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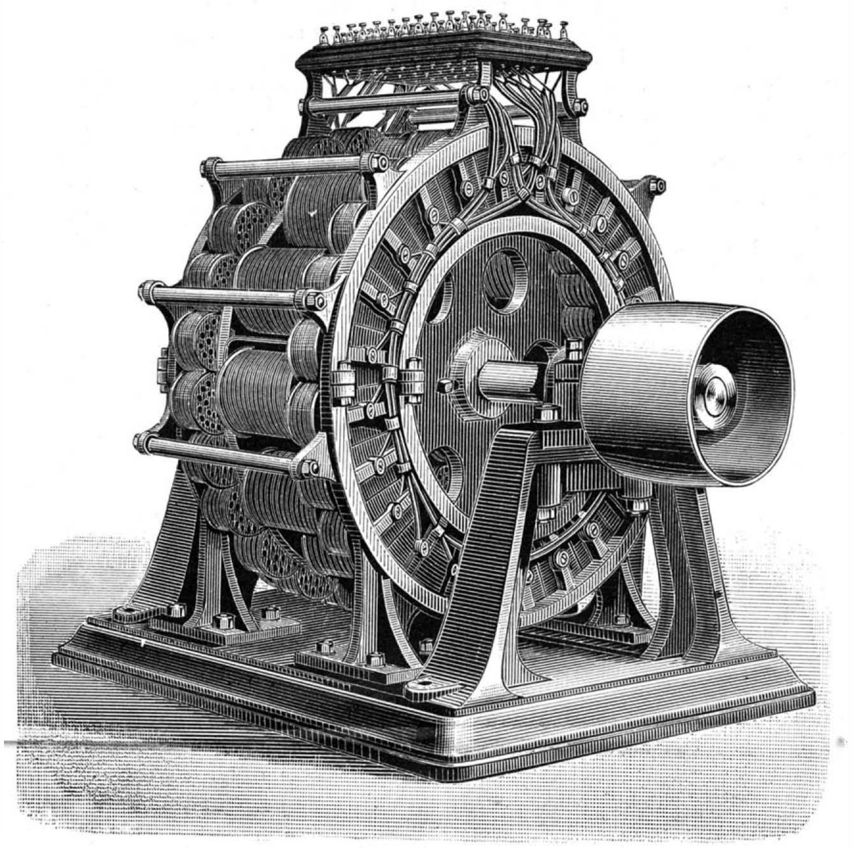
GERARD'S ALTERNATING CURRENT MACHINE.

The machine represented in the annexed engraving consists of a movable inductor, whose alternate poles pass in front of an armature composed of a double number of oblong and flat bobbins, that are affixed to a circle firmly connected with the frame. There is a similar circle on each side of the inductor. The armature is stationary, and the wires that start from the bobbins are connected with terminals placed upon a wooden support that surmounts the machine.

This arrangement allows of every possible grouping of the currents according to requirements. Thus, the armature may be divided into two currents, so as to allow of carbons 30 mm. in diameter being burned, or else so as to have four, eight, twelve, twenty-four, or even forty-eight distinct circuits capable of being used altogether or in part.

This machine has been studied with a view of rendering the lamps independent; and there may be produced with it, for example, a voltaic arc of an intensity of from 250 to 600 carcels for the lighting of a courtyard, or it may be used for producing arcs of less intensity for shops, or for supplying incandescent lamps. As each of the circuits is independent, it becomes easy to light or extinguish any one of the lamps at will. Since the conductors are formed of ordinary simple wires, the cost attending the installation of 12 or 24 lamps amounts to just about the same as it would in the case of a single cable.

One of the annexed cuts represents a Corliss steam engine connected directly with an alternating current machine of the system under consideration. According to the inventor, this machine is capable of supplying 1,000 lamps of a special kind, called "slide lamps," and a larger number of incandescent ones.—*Revue Industrielle.*



GERARD'S ALTERNATING ELECTRIC MACHINE.

New Explosive from Carbon Bisulphide.

According to a statement in the *Polytech. Notizblatt*, the gas manager's old foe, carbon bisulphide, is capable of new and surprising developments. M. Turpin, of Paris, has succeeded in making a most powerful explosive, which he has named "Panclastic" (break all), from a mixture of carbon bisulphide and hyponitric acid; the latter made by heating acetate of lead. The mixture will not explode by percussion alone, nor when heated to 200°C., but is fired by a charge of fulminate of mercury or gun powder. The most powerful effects are obtained from equal parts of each ingredient.

The new explosive is used for shells and torpedoes; and reports concerning experiments made with it at Cherbourg indicate that its force far exceeds that of dynamite. When not confined, the same mixture burns quietly with a brilliant white light, and can be used for spectacular effects, to imitate moonlight. For this use it is better to keep the liquids separate, and feed them through capillary tubes to a dish that serves as a burner, and which must be properly cooled. If some phosphorus is dissolved in the carbon bisulphide, the illuminating power of the mixture is increased, and it is then called "Heliophanite," or sunshine.

Protection of Iron from Rust.

The problem of protecting iron from rust is one of perennial interest, and new systems of painting or otherwise treating iron for this purpose are continually being proposed. It has been observed that iron lying still and exposed to the air, as in railways not in actual use, rusts more quickly than when the metal is strongly vibrated by constant traffic. From this it has been inferred that the vibration is attended with an electrical action that decreases the affinity of the iron for oxygen. In tearing down old masonry, iron clamps and bonds are sometimes met with which, when completely bedded in mortar, are as free from rust as when they left the blacksmith's hands.

A French engineer, says the *Polytech. Notizblatt*, observed this remarkable effect when uncovering the anchor plates of several chain bridges which had been built for about thirty years. Where the anchors had been covered with the fat lime mortar of the masonry, they showed no sign of rust; but the parts of plates that had been prolonged into empty space were so rusted that two-thirds of their substance had gone. It has been repeatedly observed that iron does not rust in water in which are dissolved small quantities of caustic alkalies, or alkaline earths, which neutralize every possible trace of acid.

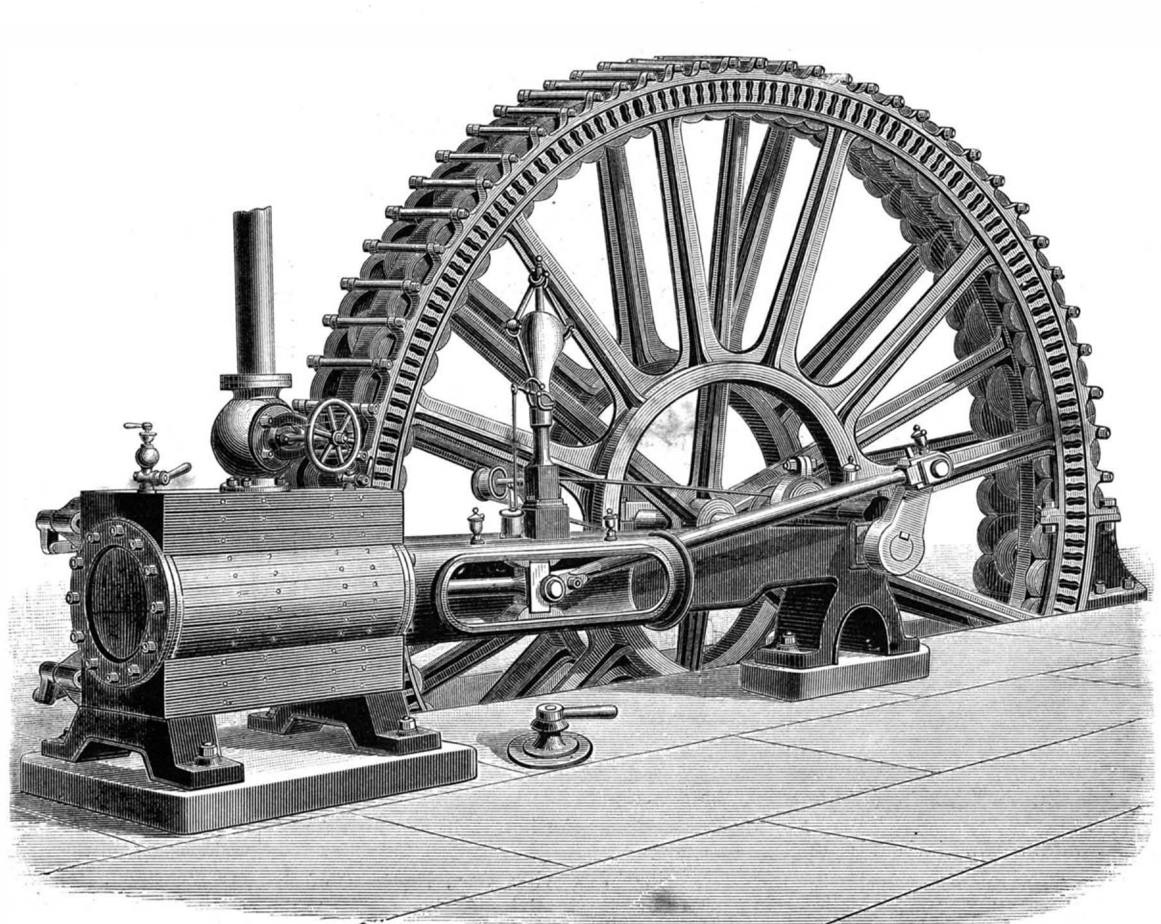
These experiences are apparently the bases of a theory propounded by Herr Riegelmann, of Hanau. The paint that he uses contains caustic alkaline earth (baryta, strontia, etc.), so that the iron is in a condition analogous to that of the anchors of the chain bridges already mentioned. Although a thin coat of paint cannot contain so much alkali as a thick bed of mortar, the alkaline action will nevertheless have effect so long as the coating has a certain consistence. Under any circumstances, these new paints will be free from active acids. Riegelmann's paint, moreover, is said to contain a rust preventing composition which does not require the aid of any alkali in order to effect its purpose. Perhaps this is the same mixture described in the *Neueste Erfinderung*, where it is stated that if 10 per cent of burnt magnesia, or even baryta or strontia, is mixed cold with ordinary linseed oil paint, and then enough mineral oil to envelop the alkaline earth, the free acid of the paint will be neutralized, while the iron will be protected by the permanent alkaline action of the paint. Iron to be buried in damp earth may be painted with a mixture of 100 parts of resin (colophony), 25 parts of gutta-percha, and 50 parts of paraffin, to which 20 parts of magnesia and some mineral oil have been added.

Waterproof Clothing.

For some time past the Belgian War Department has conducted a series of experiments at Valvorde, on the water-proofing of soldiers' uniforms by means of liquid alumina. With respect to the hygienic side of the question, the medical authorities have satisfied themselves that the articles of dress thus treated permit the perspiration to pass off freely, and chemical analysis has proved that the preparation used in no way injures the materials or destroys their color. More than 10,000 meters (10,936 yards) of materials, redressed two or three times over, notwithstanding the rinsing and washing to which they have been subjected after having been soiled, and after constant wear, remained perfectly waterproof.

The only drawback to the process appears to be that it is not very economical, and, to insure the desired result, must be conducted on a large scale, which requires a considerable amount of plant.

The following, according to the *Journal d'Hygiene*, is the process employed: Acetate of alumina is obtained by making solutions of equal parts of alum and acetate of lead in separate vessels, and then mixing them together. Sulphate of lead will be thrown down, leaving acetate of alumina in solution, which must be decanted. The materials to be waterproofed are soaked in this solution, and then withdrawn without being wrung, and dried in the air.



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THE immense crematory at Rome is in almost daily use. Cremation is daily becoming more popular, and bids fair soon to dispose of more corpses in the Italian capital than old-fashioned burial.

Scientific American.

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NEW YORK, SATURDAY, SEPTEMBER 1, 1883.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 400,

For the Week ending September 1, 1883.

Price 10 cents For sale by all newsdealers

SUGAR AND FODDER, IN ONE.

In discussing recently the *future sugar* of the United States, under the title of "The Sugar Canes," a number of points were necessarily left untouched, and the subject is one of such exceedingly great interest that it is worth while to recur to it again and again. In that article, while urging that we ought to become exporters of sugar instead of importers, it was remarked that by so doing we need not interfere with any crop now cultivated. We will see if that remark was not strictly in accordance with truth. We can scarcely afford to cut off any of our present resources, even for the sake of getting new ones.

