon of onion juice. 2. Add 1 teaspoon made mustard or ¼ teaspoon ground mustard. 3. Use ¼ teaspoon paprika (Hungarian red pepper) instead of black pepper. 4. Add from ¼ to ½ teaspoon of powdered sugar. 5. For fruit salads, use lemon juice, orange juice, or grapefruit juice in place of the vinegar, and add ¼ teaspoon or more of powdered sugar. 6. To make a sharper tasting dressing, use a larger proportion of vinegar and more salt. 7. Use vinegar flavored with tarragon or with chervil. 8. To secure a slight flavor of strong herbs, crush a few of the fresh leaves in a mortar, and soak them in a little oil, which may then be pressed out and added to the dressing. Herbs may be used as follows:

Summer savory or thyme in a green salad to be served with poultry; mint in a salad to be served with lamb or mutton or on a lamb or mutton salad; sweet marjoram or sage in a salad served with geese or ducks; sweet basil in a salad of fish or clams; caraway, balm, or chervil may also be used. 9. Add chopped parsley, chives, capers, or green peppers. 10. Add the finely chopped white of a hard-cooked egg, or the yolk put through a sieve. 11. Add chutney sauce, catchup, or Chile sauce. 12. Add tabasco or Worcestershire sauce. 13. Add cheese, such as grated Cheddar, crumbled Roquefort, or grated Parmesan. 14. Add curry powder.

Cream dressing.

Two standard recipes for cream dressings are as follows:

Sour cream dressing (for cold boiled vegetables and tomatoes)

1 cup thick sour cream (not too old)	
2 teaspoons vinegar	1 teaspoon sugar
1 teaspoon salt	Dash of cayenne or ¼ teaspoon paprika
Juice ½ lemon	

Beat the ingredients together thoroughly.

Sweet cream dressing (for vegetable or fruit salads)

½ cup heavy cream	¼ teaspoon salt
3 tablespoons vinegar	Cayenne pepper or ¼ teaspoon paprika

Beat the cream until it is stiff; add the seasonings; add the vinegar slowly, and continue to beat until the ingredients are well blended. For tomato salads and meats, fold in 2 tablespoons of grated horse-radish root.

Mayonnaise dressing.

Suitable for egg salad, fish or meat salad, and for fruit or vegetable salad, although French dressing is often preferred for the last two.

Recipe.

1 cup oil	2/3 teaspoon powdered sugar, if desired
Yolk of 1 egg	2/3 teaspoon salt
2 tablespoons vinegar or lemon juice	2/3 teaspoon mustard
Few grains cayenne	

If onion flavor is desired, rub a bowl with a freshly cut onion or a clove of garlic. Put in the seasonings, and mix them well. Add the entire amount of acid, then add the egg yolk and beat the mixture well. Add the oil, at first by tablespoons and later in larger quantities, beating the mixture with a Dover egg-beater after each addition. When all the oil has been used, add any further necessary seasonings, and beat the mixture thoroughly. Cover the bowl with an earthen dish, and keep it in a cool place until it is needed.

By adding the acid before the oil, the egg is partially curdled or thickened, and the oil may be added more rapidly than by the older method.

Mayonnaise may be prevented from separating, and the quantity may be increased without materially altering the flavor, by stirring into it, after it is mixed, from 1/3 to ½ its bulk of hot cornstarch paste, made in the following way:

2 tablespoons cornstarch	1/3 cup boiling water
1/3 cup vinegar	

Add the vinegar to the cornstarch in an enamel saucepan, stirring the mixture until it is smooth. Add the boiling water, bring the mixture to the boiling point, and simmer it gently for 5 minutes. Cool it slightly, and beat the desired quantity into the mayonnaise, which will become thicker and lighter in color. Chill the dressing before using it.

This starch-paste binding is good for modifying the excessive oily flavor, to which some persons object. It may also be used to conceal the flavor of cottonseed, corn, or peanut oil for persons who have become accustomed to olive oil.

Variations in mayonnaise dressing.

1. The number of raw egg-yolks in the original dressing may be increased, or part of the yolks used may be raw and the other part hard-cooked and pressed through a sieve. When several egg-yolks are used, somewhat less oil will be required, and the dressing will be stiff enough for whipped cream or the stiffly beaten white of egg to be added to it just before it is used. Extra salt and other seasoning should be added as required. When hard-cooked yolks are substituted entirely for raw yolks, the result is called Remoulade sauce. 2. For Potato Mayonnaise use the inside of a small freshly baked potato in place of egg-yolks. Remove it, mash it, and add:

1 teaspoon mustard	1 tablespoon vinegar
1 teaspoon salt	1 teaspoon powered sugar, if desired
Dash of cayenne pepper	

Force the mixture through a fine sieve, and add 1 tablespoon of vinegar and 2/3 cup of oil by tablespoons, as in standard mayonnaise. 3. Use thick, slightly soured cream in place of a part of the oil. 4. Use melted butter in place of a part of the oil. 5. For fruit salads, use powdered sugar, omit the mustard and pepper, and use lemon juice in place of vinegar. 6. For White Mayonnaise, use a smaller quantity of egg-yolk; substitute lemon juice—which whitens the dressing—for vinegar. Beat in whipped cream or stiffly beaten egg-whites just before using the dressing. 7. For Green Mayonnaise, add juice pressed from fresh leaves of spinach, parsley, tarragon, or other salad herbs. A combination of two parts of water cress and one part of parsley is particularly good. Break the greens in pieces, pound them in a mortar until they are thoroughly macerated; then squeeze out the juice through cheese-cloth. Artificial vegetable coloring may also be used. 8. For Red Mayonnaise, color the dressing with lobster or pimentos rubbed through a fine sieve, or with cooked beet juice, highly colored fruit juice, or artificial vegetable colorings. 9. For Horse-radish Mayonnaise, to be used with meat and fish salads, add about 3 tablespoons of grated horse-radish, or the same amount of prepared horse-radish. In the latter case, squeeze out the vinegar in which the horse-radish was packed, and use it instead of the plain vinegar in the dressing. 10. For meat, fish, or shell-fish salads, to 1 cup of mayonnaise add 2 tablespoons each of olives and finely chopped pickles. 11. For Mayonnaise Tartare or Sauce Tartare, to be used with fish and shell-fish salads, fried fish, scallops, and soft-shell crabs, add onion juice or finely chopped onions and finely chopped cucumber pickles, capers, parsley, and olives. 12. To 1 cup of mayonnaise, add 1½ tablespoons of chutney and stir the mixture until it is thoroughly blended.

Cooked salad dressings.

Boiled dressing (for vegetable and fruit salads, and for salmon salad).

Recipe I

Yolks of 3 eggs	¼ teaspoon paprika
1/3 cup sugar	½ teaspoon salt
1 teaspoon mustard	1 cup vinegar

Whipped cream

Beat the eggs slightly, and add to them the other ingredients in the order given. Cook the mixture in a double boiler, stirring it constantly until it is smooth and thick. This dressing will keep for a long time in a cold place. When ready to use the dressing, mix it with equal parts of whipped cream. A variation pineapple dressing for fruit salads may be made as follows:

2 eggs	1½ tablespoons butter
6 tablespoons pineapple juice	Salt
3 tablespoons sugar	Whipped cream

Recipe II.

4 tablespoons sugar	1½ cups milk
2½ teaspoons mustard	3 tablespoons melted butter
2 teaspoons salt	½ cup vinegar
1½ tablespoons flour	2 eggs, slightly beaten

Cayenne pepper

Mix the dry ingredients and blend with them ¼ cup of milk. Heat the remainder of the milk to the boiling point, add the butter, thicken it with the first mixture, and boil this for 2 minutes. Cool the mixture slightly, add the vinegar gradually, and pour this hot liquid cautiously over the slightly beaten egg, stirring it constantly. Cook the dressing over hot water until it thickens. Cool it immediately in order to prevent curdling, and pour it into a scalded glass jar. This recipe makes more than a pint of rather mild dressing, which will keep for a long time in a cold place.

No whipped cream need be added to the dressing.

For lobster, tuna-fish, or meat salad, omit the sugar and reduce the milk to 1 cup; add 2 extra tablespoons of butter, and a little more vinegar. Thus modified the dressing has somewhat the consistency of real mayonnaise, and is more palatable with meat salads and with lobster and tuna-fish salads than is the sweetened form. For fruit salads, omit the mustard and the butter, and replace the milk with thin cream.

Bacon dressing.

Use the fat left from cooking bacon or smoked ham. Heat it, and strain it through fine cheese-cloth, if there is much sediment. Use two parts of fat to one part of vinegar, thicken it slightly with flour and water well blended, and cook the mixture for a few minutes to remove the raw taste of the flour. This dressing is generally served hot on dandelion, cabbage, and other green salads. It is a good salad dressing for use on camping trips.

CHAPTER XXXII

DESSERTS

By Winifred Moses

In planning a well-balanced meal the dessert must be considered, because if it is used at all it plays a part in the nutritive scheme of the meal. It may be as simple as fresh fruit or as complex as plum pudding, and the correct choice determines the success of the meal both in nutritive value and in palatability. If the main part of the meal is made up of less hearty foods, the dessert may well be a heavy one, such as steamed pudding with hard sauce, or pie. If the other courses are heavy, however, a light dessert such as fruit or fruit sherbet may be the best choice.

Batters and doughs and eggs mixtures are discussed elsewhere. Other desserts will be briefly considered in this chapter.

FRUITS

Fruits may be served alone as dessert, fresh or cooked, hot or cold. A combination of fruits may be used for variety in flavor or color.

GELATIN DESSERTS

General directions for making gelatin desserts are as follows:

(1) Soak the gelatin in about four times its measure of cold liquid for from 3 to 5 minutes, or until it is softened; (2) dissolve it by pouring the boiling liquid over it; or to hasten the process set the gelatin and cold liquid over boiling water to dissolve; (3) add the sugar to the hot mixture, stirring it until it is dissolved; (4) add the fruit juice or other flavoring; (5) turn it immediately into a wet mold, allow it to cool and place it near ice to stiffen; (6) if a foamy jelly is desired, before pouring the mixture into the mold, allow it to cool and begin to stiffen, then beat it well with a wire whisk before pouring it into the wet mold; (7) if fruit is to be used, allow the jelly to begin to stiffen before adding it in order that it may be mixed evenly throughout the jelly, or it may be added in layers by allowing one layer

of jelly to stiffen, adding a layer of fruit, pouring over this more of the jelly mixture that has been kept warm, and allowing this layer to stiffen before adding more fruit; (8) 1 tablespoon of gelatin will stiffen about 1 pint of liquid.

Sponges and Bavarian creams.

To make sponges and Bavarian creams, when the jelly has begun to stiffen, beaten whites of eggs or whipped cream should be added, and the mixture beaten to a froth. For a slightly different texture, the jelly should be beaten to a froth, and the beaten egg-whites or the whipped cream lightly folded in. The mixture should then be turned into a wet mold and chilled.

Charlottes.

Charlottes are combinations of cake with whipped cream or Bavarian creams or sponges. Thus the suggestions for making sponges and Bavarian creams apply to charlottes also. Bread dipped in melted butter may be substituted for the cake. Fruit sauces may be used instead of the whipped cream or the gelatin filling; the dish may be garnished with jelly, jam, or nuts, and served with a hard sauce.

WHIPPED CREAM

In whipping cream, only cream containing at least 20 per cent of butter-fat should be used, and 25 to 40 per cent is better. Cream from twelve to twenty-four hours old is best to use in order that a small amount of lactic acid may have developed. The cream should be held at as low a temperature as possible, 35° to 45° F., for two hours before whipping and should be whipped in a cool room, and cold utensils used.

The use of viscogen makes it possible to whip fresher, thinner, or warmer cream than is otherwise advisable. It is made of $2\frac{1}{2}$ parts of sugar, 5 parts of water, and $^3/_{10}$ part of milk of lime. The ingredients are mixed thoroughly and allowed to stand 24 hours before being used. The mixture is used in the proportion of 1 teaspoonful to 2 cups of cream. It is in no wise harmful.

Syllabubs, or whips.

For syllabubs, or whips, whipped cream should be flavored as desired, and sweetened by adding sifted powdered sugar gradually in the proportion of about 3 tablespoons of sugar to 1 pint of cream. It is then drained and put near the ice until time to serve. It should be piled lightly in a glass dish, and garnished with fruits, nuts, or colored sugars.

Cold steamed rice or dry cake or cookie crumbs may be beaten lightly into the whipped cream, and the dish may be garnished with a red cherry or red jelly.

JUNKET

One junket tablet will stiffen about 1 quart of milk. (1) Crush the tablet and dissolve it in cold milk; (2) heat the remaining milk, stirring it constantly, to about 100° F.; a simple test for this temperature, which is about that of the body, is to let a drop of milk fall on the inside of the wrist and if there is no sensation of heat or cold, the temperature of the milk about corresponds with that of the body; (3) add the sugar, the flavoring, and the dissolved junket tablet, stirring the mixture well; (4) turn the mixture into wet molds, and let it stand in a warm place until it stiffens, then chill it. Junket may be served with whipped cream, fruit, or fruit sauces, nuts, or preserved ginger.

FROZEN DESSERTS

Water ices.

Water ices are fruit juices sweetened, diluted with water, and frozen.

Frappés.

Frappés are ices made of fruit juice, water, and sugar, frozen to the consistency of mush.

Sherbets.

Sherbets are water ices to which have been added a small quantity of dissolved gelatin or beaten whites of eggs. They may be made of one fruit juice or a combination. The juice of one lemon is generally added to each quart of the mixture in order to accentuate the flavor of the other fruit. Sometimes no water is added to the fruit juice.

Sorbets.

Sorbets are a kind of frozen punch or water ice to which various kinds of fruit are added.

Granites.

Granites are water ices to which fruit is added after the freezing.

*Ice creams.**

Plain ice cream is generally made of thin cream, scalded or not, as desired, sweetened, flavored, and frozen. Whole eggs or yolks of eggs may be used to make a custard which is then frozen. When cream is not plentiful, four parts of milk and one part of double cream may be jellied with junket tablets (page 572) and used. Eggs may be used with skim-milk in place of cream. Arrowroot, cornstarch, or flour is sometimes used in place of some of the eggs. It should be mixed with a little cold milk or cream, and cooked for 10 minutes, being stirred constantly, before being added to the eggs and sugar. If fruit is used, it should be crushed, mixed with the necessary amount of sugar, preferably in the form of sirup, and allowed to stand for 1 hour. It is then added to the partly frozen cream. Strawberries and peaches may be put through a potato ricer. Berries, like raspberries, should be passed through a fine sieve. Fruit flavors are considered by some persons not to harmonize well with eggs, and are therefore not used in custard creams.