Of course it is understood, from what has been previously written, that our proposed supply of sugar for the future is to come from sorghum, and our expectations and promises are based on the recent advances in chemical and manufacturing knowledge, by means of which the crystallization of sugar from sorghum is no longer a matter of caprice and uncertainty, but becomes an established business fact.

Sorghum, as is well known, can be grown, as a general rule, wherever Indian corn can be raised satisfactorily; and it has this advantage in point of success, that it thrives well on land which is too poor to yield any more than a very indifferent crop of corn. It follows that the regions of extended corn growing are likely to be also the regions demanded for sorghum when we come to produce our 2,000,000,000 pounds of sugar and then go on beyond that to supply the foreign market.

Shall we not, therefore, cut off our supply of corn? If we turn our corn-fields into sugar-fields, are we not about to diminish our yield of beef and of pork, the very bone and sinew of the nation? And shall we not deprive our people of the "hominy" as well as the "hog," which have been inelegantly said to furnish the staple food of many millions in our southern and western border lands?

If it could be shown that the widespread cultivation of sorghum for sugar production would result in a diminished food supply for either man or beast, a strong argument would at once be found against such cultivation, notwithstanding the fact that pecuniarily it was more profitable. But we propose to show that no such diminution need occur, or will occur, even assuming that not an acre of additional land should be brought into use. Our great corn-producing sections, the broad plains of the Western and Northwestern States, which will presently be waving in every direction with magnificent cane-fields of sorghum, contain, as yet, almost illimitable ranges which have never felt the plow, and the natural progress of population and of industry will, in due time, sweep them within the area of our wealth-yielding lands. But, even without them, we can produce our full measure of sugar, as already given—2,000,000,000—and hog and hominy shall still prevail, as now. The present corn-fields, "from Ohio to Nebraska, and from Kentucky to Minnesota, can do it all."

To make our position plain, we will assume a definite case. A farmer in Iowa has this year 100 acres in corn. The records of the State show that his average yield may be expected at 3,800 bushels, worth in round numbers $900. Of this he consumes, on the premises, we will say 2,500 bushels, selling the remainder. Of this 2,500 bushels by far the largest portion has gone as food for his hogs, horses, etc. The human consumption, according to the number in his family, has not in all probability exceeded 100 bushels. He needed therefore to supply his family with their direct corn-food only three acres of corn; and to supply his stock he needed sixty-five acres, and outside of this he had a money value of corn sold of $310.

Now turn the slate, and cipher on the other side. The next year he plants corn for his family, say ten acres, so as to allow a free margin, and his remaining ninety acres he plants in sorghum, the variety selected being according to his locality. The one feature which above all others is essential to his getting the value from his sorghum as a sugar producer is that the crop should become perfectly mature, the seed fully ripe. And here is where the two values of his crop coincide in giving him their returns. Experience abundantly shows that sorghum seed, as food for live stock, is equal in every respect to Indian corn. Cattle, horses, hogs, eat it freely and thrive upon it to perfection. When thoroughly ripe, its fattening qualities are not at all surpassed by those of the corn; and acre for acre, the yield of an average crop of ripe sorghum is equal in feeding value to an average crop of corn.

How does our farmer's account therefore stand as compared with last years' returns? His family have had their supply as then; on his sixty-five acres he has fed the same amount of stock as then; on his remaining 25 acres he has realized seed which has enabled him to feed a proportionately increased number of hogs, or of mules, or of whatever stock he has chosen, and he has their value in return, but he has not his $310 for sales of corn.

Is the wealth of the country diminished because the farmer planted ninety acres in sorghum instead of in corn? It has received all the pork and beef that it did before, and in addition the pork and beef represented by the twenty-five acres. And what has the farmer in exchange for his $310 of corn money?

Mr. A. J. Russell, of Janesville, Wis., President of the Wisconsin Amber Cane Growers' Association, reports to the Hon. Geo. B. Loring, U. S. Commissioner of Agriculture, in Dec., 1881, tha the yield from sorghum per acre there was 1,000 pounds of sugar, selling for nine cents per pound, with sirup worth half as much in addition. And Mr. Russell expressly states that this is no fair return, inasmuch as the farmers, from lack of knowledge as to fertilizers, etc., had produced on an average only about half of what might fairly be expected, and of what would actually be yielded in the future. He had himself produced 2,000 pounds to the acre, with sirup in proportion.

But taking the returns only as given at these lowest figures, an acre yields $130. We do not dare to multiply that by the 90 which represents the number of acres which our farmer had in sorghum, for fear the figures should seem too flattering for belief, but there they are, and any one can take the slate and pencil and work out the sum for himself. We will only remark that the farmer did not lose by giving up the crop of Indian corn, even if he lost his $310.

Now, let no one suppose that we are going off in wild visions of boundless wealth to tumble into every man's pocket from sorghum growing. It is no more certain than everything else of human labor. Crops will fail, as crops of all sorts fail. But crops also will succeed, and where Indian corn will produce its value, sorghum will also produce its own value, and the relative value of the two on a hundred acres we have considered.

PETROLEUM—THE OLD IN THE NEW.

Perhaps never in the world's history has there occurred a case in which an article known from time immemorial, and counted as being of too small value to have any influence whatever, has all at once become one of the forces which sway the commerce, and almost the destinies of nations, to an extent so wonderful as is actually true in regard to petroleum. Its progress, its development, the grasp which it has on the welfare, the politics, and the destiny of various countries, above all others, of our own, deserve a careful study. A few words in relation to one feature of its history are all that our present space will allow; we may recur to it at another time.

When we look into the columns of the various daily papers, the *Times*, *Tribune*, *Herald*, etc., and see with how much care the petroleum column is worked up, how its daily, and sometimes hourly, fluctuations are studied and quoted, and when we read a little further and see what enormous amounts of the crude article are brought to the seaports—New York, of course, chiefly—and what immense shipments are made to the very ends of the earth (for China, on the opposite side of the globe, is becoming now one of our very thirsty absorbents), we find it difficult to realize that all this is only a thing of yesterday, as it were. And yet that is strictly true. Forty years ago the word *petroleum* had no existence in current language. It is a compound term meaning simply rock oil; it was in the dictionaries, but it was not known to people in general. And yet the article at that time was on sale, in the large cities, and occasionally in smaller places. But it was in very small quantities, and was disposed of by the ounce. Very probably the entire stock on hand in the city of New York could have been held in a few five gallon cans. Those who are old enough to remember as far back as 1840 can possibly recall a very bad-smelling medicine to which they were perhaps subjected. It was called Seneca Oil, and was "dreadful good for the rheumatiz," being fortunately, in most instances, used externally, though not always. It was understood to be brought from the "Seneca Nation," in the Southwestern part of the State of New York; hence its name. Seneca oil was simply crude petroleum, and it is on the instant recognized that it came from the immediate vicinity, the very border of the region which has within these later years revolutionized the world with its oil wells.

But in going back to Seneca oil do we touch the early days of petroleum? Not at all; and we shall never touch them. No glimmering light shines back so far. When the fires fell on the Cities of the Plain, in the circuit of Jordan, at the north end of the Dead Sea, the combustible material which insured the destruction of Sodom and Gomorrah was crude petroleum, the "slime pits" of the Vale of Siddim. Later still petroleum, in its viscid form, served to make water-tight the cradle of the baby Moses. But both these instances are relatively of modern date; for perfectly untold ages before that time petroleum had served to aid in preserving the Egyptian dead from decomposition, for the very oldest of all the mummies yet brought to light reveal its presence. And how early in the experience of the human race its remarkable properties were brought into play we can only conjecture, for nothing remains to tell us.

Petroleum, therefore, has two histories, and they may be said to be as distinct from each other as though they were of two separate articles. The old reaches back, so we have seen, to the days of shadow and fable; the new begins August 6, 1859, only twenty-four years ago! And it begins at Titusville, on Oil Creek, a branch of the Allegheny River, in Crawford County, Pennsylvania. To such narrow limits in both time and space are we able to concentrate our attention, and yet we are looking at that which has become one of the mighty factors in modern civilization.

Now once more we will see what we can do in the work of bringing our ideas to a focus, and this time we will look at the subject geographically. Petroleum is found in very various parts of the world, in fact, almost in every country, to some extent. There are, however, certain points of concentration, and they are not many. The island of Zante, the mainland opposite in Hungary, Gallicia, and Moldavia; then, again, away off on the Irawaddy, but most of all—on the Eastern Continent—the shores of the Caspian, especially near Baku; all of these produce petroleum, and the springs of Baku yield more than all the others combined. But we may fairly set all of them—the entire Eastern Continent—aside as being of no great moment. It is no mere figure of speech, it is not rank boasting, to say that petroleum, so far as the markets of the world are concerned, is an *American product*. Our regular daily and monthly yield so far surpasses all others that they cannot be counted as rivals in the trade and its results.

The springs of Baku yield about 500,000 barrels annually; we turn out that amount in the space of a very few weeks at any time. The records of 1879, not to speak of anything later, give the exports only from the three ports of Philadelphia, Baltimore, and New York at 8,500,000 barrels. Surely we may call petroleum, in all its bearings, an American product.

And does it come from all parts of America? Perhaps few persons are aware how very much restricted really is the region which yields such incredible results. The fact is that the "oil center," that from which petroleum has been produced in paying quantities, can all be comprised within a space 39½ *square miles*. It is wonderful. We will look to it again.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

BY H. C. HOVEY.

The attendance on the thirty-second annual meeting of this influential organization was less than for several years past. This was mainly owing to its being held in a locality so far to the West, and to the refusal of some of the main trunk-lines to reduce railroad rates. Yet there were from 300 to 400 scientific people convened at Minneapolis from all parts of the country, and although the hospitality of this thriving and beautiful city is ample, the probability is that it was sufficiently taxed. The majority of members present was from the Western States, while barely a hundred were from the East. The daily sessions, from Aug 15 to 22, were held in the admirably located buildings of the State University, near the Falls of St. Anthony. The opening prayer was by Bishop Foss, after which addresses of welcome were made by Mr. G. A. Pillsbury, chairman of the local committee, Gov. Hubbard, Mayor Ames, and Pres. Folwell, of the University, men who had seen Minneapolis grow from a cluster of huts amid wolves and Indians to be a city of 100,000 inhabitants. Surely the representatives of such a place were pardonable for a little boasting as they indicated its vast resources, and pointed to its proofs of tireless energy. To these words of welcome Prof. C. A. Young, the President of the Association, responded; after which Prof. F. W. Putnam made his report as Secretary, and read the list of members who have died during the year—16 in all.

The sections were then organized, and heard addresses from the Vice-Presidents. Prof. W. A. Rogers spoke, in Section A, on "The German Survey of the Northern Heavens." Previous to this work, undertaken by the German Astronomical Society, formed in 1866, stellar catalogues abounded in errors, and no attempt had been made to get at a homogeneous system. This society has undertaken to determine the co ordinates of all stars in the northern heavens down to the ninth degree of magnitude. Special interest attaches to the work, both on account of its practically useful results and also its bearing on the principles underlying the form and stability of the stellar and solar systems.

In taking the chair in Section B—Physics—Prof. H. A. Rowland made an able plea for "Pure Science." Before any science can be applied it must exist. In America we are mainly applying what we borrow from countries where pure science is cultivated. Our colleges are too many, and too poorly equipped. Over 100 institutions in this country are called universities. The term should not be applied to anything having an endowment of less than $1,000,000. He attacked in severe language the little colleges with incompetent professors. There were in this country, in 1880, about 400 colleges with a total wealth of $40,000,000 in buildings and $43,000,000 in funds. He would, if possible, concentrate this into one great university with $10,000,000, four minor ones of $5,000,000 each, and 26 colleges of $2,000,000 each. Then the interests of pure science could be properly cared for.

Prof. Otis T. Mason addressed the Anthropological Section on the nature and value of anthropological studies, which be defined as an attempt to apply to the inductive study of man the methods approved in the general study of natural history. Patient investigation should be made into the whole series of problems arising as to the human race; its ethnology, glossology, technology, psychology, sociology, mythology, and lexiology, or balancing of harmony with the outer world. Men should study man. Science has her mission field as well as religion.