For each quart of the mixture to be frozen, any of the following flavorings may be used: 1½ squares Baker's chocolate; ¼ cup prepared cocoa; 1 tablespoon vanilla; 2 cups orange juice; $^2/_3$ quart can of pineapple.

A smooth, velvety texture is desired in ice creams, rather than a coarse-grained mass of crystals. Texture is influenced by: (1) The amount of butter-fat present. The richer the cream, the smoother is the product. (2) The rapidity of freezing. If frozen rapidly, the cream will be coarse and full of large

* For further information on experiments in freezing ice cream, see Bull. 155, Vt. Exp. Sta.

water crystals. (3) The amount of whipping during freezing. The air thus incorporated produces a light, smooth, cushiony consistency. In properly made ice cream, the water freezes in very fine crystals interspersed with minute bubbles of air. It should contain from 33 to 40 per cent of air. (4) The age of the cream. Cream fresh from the separator or pasteurizer produces a coarse-grained ice cream. Cream that is 12 hours old, held at 32–35° F., makes a smooth mixture when frozen.

Frozen puddings.

Frozen puddings are ice creams made of thin cream or thin cream and egg-yolks, highly flavored and containing many preserved fruits and nuts. They are generally molded in melon molds, lined with lady-fingers.

Mousses.

A mousse may be made in either of two ways: (1) heavy cream may be beaten until stiff, drained, sweetened, and flavored; or (2) the whip from thin cream may be folded into a mixture stiffened with gelatin. Mousses are placed in molds, and packed for 3 hours in equal parts of ice and salt. Sherbets are frequently combined with them either as the lining of the mold or as a layer of filling.

Parfaits, biscuits, and soufflés.

For a parfait, biscuit, or soufflé, yolks of eggs are cooked with sirup to a thick smooth cream. The mixture is then flavored and beaten until it is cold and light, and mixed with drained whipped cream. It is then poured into a mold and packed in ice and salt for 3 or 4 hours according to the size of the mold. Parfaits are not solid like custard ice creams; they have a spongy texture. They should not be frozen too hard.

Biscuits take their name from their size, being in reality parfaits frozen in individual forms.

Soufflés are parfaits reinforced with gelatin and a larger proportion of liquid and frozen in soufflé dishes.

Freezing.

(1) Put the ice in a strong cloth or bag, and with a wooden mallet pound it fairly fine. The finer the ice, the more quickly will the mixture freeze. Snow may be used instead of ice. (2) Use coarse salt and ice in the proportion of: 1 part of salt to 1 part of ice, for mousse and parfait; 1 part of salt to from 1 to 3 parts of ice for frappé and ice; 1 part of salt to from 1 to 15 parts of ice for ice cream. The larger the proportion of ice to salt, the slower will be the freezing and the finer the grain. Fine salt dissolves more readily than coarse, and consequently produces a lower temperature more quickly; but it tends to form crusts and bridges which prevent the ice from settling in place and fitting around the freezer. (3) Fill the can two-thirds full. (4) Place the can, which has been washed with soap and water, scalded, and cooled, in the freezer, and adjust the crank. Turn the crank to see that it is in place. (5) Place the freezer in a dishpan, and set the dishpan on a towel to keep it from slipping and to deaden the sound. Spread papers on the floor to protect it from ice and salt that may be dropped. (6) Fill the freezer half full of ice, and add a layer of salt, using a long-handled spoon. Add more ice and more salt in layers, placing salt near the top so that on dissolving it may trickle over the ice. If snow is used, pour in 1 cup of water after the freezer is packed. (7) Turn the crank until the mixture is stiff. In freezing water ices it is considered advisable by some persons to turn the crank for 5 minutes, to stop for 5 minutes, to turn it again for 5 minutes, and to continue in this way until the freezing is completed. Do not draw off the salt water while freezing the mixture unless the salt water stands so high that there is danger of its getting in the can.

Packing.

(1) When the mixture is frozen, take off the crank; (2) wipe the lid of the can carefully, and make sure that the ice and salt are well below the lid; (3) lift off the lid and take out the paddle; (4) fruit or whipped cream should be added at this time if they are to be used; (5) with a spoon or spatula, pack down the cream, a potato-masher being used to make the mass compact; (6) replace the lid and put a cork in the hole; (7) draw off the water; (8) pack the can as described for freezing; (9) cover the freezer with a heavy cloth, and let it stand from 1 to 3 hours before using if possible, to develop the flavor; (10) look at it occasionally to see that the water does not rise above the opening. If properly watched and repacked, the cream can be kept for any reasonable length of time.

CHAPTER XXXIII

SUGAR COOKERY *

By Mary F. Henry

Success in sugar cookery, as in all other cookery, requires intelligent work and to work intelligently means that one must understand the nature of the materials used, the changes that occur during the process of cooking, and the conditions that bring about desirable, and prevent undesirable, changes. The behavior of sugar under different conditions largely determines the quality of the product.

Kinds of sugar.

While there are many different kinds of sugar, those of interest to the housekeeper are of two classes: in the one group are the familiar granulated cane or beet sugar, maple sugar, and brown sugar; in the other is glucose, commonly known in the form of a clear, sticky sirup. Corn sirup consists of a mixture of glucose with dextrines and other substances. Molasses contains large amounts of cane sugar. These two classes of sugar differ greatly in characteristics. Sugars belonging to the first class are very sweet and crystallize in large crystals, with which all are familiar; glucose is less sweet, and either crystallizes less easily in much finer crystals or remains as a heavy sirup of creamy consistency. In certain kinds of candy, this creamy texture is one of the requisites. The fact that in the process of cooking it is possible to change a part of the crystalline sugar into glucose with its finer texture is one of the chief factors in making candy. The whole problem of preventing the formation of the undesirable granules, or crystals, is simply to convert some of the crystalline sugar to glucose and to avoid conditions that may cause candy to grain.

* Keeping Christmas. Cornell Reading-Course for the Farm Home, Bull. 97.

How to make candy fine-grained.

While the simple boiling of sugar brings about to some extent this desired change of crystalline sugar to glucose, the addition of a little acid, such as cream-of-tartar, greatly hastens the process. It is possible to get the same result by substituting glucose for a part of the sugar in the first place.

Overcooking, that is, cooking beyond the correct temperature, causes graining, for glucose contains more water than does crystalline sugar, and overcooking drives off the water and forces the glucose to go back to sugar.

A crystal of sugar falling into the solution may cause the whole mass to crystallize. Hence care must be taken not to allow crystals to be carried up to the side of the pan and fall back into the mixture. Washing down these crystals carefully with a swab prevents trouble from this source.

Stirring the mixture while it is cooking may cause crystallization, especially in the case of fondant, which contains only sugar and water. When milk is used, it is necessary to stir the mixture occasionally to prevent its sticking to the pan. There is not the danger, however, of graining in this case, for milk and cream both tend to prevent crystallization. Stirring the mixture while it is hot or cooling it too suddenly may cause crystallization.

Temperature.

Another problem is one that concerns the length of time for cooking sugar mixtures. It is well known that when sugar is heated with water a sirup is formed. If the heating process is continued, water is driven off as steam, and the sirup becomes thicker, or more concentrated. As the concentration increases, the temperature rises.

The stage of concentration to which the solution is to be boiled depends on the kind of product that is to be made. The terms thread, soft ball, hard ball, crack, hard crack, and caramel are used to distinguish the different stages. While the ordinary method used by amateurs for testing candy consists in dropping a little of the solution into cold water, more uniform and accurate results may be obtained by the use of a thermometer. A glass thermometer may be bought at a drug store for about $1.25. In using a thermometer, care should be taken that the bulb is entirely covered by the sirup and that it does not reach the bottom of the kettle; if the bulb is exposed to the air or touches the metal of the pan, the registered temperature is lower in the one case and higher in the other than is the actual temperature of the sirup.

In the absence of a thermometer, however, the test already mentioned, dropping a little of the boiling sirup into cold water, may be used with comparatively good results. The following table gives the different stages of concentration, the corresponding temperatures, and the tests that may be used to determine the condition of the sirup. The temperatures refer to a sirup made from cane sugar. When glucose or corn sirup is used in part, the same consistencies are reached at lower temperatures.

TABLE LII.—Determination of Stages in Sugar Cookery

Stage	*Temperature*		*Test*
Thread	230° 110°	F. C.	Sirup forms a thread when dropped from a spoon
Soft ball......	236° 113°	F. C.	Sirup forms a soft ball when dropped into cold water
Hard ball	252° 122°	F. C.	Sirup forms a hard ball when dropped into cold water
Crack	270° 132°	F. C.	Sirup becomes brittle when dropped into cold water
Hard crack....	293° 145°	F. C.	Sirup becomes very brittle when dropped into cold water
Caramel	310°+ 154°+	F. C.	Sirup changes color and becomes very hard and brittle when cool

Utensils.

Granite utensils usually give better results than do those of aluminum or tin, because granite ware is not so good a conductor of heat, and hence the temperature is more easily regulated.

Wooden spoons are preferable to metal ones, for wood does not conduct heat as does metal. Moreover, the sirup does not tend to stick to wood as much as to metal.

CHAPTER XXXIV

FOOD PRESERVATION

If foods are to be kept successfully from one season to another, it is necessary to have as nearly as possible exact knowledge of the conditions that interfere with their preservation. This statement refers not only to fruits and vegetables that are pickled, preserved with sugar, or put up in cans, but to other foods, such as apples, winter vegetables, and eggs—foods that do not need to be kept indefinitely but that should be given a longer season of usefulness.

There are two main causes for the spoiling of foods: first, the presence of small living organisms that feed on the foods and change them so that they may cease to be desirable and may even become harmful; second, the normal occurrence in such foods as fruits, vegetables, eggs, meat, and seeds of all plants, of certain substances which, although not alive, are the products of living things and have the power of causing fruit to ripen, seeds to start growing, meat to soften, and all finally to decay.

Any food in which the life processes are still going on is subject to either of the types of changes just described. Yeast plants or bacteria may live on foods and cause them to spoil. Bacteria, yeasts, and molds grow everywhere—on the ground, in water, and in air. All micro-organisms need warmth, moisture, food, and oxygen for growth. Warmth, moisture, light, and oxygen also favor the maturing, ripening, and decay changes occurring in eggs, meat, fresh fruits, and vegetables.

If food is to be kept for any length of time, it is necessary to retard or prevent natural ripening or developing processes and to protect the food from invasion by invisible as well as visible enemies. Methods of food preservation may be grouped as follows: (1) By means of low temperature; (2) the removal of moisture; (3) preservatives; (4) high temperature.

A temperature even as low as the freezing point of water may not kill micro-organisms nor destroy in such foods as fruits and vegetables the substances that ripen and mature them. Such a temperature does, however, retard or check all life processes, and therefore its use is a highly efficient method of keeping foods during limited periods of time. Refrigeration and cold storage on a commercial scale are not discussed here, but storage at moderately low temperatures that is practicable for the average home is described.

When foods are dried until their water-content is reduced below 20 per cent, micro-organisms are not likely to develop in them. When foods are dried, the micro-organisms originally present are not destroyed, but their growth and multiplication are checked. If moisture is supplied, active life quickly begins again.

The word preservative covers a wide range of substances that are used in food preservation to retard or prevent the growth of micro-organisms. Foods containing any substance sufficiently active to destroy or check the growth of micro-organisms should be at least thoroughly questioned before being used. Preservative substances may be divided into three classes: (1) those known to be harmless, such as sugar, salt, vinegar, and spices; (2) those about which there is doubt, such as saltpeter, smoke, and liquid smoke; (3) those known to be harmful, such as boric acid and the borates, salicylic acid and the salicylates, benzoic acid and the benzoates, sulfurous acid and the sulfites, and formaldehyde.

The United States Department of Agriculture has issued the following statement concerning the use of canning powders. The possibility of harmful effects from these substances is still not fully recognized by many housekeepers.

"The attention of the Department of Agriculture has recently been called to the widespread use, especially in rural communities, of salicylic acid in putting up preserves. The Department is aware that this practice is not confined to salicylic acid under its own name alone, but that large quantities of this acid, and of boric acid as well, are sold under fanciful names as preserving powders or canning compounds at prices which are much in excess of their real value. In the directions for use, the housewife is told to fill the jar with the fruit or vegetables, cover with water, and add a teaspoonful of the powder. It is true that these powders may prevent the decay of the fruit or vegetable, but they also encourage uncleanly or careless work, and their excessive use may be attended with very serious effects on the health. Salicylic acid is a medicine of the greatest value in acute articular rheumatism and certain other diseases. It is well known as a poisonous substance, and one of the evils which may accompany its use is derangement of the digestion. It is therefore plain that its extensive use in food may lead to disturbance of digestion and of health. It is entirely practicable to put up both fruits and vegetables in such a manner that they will keep indefinitely by sterilizing the products by means of heat, and there is no excuse for running any risk by the use of preserving powders."

A temperature as high as that of boiling water is destructive to the vitality of both micro-organisms and the foods on which they may occur. This fact is the corner stone of canning.

PRESERVATION OF FOOD BY LOW TEMPERATURES

*Preservation of eggs.**

Eggs should be preserved during March, April, May, and June, when the production is greatest and the price lowest. Spring eggs will keep better than summer or fall eggs. Only absolutely fresh eggs should be preserved (see page 534). Infertile eggs are better than fertile ones for preserving. Dirty eggs or eggs that have been washed should not be preserved.

Of the many ways of preserving eggs in the household, a water-glass solution seems to give the best results. Earthenware jars are the most suitable vessels to use. Danger of loss through the presence of one bad egg is reduced by using several small instead of one large vessel. Eggs should not be left in the preservative longer than one year. The same liquid preservative should not be used more than one year. If the solution evaporates and becomes thick and jelly-like, water should be added. Eggs should be rinsed in clear water when they are taken from the water-glass solution. They will generally remain good for about two weeks after being removed from the

* Condensed from Preservation of Eggs, by Earl W. Benjamin in Cornell Reading-Course for the Farm Home, Bull. 21

preservative, but the sooner they are used, the better. If it is desired to boil them, a small hole should be pricked through the large end of the shell before they are placed in the water, in order to prevent their breaking when heated.

To use water-glass solution (for thirty dozen eggs):

(1) Mix thoroughly 1½ quarts of commercial water-glass solution with 18 quarts of boiled water; (2) pack clean eggs into clean earthenware jars or tight odorless tubs, two 6-gallon, or three 4-gallon jars being sufficient for preserving thirty dozen eggs; (3) cover the eggs with the water-glass mixture, and if the solution does not cover the eggs at least 2 inches, as much as 5 additional quarts of water may be added for each 1½ quarts of commercial water-glass solution used; (4) cover the jars to prevent evaporation; (5) keep the eggs in a cool dark place.

Preservation of butter (E. S. Guthrie).

Butter can be laid down during the summer season to give a satisfactory supply for winter use. Sweet cream of good quality should be used. It should be pasteurized by keeping the container in hot water for 30 minutes at a temperature of 145° F. The cream should be stirred frequently during the process. It should then be cooled to approximately 50° F. It is important that the butter should be made from sweet cream rather than from sour cream, since the keeping quality of sweet-cream butter is better. This cream should be churned in the usual way, and the butter should contain the usual amount of salt. It may be packed solid in stone jars, or it may be made into pound prints and packed in jars, either with or without the regular parchment paper wrappers. The jars should be thoroughly scalded and free from taint or odors. The butter should then be completely covered with a salt solution in which the amount of salt used is about one-fourth the weight of the water. A large plate or a header made of some odorless wood should be placed on the butter. Clean stones or bricks may be used to weight it. The butter must be kept covered with the brine solution. Butter packed in this way and stored in a cool cellar should keep all winter.

Persons who are not making their own butter can secure satisfactory results by getting fresh butter made from sweet cream and packing it as described. Such butter may be obtained of near-by creameries in wholesale lots. The best time to buy is from the middle of May to the middle of July.

*Storage of fruit.**

Fruit should be picked carefully and without bruising, and should be placed in storage as soon as possible. It may be packed in barrels or boxes or placed in open trays. When the latter method is used and it is desired to keep the fruit in particularly fine condition, the specimens should not be allowed to touch one another. Apples that are to be kept for a considerable time, whether exposed or in packages, should be wrapped separately. Light manila wrappers, 10 by 10 inches, may be used.

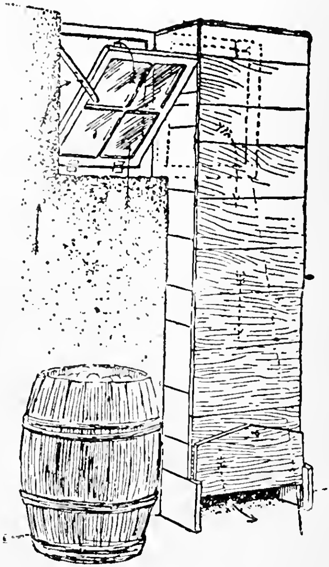

Fig. 121.—Cellar ventilation.

Fruit stored in the cellar frequently does not keep well; it either shrivels or becomes spongy and decays. This fault, which often lies in the storage room, may be corrected wholly or in part. A fruit cellar should be well ventilated. The principle of physics that warm air rises and cool air settles, is applicable here. Warm air should be permitted to pass out at the top of the room through ventilators, and cool air from outside should be admitted to the room at the bottom (Fig. 121). In a cellar this can be accomplished by means of a shaft leading down the wall from a window and opening near the floor. A few windows at the top of the wall constitute the system of ventilation for most

* C. S. Wilson, Cornell Reading-Course for the Farm Home, Bull. 21.

farm cellars. Although this arrangement is accepted as sufficient and in many cases gives fairly good satisfaction, the temperature cannot be kept so nearly uniform and correct as when intake shafts are used.

A uniform temperature of 50° F. in the cellar will keep fruit in good condition for months. The ideal temperature is about 31° or 32° F., but this cannot usually be maintained in a cellar. The temperature should not be permitted to fluctuate. Fruit that is kept at 34° F. during the night and at 60° F. during the day will soon decay. In the farm cellar, uniformity of temperature is maintained by means of the ventilation, which should be watched very closely. In cellars where it is impossible to control the temperature and humidity as desired, the fruit may be wrapped in paper and packed in hardwood sawdust.

Fruit may also be stored in pits. This method is described by L. H. Bailey as follows: "Many apples, particularly russets and other firm varieties, keep well when buried after the manner of pitting potatoes. Sometimes, however, they taste of the earth. This may be prevented by setting a ridge-pole over the pile of apples in forked sticks, and making a roof of boards in such a way that there will be an air space over the fruit. Then cover the boards with straw and earth. Apples seldom keep well after removal from a pit in spring."

*Storage of vegetables.**

Storage requirements for different vegetables vary widely. Some vegetables are easily kept. If the parsnip is merely left in the ground, oncoming spring will find it not only well preserved but actually improved in quality. On the other hand, the sweet potato and the squash are kept successfully only when the temperature is high and uniform and the humidity is low.

Certain fundamental principles apply to the storage of all sorts of vegetables under all conditions. The important factors to consider are temperature, moisture, and ventilation. A temperature that is too high favors decomposition; a tempera-

* Paul Work. Cornell Reading-Course for the Farm Home, Bull. 21.

ture that is too low causes freezing, with the subsequent breaking down of vegetable tissue. A dry atmosphere causes fruits and vegetables to dry out and shrivel; while undue moisture, especially when combined with high temperature, favors the growth of destructive fungous and mold organisms. Ventilation is not only a means of regulating these conditions, but it is also important in itself in removing gaseous products that may be more or less injurious.

Proper condition of the produce is essential for successful storage. Vegetables should be nearly mature when stored, but over-ripeness is to be avoided, as it favors early decay. Ripening processes continue, though slowly, after storage, and due allowances must be made for these in determining the maturity of the vegetable to be stored. Only the very finest specimens should be selected—those that are firm and of good size and shape. It is at injured spots that decay begins, and even bruises that can be found only by careful examination are serious; hence the necessity for the greatest care.

There are wide differences among varieties of vegetables in their adaptability to storage. In general, the late-maturing sorts are the most suitable.

Many methods of providing the conditions necessary for successful storage have been devised. The first place to suggest itself is the basement of house, barn, or outbuilding. The house cellar. however, is likely to be too warm and dry, particularly if there is a furnace in it. It is likewise undesirable to have a large amount of vegetable matter beneath the dwelling. However, these objections may be overcome partly. Small quantities of fruits or vegetables may be stored in a corner of the cellar away from the furnace, and may be protected from drying out by moss or by soil, preferably of sandy type. If a large quantity is to be kept, a separate compartment may be boarded off by a double partition filled with some nonconductor of heat, such as dry sawdust. This compartment should be ceiled, and should be provided with ventilating openings or flues so that it may be quite independent of the remainder of the house. Vents should be arranged at both ceiling and floor. Since warm air rises and cold air falls, it is possible to control the temperature by means of these vents. While the weather remains warm in the fall, the flues are closed during the day and opened at night. When the weather becomes more severe, the plan is reversed, and the warmer air of midday is admitted.

Special cellars and pits for storage of vegetables may be constructed at small cost and are very satisfactory. A simple type is shown in Fig. 122. A pit 1 or 2 feet deep is dug in a well-drained spot, and a foundation wall of stakes and boards, or, better, of concrete, is built around it. On this wall, rafters are erected for the support of roof boards. The roof is covered

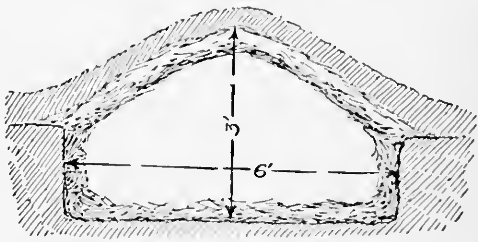

FIG. 122.—The storage trench.

with soil and sod, or with straw and a light covering of earth, or with manure. Such a pit will last several years, especially if a rot-resistant wood, as the so-called "pecky" cypress, is used. With the specific directions that are furnished by cement manufacturers, concrete work is within the range of any handy man, and a permanent concrete cave or pit may be built with little expense and trouble. No matter what the form of construction, one or two small ventilators should be provided at the top of the cave, and one at the bottom of the door. These should be arranged to open and close.

Burying vegetables is one of the easiest, as well as one of the most successful, methods of storing them. It keeps them in good condition and involves no expense. One objection to this method is that it is often difficult or impossible to get at the vegetables at certain times during the winter. However, a considerable quantity may be taken out at one time and kept in the house cellar for a week or two. A site, preferably on sandy soil, well drained and well protected from surface wash, should be chosen. An oblong pit of the required size and about a foot deep should be made. The bottom of the pit should be lined with straw, and the vegetables carefully heaped on it. They should then be covered with a layer of leaves and straw for protection and to make their removal easier. Lastly, soil should be added to a depth from 4 to 8 inches. Wisps of straw may be set at intervals in the peak for ventilation. Great care must be taken early in the season not to cover the vegetables too closely, as speedy decay will result from heating and sweating. As the weather becomes severe, manure may be piled on to give additional protection.

When several vegetables are to be stored, or when they are to be removed at different times during the winter, it is well to make the pit very long and narrow. Earth partitions may then be built in as the work progresses. The different compartments may be marked with stakes. One compartment can be opened without disturbing the others.

The root crops require very simple treatment for storage. The tops should be removed, and the roots may be kept by any of the general methods described.

Cabbage also may be stored in any of the ways given. Heads should not be over-mature and should remain in the garden as long as there is no danger of severe freezing. They should be cut near the ground, with most of the leaves about them. When a quantity is to be stored, the trench may be made by throwing furrows on both sides and finishing with the shovel. The heads are then laid in order, perhaps two or three wide and two deep. The plow may be used to begin the covering, but the work should be completed by hand. If the heads are not mature at storing time, they should be lifted with the roots and placed in a trench, roots down, as close as they will stand. A little sand should be packed about the roots as the work goes on. In this way the heads will continue growth and become thoroughly solid. Danish Ball Head is best for winter storage under most New York conditions.

Celery should be lifted entire and set erect in trenches or pits with loose soil about the roots. In storing this crop, great care must be taken to avoid covering too heavily at first. Giant Pascal and Winter Queen are good sorts for winter use.

Squash requires a warm place for storage. A temperature of 50° F. or more is good. Shelves or bins in a house or a dry cellar are preferable to burying.

DRYING FRUITS AND VEGETABLES

Dried products do not require expensive containers, and they can be stored almost indefinitely under proper conditions in relatively small space. One hundred pounds of fresh vegetables may be reduced to an average of ten pounds by drying. Vegetables and fruits, if properly dried, retain much of their natural flavor and food value; in some cases they are more palatable than when canned, in others they are less palatable. Drying does not seem to injure the nutritive value of foods.

Early apples, sweet corn, carrots, partly ripened lima beans, string beans, well-matured peas, sweet potatoes, certain types of squash, pumpkins, and some of the berries lend themselves particularly well to drying, either in small quantities for home consumption or in larger quantities for sale. Blackcap, purple-cane, and in some cases red raspberries make good dried products. Blackberries also may be dried, but the results are not so good as with raspberries. Prunes, apricots, peaches, any of the sweet varieties of pears, strawberries, sweet cherries, and in some cases sour, are also successfully dried, though these fruits may usually be sold in the fresh state to commercial firms at a reasonable profit.

Proper ventilation that allows for a free circulation of dry air is more important than heat in drying foods. For example, an electric fan placed before a drier may accomplish excellent results without the aid of heat. However, the use of heat is more practicable in most homes.

The temperature for drying should be rather low to prevent scorching, but the more quickly the food is dried, the better will be the color and the flavor. The temperature of the drier cannot be determined very accurately except by using a thermometer. An oven thermometer or a chemical thermometer may be suspended in the oven or the drier. The greatest care should be given to the regulation of the heat, because the temperature in the drier may rise rather quickly, and the product may scorch. The food should be stirred from time to time both to prevent scorching and to obtain a uniform product.

In climates where successive sunny days may be counted on, certain foods may be dried outdoors. If food is to be dried over a kitchen stove or outdoors, it should be carefully protected from dust and from flies. Coarse cheese-cloth may be laid over the food in the house. If the food is outdoors, the covering of cheese-cloth should be raised by means of supports or racks so that it will not rest directly on the food and thus allow possible contamination from flies. Especially in the case of food that is entirely or partly dried outdoors and that is to be used without being cooked, every precaution should be taken to prevent the spreading of certain intestinal diseases that may be carried by flies.

Equipment for drying.

A very slow oven may be used for drying fruits and vegetables spread on papers, large platters, sheets of metal, or pieces of heavy screening with an inch or two turned down at opposite ends for supports. The heat must be carefully controlled to prevent scorching. The oven door should be left slightly open to allow a circulation of air to carry off the moisture set free by evaporation.

Barrel hoops or frames made of laths may be covered with galvanized iron netting or with cheese-cloth and suspended above the stove by a rope with a pulley arrangement, which makes it easy to adjust the trays at the proper height. Some housekeepers use window screens on bricks as supports. A piece of heavy galvanized iron screening with 4 or 5 inches on two opposite sides bent down to form supports is both simple and effective. A sheet of tin laid over a dripping pan containing a small amount of hot water makes a good substitute for a certain type of commercial drier.

There are several small driers on the market that give satisfactory results. They are of such size that they can be placed on the top of a kitchen stove. Portable outdoor driers are convenient if much food is to be dried. Home-made dry kilns are used in some sections of the country.

Any piece of home-made apparatus that provides means for free circulation of air and for regulating the temperature is likely to prove satisfactory. A device with metal sides that will confine the heated air in a given channel during its upward course through the trays of food, uses heat economically.

Drying fruits.

All fruits that are to be dried should be well ripened but not over-ripe.

Fruits that are dried with the skins on should be dipped quickly, by means of a wire basket or a piece of cheese-cloth, into a boiling solution of lye made in the proportion of ½ pound of concentrated lye to 8 gallons of water. They should then be rinsed two or three times in clear water. The lye perforates the skin and thus facilitates evaporation. Moreover, it destroys micro-organisms that might cause spoilage.

Most fruits are improved by being dipped into a thin sirup before being dried. If the fruit is to be used in puddings, cakes, breads, breakfast cereals, or as a confection, it may be sprinkled with sugar before being dried; if it is to be cooked for sauce, little or no sugar should be added.

Metal trays for drying fruits should be covered with cheesecloth to prevent acid action. Wrapping paper may be used on trays in an oven.

Juicy fruits require more ventilation in drying than do such fruits as apples.