The opening address in the section of Biology was by Prof. W. J. Beal, who chose to speak on the scientific needs of agriculture. No industry excels this in importance, yet none is more at the mercy of caprice. It should be protected against the whims of politicians. He spoke of the value of chemistry, entomology, meteorology, and other sciences in their application to agriculture.

The "Methods of Statistics" were treated fully and admirably by Dr. F. B. Hough, in opening the newly constituted section on Economic Science. The collection and classification of data demand simplicity, accuracy, and completeness, and on this thoroughness depends the success of both public and private enterprises. Loss and failure flow from ignorance or inattention to facts. Our common interests may be promoted by associations for gathering statistics. This stimulates inquiry and activity in business of all kinds, and furnishes a sound guarantee for all sorts of human undertakings, whether commercial, political, religious, or educational, and tends to check speculation and fraud. Official statistics may be classified as being: (1.) Summaries of current business published annually. (2.) Periodical inquiries at wider intervals, like the census taken every decade. (3.) Special inquiries by experts or commissions created for the purpose. The speaker then gave a historical sketch of census taking from colonial times to the present day. Great difficulties yet remain, the chief ones being in getting at facts with certainty, recording them accurately, and condensing the mass of materials into a useful and accessible form. Estimates will depend on the intelligence and honesty of him who makes them. The speaker dwelt at some length on the use of what he termed "graphic illustrations," *i. e.*, devices by means of lines, areas, and colors to represent quantity, time, direction, and intensity of force. Their skillful use will greatly facilitate comparison of subjects and the study of the relation of causes and effects.

The opening address on "Geology and Geography" was by Prof. C. H. Hitchcock, who showed that these sciences were associated and interdependent. The very zones of the earth must have been arranged according to the varying density of a cooling globe. The primeval ocean came from condensed vapors assuming liquidity as soon as water could remain upon the solid crust of what had been an igneous sphere. Through such a crust numerous volcanoes, discharging melted rock, would build up hills overlooking the water and forming the dry land—continents would arise inclosing land-locked valleys and wide areas of fresh water. Some of these immense basins would be filled by the action of various forces, until the resulting plains would be capable of sustaining the varied forms of organic life. Glacial action put on the finishing touches of the earth's contour, and the completed structure must be pronounced "very good."

The sections having been duly organized and opened, the retiring president, Dr. J. W. Dawson, of Montreal, addressed the assembled body at Westminster Church on "Some Undiscovered Truths of Geology." It abounded in interesting thoughts, of which but an epitome can be given. His subject covered the whole history of the earth in all time, allying itself at the beginning with astronomy, physics, and celestial chemistry; and dealing along its course with meteorology, geography, and biology, and finally getting mixed with questions of archæology and anthropology.

In such a wide sweep we need not be surprised to learn that there are yet some unsolved problems. We are met at the outset with an inquiry as to man's place in the nature he is to study. His organism is certainly a part of nature, and he is the terminal link of a long chain of being. As a scientific animal, man finds within himself a mind more potent than matter, and that reacts on nature. We recognize this difficulty when we divide science into experimental and observational. It does little good to meet mysteries by guesses, nor should we on the other hand resign ourselves to ignorance. We must wrestle with the unsolved questions of nature, mastering what we can and leaving others to be grappled with by our successors. In proceeding to mark out the limits of ascertained knowledge, the speaker began with the oldest rocks, a formation of immense thickness, and corresponding to what used to be called fundamental granite. He intimated his belief that this was deposited as gneiss from a shoreless ocean. The Lower Laurentian rocks probably limit our progress backward, beyond which lie only physical hypotheses as to a cooling incandescent globe. Ascending, we meet with significant changes. Beds of limestone are associated with the beds of gneiss. Gravel beds show the existence of shores; and graphite informs us of some sort of plant life, and iron ores of organic matters. In the Middle Laurentian appeared the *Eozoon Canadense*, probably the oldest form of life of which we have any knowledge. Metamorphism next came into play. Nothing in geology perishes. Heat may change clays into slates, and limestones into marbles; but nothing wholly disappears. A great battle rages over the genealogy of the rocks, the steps of which Dr. Dawson set forth, claiming that the sudden incoming of life in varied forms baffled biologists and furnished an unsolved problem. The theories of evolution are insufficient to account for it. The process still is as mysterious as ever, and a great gap is left in our accumulated knowledge.

Suppose that we start, however, with a number of organisms ready made; we ask, how can these have varied so as to give us new species? It is a singular illusion that variation may be boundless, aimless, and fortuitous, and that development arises from spontaneous selection. Varieties must have causes, and the vast and orderly succession of nature must be regulated by fixed laws, only a few of which are yet known to us. One consideration showing how imperfect are our attempts to reach the true causes of genera and species, is the remarkable fixity of leading types. Trace certain forms of life along their own line through stupendous vicissitudes and across the ages, and you find them substantially unchanged. Examples are the foliage and fructification of mosses, the venation of wings of insects, the structure and form of snails; all of which were settled in the Carboniferous age. Huxley holds that there are but two possible alternatives as to the origin of species, viz., 1. Mechanical construction, 2. Evolution. But we know that instead of two there are numerous possible methods, such as absolute creation, mediate creation, critical evolution, and gradual evolution. The origin of whales affords an example of the difficulties arising from referring existing forms to imaginary ancestors. Gaudry, though a strong evolutionist, candidly says, "We have questioned these strange and gigantic sovereigns of the Tertiary oceans, and they leave us without a reply."

The periods of rapid introduction of new forms of life were not periods of struggle for existence, but of expansion; while the real periods of struggle were marked by depauperation and extinction.

Another unsolved problem is the inability of palæontology to fill the gaps in the chain of being. Many lines of being present a continuous chain. On the other hand, the abrupt and simultaneous appearance of new types in many specific and generic forms, over wide areas, obliges evolutionists to assume periods of exceptional activity alternating with stagnation—a doctrine scarcely differing from the old theory of special creation. Plainly a vast amount of conscientious work is needed to account for these breaks in the chain.

Another mystery yet unexplained is the cause of the great movements of the earth's crust by which mountains and plains and ocean beds have been formed. It is known, however, that much is due to the unequal settling of the earth toward its center, and also to the pressure of the ocean against the shore. Complex movements of plication are more easily comprehended than the regular pulsations of flat continental areas, each change being accompanied by changes of climate, plants, and animals.

The problems as to coal formations, the ancient fucoids or algæ, and as to the great and much debated glacial period, next received attention. What caused the great climatic changes that have occurred during geologic time? How came there to be a vast continental glacier reaching as far south as the 40th degree of latitude and thousands of feet thick? Shall we not after all have to give up this favorite theory? May not many of the phenomena be explained by supposing a glacial sea with Arctic currents and icebergs wafted southward or due to local glaciers? It may also be questioned if glaciers are not relatively protective rather than erosive agencies, and if sufficient importance has been attached to their work in leveling and filling old hills and channels. Still another question is as to how long a time has elapsed since the glacial era. Recently the opinion has been gaining ground that its cessation dates back only 6,000 or 7,000 years. This problem, of course, carries with it the question of the origin and early history of man.

The practical inference is that we are but new-comers on this earth, and have had but little time to solve such great problems. Geology is young, scarcely a century old. We are surprised that so many regard it as a complete and full grown science. Humility, hard work, and abstinence from hasty generalizations should characterize geologists for at least a few generations to come. Science is light, and light is good. Let us raise it high enough to shine over every obstruction that casts any shadow on the true interests of humanity. Above all, let us hold up the light and not stand in it ourselves.

Copper in the Pickle Jar.

The Court of Appeal in Brussels has just decided that the objection to pickles, artificially colored green by the contact of the vinegar with copper utensils, is a mere prejudice. Some manufacturers of pickled gherkins in that city having been condemned in December last to a fine, for having in the technical language of the judgment "sold or exposed for sale certain substances affected by copper verdigris, of a nature to cause the death of the consumer, or at least to produce effects injurious to health," one of the condemned appealed, and the case has necessitated the examination of scientific witnesses, and the hearing of arguments from eminent counsel on both sides.

On the part of the prosecution, M. Depaire, ex-Professor of Chemistry in the University of Brussels, deposed that salts of copper are unquestionably poisons. For the appellants, however, M. Dumoulin, Professor of Chemistry in the University at Ghent, declared with no less confidence that such salts are "incapable of doing any harm." This witness even stated that so certain was he on this point, he himself, as well as his wife and children, had taken a strong dose; that so far from being unwell they had felt better for the experiment. M. Dumoulin's emphatic assertion that the "sels de cuivre" "had been calumniated by science" is stated to have caused a strong sensation among the parties interested in court. Finally judgment, free of costs, was given for the appellant.—*London Daily News.*

Flowers Colored by Absorption.

At a late social entertainment the Prince of Wales is said to have carried a bouquet of large lilies tinted with delicate pink and blue, by the absorption of dyes through the stems. The dyes do not in the least affect the perfume or freshness of the flowers. The process is the discovery of Mr. Nesbit. It is said flowers refuse to absorb certain colors. Some of the lilies which had been treated with a purple dye separated the red and the blue, the colors being divided in the process of absorption.

Staining Cherry in Imitation of Old Mahogany.

Digest logwood chips in vinegar or acetic acid for twenty-four hours or more. When ready to use, heat the solution, then dip the wood until the suitable color is obtained.

The Nickel Plate Patent.

The decision of the United States Court for this district, Judge Blatchford presiding, sustains once more, goes a little further, and gives a still broader interpretation to the Adams patent than had been given at any previous trial. Judge Blatchford holds substantially that Adams was the first discoverer of a practical method for electroplating with nickel, and his patent secures to him practically a broad monopoly of the art, and of all articles electroplated with nickel. The patent in question was granted to Isaac Adams, Jr., August 3, 1869, and the two principal claims read as follows:

1. The electro deposition of nickel by means of a solution of the double sulphate of nickel and ammonia, or a solution of the double chloride of nickel and ammonium, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction.

4. The electroplating of metals with a coating of compact, coherent, tenacious, flexible nickel of sufficient thickness to protect the metal upon which the deposit is made from the action of corrosive agents with which the article may be brought in contact.

The defendant, Pendleton, obtained a patent September 28, 1880, for what he claims as a new and entirely different mode of plating with nickel. His claims are as follows:

1. In the art of nickel plating, an acid solution of acetate of nickel, consisting of oxide of nickel and acetic acid, said solution having an excess of acid.

2. The method of making acid solutions of acetate of nickel, consisting in slowly digesting oxide of nickel and acetic acid with or without heat, so as to have an excess of acid in the solution, substantially as described.

The court held the Pendleton process to be merely the chemical equivalent of the Adams process, and accordingly gave judgment for Adams, with injunction and an account. How the Supreme Court will look upon the matter remains to be ascertained.

An Important Electrical Trial.

The patent suit brought by the owners of the Gramme dynamo-electrical machine, to establish their claims to a broad monopoly in the manufacture of these instruments, has at last been brought to final argument before the United States Circuit Court at Newport, R. I. If the patent is sustained it is supposed that nearly all of the dynamo machines now running will be found to be an infringement—in which case the Gramme owners will make a rich haul. One of the most serious points made against the Gramme patent is that it was patented in Austria prior to the grant of the American patent, which Austrian patent has expired. Under the American law the American patent ceases with the expiration of the previously granted foreign patent for the same inventor; and if this patent has been clearly proven the decision must necessarily be adverse to the validity of the Gramme invention. It is expected that several weeks will elapse before the judgment of the court will be delivered.

NEW BORING MACHINE.

The engraving shows a very simple appliance for boring holes in wagon fellies, either radially or at any desired angle.

IMPROVED BORING MACHINE.

The frame which clamps on the felly carries an arm, having at the end a socket, in which is placed an eye that is adjustable up or down, and is clamped in any desired position by means of the set screw.

In this eye is placed a shaft having at one end a crank by which it may be turned, and at the other end a square socket adapted to the shanks of boring bits. It will be seen that by raising or lowering the eye that carries the bit shaft, the angle of the hole bored by the bit may be varied, and by clamping the device in different positions on the work to be bored, the holes may be made at any desired angle laterally.

This machine has been patented by Mr. Vincent Cox, of New Vienna, Ohio.

VELOCIPEDE SLEIGH.