When fruit is sufficiently dry, it should be impossible to press water out of the freshly cut ends of the pieces. The natural grain of the fruit should not be apparent on cut surfaces. The fruit should be leathery or pliable, and not so dry that it will snap or crackle. In general, the drier the fruit is, the less chance there is for spoilage; but sweet fruits can safely contain more moisture than those with a low sugar-content.

Fruit should be cooled quickly after being dried in order to prevent a shriveled and unattractive appearance.

Fruit juices or fruit pulps may be concentrated by being boiled over direct heat and then dried in the top of a double boiler, or in platters or enamel pans set in a moderate oven, or in the sunshine. The juice or pulp is sufficiently concentrated when on cooling it makes a highly glazed, tough, dry, leathery jelly. The leather may then be dried in thin sheets, sprinkled with granulated sugar, rolled like a jelly-roll, and then cut across in pieces, or it may be dried in a sheet ¾ inch thick and cut in cubes.

Drying vegetables.

Equally as great care should be given to the selection and preparation of vegetables for drying as for canning. Good results depend largely on the use of vegetables that are absolutely fresh, young, tender, and perfectly clean. All vegetables should be washed and cleaned thoroughly before being dried. If steel knives are used for paring and cutting the vegetables, they should be kept clean and bright in order to prevent discoloration.

After being cleaned and prepared, the vegetables should be blanched as for canning (pages 605 and 612 to 614) but not dipped in cold water. This removes the strong odor and flavor from certain kinds of vegetables, and softens and loosens the fiber, which allows the moisture in the vegetables to evaporate more quickly and uniformly. Moreover, it quickly coagulates the protein and thus helps to retain the natural flavors. After being blanched for the required number of minutes, the vegetables should be drained and either placed between two towels or exposed to the sun and air for a short time to remove the surface moisture.

Storage of dried foods.

Dried foods should always be stored in containers that will exclude light and insects and in a warm dry place, such as an airy attic. The best container is a tin box, bucket, or can fitted with a reasonably tight cover. Perhaps the most convenient and cheapest container is the small paper bag. Small amounts of food should be put in each bag. This will prevent the opening of any dried product that cannot be consumed in a short time. The upper part of the bag is twisted to form a neck. The neck is bent over and tied with a string. The entire bag is then painted with a coat of melted paraffin by means of a small brush or a frazzled end of a piece of rope. This makes the bag practically proof against insects. To protect them further from insect ravages, the bags should be labeled and packed in a tin container with a tight-fitting cover. A large number of bags can be stored in an ordinary lard can. Paraffin-coated paper containers of various sizes can be found on the market. If such containers are used, they should be stored as are the paper bags.

When vegetables are first taken from the drier, if completely dried they are very brittle. They are more easily handled and are in better condition for storing if allowed to stand from one to three hours to absorb enough moisture to make them pliable before they are put into bags or stored otherwise. If it is not convenient to store products immediately and they are allowed to stand for several days, they should be heated to 180° F. to destroy any insect eggs that may be on them. Care should be taken not to heat the vegetables higher than 180° F.

Apples, which absorb moisture readily, should be stored in a tight box or barrel lined with paper in preference to cloth sacks.

SALTING VEGETABLES *

Equipment.

A supply of clean wooden kegs or stone crocks is the first requisite. For home use the smaller sizes are preferable as a rule, because the contents will then be used up more quickly and there will be less chance of molding from standing too long after the kegs or crocks are opened. Wooden kegs holding 5

* Round, L. A., and Lang, H. L. Preservation of vegetables by fermentation and salting. Farmers' Bull. 881, U. S. Dept. of Agr.

or 10 gallons are a convenient size. New kegs are preferable, but old ones, such as beer or cider kegs, may be used if they are thoroughly washed and steamed to remove any undesirable odor or flavor which might be imparted to the foods packed in them. Wooden vessels of yellow or pitch pine are undesirable, since they are apt to give a disagreeable taste to the foods. Stone crocks or jars holding from 1 to 5 gallons are convenient. Stoneware is less likely to absorb flavors than wood, and stone jars may be obtained in smaller sizes than wooden kegs. Wide-mouthed bottles or glass jars, which are not suitable for canning, may also be used for salting or fermenting small quantities of foods.

A supply of ordinary fine salt, which can be purchased in bulk for about 2 cents a pound, is most satisfactory for general use. Table salt will do very well, but is rather expensive if large quantities of vegetables are to be preserved. The rather coarse salt (known in the trade as "ground alum salt"), which is used in freezing ice cream, can be used. Rock salt should not be used because it is too coarse and is likely to contain impurities.

Clean white cloth (cheese-cloth or muslin) is necessary for covering the material after it is packed into the container. It will be convenient to cut this into circular pieces about 6 inches larger in diameter than the stone crock or keg. Two or three thicknesses of cheese-cloth or one thickness of muslin or heavier cloth should be spread over the top of the vegetables.

Round pieces of board about 1 inch or more in thickness will be needed to put on top of the cheese-cloth. The boards should be a little smaller in diameter than the inside of the crock or the head of the keg or tub, so that they will slip in and out easily. The pieces may be sawed out at a lumber mill, or may be made at home by fastening together several boards with cleats and rounding them with a small saw and a carpenter's shave. Almost any wood may be used except yellow or pitch pine, which is likely to impart an undesirable flavor to the vegetables. For small containers, if preferred, heavy plates of suitable size can be used instead of boards.

One or more clean bricks or some clean stones may be used as weights to hold down the mass in the keg or crock.

Paraffin is needed to pour over the liquid in the containers (after fermentation has ceased) to prevent mold.

A pair of kitchen scales or steelyards and a quart or gallon liquid measure complete the necessary equipment.

Fermentation with dry salting.

As has already been stated, fermentation with dry salting consists in packing the material with a small amount of salt. No water is added, for the salt extracts the water from the vegetables and forms the brine. The method, in general, is as follows:

Wash the vegetables, drain off the surplus water, and weigh them. For each 100 pounds of the vegetables weigh out 3 pounds of salt; for smaller quantities use the same proportion (3 per cent by weight) of salt. Cover the bottom of the keg, crock, or other container with a layer of the vegetables about 1 inch thick and sprinkle over this a little of the salt. Do not add too much of the salt to the first layers packed, but try to distribute it equally among the different layers so that the quantity which has been weighed out will be sufficient for the given quantity of vegetables packed. If a little of the salt is left over, it can be added to the top layer, but if more has to be added than has been weighed out, the finished product will taste too salty. Continue adding layers of the material sprinkled with salt until the container is about three-fourths full. Sprinkle the last of the salt on the top layer and spread over it one or two thicknesses of cheese-cloth, tucking them down at the sides. On the cloth place one of the round pieces of board or a plate, and on this put a clean stone or one or two clean bricks. The size of the weight depends on the quantity of material being preserved. For a 5-gallon keg a weight of 10 pounds will be sufficient, but if a larger barrel is used, a heavier weight will be needed. The weight added should be sufficient to extract the juices to form a brine, which will cover the top in about twenty-four hours and sometimes it may be necessary to add more stones after the material has stood a while, if a brine does not form.

After it is packed, allow the container to stand in a moderately warm room to ferment. The salt and pressure of the weight soon extract water from the vegetables and form a brine which soon covers the whole mass. The stone and board serve to keep the vegetables beneath the surface of the liquid. If the weight is not sufficient for this purpose, a larger stone or more bricks should be added. As the fermentation goes on, bubbles arise to the surface of the liquid. The rate of fermentation depends principally on the temperature. In warm weather it requires only eight to ten days; in cool weather two to four weeks may be necessary. When bubbling stops, fermentation is complete. A good way to determine this is to tap the receptacle gently; if no bubbles arise, fermentation is finished.

The containers should then be placed in a cellar or other cool storeroom and the surface of the liquid treated to prevent the development of a scum of mold. If this is not done, a thin film will appear on the surface of the brine soon after fermentation ceases, which will spread rapidly and develop into a heavy folded membrane. This scum is a growth of micro-organisms which feed upon the acid formed by fermentation. If allowed to grow undisturbed, all the acid will eventually be destroyed and the fermented material will spoil. This scum must be prevented from forming if the product is to be kept for a considerable time. Exclusion of air from the surface of the brine will entirely prevent its formation. There are three feasible methods of accomplishing this.

The first method is to cover the surface with very hot melted paraffin. If the paraffin is sufficiently hot to make the brine boil when poured upon it, a smooth, even layer will be formed before hardening, making a perfectly air-tight seal. Before adding paraffin the containers should be set where they will not be disturbed until ready for use, as any attempt to move them afterwards may break the seal and necessitate resealing. Paraffin has the advantage of ease in handling, and of being easily separated from the fermented vegetables when they are removed. Further, it can be used over again and thus the expense is small in the long run. If it becomes dirty it can be purified by heating very hot and straining through several thicknesses of cheese-cloth. One disadvantage in the use of paraffin is that the formation of gas below the layer will break the seal; therefore, it should not be used until fermentation has ceased. If the paraffin breaks, it should be removed, remelted, and replaced.

The second method is to pack a barrel or keg full and then replace the head. Fill the barrel or keg as full as possible with the fresh material to be fermented and then add the round board and weights exactly as described on page 594. Let the barrel stand for 48 hours to allow part of the gas to escape. Then remove the board and weight and head the barrel or keg up tight. Bore a small hole (about ½ inch) in the head and fill the barrel full with brine (made by dissolving ¾ cup salt in 1 gallon water) so that there is no air space. Allow the barrel to stand until the fermentation has stopped, adding more brine at intervals to keep the container full. When bubbling has stopped, plug the vent tight. If the barrel does not leak, fermented products put up in this manner will keep indefinitely.

The third method is to use an oil, like cottonseed oil, which floats on the surface and effectively prevents air from reaching the brine. Brine covered with a layer of cottonseed oil or some other wholesome oil about ¼ inch thick will keep indefinitely. The only objection to liquid oils is the difficulty of getting at the preserved vegetables without getting them covered with the oil, which is difficult to remove. Before the vegetables are to be removed the oil should be skimmed or siphoned off from the surface of the brine.

If oil or paraffin is used to cover the brine, it is advisable, after fermentation is finished, to adjust the amount of brine used and weights on the cover so that the brine comes up to but not over the cover. In this case only the brine exposed between the cover and sides need be oiled or paraffined, thus saving covering material.

Experiments have shown that the following vegetables may be preserved successfully under home conditions by the above method of fermentation by dry salting: cabbage (sauerkraut), string beans, beet tops, and turnip tops, and it is probable that others may be added to this list as a result of further experiments.

Fermentation in acid brine.

Some vegetables which do not contain sufficient water are better fermented by covering them with a weak brine. This may be done as follows: Wash the vegetables, drain off the surplus water, and pack them in a keg, crock, or other utensil until it is nearly full (within about 3 inches of the top of the vessel). Prepare a weak brine as follows: To each gallon of water used add ½ pint of vinegar and ¾ cup of salt and stir until the salt is entirely dissolved. The amount of brine necessary to cover the vegetables will be about equal to one-half the volume of the material to be fermented. This is very easily calculated by knowing the contents of the container used. For example, if a 5-gallon keg is to be packed, 2½ gallons will be needed. It is best to make up at one time all the brine needed on one day. A clean tub or barrel can be used for mixing the brine. Pour the brine over the vegetables and cover as described on page 594. Set the vessel and its contents away in a moderately warm room to ferment. When fermentation has stopped, the container should be placed in a cool cellar or storeroom and the surface of the liquid treated to prevent mold by one of the methods described above. Before adding the paraffin or cottonseed oil, any scum or mold which may have formed on the surface of the liquid should be removed by skimming.

Experience has shown that the following vegetables may be preserved satisfactorily by fermenting in brine: cucumbers, string beans, green tomatoes, beets, beet tops, turnip tops, corn, and green peas. The general directions given above should be followed, but some modifications are desirable in the preserving of individual vegetables by this method.

Salting without fermentation.

In this method the vegetables are packed with enough salt to prevent fermentation or the growth of yeasts or molds. The following directions should be followed in salting vegetables: Wash the vegetables, drain off the water, and then weigh them. For each 100 pounds of vegetables weigh out 25 pounds of salt. For smaller quantities use the same proportion of salt (one-fourth of the weight of the vegetables). Spread a layer of the vegetables about 1 inch deep on the bottom of a clean keg, tub, or crock, and sprinkle heavily with some of the salt. Try to distribute the salt evenly among the different layers packed so that the quantity weighed out will be just enough to pack the vegetables. Continue adding layers of vegetables and salt until the container is nearly full and then cover with the clean cloth, board, and weight, as in the case of fermentation by dry salting. The keg or other container should then be set aside in a cool place. If the salt and pressure of the weight have not extracted sufficient brine to cover the vegetables, after 24 hours, prepare a strong brine by dissolving 1 pound of salt in 2 quarts of water and pour enough of this over the vegetables to come up to the round wooden cover. There will be a small amount of bubbling at the start, as in the case of the fermented vegetables, but this will not continue long. Just as soon as the bubbling has stopped, the surface of the liquid should be protected by one of the methods described on page 595.

Experiments have shown that the following vegetables may be satisfactorily preserved by the above method: dandelions, beet tops, turnip tops, spinach, chard, kale, cabbage, string beans, green peas, and corn.

Care and storage.

If properly prepared and stored, fermented and salted products will keep for a long time. It is absolutely necessary to prevent mold from growing on the surface of the brine of fermented vegetables by the addition of paraffin or in some other way. Protection of the surface of salted vegetables is desirable, but not necessary if the containers are covered to prevent the evaporation of the brine. Practically all of the trouble with the fermented or salted products may be traced to carelessness in protecting the surface of the brine. In case mold should develop upon the surface or the brine should become evaporated so that the upper layers of the food spoil, this does not mean necessarily that the entire contents of the vessel have spoiled, even though the upper layers may have a very disagreeable odor. The molds and other organisms which cause the spoiling do not penetrate rapidly to the lower layers, and by carefully removing the spoiled material from the top, adding a little fresh brine and pouring hot paraffin on the top, the remainder of the contents of the vessel may be saved. After fermentation has ceased, the containers of salted and fermented vegetables should be stored in a cool place. They should be protected from rats, mice, and vermin, which might eat through the paraffin layer and get at the contents.

Preparation of fermented and salted vegetables for the table.

Some fermented and salted vegetables, like cucumbers, are eaten raw; others, like cabbage (sauerkraut), are usually cooked. In general the fermented and salted products may be prepared for the table in much the same manner as the fresh vegetables, except that before being cooked they should be soaked in fresh water for several hours or longer, if necessary, to remove the salt, the water being changed several times. In some cases it may be necessary also to change the water once or twice during the boiling of the salted vegetables. In this, one should be guided by taste.

Fermented vegetables, after being removed from the container, should be rinsed thoroughly in fresh water and then cooked without soaking if a product having a decidedly acid flavor is desired. If one does not desire the acid flavor, it may be modified to any extent or removed almost entirely by soaking the fermented vegetables as directed above for the salted product.

CANNING

Successful preservation of food by canning depends on two things: first, the sterilization of the food and the can, that is, the complete destruction by heat of all life in or on the food, and on all parts of the can that are to come in contact with the food; second, subsequent care to prevent further entrance of micro-organisms.

The presence of air in a can will not cause food to spoil, provided the air is sterile, that is, freed from all living organisms. A half-filled can of fruit will keep perfectly if fruit, can, rubber, and cover are sterile, if the air space above the fruit is sterile, and if micro-organisms cannot enter the can. The precaution sometimes taken to run a knife or a spoon down the sides of a can in order to remove the few bubbles that may be there, is consequently unnecessary. Unless the spoon or knife has been boiled, its use in removing air may even endanger the keeping qualities of a can of food, for it may hold organisms that thus find their way into the can.

It is now known that some micro-organisms that cause foods to spoil may assume two forms, the spore and the vegetative form. When conditions are unfavorable to their growth, they go into the spore form, cease growing and reproducing, and become inactive and very resistant to the influence of heat. It is their method of tiding over a hard time.

In the spore form micro-organisms are much more difficult to destroy than in the vegetative form, and some of them are able to resist for many hours a temperature even as high as the boiling point of water. During a dry season spores occur much more frequently than usual on fruits and vegetables, and the difficulties of successful canning may, therefore, be greatly increased. As soon as growth conditions become favorable—when warmth, moisture, and food are supplied—spores begin changing over to the active, growing, vegetative form, and in their greater liveliness they lose much of their power to resist heat, cold, and other unfavorable influences. These facts explain why canned foods sometimes spoil even after long boiling and careful and complete sealing; the boiling temperature may not have been sufficient to destroy the spores, which soon change over to the active growing state. The problem of successful canning is, therefore, how even the most resistant micro-organisms may be killed.

The commercial canner has solved the problem of sterilization by the use of steam under pressure. In this way a temperature higher than the boiling point of water, and hence more destructive, is obtained. With a sufficiently high temperature, a relatively short time of cooking is required to sterilize food.

Equipment for canning.

If canning is to be done successfully, even on a small scale, it is necessary to have some equipment that will lighten labor and save time. Such equipment may be bought especially for

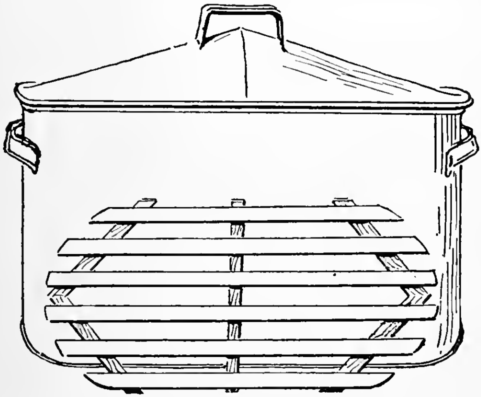

Fig. 123.—Sterilizer, showing false bottom as a rack.

the purpose, or it may be made from something already on hand. If possible, a canner should be seen in operation before it is bought.

If the so-called cold-pack method (page 606) is used, the first and most essential part of the canning equipment is a receptacle in which the cans of food may be steamed or boiled. This receptacle and its parts are generally spoken of as the canner or the canning outfit. Canners suitable for home use are of four general types: (1) hot-water outfits; (2) steam cookers; (3) water-seal outfits; (4) steam-pressure outfits.

While a small hot-water canner may easily be devised at home, as suggested in the following paragraph, its usefulness is limited by its small capacity and the amount of fuel that it requires. Commercial outfits capable of accommodating comparatively large quantities with convenience are briefly discussed in succeeding paragraphs.

A home-made hot-water canner may be constructed out of any utensil that is large enough to hold a number of cans, that

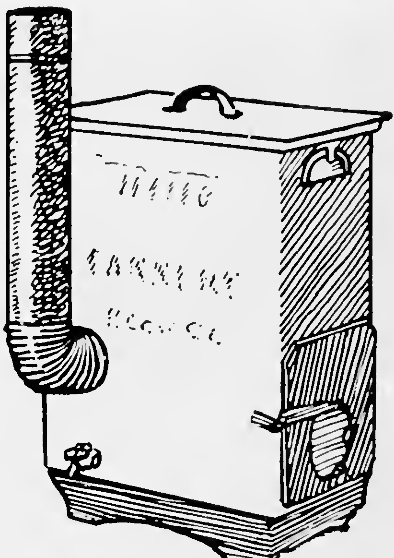

FIG. 124.—Commercial hot-water canning outfit for out-of-door work.

is deep enough to allow the cans to be completely covered with boiling water, and that is capable of being fitted with a rack, or false bottom, to prevent the cans from resting on the bottom of the receptacle, and to insure the free circulation of water in the boiler (Fig. 123). A tight-fitting cover that will retain as much heat as possible will help to save fuel. A tin sap-bucket, a large tin oyster-pail, or a clothes boiler may be converted into a hot-water canner to meet the requirements of the individual housekeeper.

A number of simple hot-water outfits are now on the market. The main advantages that they have over those adapted at home from some other equipment are that they will hold more cans at one time, and that they have perforated trays, with

FIG. 125.—Steam cooker.

handles, on which a number of cans may be lowered into and lifted from the canner at one time. Such trays may and should be made for the home-made outfit. The commercial hot-water outfits are often equipped with a fire-box, which makes it possible to use them outdoors if desired (Fig. 124).

The steam cooker (Fig. 125) is light in weight and is easily handled. It is a better shape than the boiler for use on a stove and is far more economical in the amount of fuel required. It may be used throughout the year, since it is adapted for ordinary cooking as well as for canning. Food that is canned in a steamer retains its shape well. The time of cooking as given in the time-table must be somewhat increased because the temperature is likely to be slightly lower than the boiling point of water. Steamers are made in copper and in tin.

The cover of the water-seal outfit is so devised that a seal of water holds it down tight, and thus the steam in the space above the cans is held under slight pressure. The temperature of steam under pressure is above that of boiling water. Hence with the water-seal outfit the time needed for sterilization may be somewhat reduced. The efficiency of such an outfit depends on the amount of pressure produced.

When steam is held under considerable pressure, temperatures much higher than that of boiling water may be obtained, and the rise in temperature is in direct proportion to the rise in pressure. A number of good portable canners in which a pressure from five to fifteen pounds may be obtained are now on the market.

Steam-pressure canners are the most successful for almost all kinds of vegetables and meats, because the greater heat obtained in them effects complete sterilization in a comparatively short time and during one cooking. Hence time, labor, and heat are saved.

The equipment is the same as for hot-water outfits, with the addition of a steam gauge, a pet cock, and a thermometer. In some cases when canning is done in tin cans, a blast furnace is supplied, together with the soldering tools. Some outfits include a boiler, a crate, a soldering outfit, and arrangements for a fire pot.

There are many kinds of jars on the market. The best jar is one that is simple in construction, that can be sealed perfectly and washed easily, that protects the contained food against contact with metals, that has the fewest parts to be lost or misplaced, and that fits the shelves and receptacles planned to hold it. The glass should be clear with no bubbles, and the jar should be smooth both inside and outside. The color of the glass, whether white or green, has no effect on retaining the color of the food. The type of jar that seems to give most

FIG. 126.—Manner of testing a jar.

FIG. 127.—Position of clamp during sterilization.

FIG. 128.—Position of clamp after sterilization.

general satisfaction is one with a wide mouth and straight sides and with a glass cover clamped on with some metal device.

A glass jar should be tested before it is used (Fig. 126). The finger should be run around the edge of the jar as well as the lid where the rubber rests, to determine whether the glass is smooth. Filing may be necessary.

A jar with a wire clamp should have the lid placed on it, and the lid should be tapped. If it rocks, the jar is imperfect. When the rubber is adjusted and the lid is placed on the jar, the wire clamp should snap on. It may be necessary to remove the bail and either to straighten it or to bend it more in order to tighten or loosen the lid as the case may require. Bulging of the rubber may be caused by too tight a clamp.

A mason jar may be tested by placing the lid on it without a rubber and attempting to insert the thumb nail between the lid and the jar. If this can be done, the jar is defective. Another test is to adjust the rubber and the lid and to pull out the rubber in one place. If the rubber stays out, the jar is good; if it springs back, the jar is defective.

The testing of any type of jar may be accomplished by filling the jar partly with boiling water, adjusting the cover and the rubber, and sealing and inverting the jar. If it leaks, it should be examined to determine whether the leakage is due to an imperfect jar, a poor rubber, or to improper adjustment of the wire clamp, in case a wire clamp is used. If any defect noticed cannot be remedied, the jar should be reserved for pickles or some food that does not require sealing.

New rubbers should be used each year. Old rubber loses its elasticity, and may cause imperfect sealing and thus endanger the keeping of the food. A good rubber is elastic, not brittle, and will not break easily when stretched. Care should be given to the selection of good rubbers, for even new ones may be stiff, inelastic, and hard, or may contain no rubber at all. Some rubbers on the market impart so disagreeable a flavor and odor to the canned food that it must be discarded. Good rubbers are hard to procure, but nothing less than the best should be accepted. They are more expensive than poor rubbers, but in the end they cost less.

Blanching.

Blanching is an important preliminary step in the cold-pack method of canning. It is used for some fruits and may be used for all vegetables. Blanching may be done with either boiling water or steam.

When boiling water is used, the fruit or the vegetable is placed in a piece of cheese-cloth or a crate, lowered entirely under the water, and heated for the required number of minutes (pages 612 to 614). Only a small quantity of the product should be blanched at a time in order that the water may be kept as near the boiling point as possible.

Delicately flavored greens are generally blanched by steam in order to avoid the loss of iron and other nutrients that occurs when they are immersed in boiling water. For blanching in steam, the food is placed in some perforated utensil or a piece of cheese-cloth and suspended in a tightly closed steamer. The food should be blanched until no further shrinkage will occur. Blanching in steam generally requires a longer time than blanching in boiling water. The steam must penetrate to all parts of the mass, and for this reason the fruits or vegetables should not be crowded together. Blanching in steam is not recommended for strong-flavored greens.

Blanching may accomplish one or more results: (1) it helps to insure a close pack either by contracting the tissue and making the product flexible, as in the case of string beans and asparagus, or by causing a decided shrinkage, as with greens; (2) it may partly eliminate strong acids or bitter flavors; (3) it may set the color; (4) it begins the sterilization of the food; (5) it loosens the skins of certain fruits and vegetables from the pulp so that they may be slipped or scraped off easily, as in the case of peaches, tomatoes, or carrots. When blanching serves this last purpose, it is frequently called scalding. Blanching may not be necessary but it is believed to give a superior product in many cases.

The cold dip is the rapid chilling of the outside of the blanched fruit or vegetable by plunging it into cold water. While the food may need to be cold dipped in order to be cooled sufficiently to make it easily handled and to insure the cooling of the center of the mass, it should not be allowed to remain long in the cold water.

Sirups.

The thickness of sirup for canning fruits depends on the kind of fruit with which it is to be used and the richness of the product desired.

In order to obtain three grades of sirup for ordinary use in canning, sugar and water may be combined in the following proportions and heated only until the sugar is dissolved. The quantity of water is kept constant in order to show the variation in the quantity of sugar used.

Thin sirup (about a 30-per-cent solution): $1\frac{3}{4}$ cups of sugar and 4 cups of water. This sirup may be used for such fruits as apples, pears, raspberries, and other sweet berries, when a rich product is not desired.

Medium sirup (about a 40-per-cent solution): $2\frac{3}{4}$ cups of sugar and 4 cups of water. This sirup may be used for such fruits as sweet plums, blackberries, and sweet cherries.

Thick sirup (about a 55-per-cent solution): 5 cups of sugar and 4 cups of water. This sirup may be used for such fruits as peaches, cherries, or pineapples when a sweet product is desired.

A still thicker sirup may be desirable for rhubarb, gooseberries, currants, sour cherries, and other very sour fruits. Such a sirup may be made by boiling the thick sirup until it begins to spin a thread instead of using it when the sugar has just dissolved.

Methods of canning.

Two methods of canning are commonly used both in the household and in the canning factory, the open-kettle method and the cold-pack method.

The open-kettle method is so called because the food to be canned is completely cooked in a kettle and then poured into the jar. Unless the jar, the cover, the rubber, and all utensils that come in contact with the food have been boiled for twenty minutes before the jars are filled, and unless the work is carefully done, there is always the risk that the food will be reinfected and that it may spoil after the jar has been sealed. For some products, such as preserves, conserves, jams, and marmalades, for which condensation and heat more intense than that of boiling water are needed, the open-kettle method must still be used. For beets, the open-kettle method is recommended, because the skins can be removed after the cooking, and thus less color is lost. Many persons prefer the open-kettle method for canning strawberries and tomatoes.

In the so called cold-pack method, the uncooked or partly cooked fruit, vegetable, or other food is packed in a can; the food is covered with some liquid, such as water, sirup, or juice; and both the jar and its contents are heated simultaneously in boiling water or steam. This method may be used for most fruits and all vegetables. It is recommended for meats, because it conserves the flavor and because meat may thus be canned under steam pressure. It is used by all canning factories for simple canned vegetables, fruits, and meats. It is also being adopted gradually by housekeepers, since in general it is a safer, easier way of canning most foods than the old open-kettle method, and since the product keeps much of its natural flavor.

Heat may be applied in the cold-pack method in one of two ways:

1. Continuously. (a) The cans may be covered with boiling water and may be cooked continuously for a given length of time and sealed. (b) The cans may be placed in a pressure canner and cooked under steam pressure for a given length of time and sealed.

2. Intermittently. The cans may be covered with boiling water and may be cooked for a stated length of time on each of three successive days, being sealed at the close of each period of heating.

When food is cooked in the can for a given period on each of three successive days, the process is called intermittent heating.