The engraving shows an improved velocipede sleigh recently patented by Mr. James B. Bray, of Waverly, N. Y. The apparatus is to be ridden and propelled in a manner similar to that of the velocipede or bicycle. The backbone is supported by two pairs of runners, the front pair being swiveled. The propelling wheel is mounted in a forked frame swiveled in the backbone or main frame, and provided with spurs projecting from its periphery.

BRAY'S VELOCIPEDE SLEIGH.

The outer ends of the crank shaft are connected with the front runners, so that when the wheel is turned for steering, the front runners will turn in the same direction.

This velocipede sleigh is designed to secure a high speed on snow or ice.

Relief of Sea Sickness.

In spite of the fact that much has been written on the subject, people still continue to suffer from sea sickness, which proves the unreliability of our therapeutic resources. Therefore the following experience of Dr. T. M. Kendall, who has recently had 200 cases under his charge, may prove interesting:

Many people, as soon as sea sickness commences, have recourse to oranges, lemons, etc. Now oranges are very much to be avoided on account of their bilious tendency, and even the juice of a lemon should only be allowed in cases of extreme nausea.

Champagne, too, is a very common remedy, and, without doubt, in many cases does good; but this appears to be chiefly due to its exhilarating effects, as, if it be discontinued, the result is bad, and a great amount of prostration follows.

Creosote is a very old but still very good remedy, and, in cases accompanied by great prostration, is very useful; but if given in the early stages of sea sickness, it is often followed by very bad results, and even increases the nausea.

Bicarbonate of soda is useful in slight cases, as it relieves nausea, and checks the frequent eructations which often follow attacks of sea sickness; but, in severe cases, it is absolutely useless, and, in fact, it very often prolongs the retching.

A very good remedy in the earlier stages of sea sickness is a teaspoonful of *Worcester sauce*. How this acts I cannot say; but it, without doubt, relieves the symptoms, and renders the patient easier. Its action is probably of a stimulant nature.

Hydrocyanic acid is of very little service, and most acid mixtures are to be avoided, except that perhaps, for drinking purposes, when it is best to acidulate the water with a small quantity of hydrochloric acid.

Of all the drugs used, I found the most effectual was *bromide of sodium*. When bromide of sodium is given in doses of ten grains three times a day, the attacks entirely subside, the appetite improves, and the patient is able to walk about with comfort.

In all cases of sea sickness, it is very desirable that the patient should take sufficient food, so that at all times the stomach may be comfortably full, for by this means overstraining during fits of retching is prevented, and the amount of nausea diminished. The practice of taking small pieces of dry biscuit is not of much use; as, although the biscuit is retained by the stomach, yet the amount taken is never sufficient to comfortably fill the stomach. Soups, milk puddings, and sweets are to be avoided, as they increase the desire to be sick, and are followed by sickening eructations. Fat bacon is easily borne, and does much good, if only the patient can conquer his aversion to it. When taken in moderate quantity, it acts like a charm, and is followed by very good results.

But of all food, *curry* is the most useful in sea sickness, and is retained by the stomach when all other food has been rejected. Next to curry, I would place small sandwiches of cold beef, as they look nice on the plate, and are usually retained by the stomach.

In conclusion, I would advise that brandy should be used very sparingly, as, in many cases, it induces sea sickness; and its chief use is confined to those cases where the prostration is very great, and even then champagne is more effectual.

Penny Kites.

Some things made in New York are very dear—models for the Patent Office, for example, and good lamb chops, but some other things are excessively cheap—for instance, kites, which can be had for a cent a piece.

"The penny kite," said a dealer to a *Sun* reporter, "is a simple affair, but those unfamiliar with the business think it a marvel of cheapness. They are all alike in size and shape, but differ in color. The kite consists of a piece of paper and three slender sticks. The piece of paper is from one-eighth to one-sixth of a full sheet, a ream of which will weigh forty pounds. The paper costs seven cents a pound, so the piece for a kite costs about one-sixteenth of a cent. A foot of pine will make sticks for sixty kites. At the market rate for lumber they will cost about as much as the paper or a little more. The materials of the kite thus cost about one-eighth of a cent. Sometimes the paper is printed with a picture of a horse or a yacht, or some other fancy cut. This adds twenty-five cents a thousand to the cost, but gives a variety for the boys to choose from.

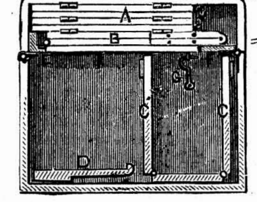
"The paper, cut to the right size, is piled on a table on one side of a girl. Two piles of sticks are at her other hand, and a pot of paste and a brush before her. She spreads out a piece of the paper, and runs the paste brush around the edge. Then two of the longer sticks are laid on in the form of an X. Across the cross of the X a shorter one is laid. Then the pasted edges of the paper are folded over, inclosing the ends of the sticks. The completed kite is laid away to dry. Cost for labor, one-sixteenth of a cent. Cost of the kite, three-sixteenths of a cent. Some cost as high as three-fifths of a cent, but they sell no better than the others. There is a fair margin of profit all around."

Two New Tunnels and One Bridge.

The London Metropolitan Board of Works has unanimously determined to ask the sanction of the House of Commons for the construction of a low-level bridge across the Thames immediately eastward of the Tower. Sir Joseph Bazalgette has been instructed to prepare designs for this in substitution for the plans for a high-level bridge, which he submitted some months ago. It has been resolved also to seek powers to construct two great tunnels under the river, easily accessible for all kinds of traffic. The points selected for the construction of these important works are Shadwell and Blackwall, and the designs for them are already completed by Sir Joseph Bazalgette.

COMBINED TRUNK AND WARDROBE.

The engraving shows a very ingenious combination which enables the traveler to avail of at least one of the conveniences of home, and that is a wardrobe, wherein may be hung the various articles of clothing which are carried in the trunk. The trunk in this case forms one part of the



COMBINED TRUNK AND WARDROBE.

wardrobe, and incloses the other parts, which may be easily and quickly put into position to form a wardrobe. Most of the parts required in addition to the trunk itself to form the wardrobe are carried in the trunk cover, as shown in the sectional view. The boards, A B, forming the sides and back of the wardrobe, are compactly folded together in the trunk cover, and the doors, C, are packed with the clothing in the body of the trunk.

Hooks on which the clothing is to be hung are hinged in recesses in the back, and when the wardrobe has been formed they are swung out for use. The doors are provided with locks, so that the wardrobe is in every way as complete, secure, and convenient as those of the usual pattern.

This invention has been patented by Mr. Alphons Dryfoos, of New York city.

WIRE ROPE TOWAGE.

We have from time to time given accounts in this journal of the system of towage by hauling on a submerged wire rope, first experimented upon by Baron O. De Mesnil and Mr. Max Eyth. On the river Rhine the system has been for many years in successful operation, and we this week publish from *Engineering* a view of one of the wire rope tug boats of the latest pattern adopted.

Our contemporary gives the following particulars:

The Cologne Central Towing Company (Central Actien-Gesellschaft für Tauerei und Schleppschifffahrt), by whom the wire rope towage on the Rhine is now carried on, was formed in 1876, by an amalgamation of the Rührorter und Mülheimer Dampfschleppshifffahrt Gesellschaft and the Central Actien-Gesellschaft für Tauerei, and in 1877 it owned eight wire rope tugs (which it still owns) and seventeen paddle tugs. The company so arranges its work that the wire rope tugs do the haulage up the rapid portion of the Rhine, from Bonn to Bingen, while the paddle tugs are employed on the quieter portion of the river extending from Rotterdam to Bonn, and from Bingen to Mannheim.

The leading dimensions of the eight wire rope tugs now worked by the company are as follows:

	Tugs No. I. to IV. Meters. ft. in.	Tugs No. V. to VIII. Meters. ft. in.
Length between perpendiculars..	39=126 0	42=137 10
Length over all.......	42·75=140 3	45·75=150 1
Extreme breadth............... ..	7·2 = 23 8	7·5 = 24 5
Height of sides....	2·38= 7 11	2·38= 7 11
Depth of keel	0·12= 0 5	0·15= 0 6

All the boats are fitted with twin screws, 1·2 meters (3 feet 11¼ inches) in diameter, these being used on the downstream journey, and also for assisting in steering while passing awkward places during the journey up stream. They are also provided with water ballast tanks, and under ordinary circumstances they have a draught of 1·3 to 1·4 meters (4 feet 3 inches to 4 feet 7 inches), this draught being necessary to give proper immersion to the screws. When the water in the Rhine is very low, however, the water ballast is pumped out and the tugs are then run with a draught of one meter (3 feet 3⅜ inches), it being thus possible to keep them at work when all other towing steamers on the Rhine are stopped. This happened in the spring of 1882.

Referring to our engraving, it will be seen that the wire rope rising from the bed of the river passes first over a large guide pulley, the axis of which is carried by a substantial wrought iron swinging bracket, this bracket being so pivoted that while the pulley is free to swing into the line on which the rope is approached by the vessel, yet the rope on leaving the pulley is delivered in a line which is tangential to a second guide pulley placed further aft and at a lower level. This last named guide pulley does not swing, and from it the rope is delivered to the clip drum, over which it passes. From the clip drum the rope passes under a third guide pulley; this pulley swings on a bracket having a vertical axis. This third pulley projects down below the keel of the tug-boat, so that the rope on leaving it can pass under the vessel without fouling. Suitable recesses are formed in the side of the tug-boat to accommodate the swinging pulleys, while the bow of the boat is sloped downward nearly to the water-line, as shown, so as to allow of the rising part of the rope swinging over it if necessary.

The hauling gear with which the tug is fitted consists of a pair of condensing engines with cylinders 14·17 inches in diameter and 23·62 inches stroke, the crankshaft carrying a pinion which gears into a spur wheel on an intermediate shaft, this shaft again carrying a pinion which gears into a large spur wheel fixed on the shaft which carries the clip drum. In the arrangement of hauling gear above described the ratio of the gear is 1 : 8·44, in the case of tugs Nos. I. to IV.; while in tugs Nos. V. to VIII. the proportion has been made 1 : 11·82. In tugs I. to IV. the diameter of the clip drum is 2·743 meters (9 feet), while in the remaining tugs it is 3·056 meters (10 feet).

From some interesting data which have been placed at our disposal by Mr. Thomas Schwarz, the manager of the Central Actien-Gesellschaft für Tauerei und Schleppschifffahrt, we learn that in the tugs Nos. I. to IV. the hauling engine develops on an average 150 indicated horse, while in the tugs No. V. to VIII. the power developed averages 180 indicated horse power. The tugs forming the first named group haul on an average 2,200 tons of cargo, contained in four wooden barges, at a speed of 4½ kilometers (2·8 miles) per hour, against a stream running at the rate of 6½ kilometers (4·05 miles) per hour, while the tugs Nos. V. to VIII. will take a load of 2,600 tons of cargo in the same number of wooden barges at the same speed and against the same current. In iron barges, about one and a half times the quantity of useful load can be drawn by a slightly less expenditure of power.