Acid or sweet foods may be canned safely by one period of heating. It is not always safe to can certain non-acid vegetables by a single period unless steam pressure is used. They may keep if cooked long enough but there is always a risk. This is because of the possible presence on them of resistant spores which are sometimes able to survive even twelve hours of continuous boiling. The intermittent method seems to be safer for these vegetables, but only the steam pressure method can be considered wholly safe. Many vegetables accepted by the housekeeper as having kept are poor in both flavor and odor, and this is due to spoilage. Food that has kept should not have either a flat or a sour taste.

Experiments in canning seem to indicate that the organism known as *botulinus* may not be destroyed either by the continuous or the intermittent methods of canning in hot water. When foods are canned at home, unless the pressure cooker has been used, it is urged that when the contents are removed from the can they be boiled for several minutes before being eaten. If, for example, beans are to be used as a salad, they should be boiled first and then cooled. Such a procedure makes for safety.

For peas, beans, corn, asparagus, greens, pumpkin, and squash, the intermittent method of canning is strongly recommended, unless steam pressure is used. Many canned foods, even non-acid ones, may keep without intermittent heating if the time of boiling is long enough, but there seems to be no certainty about it. Variations in soil, moisture, and climatic conditions from year to year may cause a failure one year when success has always before attended the one-period process of cooking. Even with the three periods of heating, there is risk of spoilage, if the first period has not been long enough or if too long a time elapses between the first and second periods.

The intermittent method is as follows: After a food is canned, boiled, and sealed, it is allowed to stand for twenty-four hours at room temperature. This gives time for spores to change to the vegetative form which they will do when warmth and food are supplied. The canned food is then cooked a second time in order to destroy the vegetative forms, and, still sealed, is allowed to stand for twenty-four hours at room temperature. Since all spores may not have changed during the first twenty-four hours, it is safer to allow a second twenty-four hours of standing and a third period of cooking.

The high temperatures or repeated heatings used in the canning of vegetables are not only troublesome and expensive, but often injurious to the flavor and texture. Experiments at the University of California * have developed a very simple and certain way of sterilizing vegetables as easily as fruit. This con-

* Cruess, W. V. Circ. 158, Agr. Exp. Sta., Univ. of Calif.

sists in the addition of a little acid to the liquid in which they are canned. It was found that peas heated to 212° F. in a brine acidified by the addition of 5 ounces of lemon juice to every gallon, kept perfectly, while peas heated in the same brine without lemon juice spoiled. The same results were obtained with beans, pumpkins, beets, turnips, artichokes, and asparagus. Large quantities of these vegetables are lost by "spoilage" in the commercial canneries. The flavor of the vegetables sterilized at the low temperature was much superior to that of those sterilized under pressure.

The common household practice of canning corn and tomatoes together owes its efficacy to the same principle. Corn alone is very difficult to sterilize, owing to its lack of acidity. This lack is supplied by the tomatoes and the mixture is easily preserved by ordinary heating. Doubtless other wholesome acids, such as vinegar, citric, or tartaric acid, could be used for the same purpose. The amount of acid used is small and improves rather than injures the flavor.

The new method avoids both the expense of a pressure cooker and the trouble of repeated heatings, and can be highly recommended at least for home use. It consists essentially of making the vegetables slightly acid, thus rendering them as easy to sterilize as fruits. Lemon juice or vinegar may be used to acidify brines. If ordinary cider vinegar is used, twice the amounts given for lemon juice are needed (page 615).

Directions for canning fruit by the cold-pack method. *

(1) Select well-grown, firm, and not overripe fruit; (2) if possible, can fruit on the day that it is picked; (3) wash, pare, or otherwise prepare the fruit, removing all bruised or decayed parts; † (4) if there is much variation in size, grade the fruit so that the contents of each jar will be as nearly

* The open-kettle method is preferred by many persons for canning fruits, especially strawberries, pineapples, and quinces.

† Skins of peaches, plums, and pears may be removed by the following method. Bring 2 gallons of water to the boiling point. Add to it 1 pound of concentrated lye. Lower the fruit into the boiling solution in a wire basket or a thin cloth. Let it remain for from 20 to 30 seconds. Remove the fruit quickly, and immerse it in cold water. Then wash the peeling from the fruit.

uniform as possible; (5) if food is to be blanched, blanch or scald in boiling water a small quantity at a time (page 606), the number of minutes required for blanching being given in Table LIII; do not blanch cherries, berries, or plums; (6) if blanched food is to be cooled, chill the outside of the blanched fruit by immersing it for a brief period in a large vessel of cold water (page 607), and do not attempt to cool the fruit thoroughly by this cold dip; (7) pack the fruit firmly in clean, tested jars to within ½ inch of the top; (8) fill the jars to within ¼ inch of the top with boiling sirup or hot water (see directions for preparing sirups on page 607); (9) place a new rubber on each jar, adjust the cover of the jar, and partly seal it, and if using the hot-water bath, warm the cover before adjusting it; (10) sterilize the jars for the required length of time (Table LIII); if the hot-water bath is used, immerse the jars in sufficient boiling water to cover the tops to the depth of about 1 inch, and do not begin to time the sterilizing until the water boils over the jars; keep the water boiling during the sterilizing period; (11) remove the jars from the sterilizer, seal them, and invert them to cool, avoiding a draft on the jars, but cooling them as rapidly as possible; (12) wash the jars thoroughly, label them, and set them away, storing red fruits in a dark place to prevent loss of color.

Directions for canning vegetables by the cold-pack method.

(1) Choose vegetables that are young and have made a quick growth. (2) Do not use very dirty vegetables. (3) Can vegetables as soon as possible after they have been picked. This is particularly necessary with asparagus, peas, beans, and corn. (4) Clean the vegetables, and prepare them as for cooking. (5) Grade the vegetables, if there is much variation in size, so that the contents of each jar will be as nearly uniform in size as possible. (6) Do not attempt to handle too large a quantity of vegetables at once, especially in hot weather. The various steps in the canning process must be followed in rapid succession to prevent loss of flavor from what commercial canners know as flat sour. (7) Blanch or scald the vegetables by plunging them into a large quantity of boiling water (page 606). The blanching or scalding should be continued just long enough to make the vegetables sufficiently flexible to pack easily, or to loosen the skins sufficiently to allow them to be quickly scraped off (Tables LIII to LV). Spinach and certain other delicately flavored greens should be blanched in steam instead of in boiling water, until they are thoroughly shrunken. (8) Chill the outside of the vegetables by immersing them quickly in a large vessel of cold water. Do not attempt to cool the vegetables thoroughly by this cold dip. This step may be omitted. (9) Pack the vegetables firmly in clean, tested jars to within ½ inch of the top. (10) Add ½ to 1 teaspoonful of salt to each pint jar. Some vegetables are improved by the addition of a small amount of sugar as well. (11) Fill the jars with boiling water to within ¼ inch of the top. (12) Place a new rubber on each jar, adjust the

cover, and partly seal it. Place the jars in a hot-water bath or a pressure cooker. (13) Sterilize the jars for the required length of time (Tables LXIII–LXV). Acid vegetables, such as tomatoes, may usually be successfully sterilized by the one-day, or continuous, method. It is recommended that peas, beans, corn, succotash, greens, asparagus, pumpkin, and squash be sterilized by the three-day, or intermittent, method, unless a steam pressure canner is used. If the hot-water bath is used, the boiling water should cover the tops of the jars to the depth of about 1 inch. Do not begin to time the sterilizing until the water boils over the jars. Keep the water boiling during the sterilizing period. (14) Remove the jars from the sterilizer, seal them, and invert them to cool. Avoid a draft on the jars, but cool them as quickly as possible, especially in canning peas, beans, corn, asparagus, and greens. (15) If the continuous method of sterilization has been used, the canning is now completed. Wash the jars, label them, and set them away. If the intermittent method is being used, let the cans stand for 24 hours at room temperature, and sterilize them for 1 hour on the second day. Remove the jars from the sterilizer, cool them, and let them stand for 24 hours at room temperature. Sterilize them for 1 hour on the third day. It is safer to loosen the wire clamps each time before returning the jars to the hot-water bath. Cool the jars, wash them, label them, and set them away. Red vegetables should be stored in a dark place to prevent loss of color.

Directions for canning meat by the cold-pack method.

Continuous sterilization is necessary for meats canned by the cold-pack method. A fowl weighing 2 pounds when dressed should make a pint can of solid meat and a pint of stock thick enough to jelly. A fowl weighing 3 pounds should fill 1½ pint cans.

(1) Select meat in perfect condition. Sterilizing will not render spoiled meat harmless. Tough cuts lend themselves well to canning. (2) Trim off dark-colored or strong-smelling portions, and surplus fat. Wipe the meat well with a damp cloth. Save the bones for soup stock. (3) Free the meat from bones, and cut it in pieces suitable for packing in the jars. Tough cuts of beef are sometimes passed through a meat-chopper before they are canned. (4) If additional flavor is desired, partly brown the meat in a heavy frying pan, using a small quantity of fat. (5) Pack the raw meat solidly into tested clean glass jars, filling them to within ¾ inch of the top. (6) Add ½ to 1 teaspoonful of salt for each pint of meat, and other seasoning, such as chopped onion, celery leaves, or bay leaf, if desired. Add no water. (7) Adjust the rubbers and the covers, and partly seal the jars. (8) Sterilize the jars in the pressure cooker.

For soup stock all bones and trimmings of the canned meats should be covered with cold water, salted, and slowly simmered until the flesh drops in shreds from the bones, and the liquid, or stock, is concentrated. Seasoning, such as onion and a bit of celery leaf, may be added. The stock may be strained if desired, reheated, and boiled for 10 minutes. It should then be poured into scalded jars, and sterilized for 1 hour on each of two successive days.

TABLE LIII.—A TIME-TABLE FOR CANNING FRUITS, ACID VEGETABLES, AND MEATS BY THE SINGLE, OR CONTINUOUS, PERIOD OF HEATING

Food	*Time of blanching*	*Time of cooking in pint jars*	
		If the hot-water bath is used	*If the pressure cooker is used (5 pounds)*
	Minutes	Minutes	Minutes
Apple cider	....	20	12
Apples	1–2	20–30	10
Apricots	1–2	16	10
Blackberries, dewberries	....	16	6
Cherries	....	16	10
Fruit juices	....	20	10
Grapes	....	16	10
Huckleberries	....	16	8
Peaches	1–2	16	10
Pears	1–2	20	10
Pineapples	....	60	40
Plums	....	16	10
Quinces	1–2	60	40
Raspberries	....	16	8
Rhubarb	1–2	16	10
Strawberries	....	16	10
Sauerkraut	....	120	60
Tomatoes	1–2	22	10
Tomatoes and corn	....	90	60
Tomato juice	....	20	15
Meat	....	300	180

TABLE LIV.—A TIME-TABLE FOR CANNING VEGETABLES BY THREE PERIODS OF HEATING, OR THE SO-CALLED INTERMITTENT METHOD

Food	*Time of blanching*	*Time of cooking in pint jar* †	
		First day	*Second and third days*
	Minutes	Minutes	Minutes
Asparagus......	5	60	60
Beans..........	5	60	60
* Beets........	6–10	60	60
Carrots.........	6–10	60	60
Cauliflower.....	5	60	60
Corn...........	5–10	60–75	60–75 (depending on closeness of pack)
Parsnips.......	6–10	60	60
Peas...........	5	60	60
Pumpkin.......	......	75	75
Spinach and other greens	5	75–90	75–90 (depending on closeness of pack)
Squash........	......	75	75
Succotash.....	......	60	60

* A good method for canning beets is to cook them in the open kettle before they are pared until they are almost done, and then pare them and sterilize them for 1 hour in the jars.

† For quart jars 10 to 15 minutes additional time should be allowed each day; for 2-quart jars 30 minutes should be added.

TABLE LV.—A TIME-TABLE FOR CANNING VEGETABLES WITH THE PRESSURE COOKER OR BY THE SINGLE PERIOD OF HEATING IN THE WATER BATH

Food	*Time of blanching*	*Time of cooking in pint jars*	
		When the hot water bath is used (a risky method for the vegetables starred)	*When the pressure cooker is used (the only really safe method) 10 pounds*
	Minutes	Minutes	Minutes
*Asparagus	5	180 (*not advised*)	40
*Beans	5	180 (*not advised*)	30
Beets	6–10	120–180	40
Carrots	6–10	120–180	40
Cauliflower	5	180	40
*Corn	5–10	180 (*not advised*)	60
Parsnips	6–10	180	40
*Peas	5	180 (*not advised*)	30
Pumpkin	......	200	40
*Spinach and other greens	5	200 (*not advised*)	40
Squash	......	200	40
*Succotash	......	180 (*not advised*)	40
Meat	......	300	60

TABLE LVI.—USE OF ACID IN CANNING VEGETABLES (Page 610) *

Vegetable	*Proportion of acid*	*Period of sterilization at 212° F.*
Asparagus	5 ounces lemon juice to 1 gallon brine †	1 hour
Green beans	5 " " " " 1 " "	1½ hours
Beets	5 " " " " 1 " "	1½ hours
Carrots	4 " " " " 1 " "	1½ hours
Sweet corn	7 " " " " 1 " sirup, made of ½ pound sugar and 1½ ounce salt to the gallon, used to cover corn	1½ hours
	Equal quantity of tomatoes	1 hour
Peas	7 ounces lemon juice to 1 gallon brine, made of 2–1/3 ounces salt and 3½ ounces sugar to the gallon	1 hour
Pumpkin	4 ounces lemon juice and 2–2/3 ounces salt to the gallon	1½ hours

* Data from Circ. 158, by W. V. Cruess, Agr. Exp. Sta., Univ. of Calif.
† Two-per cent brine: about 6 tablespoons salt to 1 gallon water.

Storing canned foods.

Canned food should be set aside for two or three days before being stored, and then as a means of special precaution, it should be tested as follows: Loosen the clamp and grasp the jar by the edges of the glass top. If the can leaks or if decomposition has set in, the top will come off. If the top stays on, tighten the clamp again and the food is ready for storage. If the top comes off, reject that can of food.

Red fruits and vegetables should be stored in a dark place, as light destroys the color, leaving the food unattractive in appearance. If the jar and its contents have been made absolutely sterile, and the jar is entirely air-tight, the food will not spoil if held in a warm place. If spoiling does occur, it will be due to one of the following causes: (1) some flaw in the can, which makes it a so-called "slow-leaker"; (2) the presence of some micro-organisms that have survived the cooking process, in spite of all care; (3) a drying-out of the rubber, and hence the breaking of the seal.

In some factories where foods are canned in glass jars, racks are made for holding the jars upside down in an inclined position, thus keeping the liquid constantly in the top of the can and preventing the rapid drying of the rubber.

Score-cards for judging foods canned in glass.

The following score-card may be used when it is not feasible to open the jars:

Quality of fruit, judged by appearance (50)	
Uniformity of shape, size, ripeness	20
Retention of shape, size	20
Color	10
Quality of liquid (40)	
Clearness	20
Color	20
Appearance of jar (10)	
Cleanness	5
Label: size, color, position, legend	5
	100

The following score-card may be used when it is feasible to open the jars:

Appearance of jar (10)	
Cleanness	5
Label: size, color, position, legend	5
Quality of fruit (60)	
Uniformity of shape, size, ripeness	10
Retention of shape and size, due to selection and proper cooking	10
Color	5
Flavor	20
Texture: suitability of variety for canning, overripeness, underripeness, density of sirup	15
Quality of liquid (30)	
Flavor: richness, lack of fermentation	20
Color	5
Clearness	5
	100

Fruit juices.

Properly extracted fruit juices contain much of the sugar and the body-building and body-regulating constituents of the whole fruit, as well as much of its flavor and its pectin (jelly-making substance). Hence fruit juices have a real food value. They also furnish an easy and often inexpensive means of variety in the daily meals, in both warm and cold weather. Fruit drinks (page 471), jellied desserts, pudding sauces, ice creams, and ices are easily made from bottled fruit juices, which may often be extracted from parts of the fruits that would otherwise be discarded. Juices from pineapples, rhubarb, strawberries, blackberries, raspberries, blueberries, currants, cherries, peaches, plums, apples, pears, quinces, grapes (red, white, and black), are especially good for these purposes.

Juice may be extracted from discarded parts of fruit; from left-over portions of fruit prepared for the table; from skins and pits of peaches; from skins, cores, and seeds of apples; from pulp discarded after making jelly and marmalade; from well-scrubbed skins of oranges and lemons used in making lemonade; from cores, skins, and eyes of well-scrubbed pineapples.

The following procedure may then be carried out:

Cover the pulp or parings with cold water, bring the mixture slowly to the boiling point, simmer it until the juice is extracted (15 or 20 minutes), and strain it. Boil the strained juice for 5 minutes, and pour it into jars or glass bottles that have been sterilized by boiling for 20 minutes, filling the jars to overflowing. Seal the jars immediately. Stopper the bottles with corks sterilized and dried for shrinkage, and make an air-tight seal by dipping the cork and the lip of the bottle into hot paraffin. If desired, add 1 cupful of sugar for each 6 cupfuls of fruit juice before boiling the juice. In this case, be sure to note on the label the proportion of sugar used.

A rich clear juice may be obtained by allowing well-washed juicy fruits to stand overnight with alternate layers of sugar. If enough sugar is added the next morning (a little more than pound for pound) the strained juice may be sealed, without cooking, in sterilized bottles, stoppered with sterilized corks.

*The making of jelly.**

Currants, sour apples, crab-apples, raspberries, blackberries, blueberries, partly ripened grapes, and quinces make good jelly; but peaches, pears, strawberries, and cherries are deficient in certain substances necessary to produce a jelly of good consistency and flavor. This deficiency may be overcome, by combining these juices with those that make good jelly.

A fruit juice that is good for making jelly is one that contains pectin, the essential jelly-making substance. Juices extracted by cooking are apparently far richer in this substance than juices extracted from the raw fruits. To determine whether a juice contains pectin, 1 or 2 tablespoonfuls of the hot juice should be mixed thoroughly with an equal volume of grain alcohol (90 to 95 per cent), and the mixture should be cooled. If pectin is present, a gelatinous mass, which can be gathered on a spoon, will appear in the liquid.

Acid is another requisite for juices that make good jelly.

To extract juice from a very juicy fruit, such as currants or raspberries, place the clean fruit, washed if necessary, in an enameled preserving kettle, add just enough water to prevent burning—perhaps 1 cup to 4 or 5 quarts of fruit—cover the kettle, and place it where the fruit will cook rather slowly, stirring it occasionally with a wooden or a silver spoon. When the simmering point is reached, crush the fruit further with a well-soaked wooden masher, and continue heating it until the whole mass is cooked through. Allow the juice to drain through a jelly bag or a double piece of cheese-cloth into an earthenware or enameled receptacle for half an hour or more. It is better not to combine the first extraction with the later. If later extractions are to be made, it is well to reserve a pectin test of first extraction as a standard for concentrating ones later.

When the first extraction is fairly well drained out, generally within half an hour, transfer the pulp to the preserving kettle, cover it with water, stir it well, and cover the kettle. Bring the juice slowly to the boiling point, and simmer it for 15 or 20

* Condensed from Principles of Jelly Making, by N. E. Goldthwaite, Univ. of Ill., Bull. 15.

minutes. Strain it through a jelly bag as for the first extraction. If the alcohol test indicates much pectin, make a third extraction. Generally only three extractions can be made, but some fruits will allow five. The second and later extractions may be combined. The boiling juice may be sealed in sterilized bottles and made into jelly in the winter.

If a less juicy fruit, such as apples or quinces, is used, wash the fruit, discard any unsound parts, cut it into small pieces, including the skins and the seeds, cover it with water, and extract the juice according to the directions for juicy fruits, making more than one extraction if possible.

For currants and partly ripened grapes, the correct proportion of sugar for the first extraction is likely to be equal volumes of sugar and juice. For red raspberries, blueberries, and blackberries, and for fruits to which much water must be added, such as sour apples, crab-apples, and cranberries, the correct proportion by volume for the first extraction is likely to be three-fourths as much sugar as juice. The quantity of sugar required is determined by the quantity of pectin present in the juice. If too little sugar in proportion to pectin is used, the jelly is likely to be tough; if too much sugar is used, the jelly is soft and does not hold its shape. The remedy for having used too much sugar is to add more juice and thus supply more pectin. It is better to err on the side of too little rather than too much sugar. The second and third extractions may be mixed. The mixture should be boiled down until the juice approximates in pectin-content the richness of the first extraction, as shown by the pectin test. The juice should then be measured, and the sugar should be added in the proportion suggested for the first extraction.

The proportion of sugar to juice, the proportion of pectin in the juice, and possibly the proportion of acid in the juice, govern the length of time for boiling the juice to produce good jelly. Boiling from 8 to 10 minutes may be sufficient for currant juice, while from 20 to 30 minutes may be required for juice from raspberries, blackberries, apples, and the like. The juice in any case should be boiled rapidly.

The sugar should be added to the juice when the period of boiling is about half completed. If the sugar is hot, the cooking process is not delayed. Care should be taken not to scorch the sugar, however. The juice should be stirred fairly constantly, after the sugar is added, in order to prevent burning.

A good jelly test is to allow juice to drop from the side of a spoon and when it sheets off, or breaks off, to stop the cooking.

If jellies are to stand any length of time before using, they should be sealed properly from the air. After the glasses have been filled completely with the hot jellies, they should be set in a cool place for the contents to harden. Jellies slightly undercooked may be covered with panes of glass and allowed to harden in the sun. In either case, when the jellies are well set, the glasses should be filled with hot paraffin—the jelly will have shrunken, leaving space for this—not merely melted paraffin, but hot paraffin so that all germs that may have fallen on the surface of the jelly may be killed and future trouble with them obviated. The glasses should be closed with hot, clean tin covers, and kept in a dry, cool place.

Jams.

The method of making jams is to cook the fruit until tender, add sugar in the proportion of equal quantities or three-fourths as much as fruit, and cook the mixture until a drop will jelly on a cold dish. It should then be poured into sterilized jars and sealed.

PRESERVATION OF MEAT *

Directions for canning meat are given on page 613.

Keeping fresh meat

All meat to be preserved, either fresh or cured, should be thoroughly cooled after the animal is slaughtered, for unless this is done the meat will not cure well nor will it be possible to keep it in a fresh state for any length of time.

* Seulke, K. J. The Curing of Meat and Meat Products on the Farm, Cornell Reading-Course for the Farm, Bull. 119.

In cold weather meat may be kept by hanging it in a dark, cool place, where dogs, cats, and rodents cannot reach it. If a temperature below 40° F. is maintained, meat may be kept for weeks; but with the temperature alternating between low and high, it will not keep well. Meat that is frozen will keep indefinitely so long as it remains frozen. Alternate freezing and thawing will spoil the flavor and cause early decomposition. It is important that the meat be kept in a place where the air is dry. A dark, cool cellar, or an attic that is dry and free from odors, is the proper place for keeping meat on the farm.

Meat packed in snow may be kept for a considerable length of time. The meat should first be frozen hard. After it is frozen, an earthen jar or a barrel should be provided, and a thick layer of snow should be tamped tightly in the bottom of this. On the snow a layer of meat is packed, and covered with another layer of snow. Care must be taken to have a thick layer of snow between the meat and the inner surface of the receptacle. Another layer of meat is then put on, and another layer of snow, and so on until all the meat is packed or the jar is almost full, when a heavy covering of snow should be put on top and covered with a block or some other object in order to keep out rats and mice. The meat may be taken out as needed, and the snow should be repacked on top each time.

Another method commonly used with pork and sausage is partly to cook the meat by frying it on both sides, pack it in a jar, and pour hot lard over it in order to seal the whole and keep out air. The meat may be taken out as needed. Care should be taken each time to melt the lard that is taken off, and to pour it back.

Curing meats

As has already been stated, meat should be thoroughly cooled before it is cured. It is equally important, however, that the meat shall not be in a frozen condition, for if it is frozen the brine or pickling solution cannot penetrate freely and the meat will not be of even flavor throughout.

The vessels used for curing meats are of various sorts and sizes, depending on the amount of meat to be cured and the expense to which the owner cares to go. Large earthen jars or crocks give the best results, but these are somewhat expensive—8 to 10 cents a gallon of capacity—and they are very easily broken if not carefully handled. Tight hardwood barrels may be used. New barrels or barrels that have contained molasses should be used, never vinegar or kerosene barrels unless they have been burned out on the inside. If molasses barrels are used they should be thoroughly scalded.

The principal preservatives used are salt, sugar, and molasses, and their combinations. Chemicals forbidden by law and those known to have a bad effect on health should not be used. Salt preserves meat through its astringent and slightly germicidal action. It hardens the muscle fibers and draws the moisture from the meat. Sugar and molasses have an almost opposite effect. They cause the retention of the moisture of the meat, and keep the muscle fibers soft and tender. Therefore, salt and sugar are commonly used together, as the sugar gives a desirable flavor and prevents the hardening action of the salt. Saltpeter is often used to retain the natural reddish color of the meat. It is detrimental to health and should be used sparingly if at all.

Curing pork.

SUGAR-CURED HAMS, BACONS, AND TONGUES

Method I. After the meat has been thoroughly cooled, the carcass may be cut up and cured. Sugar-cured pork is preferable to dry-cured or plain salt pork because of its pleasant flavor and because the meat is not so dry and hard. Beef tongues may be cured in the same pickle with the pork. All the pork carcass may be cured except the loins, which are used fresh for chops and roasts, the spare-ribs, which are used fresh, and the trimmings, which are used for lard and sausage. The hams, shoulders, and bacons are sugar-cured, and the fat backs are dry-cured or pickled in a plain salt pickle.

Before the meat is placed in pickle or salt, all corners and ragged edges should be cut off and used for sausage and lard. If they are left on they will be wasted, for they will be thoroughly soaked by the pickle and will be of no use.

Rub the pork thoroughly with salt and pack it in a cool place overnight. The next day pack it in a barrel or an earthen jar, with the heaviest hams and shoulders at the bottom, the lighter hams and shoulders next, and the bacons and tongues at the top.

For every 100 pounds of meat weigh out 10 pounds of salt, 2½ pounds of brown sugar, and 2 ounces of saltpeter. Rub these together thoroughly, taking care that the saltpeter is finely powdered. Dissolve the whole by stirring it into 4 gallons of boiling water. Allow this brine to cool thoroughly, and then pour it over the meat. If it does not entirely cover the meat, add more water. The brine should cover the meat at all times. The meat may be weighted down with a block if necessary, for if it is not covered the projecting meat will decompose in a short time.

If the brine shows signs of fermenting during the curing process, it should be drawn off, boiled, and cooled, and then poured back on the meat.

The bacons and tongues may be taken from the pickle after four to six weeks, and after being washed in warm water they may be hung in the smoke-house and smoked. The lighter hams and shoulders will be ready to take out of the pickle in six to eight weeks, and the heavier ones at the end of the eighth week.

Method II. Another recipe for sugar-cured hams, bacons, and tongues that has given good results is as follows:

Pack the thoroughly cooled meat in a cool, dry place, on a table that has previously been covered with a layer of salt. Sprinkle salt over each piece of meat, and add alternate layers of meat and layers of salt until all is packed.

Allow the meat to remain in the salt for eight to ten days, and then wash off the salt with lukewarm water. The meat is now ready to go into the pickle, which is mixed as follows: To 18 gallons of water add 5 pounds of brown sugar, a small handful of saltpeter, and 1 tablespoonful of ginger. Stir the mixture until the solids are all dissolved, and then stir in 12 pounds of salt. Stir until all the salt is dissolved. This amount can be increased or decreased according to the amount of meat to be pickled. Ordinarily one-fourth of this mixture will be enough for 100 pounds of pork.

The pickle should test 75° with the hydrometer test. If a hydrometer is not at hand, drop a fresh egg into the pickle; if the egg floats almost submerged, the brine is of the proper strength.

Pack the meat in a barrel or a jar, with hams and shoulders weighing over 10 pounds on the bottom, those weighing less than 10 pounds next, and the bacon strips and tongues on top. Pour the brine over the meat so that it is all covered, and weight it with a block so that none of the meat projects from the brine.

The bacons and tongues may be removed from the brine at the end of three weeks, the lighter hams and shoulders at the end of five weeks, and the heaviest ones after six to seven weeks. After the meat is removed from the brine, it should be washed in warm water in order to remove the crust of brine and any scum that may have formed, and after drying for an hour or more it may be hung in the smoke-house and smoked.

BRINE SALT PORK

Pack thoroughly cooled pork in a barrel or a jar after having rubbed each piece with salt. The following day weigh out for each 100 pounds of meat 10 pounds of salt and 2 ounces of saltpeter. Mix these, and dissolve the mixture in 4 gallons of boiling water. Allow this brine to cool thoroughly, and then pour it over the meat in the barrel. Place a block on top in order to keep the meat submerged.