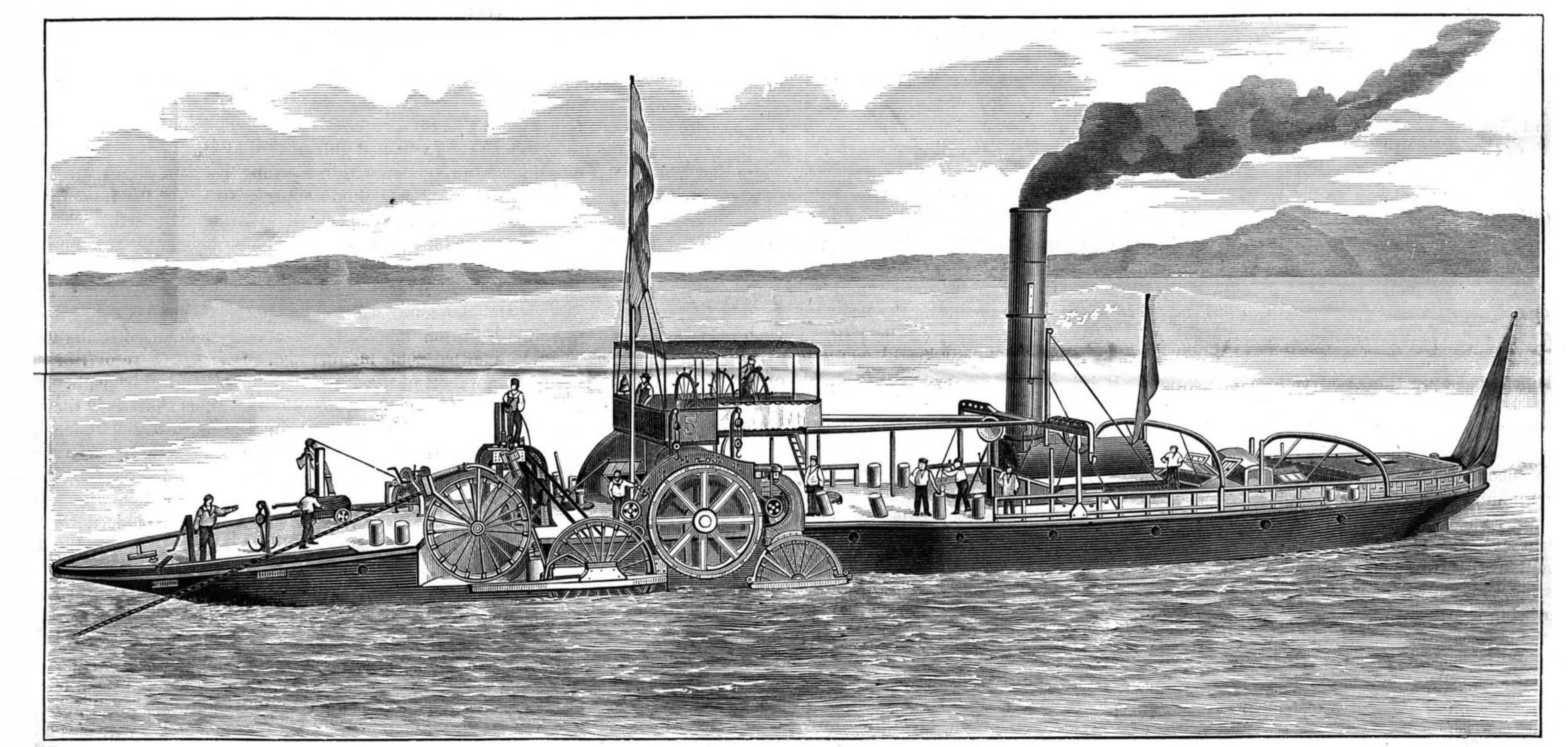
The average consumption of coal per hour is, for tugs Nos. I. to IV., 5 cwt., and for tugs Nos. V. to VIII., 6 cwt.; and of this fuel a small fraction (about one-sixth) is consumed by the occasional working of the screw propellers at sharp bends. The fuel consumption of the wire rope tugs contrasts most favorably with that of the paddle and screw tugs employed on the Rhine, the best paddle tugs (with compound engines, patent wheels, etc.) burning three and a half times as much; the older paddle tugs (with low pressure non-compound engines), four and a half times as much; and the latest screw tugs, two and a half times as much coal as the wire rope tugs when doing the same work under the same circumstances. The screw tugs just mentioned have a draught of 2½ meters (8 feet 2½ inches), and are fitted with engines of 560 indicated horse power.

During the years 1879, 1880, and 1881, the company had in use fourteen paddle tugs and ten eight-wire rope tugs, both classes being—owing to the state of trade—about equally short of work. The results of the working during these years were as follows:

Class of tugs.	Year.	Freight hauled in ton-miles.	Cost of haulage in pence per ton-mile.	Degree of occupation.
Paddle...	1879	31,862,858	0·1272	0 686
"	1880	31,467,422	0·1305	0·638
"	1881	28,627,049	0·1245	0·537
Wire rope...........	1879	15,407,935	0·1167	0·614
"	1880	17,289,706	0·1056	0·615
"	1881	17,593,181	0·0893	0·536

The last column in the above tabular statement, headed "Degree of Occupation," may require some explanation. It is calculated on the assumption that a tug could do 3,000 hours of work per annum, and this is taken as the unit, the time of actual haulage being counted as full time, and of stoppages as half time. The expenses included in the statement of cost of haulage include all working expenses, repairs, general management, and depreciation. The accounts for 1882, which are not completely available at the time we are writing, show much better results than above recorded, there being a considerable reduction of cost, while the freight hauled amounted to a total of 54,921,965 ton-miles.

As regards the wear of the rope, we may state that the relaying of the first rope between St. Goar and Bingen was taken in hand in September, 1879, while that between Obercassel and Bingen was partially renewed the same year, the renewal being completed in May, 1880, after the rope had been in use since the beginning of 1876. The second rope between Bonn and Bingen, a length of 74¾ miles, is of galvanized wire, has now been 2¾ years in use, during which time there have been but three fractures. The first rope laid was not galvanized, and it suffered nine fractures during the first three years of its use. The first rope, we may mention, was laid in lengths of about a mile spliced together, while the present rope was supplied in long lengths of 7½ miles each, so that the number of splices is greatly reduced. According to the report of the company for the year 1880, the old rope when raised realizes about 16 per cent of its original value, and allowing for this it is calculated that an allowance of 18·7 per cent per annum will cover the cost of rope depreciation and renewals. Altogether the results obtained on the Rhine show that in a rapid stream the economic performances of wire rope tugs compare most favorably with those of either paddle or screw tug-boats, the more rapid the current to be contended against the greater being the advantage of the wire rope haulage.



WIRE ROPE TUG BOAT, RIVER RHINE.

Neglect of House Cisterns.

In his report on the London water supply during June Colonel F. Bolton says: "It appears to be the rule in building a certain class of houses to place the cistern over the water closet, with an untrapped waste pipe communicating with the drains. Cisterns and water butts are in many instances left open and regularly receive the drippings from the roofs and gutters, may be seen without lids, full of rank and decaying vegetation, which on closer examination would show more or less organic deposit, and under the microscope would be found to abound in infusorial life. They are often in close proximity to the dust bins and other deposits of filth and garbage, while children amuse themselves by throwing all sorts of dirty rubbish into the water. The purest water in England would be poisoned by such a system of storage. A remedy for this state of affairs will be found in the establishment of the constant supply and the consequent total abolition of the intermittent system; meanwhile, and until this constant supply is completed, the owners and occupiers of houses are highly culpable in permitting such a disgraceful condition of things to exist. In the better class of houses and in many public buildings the cleansing of cisterns and tanks—often placed in positions extremely difficult of access—is frequently neglected for months, and in some cases years are permitted to pass without any examination or cleansing taking place. All cisterns and other receptacles should be frequently cleaned out, and every care should be taken to prevent the contamination of the domestic supply after delivery.

Reappearance of the Great Comet of 1882.

It appears quite possible, says *Nature*, that as the moon draws away from the morning sky toward the end of the present month, this comet may be again observed with our larger instruments. Its distance from the earth has been increasing from soon after perihelion passage in September last, and a maximum takes place at the beginning of September next, when the distance is 5·988; the earth then for a time overtakes the comet, and the distance diminishes to 5·709 on December 1. The intensity of light, however, is greatest at the end of August, and the comet then rises at a sufficient interval before the sun to render observation feasible. It will at least be of much interest to ascertain if the comet can be reached with our most powerful telescopes. The only comet which has been hitherto observed under similar conditions is the celebrated one of 1811, which, it may be remembered, was observed by Wisniewsky at Neu-Tscherkask, in August, 1812.

ASPECTS OF THE PLANETS FOR SEPTEMBER.

VENUS

Is morning star until the 20th, and then evening star for ten months to come. On the 20th, at 6 o'clock in the evening, she is in superior conjunction with the sun. This is the most interesting event in the month, and gives the Queen of the Stars the place of honor on its planetary record. It has taken this untiring traveler over the celestial road since the 6th of last December to reach the opposite portion of her orbit, as seen from the earth.

She was then—the time of her long-to-be-remembered transit—in inferior conjunction, passing directly between us and the sun, with her dark side turned toward us, as very many observers, who saw her making her way over the sun's disk, had the pleasure to behold.

At superior, or outer, conjunction she will pass beyond the sun, at a distance from the earth of 160,000,000 miles, and if she were not hidden in the sun's rays, would present the appearance of a small round disk, 10 inches in diameter. At inferior, or inner, conjunction she passes between us and the sun, at a distance of 25,000,000 miles, and is usually invisible, her dark side being turned toward us. Her disk is then 60 inches in diameter, and, if her illuminated side were turned toward instead of from the earth, we should behold a superb young moon whose dazzling brilliancy would pale the luster of the stars. Since inferior conjunction, she has oscillated westward from the sun, reaching her extreme western elongation, and retracing her steps toward him. Though Venus is but 112 days in making half her revolution around the sun, it takes her 292 days, or about ten months, to complete half of her synodic period, or reach the point where she, the sun, and the earth are in the same straight line. While she is moving in her orbit at the rate of 21 miles a second, the earth is moving, in a much larger orbit, at the rate of 18 miles a second. Therefore 292 days are required to bring them into line, and 584 days must pass before a synodic revolution is completed.

These points being fixed in the mind, the brilliant course of Venus for the next ten months is easily followed. After superior conjunction, on the 20th, she passes from the sun's western to his eastern side, and becomes evening star. For a month or two she will be so close to the sun as to be invisible, but in November sharp eyes will pick her up as a small, brilliant star, shining, in the western twilight, for a short time after sunset. She will be superb in the winter evenings as she oscillates eastward toward elongation, and the midsummer of another year will pass before, retracing her steps toward the sun, she comes again to inferior conjunction. There are four epochs to be impressed upon the memory in tracing the movements of the inferior or inner planets. These are, inferior conjunction, western elongation, superior conjunction, and eastern elongation. It is easier to follow the course of Venus while evening star, for it does not require the exertion of early rising to reward observation. Students will therefore begin to anticipate her reappearance in November, and can easily follow her progress with an intelligent comprehension of the reasons that result in her apparently devious path.

On the 17th, at 11 o'clock in the morning, Venus is in conjunction with Uranus passing 45' north. The event is interesting, as it shows the proximity of the two planets, the former being nearly ready to pass to the sun's eastern side, while the latter has just passed to his western side.

The right ascension of Venus is 10 h. 53 m.; her declination is 11° 30' north, and her diameter is 10".

Venus rises on the 1st at 5 o'clock in the morning; on the 30th, she sets a few minutes before 6 o'clock in the evening.

URANUS

is evening star until the 16th, when he joins the company of morning stars, thus reversing the role that Venus plays during the month. On the 16th, at 7 o'clock in the evening, he is in conjunction with the sun. After conjunction, he appears on the western side of the sun and becomes morning star. All the outer planets of the system are then on the sun's western side, and all are traveling with varying speed toward opposition in the following order of precedence: Neptune leads the brotherhood, rising on the 16th at half past 8 o'clock in the evening. Saturn follows at half past 9 o'clock. Mars appears a few minutes before midnight. Jupiter takes his turn at 1 o'clock in the morning, and Uranus brings up the rear, closely hugging the sun. Venus and Uranus illustrate the difference between the superior conjunction of an inner planet and the conjunction of an outer planet. In the former case, Venus seems to pass from the sun's western side to his eastern. In the latter case, Uranus seems to pass from the sun's eastern side to his western. In reality, the planets all revolve around the sun from west to east, their apparent movements being due to the fact that they are viewed from the earth, which is a moving observatory. Viewed from the sun their movements would be much less complicated.

The right ascension of Uranus is 11 h. 35 m., his declination is 3° 31' north, and his diameter is 3·4".

Uranus sets on the 1st at 7 o'clock in the evening; on the 30th, he rises ten minutes before 5 o'clock in the morning.

SATURN

is morning star. On the 2d at 3 o'clock in the morning he is in quadrature with the sun, the second of the great planets to reach this epoch in his course, the half-way house in his progress from conjunction to opposition. He is becoming an object of exceeding interest to observers, for, rising now at half-past 10 o'clock, and at the end of the month at a quarter before 9 o'clock, he may be seen peering above the horizon without requiring the observer to encroach on the hours devoted to sleep to gain a view of his serene and softly-shining disk. He may be recognized by his vicinity to Aldebaran and the Pleiades, and by the color of pale gold that distinguishes him from his brother planets. Beautiful as is his present appearance among the stars, he will continue to increase in size and brilliancy until the last of November, when he reaches the culminating point for the present year.