Fat backs are ordinarily used for salt pork cured in brine, but any part of the carcass may be cured in this way. The meat cures best when cut in strips or in 6-inch squares.

The meat should be left in the brine and be taken out as needed.

DRY-CURED PORK

To dry-cure meat involves more work than to brine-cure it, although it is a little less expensive in some cases. It is less difficult merely to salt the meat, pack in a jar, and pour the brine over it, than to rub the meat several times with the dry mixture. Also, the brine-cured meat is not so dry and is a little more palatable. Brine-cured meat can be kept anywhere as long as it is kept cool; dry-cured meat, on the other hand, should be kept in a cool, moist place, in order to insure even curing. With brine-cured meat there is no danger from rats and other vermin; but flies must be kept away from meat cured in either way.

In dry-curing pork, weigh out for every 100 pounds of pork 6 pounds of salt, 2½ pounds of granulated sugar, and 2 ounces of saltpeter, and mix thoroughly. Divide the mixture into three portions. Rub one portion on the meat the first day, and pack the meat in a barrel. Leave it for three days. At the end of three days take the meat out of the barrel, rub it with a second portion of the mixture, and repack it. Three days later rub the meat with the third and last portion of the mixture, and repack it. Let it stay in the barrel for ten to fourteen days. Then remove it, wash it in warm water, and smoke it.

PICKLED PIGS' FEET

Take well-scraped pigs' feet, with the toes removed, and soak them in cold water overnight. The next morning put them in a kettle, add enough water to cover them, and let them cook until soft. This will require about five hours. Salt should be added to the water during the cooking. When the pigs' feet are soft, remove them from the water, split them, pack them in an earthen jar, and pour hot vinegar over them. Spices of various kinds may be added to the vinegar if desired.

HEAD-CHEESE

Head-cheese is made from the part of the head of the hog that would otherwise be wasted. When properly prepared it is a delicacy. The feet, as well as the head, may be used for this purpose.

Skin the hog's head, remove the eyes and the brain, and split the head through the midline, or down the center of the forehead and the nose. Usually the jowls are removed and salted. Put the head pieces into a cooker, add enough water to cover the meat, and boil the whole until the meat parts come readily from the bone. Remove the meat, separate it from the bones, and chop it finely. Remove the liquid from the kettle and save it for further use. After the meat is chopped, return it to the kettle, pour on enough of the liquid to cover the meat, and allow it to cook for ten or fifteen minutes. While this final cooking is taking place, season the mixture with salt and pepper to suit the taste.

Put the cooked meat and the liquid that remains into jars, pans, or a cold-meat press, place a weight on top, and allow the meat to cool. It will then be solid and can be sliced and eaten immediately.

LARD

Lard is made from the fat of the hog carcass. Three grades of lard are obtained from three parts of the body: the best grade, leaf lard, is made from the leaf, or layer of fat lying inside the abdominal wall; the second grade is made from the backs, the sides, and the pieces trimmed from the various cuts; the third and poorest grade is made from the intestinal, stomach, and pluck fats. The last is much stronger than the other two and should not be mixed with them. On the farm the first two grades are usually made together, and sometimes all three are made together.

Cut the fat into bits about 1 inch square, and trim out all particles of meat as they give an unpleasant burned flavor to the lard and are the first to scorch if the kettle becomes too hot. Put the pieces of fat into a kettle, and add a little water, not more than a quart, to keep the fat from burning until some of the lard has melted.

Keep the kettle hot until the cracklings are brown and rise to the top. Skim off the cracklings, and press out the lard that remains in them. Draw off the melted lard, and add a little baking-soda to help whiten it. The lard should be stirred while it is cooling, in order to make it as white as possible.

Curing beef.

Beef is not so commonly cured as pork; but when corned it takes the place of fresh beef during periods of the year when fresh beef does not keep well, and also offers a method of preserving part of the meat until it is needed and thus saving a waste or loss of meat, since it is impossible for one family to use an entire beef carcass in the fresh state. Dried beef commands a high price on the market. It also offers a method of preserving meat for future use. Jerked beef is made in the drier regions of the West. The climate of the eastern states is not dry enough nor warm enough to cure it successfully, and it is not so palatable as dried beef.

CORNED BEEF

Method I. Since corned beef is used for practically the same dishes as fresh beef, only wholesome untainted meat should be used for this purpose. Naturally, the choicer the meat that is put into the pickle, the better will be the meat that comes out. The cheaper cuts of beef are ordinarily used for corning, because the choicer cuts are more palatable in a fresh condition. Plate, flank, shoulder, chuck, cross ribs, and rump are most commonly used for corning.

Frozen meat should not be put into the brine; neither should the brine be frozen while the meat is in it.

Weigh the meat. Cut it in pieces about 6 inches square. Place a layer of salt on the bottom of the vessel in which the meat is to be packed, cover this with a layer of meat, and sprinkle a layer of salt over the meat. Add alternate layers of meat and of salt until the meat is packed. Seven to 9 pounds of salt will usually be enough for 100 pounds of meat. Allow the meat to stand in the salt overnight. On the following morning make a brine, using 5 pounds of sugar, 2½ ounces of baking-soda, and 3 ounces of saltpeter for every 100 pounds of meat. Dissolve these ingredients in 4 gallons of boiling water. Allow the brine to cool thoroughly before pouring it over the meat. If more or less than 100 pounds of meat is to be cured, use these proportions for the brine. If 4 gallons of brine does not entirely cover 100 pounds of meat, water may be added. The meat should be weighted down with a block or a clean stone, since any part that is not covered with the brine will decompose very quickly.

If the brine shows signs of fermentation in warm weather, it should be drawn off, boiled, strained through a clean cloth, and, after it is thoroughly cooled, poured back on the meat.

The meat should be kept in a cool, dark place. At the end of thirty days the meat will be ready for use. If the pieces are larger than 6 inches square, a longer time may be allowed, according to the size of the pieces.

Method II. The formula given under Method II (page 625) for sugar-cured hams and bacons may be used for corned beef also.

Pressed corned beef. After the corned beef, prepared as described above, has been in the pickle for the required length of time, it may be taken out, and, after the brine is washed off, may be used in the same way as fresh beef. If desired, it may be made into pressed corned beef. This is prepared as follows: Remove the beef from the pickling solution, wash it with warm water, and place it in a kettle. Keep it barely covered with water at all times, and boil it for two hours. Salt and pepper may be added while the meat is cooking, but usually there is enough salt in the meat from the brine. Take the meat from the kettle and pack it in pans or in a cold-meat press. Strain the broth through cheese-cloth or muslin several times, replace it on the stove, boil it down to one-half its original volume, pour it over the meat in the pans, and allow the whole to harden in a cool place. After the meat has hardened it may be sliced and eaten without further preparation.

DRIED BEEF

Dried beef is usually made from the round, although any heavily muscled part may be used for this purpose. The inside of the round makes the tenderest meat. In cutting meat for dried beef, the muscles should be separated into their natural divisions. When cured and smoked in this way they can be sliced across the grain, and the meat is much tenderer than would otherwise be the case.

A jar or a barrel is the best receptacle in which to pack the meat when curing it. To each 100 pounds of well-cooled beef weigh out 6 pounds of fine salt, 3 pounds of granulated or brown sugar, and 2 ounces of saltpeter. Mix these thoroughly, without wetting, and divide the mixture into three portions. Set two portions away for future use, and rub the other portion into the meat. Pack the meat in the jar and leave it for three days. At the end of the three days take the meat from the jar, but leave in the jar the sirup that has formed. Rub the meat with another portion of the mixture, repack it, and leave it for three days. Remove it from the sirup, rub it with the last portion of the mixture, and repack it in the sirup in the jar. After three days remove the meat and hang it in the smoke-house, where it should be smoked until it is dry. It should then be kept in a dry place until it is used. The longer it is smoked and the drier it is kept, the longer it will remain good.

PICKLED BEEF TONGUES

The recipe given on page 625 for sugar-cured hams and bacons may be used also for pickling beef tongues.

Curing mutton and lamb.

Mutton and lamb are seldom, if ever cured on the farm. In the larger packing houses, mutton is sometimes partly cured in a plain salt pickle, and then cooked and packed in cans, which are soldered shut while the meat is still hot.

Sausages.

Very good sausages can be made from the scraps that would otherwise be wasted in the butcher shop and on the farm. Such pieces as cheeks, trimmings, jowls, pork hearts and tongues, mutton hearts and tongues, and many other scraps that are seldom used fresh, will make a very palatable sausage and will serve for this purpose as well as any other meat.

HAMBURG STEAK

This is the simplest form of sausage made, and consists simply of fresh beef run twice through a grinder. It may be seasoned after the first grinding, or left unseasoned. It is never stuffed into casings. Any part of the beef carcass may be used for hamburg steak, but the best quality is made from the round.

MIXED SAUSAGE

This is made by mixing beef and pork in such proportions as to suit the taste of the consumer. This kind of sausage is usually made if the consumer dislikes the extremely fat undiluted pork sausage. It is seldom stuffed into casings, but is usually left loose and made into pats when fried. The following proportions of beef and pork give excellent results: 2 parts lean pork; 3 parts lean beef; 1 part fat pork.

PORK SAUSAGE

Pork sausage should be made from clean, fresh pork scraps, or the cheaper parts of the meat. The meat should be in the proportion of three parts of lean pork to one of fat pork. This should be run through the grinder, spread out and seasoned with salt, pepper, and sage, and reground. Usually 1½ ounces of fine salt, ½ ounce of ground black pepper, and ½ ounce or less of ground sage, for 6 pounds of meat, makes a satisfactory seasoning.

Pork sausage either is used loose, being made into pats and fried, or is stuffed into pork casings and double-linked. If left loose it can be packed in jars until used. If it is to be kept for a long period, it may be run into cloth bags and smoked for a short time. The linked sausage may also be smoked for a short time in order to preserve it. If it is to be kept until summer, it may be partially cooked, packed in a jar, and covered with hot lard.

Smoking meats on the farm

The smoking of cured meats aids in their preservation because the smoking process closes the pores of the meat or casings, and the creosote is objectionable to some insects.

Smoking gives a desirable flavor to the meat if the proper kind of fuel is used. Green hickory is best, but other hardwoods or corn-cobs may be used if hickory is not available. Resinous woods should never be used, as they give an objectionable flavor to the meat. Corn-cobs are commonly used, but are not so satisfactory as hickory because of the fine ash that is forced upward by the heat and settles on the meat, giving it a dirty appearance. Juniper berries and fragrant woods are sometimes added to the fire, to give desired flavors.

Proprietary smoking preparations are not to be recommended, as a whole, because they hasten the curing process and do not give as desirable a flavor as does the ordinary smoking process. Some of these preparations also contain substances that cause digestive disorders when the meat is eaten. This is especially true of the various dips used to take the place of smoking.

The smoke-house.

The smoke-house may be of any size or construction, to suit the needs of the owner. If the house is to be used only once and only a small amount of meat is to be smoked, a large barrel or a dry goods box may be used. If the house is to be permanent, it is often worth while to build it of brick, concrete, or stone, in order to avoid all risk of loss by fire. A frame house may be used, provided that care is taken to confine the fire to the center of the floor, or to build it in a large iron kettle, so that it will not spread to the house. The safest method of smoking meat, and at the same time of preventing the smoke-house from getting too hot, is to dig a small furnace pit in the ground about 10 or 12 feet from the smoke-house, and have the smoke carried from this to the house through a galvanized pipe laid on top of the ground and covered so that it will not be crushed.

The method of construction of the smoke-house should allow ample ventilation, and there should be some means of regulating the draft. This can be done by having the outlet for the smoke under the eaves and the intake for the air at the furnace, if this is used; or, if the furnace or outdoor fire method is not used, an adjustable air intake may be attached to the door and covered with a heavy screen to keep out flies and rats.

For ordinary farm use, the house should be about 8 feet square and 8 to 10 feet high, so that the meat will hang 6 to 7 feet above the fire and near enough to the roof to get the benefit of the thick smoke and yet be below the level of the ventilator.

The smoking process.

Meat that has been pickled should be removed from the brine at least a day before it is to be smoked, and after being washed in warm water it should be hung up to dry until it is ready to smoke. The meat should be hung in the smoke-house, with no two pieces touching each other, and then a fire should be started, heating the house gradually. The meat should be kept warm, but not hot enough to dry the outside too much and prevent the smoke from penetrating. There should be as much smoke as possible, but no more heat than is necessary.

In winter the fire should be kept burning constantly until the smoking is completed, for if the meat is allowed to cool too much the smoke will not penetrate it. Meat that has been frozen should not be put into the smoke-house until it is thawed.

In warm weather there is danger of getting the meat too hot, and for this reason it is good practice to let the fire die down every other day until the meat has become properly smoked.

After the meat has become properly colored, it should be cooled (but not allowed to freeze) by opening the ventilator on the door, leaving it open until the meat hardens. It may then be packed away for future use. If warm hams are piled one upon another before they are cooled, sweating occurs where the two touch, and decomposition soon sets in.

The meat may be kept in the smoke-house for a time if the weather is not too warm, but the house should be kept free from flies.

If the smoked meat is to be used immediately, no further care is needed; but if it is to be held until summer it should be wrapped in clean, white paper, and a covering of muslin sewed on to protect it from insects. It should be kept where it will not be subject to extreme change of temperature or to dampness.

If the meat is to be kept for a considerable length of time and absolute safe-keeping is desired, the following directions,* should be followed: "For absolute safe-keeping for an indefinite period of time, it is essential that the meat be thoroughly cured. After it is smoked and has become dry on the surface it should be wrapped in parchment paper; or old newspapers will do where parchment cannot be had. Then inclose in heavy muslin or canvas, and cover with yellow wash or ordinary lime whitewash, glue being added. Hang each piece out so that it does not come in contact with other pieces. Do not stack in piles.

"Recipe for yellow wash.—For 100 pounds hams or bacon take: 3 pounds barytes (barium sulphate; 0.06 pound glue; 0.08 pound chrome yellow (lead chromate); 0.40 pound flour.

"Half fill a pail with water and mix in the flour, dissolving all lumps thoroughly. Dissolve the chrome in a quart of water in a separate vessel and add the solution and the glue to the flour; bring the whole to a boil and add the barytes slowly, stirring constantly. Make the wash the day before it is required. Stir it frequently when using, and apply with a brush."

* Farmers' Bull. 183, U. S. Dept. of Agr.

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