The right ascension of Saturn is 4 h. 33 m., his declination is 20° 3' north, and his diameter is 17·2".

Saturn rises on the 1st at half-past 10 o'clock in the evening; on the 30th, he rises a quarter before 9 o'clock.

MARS

is morning star. On the 21st, at 11 o'clock in the morning, he is in conjunction with Delta Geminorum, a star of the third magnitude in the constellation of the Twins, being 49' north. He will be near the star on the early morning of that day, and may be recognized by his ruddy color and his position a few degrees southwest of Castor and Pollux. His increasing size and brightness are so slight as to be scarcely perceptible. Indeed, he is never impressive excepting when at opposition and for a month before and after. As his opposition does not occur until January, 1884, we must wait until nearly that time to see the Martian planet under favorable conditions.

The right ascension of Mars is 6 h. 23 m., his declination is 23° 37' north, and his diameter is 6·2".

Mars rises on the 1st soon after midnight; on the 30th, he rises at half past 11 o'clock in the evening.

MERCURY

is evening star during the month. On the 11th, at 3 o'clock in the morning, he reaches his greatest eastern elongation, and is 26° 49' east of the sun. Though nearly at his maximum distance from the sun, it will be difficult to find him on account of his southern declination. On the 11th, Mercury sets at 7 o'clock, about three-quarters of an hour after sunset. It will take sharp eyes to discern him in the west at that time and for a few days before and after. But it is the last time he will be visible as evening star during the year. He may be looked for a few degrees west of Spica, and nearly 13° south of the sunrise point.

The right ascension of Mercury is 12 h. 11 m., his declination is 2° 30' south, and his diameter is 6".

Mercury sets on the 1st at twenty minutes after 7 o'clock in the evening; on the 30th, he sets a few minutes before 6 o'clock.

JUPITER

is morning star. He contributes scarcely anything to the incidents of the month, though he plays the leading part in its scenic effects. Beaming with tremulous light, he shows his princely face above the horizon shortly before 2 o'clock in the morning, and on moonless nights shines without a rival, leading the host of heaven as he rises to the zenith, which he fails to reach before his lesser light is hidden in the sunbeams. Well may we be proud of this grand member of the system, and much do we hope to learn of his constitution from the view he will present in the telescope when he draws nearer to the earth, in his annual sweep around the sun.

The right ascension of Jupiter is now 7 h. 50 m., his declination is 21° 12' north, and his diameter is 31·8".

Jupiter rises on the 1st, about a quarter before 2 o'clock in the morning; on the 30th he rises about a quarter after 12 o'clock.

NEPTUNE

is morning star. His claims to notice are that he is the first to rise, and the nearest to opposition among the morning stars.

The right ascension of Neptune is 3 h. 16 m., his declination is 16° 19' north, and his diameter is 2·6".

Neptune rises on the first at half past 9 o'clock in the evening; on the 30th he rises about half-past 7 o'clock.

THE MOON.

The September moon fulls on the 16th at thirty-three minutes past 4 o'clock in the evening, Washington mean time. The new moon of the 1st is in conjunction with Uranus on the 2d and with Mercury on the 3d. The full moon of the 16th is very near Neptune on the 20th, being 10' north. On the 21st she is in conjunction with Saturn, being 1° 14' south. In some portions of the southern hemisphere Saturn is occulted at this time for the sixth time during the year. The beautiful phenomenon has not once been visible at Washington, nor at many points adjacent. On the 24th, the waning moon pays her respects to Mars, on the 25th to Jupiter, and on the 30th to Uranus for the second time. Thus this ponderous sphere sails majestically through space, drawing near on her way to the more important members of the solar brotherhood. She takes on her most distinguished aspect during September, for she appears as the lovely Harvest Moon, rising for several successive nights with a comparatively small average difference in the time of her appearance above the horizon.

September plays a noteworthy part on the annual planetary record. Venus reaches inferior conjunction, the preparatory step that will make her the peerless starry gem of the evening sky for months to come. Uranus arrives at conjunction, and joins the whole array of outer planets congregated on the sun's western side as morning stars. Saturn is in quadrature, and grows brighter and draws nearer at every appearance. Mars contributes to the show his conjunction with Delta Germinorum. Mercury appears for a short time in the glowing west, his last evening exhibition for the year. Jupiter foreshadows the glory of his later reign. The sun himself takes on one of his most attractive phases, when on the 23d he reaches the autumnal equinox, and in serene equipoise illumines the earth from pole to pole.

The Barometer.

While no instrument of weather research has figured more conspicuously than the barometer, there is perhaps none the indications of which are less understood. As its name imports, it is a *measurer* of *weight* (but exclusively of the weight of the atmosphere), and only indirectly can it be made to serve the purpose of a "storm glass" or weather guide. At an early date it was known that air, though invisible to the eye, is really a substantial body possessing weight, and the familiar experiment of weighing a glass globe before and after the air in it is exhausted by an air-pump was made to demonstrate the fact. But the barometer is designed, not to weigh given quantities of air, but to weigh the atmosphere itself, or a column of air reaching from the earth's surface to the uppermost limit to which the atmosphere extends above the instrument.

The weight of a column of the atmosphere was first ascertained by the Italian philosopher Torricelli, a pupil of Galileo, in 1643. Galileo had observed that water would not rise in a pump more than 34 feet above the level of the water in the well, but vainly endeavored to explain the phenomenon. Torricelli took a glass tube, about three feet long, closed at one end and filled with mercury, then, placing his finger over the open end, inverted it, and plunged it in an open basin filled with mercury. When the inverted tube was held erect and his finger removed, the experimenter found that the mercury in the tube sank until its upper surface was just 30 inches above the mercury in the basin, remaining stationary, and leaving a vacuum in the top of the tube. He explained this result by the theory that the 30 inches of mercury within the tube was kept up, balanced by the weight of the column of air pressing on the mercury in the open basin. The actual proof that Torricelli's was the correct explanation was given not long after by Pascal, whose brother-in-law, Perrier, in 1648, at his request, carried the apparatus to the summit of the French mountain Puy de Dôme, about 3,500 feet above the sea, and found that at that elevation the column of mercury supported in the tube was only 27 inches, because at that level a tenth part of the whole weight of the atmosphere had been left beneath.

While the weight of the atmosphere, as shown by the oscillations of the mercury in the barometric tube, varies with its position above the sea level, it also varies greatly at the same level. "We live," says Herschel, "under an ocean of air, which has its currents, which are winds, its waves, of vast extent, not visible indeed to the eye, but capable of being made so to the intellect by the barometer, and its tides, due to the action of the sun and moon." The pulsations of this aerial ocean are as well marked by the barometer as those of the seas and rivers are by the tide gauge in our harbors. Even at the sea level the height of the mercurial column in the barometer ranges from about 27·50 to 31·50 inches, under the alternation of cyclonic and anti-cyclonic conditions. But these are extremes observed, respectively, only in ocean hurricanes and in the frozen wastes of Central Asia in midwinter. The average height of the barometer, however, is very different in different parts of the globe, and in different seasons. These we need not specify. At Philadelphia, mean normal barometric pressure, observed by the Signal Office, is, taking the year round, 30·01 inches; for winter, 30·07; for spring, nearly 29·97; for summer, 29·96; for autumn, 30·04 inches. Besides these yearly fluctuations, there is also a daily variation of the barometer—entirely independent of storms—and though the daily variation is slight, it is very regular (being marked by a *rise* of the mercury near the hours of 10 A. M. and 10 P. M., and a *fall* about 4 P. M. and 4 A. M.). So regular are these diurnal variations of pressure within the tropics, that Humboldt thought that the hour of the day could be inferred from the height of the mercury, to within fifteen or sixteen minutes.

The results of such fluctuations of air pressure over any portion of the earth's surface are, of course, extensive and violent commotions of the great gaseous sea. When these fluctuations are gradually produced by the slow accretion or withdrawal of sun heat, as in the change of seasons, the result is a reversal or change of direction of the prevailing winds. Over a region in which the barometric pressure is higher than 30·00 inches the air is dense and *massed up*, so that, by its own gravity, it will spread out or run in all directions toward adjacent regions in which the pressure is lower and the resistances can be overcome by the force of its own gravity. If the air pressure, therefore, at any time is, say, 30·60 inches over Minnesota and only 29·50 over Louisiana, it is clear that the air masses over Minnesota will move southward, causing northerly winds in the Mississippi Valley. If, however, at the same time the air pressure over Ontario was still lower (say 29·00 inches), the aerial stream from Minnesota would gravitate more readily and more rapidly eastward into Canada. It is the change in the weight of the atmosphere over any geographical area which gives rise to storms—a diminution of pressure forming a partial vacuum into which the air from all sides rushes, forming the cyclone, with ascending air in its center; while an increase of pressure originates the anti-cyclone, with its descending currents. In general, as Professor Haughton puts it, "*A line of low barometric pressure will correspond to ascending currents in the atmosphere, and a line of high barometric pressure will correspond to descending currents in the atmosphere.*"

The principle of gauging atmospheric waves by the barometer depends on the fact that the column of mercury in its tube always weighs as much as a column of air having the same diameter as the bore of the tube, and reaching from the bottom (or cistern) of the instrument to the uppermost limit of the atmosphere, far above cloudland. Were the tube filled with water, leaving a vacuum in its upper part, the column of water kept up by the air pressing on its base, at the lower end of the tube, would be about 34 feet high near the sea-level, instead of 30 inches, as in the mercury-filled barometer. The principle on which the fluid oscillates with varying pressure depends, of course, on obtaining a vacuum in the top of the barometric tube; the ordinary pump, on the same principle, raises water from the well when a vacuum is created in the pump-log by forcing the pump handle downward.

The simplest form of the barometer is a glass tube of large bore standing vertically in a cistern of mercury, the height of the mercury in the tube above the level of the mercury in the cistern being read off by the aid of a graduated scale placed beside the tube. This is the form of the "Standard" barometer used at Kew Observatory, England. In ordinary barometers the scale (of brass) is attached to the frame in which the tube is secured, the scale having been divided into inches, tenths of inches, and lesser fractions.

Another form of barometer is the "aneroid." In this form of barometer the air pressure is simply measured by its effect on a small, air-tight metallic box (made by soldering together two disks of corrugated German silver), from which the air has been exhausted. When the pressure of the atmosphere is heavier than the normal, the top of the box is pressed inward; when the pressure falls lower, the top of the box is forced outward by a spring which acts in opposition to the movement of the vacuum chamber. These movements of the lid of the metallic box are transmitted by delicate multiplying levers and a small chain to an index, which moves over a circular graduated scale, and thus shows the pressure changes. This instrument is so handy that it may be carried in the pocket.

As the scientific investigation of weather phenomena progresses, there is an increasing need for the employment by all observers of mercurial barometers corrected and frequently compared with a standard. At sea a single faulty barometer may give a reading which when entered on the "weather chart" may prove misleading as to the form and intensity of a cyclone under investigation, while on land a single incorrect barometer reading may deprive the meteorologist of the most important datum he can have for forecasting a dangerous storm.—*Phila. Ledger.*

A Fearfully Destructive Tornado.

A tornado passed over portions of Winona and Dodge Counties, Minnesota, on the evening of August 21, that destroyed residences, elevators, public and other buildings, a railroad bridge, and a moving passenger train on the Rochester (Minn.) and Northern Division of the Chicago and Northwestern Railroad, the accident occurring near Zumbrota, Minn. The train, running at a high rate of speed, was caught in the wind storm and lifted from the track. Every car of the train was a complete wreck, and was almost literally shattered to pieces by the sudden stop caused by the train's leaving the rails, burying the unfortunate passengers beneath the debris, killing many, and injuring nearly every person on the train. The number of dead from passengers on this train has been estimated at not less than twenty, and of the injured eighty more. In Rochester, Minn., three hundred houses were demolished and two hundred more were damaged.

A Meteor in New York Bay.

On the evening of August 21, as one of the Staten Island ferryboats was approaching Governor's Island, a large white colored meteor shot across the horizon and burst with a loud report so close to Bedloe's Island that it seemed as if some of the matter—if there was any—of which the aerial missile was composed, must have landed amid the tree tops where the great statue will soon stand. Only the evening star was visible in the sky when the meteor appeared. One of the fleet of the Iron Steamboat Company was passing near Bedloe's Island at the time, and the three electric lights on board were easily compared in color with the low-reaching meteor. The latter looked much more clear and white, and gave the electric light a yellowish hue.

Something New in Street Cars.

On the Hamburg tramways a number of cars with flangeless wheels, much like omnibuses, and with turning gear, are working. To run on the lines, these cars are fitted with a shaft in front of the front wheels, this shaft carrying on a lever a disk wheel which the driver can lower into the tramrail groove as he requires, or raise it when it is necessary to get out of the way of obstructions. The arrangement works well, saves a lot of trouble, and the cars run easier than those with flanged wheels.

Correspondence.

The Storage of Wind Power.

To the Editor of the Scientific American:

I have been reading with interest the several articles published in your paper on the "Storage of Wind Power," have made several inventions in that line myself, and therefore beg leave also to offer my mite.

My idea of wind force is this: were the available energy of the wind that passes over the roof of a manufactory, through a space of 10 feet in height, utilized, it would be sufficient to run all the machinery therein, or, in other words, *the force of the wind is sufficient to run all machinery.*

Deep valleys are perhaps the only places where there is a scarcity of wind, and yet it would be an easy matter to transmit power from wind wheels on the adjoining hills. Here the All-wise Creator has also provided an auxiliary power, for where is there a valley without a stream?

But an accumulator is needed. Several days often pass without a strong breeze.

W. O. A. has certainly given some very practical hints, although the idea of dynamizing it into electricity can hardly be considered at present.

The compressed air plan, of the two, is the most feasible, but the great drawback is the cost of the plant.

I had thought of the plan suggested by Mr. Davis some time ago, but came to the conclusion that it is of no practical value.

For instance, take a manufactory 30 feet high. I would have to raise a weight of 355 T, approximately 360 T in practice, to this height, to accumulate one horse power for one working day (twelve hours).

It can readily be seen how much weight and space it would take to accumulate sixty or seventy horse power. This plan would also be very expensive. By substituting large steel springs for the weight, I could save space, and, I think, expense; this may be illustrated by clocks, etc. This plan seems practical. Some day I intend to give it a fair trial.

D. H. BAUSMAN.

Lancaster, Pa. August 17, 1883.

Fish Ponds for Farms.

A writer under the *nom de plume* of Norman, in the *Prairie Farmer*, gives its readers some practical information as to the construction of inexpensive fish ponds and how to stock them. We make the following extracts from the above source:

Having indicated the possibility of farms having a pond for fishes and enjoying a dish of sweet fish at times, we want to show how this can be done at little expense and labor. We stated in a previous letter, says the writer, that an acre of water can be made to produce more than an acre of land. A farmer writing to an Ohio paper says:

"We write from practical experience in this matter, having in earlier days caught many a nice string of fish in a pond that was formerly a swamp. During one day in August, the owner, with two of his boys, went in it with a plow, road scraper, and shovels, and in a short time had a pond of nearly an acre in extent. This he stocked with fish common to the sluggish streams of the neighborhood, and procured others at some distance from the farm. For years thereafter it proved to be the best acre on the farm."

While we do not advocate so cheaply made a pond as this, mainly on the principle that "that which costs nothing is of no value," still, this is better than no pond, and if a few trees and flowering shrubs are planted around it would make a pleasant, shady spot in the summer heat. If some aquatic plants are put in the bottom of the pond, they will furnish food for fish, and produce flowers on the surface. Your unsightly swamp or slough becomes a picture as well as a means of enjoyment and profit. Where springs exist, as described in my previous letter, some means must be provided to carry off the surplus water, especially if the lower portion of the pond is a deep ditch or slough. Let this be gradually shaped to an oval form, leaving about six feet wide to form your dam. If the head of your water will not exceed five feet, a simple dam and embankment of clayey earth will be sufficient. Let the dam be solidly constructed by putting a tree across for the breast work. Square up this piece of timber, and let it be of sufficient length to be embedded into the earth some feet on each side of the ditch or dike. For the dam get good solid boards, set upright edge to edge. If hardwood planks can be obtained, elm or alder wood, so much the better will your dam be built. We should advise a bottom stringer to be put in; a tree squared up will form the best support. Inside this stringer dig a ditch two feet deep, and let the planks come to the bottom of this trench; puddle and ram them into position with clay and make a firm bottom. Build up an inclined slope of clay and stones. As you ascend, puddle and beat the clay into position against the planks. Get your road scrapers to work, and on this clay run up some of the mud and silt from the bottom of the pond. This all will give you a dam with a pond that will increase the value of your farm. A trough or sluice must be provided to carry off the surplus water. Experiments must govern you in its construction. A simple trough, a foot wide, four inches deep, will carry off a large quantity of water. Let the top of your dam around the wings be well rammed and beaten with clay, so as to prevent any leakage of water.

Into such a pond it will be necessary to put a few aquatic plants of such kind as will attract flies and larvæ, thus enabling young fish fry to obtain food in a natural state. Also plant willows near the dam. The roots will spread into the earth, binding it together, and also provide hiding places for the young fish.

Our readers will recall the fact that to successfully increase fish and keep them up to a good standard in size, we must provide proper food for them. We do this by putting in minnows and fish of such kinds as are prolific, yet of small value as food fishes. These in turn will "form food for fishes." To feed these minnows we put in aquatic plants that attract insects. We will name a few that are common: Potamogeton, Myriophyllum (water millfoil), Utricularia (bladder wort), common water lily, Polygonum, Amphibium, Pennsylvanicum, Nasturtium officinale (water cress), Zizania aquatica (water oats, or Indian rice), Sagittaria (arrowhead), a fine calla-like growing plant.

If we wish to introduce some insect life in our pond, we examine the weeds pulled from the bottom of some neighboring lake or stream, and find them teeming with minute creatures. Let us watch the minnows and small fry around these weeds! How carefully they nose around them, pushing the leaves aside. These minnows live on these infusoria. Pull a bucketful of the weeds, carry them to your pond, lay the roots on the soft mud, put a stone across the roots, and you will find the weeds soon growing. The few minnows we have put in have found the weeds and are getting a feast. Your minnows will increase and multiply. Get some yellow perch, a few pickerel, and half a dozen small bass. We cannot commend the sun fish, simply because he is a cheeky gormand, snapping up everything that comes across his way, having a decided fondness for spawn of all kinds. There are better fish to be had, but he has one advantage to commend him—he will live in almost any water.

The best table fishes for ponds having springs in them are the bass, the yellow perch, and pickerel; put in a few bullheads or pouts; they are good food fry.

Many farms in these times have a windmill on them for furnishing water for stock, and supplying the house from the well instead of the laborious pumping by hand. By all means lay on a pipe to the fish pond. It will pay. The fish named will live in water pumped from the well even though impregnated somewhat with sulphur or iron. Perhaps the soil on a farm may be gravelly, and not bearing soil in which the small blood red worms are found; such soil needs "stocking." From some stream or lake we dip up a paddle full of mud. A careful examination proves it to be full of minute worms and other forms of infusorial life. Deposit some of this mud in your pond, and you have fish food for another class of fry. Let us follow nature in her plan. Her courses are simple, few, and generally direct. She adopts a means to an end, and varies little in her aims.

It is useless to attempt to stock a pond with trout, because these love the dashing, seething brook. It is useless to put the carp in a pond with the bass family, because the latter are a carnivorous family, and must live on fish fry. The carp must be bred in ponds especially prepared for them, and after breeding must be kept separate from the young fry.

Finally, keep your pond clean. Do not make it a place for the cattle to wade in and drop their excrements. In time, put a fence around it. Plant some species of pines near to it. A few maples or rock elms will add to its beauty and afford a graceful shade. Plant some willows along its sides close to the water. These, overhanging, will afford the fish a shadow from the sun's rays, and their roots will make a good spawning bed; though a proper bed should be made in season and left in the water. A mat of brush fastened in a framework of wood, and sunk to the bottom, forms a good spawning bed for members of the perch family.

Let some attention be given every spring and fall to your pond. Repair all damages. Look to your "finny stock," sometimes feed with carcasses that are the "results of accidents" on every farm. Let this be done in nature's own way. Drive a stake into a pond to fasten such things to, and in a few hours the swarms of fish in your pond are looking for maggots, of which they are very fond.

Let me counsel in conclusion: Never allow a net to be cast in your pond. Teach your boys and girls to take their fish in the correct manner "with rod and line." If the fish increase too rapidly, then have a family picnic; invite your friends and neighbors, and have a grand, good time cooking your fish near the pond, and have one good day's sport beside this best acre on your farm.

Effects Produced by High Pressures.

M. Friedel, having contested the announcement of M. Spring that a pressure of 5,000 atmospheres exerted upon amorphous pulverulent matters causes them to become aggregated into crystalline masses, MM. E. Jannettaz, Neel, and Clermont determined to repeat his experiments, using pressures of from 6,000 to 8,000 atmospheres. They operated upon pulverized antimony, bismuth, zinc, iron, tin, copper, and lead, Darcet's alloy and brass, lead, and zinc sulphides, sodium lead and mercurous chlorides, mercuric iodide, magnesia, alumina, silica, chalk, and copper sulphate. All these powders were agglutinated into solid masses, but even those which acquired some degree of transparency were not crystallized. Many of the substances, however, such as steatite, graphite, clays, and metals, acquired a schistous structure, and assumed the thermic properties characteristic of such structure.

Locusts.

The districts of Matheran and Mahableshwar, in the Bombay Presidency, according to *The Colonies and India*, have been suffering from an invasion of locusts, huge swarms of which have settled on the trees, which appear to be covered with red foliage and clusters of red flowers during the occupation, but when abandoned are nothing but bundles of bare twigs. While the locusts are on the wing, it is difficult to make any impression on them, although an Italian landowner, resident in Cyprus, has destroyed vast numbers by placing in their path, soon after they are hatched and still unprovided with wings, pits so prepared that, after tumbling in, it was impossible for them to get out. This, however, is only feasible during the wingless stage, when the young locusts march across the country in great columns, more than a mile in breadth.

But the most radical treatment is that of destroying the eggs, which, fortunately, are deposited, not single, but in masses in one place, generally on an uncultivated hill side. The female inserts the eggs by means of a sword-like appendage, and sheds a glutinous matter for their protection; and, as traces of this may be seen glistening on the surface of the soil, it affords an easy clew for the searcher to discover their whereabouts. In Cyprus rewards have been offered and taxes imposed with a view to stimulating the peasantry to destroying the eggs, 62 tons of which were brought in during 1868, representing 50,000,000,000 locusts, the result being that the pest disappeared for several years.

Enormous as is the destruction caused by the locust, there is one advantage about it, viz., that it is edible, in Arabia men and horses using it regularly as an article of diet. By some of the natives they are eaten with oil after being stripped of their legs and wings, but Lady Anne Blunt, in her travels, was in the habit of boiling them and dipping them in salt. Their flavor is described as savoring of a vegetable, not unlike the taste of green wheat.

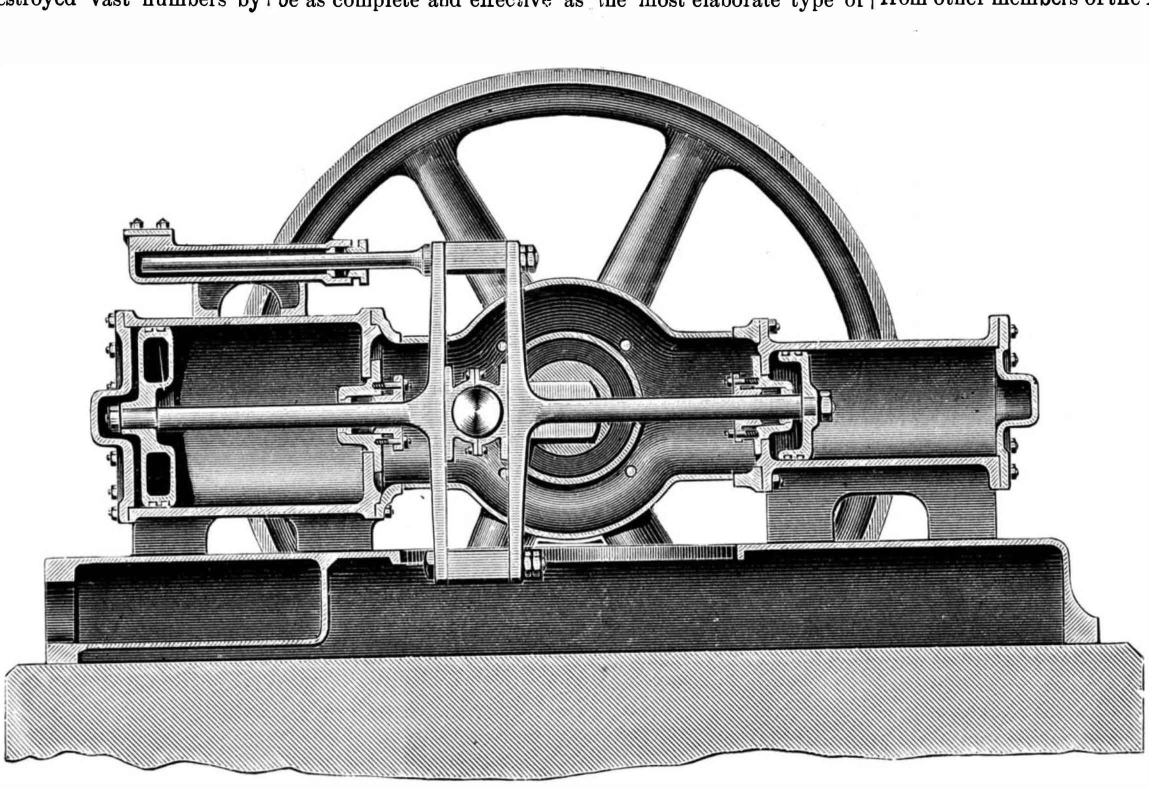
An Interesting Experiment.

In a legal case the point in dispute was whether the water in a brewery well was being polluted by the infiltration of water from a neighboring well about 100 yards distant. The constituents of the waters derived from each well did not differ sufficiently for an opinion to be formed on the point in dispute, simply by comparing the analyses of the two waters, and therefore it was ingeniously suggested, says the *Brewers' Gazette*, that some soluble salt of rare occurrence should be placed in the well suspected of causing the pollution, and then the water in the brewery well should be subsequently tested to see whether traces of this salt had passed from one well to the other. Chloride of lithium was the salt chosen for the experiments, as it is of comparatively rare occurrence, and is very easily detected by the marked crimson color it imparts to a flame, and the minutest trace can be detected by the aid of the spectroscope. Shortly after having placed some of this salt in the well suspected of causing the pollution, the brewery well water gave undoubted indications of lithium being present, and the experiment thus proved that water readily passed from one well to the other, and the dispute was easily settled.

The Grocer, London, predicts that Russian petroleum will gradually prove a formidable rival to American oil in the German market, especially the eastern provinces. Several reservoir cars, it says, have recently arrived at Bromberg direct from Baku, delivering their cargo at a price lower than American petroleum via Bremen, and of the same quality.

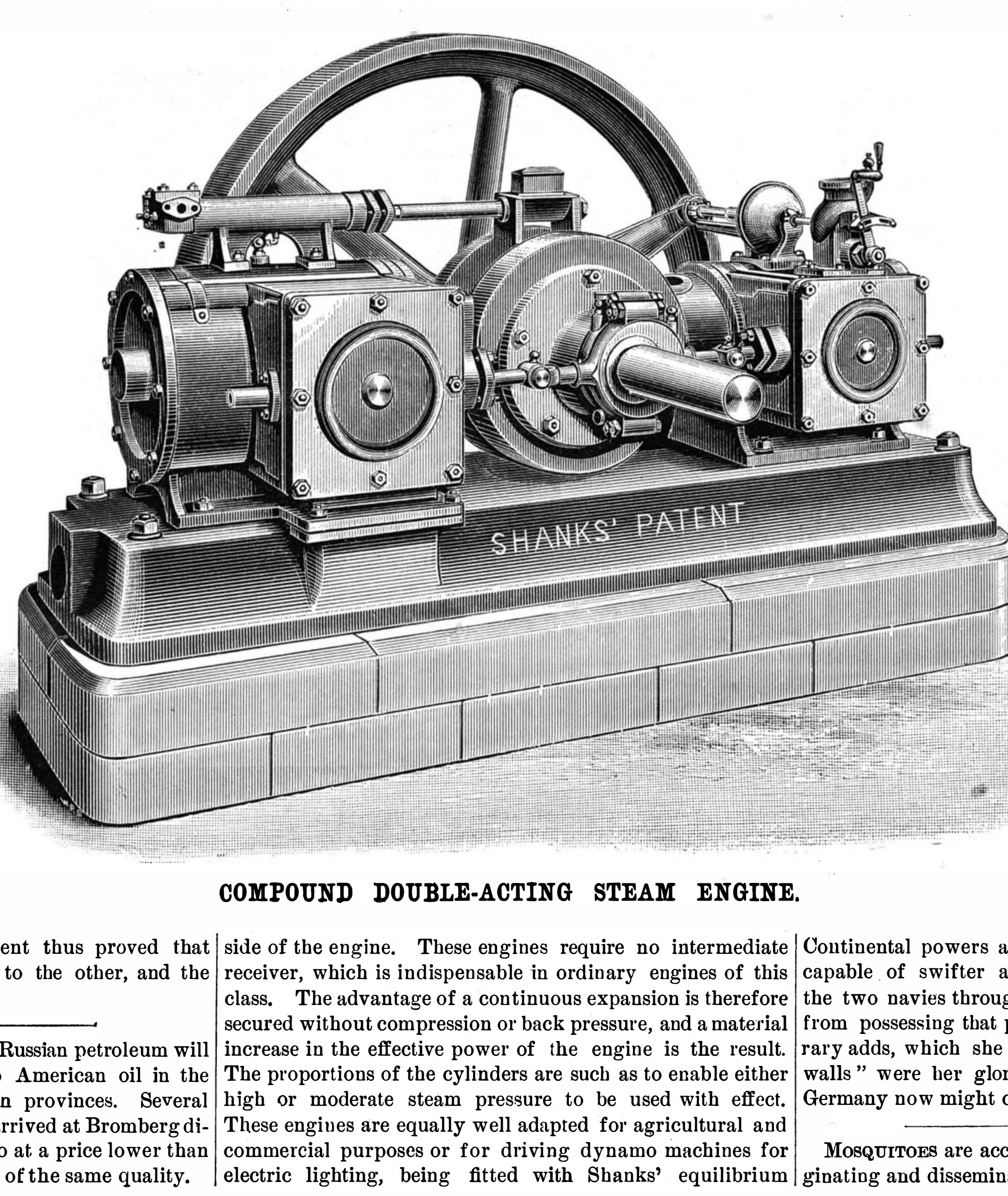
COMPOUND DOUBLE ACTING HORIZONTAL ENGINE.

We illustrate a 12 horse power horizontal engine upon this principle, and which was exhibited by Messrs. Shanks and Son, the builders, at the Engineering and Metal Trades Exhibition, London. In our engravings, Fig. 1 represents a perspective view of the engine, and Fig. 2 a longitudinal section. The chief features of this engine consist in the compactness and rigidity of its design, and the small number of its working parts; while, at the same time, the engine is found to be as complete and effective as the most elaborate type of compound engine. It will be seen that the two pistons are connected together by a wrought iron crosshead having in its center a vertical slot, into which the crank pin bush is made to slide the same length as the stroke of the pistons, the double stroke completing the revolution of the crank shaft in the usual way. The motion of the pistons is thus communicated direct to the crank shaft without the intervention of the connecting rod, motion bars, slide blocks, etc., usually required for this purpose, and all friction arising from their use is thus avoided.



COMPOUND DOUBLE-ACTING STEAM ENGINE.

The arrangement of the working parts is clearly shown at Fig. 2 of our engravings, and by means of this the whole construction will be readily understood. The crank shaft is arranged to admit of power being transmitted from either side of the engine. These engines require no intermediate receiver, which is indispensable in ordinary engines of this class. The advantage of a continuous expansion is therefore secured without compression or back pressure, and a material increase in the effective power of the engine is the result. The proportions of the cylinders are such as to enable either high or moderate steam pressure to be used with effect. These engines are equally well adapted for agricultural and commercial purposes or for driving dynamo machines for electric lighting, being fitted with Shanks' equilibrium governor, which is peculiarly sensitive, a quality essential to the satisfactory working of engines used for driving dynamo machines. In some examples of this engine a condenser is attached the condenser being placed below the engine and forming part of the sole plate.—*Iron.*



COMPOUND DOUBLE-ACTING STEAM ENGINE.

Fermentation in Bread.

Chicandard's paper on this subject, referred to in the SCIENTIFIC AMERICAN, of August 18, has drawn forth papers from other members of the Academy. V. Marcano publishes similar results (*Comptes Rend.* 96, 1733). He found, however, that the fermentation process depended upon local circumstances; thus he obtained different results in Venezuela, in the tropics, from what he got by repeating his experiments in Paris. He never noticed yeast fungi, but always saw an abundance of moving globular bacteria, and that, in the process of bread making, the gluten and a portion of the albumen was partially dissolved, and converted into peptones that are not precipitated by tannin. Also that "amylase," a secretion of the microbes, was formed. These results agree with those of Chicandard. But while the latter did not observe the dissolving of the starch, Marcano found in his Venezuela experiments that the dough at the beginning of the fermentation contained a mixture of much "erythro" dextrine with but little soluble starch; as soon as it was put into the bake oven, it contained a perceptible quantity of "achro" dextrine. These substances could be isolated.

Hence bread making is an example of the direct fermentation of starch. In Venezuela, if sugar is mixed with the flour, which makes the dough poor in gluten, it is easy to prove that the bacteria do not attack the starch until the albumen is exhausted. From this it will be seen that there is an actual and direct fermentation of the starch, while it explains the necessity that people there are under of employing ferments that are very strongly developed by Indian corn, potatoes, cane sugar, etc., to get a dough that rises well. In Paris he did not succeed in observing the direct fermention of starch; it remained perfectly intact.

Moussette then published (*Comptes Rend.* 96, p. 1865) an account of experiments made by him in 1854, when he was assistant to Barral, in condensing the vapors that came out of a bake oven while bread was being baked.

He obtained a liter of liquid from which he was able to distill off 1·6 per cent, by volume, of *alcohol*, and 0·06 per cent of acetic acid, by weight. Will not some American repeat this experiment?

Naval Power of France and England.

A comparison of the British with the French fleet shows that each contains just thirty-six first-class war vessels. In point of thickness of armor and weight of guns, two of the English are superior in offensive power to any on the French list. But in the next seventeen on each list the French are superior to the English, and in the whole list the French are superior in twenty-four, the English only in twelve. Besides this, the English discarded breech-loading cannons in the construction of their fleet, on the ground that muzzle-loaders are easier to manage at sea. The French and the other Continental powers adopted the breech-loaders, which are capable of swifter and more effective handling. Taking the two navies throughout, it appears that England is far from possessing that pre-eminence on the sea, a contemporary adds, which she did in the days when her "wooden walls" were her glory and her defence. Even Italy and Germany now might challenge comparison with her.

MOSQUITOES are accused by Prof. A. F. A. King of originating and disseminating malarial disease.

EPHEMERA, OR DAY FLIES.

These insects belong to the family which is scientifically called Ephemeridæ. They are called day flies on account of their short life, a single day sometimes witnessing their entrance into a perfect state of development and their death. They pass about two years in their larval and pupal state.

These insects are interesting and remarkable for a stage of development which is very uncommon. When they forsake the water where their larval and pupal state is passed they creep out of the pupa case, and after resting for a short period—from one to twenty hours—begin a tremulous motion of their wings. Then they fly to the trunk of a tree or to the stem of some water plant, and cast off a thin membranous skin which has enveloped the body and wings; and fly quickly away before the eyes of the observer, leaving this skin resting upon the stem, looking at first like a dead insect. After this operation the wings are much brighter. The state between leaving the water and casting off the skin is called "pseudimago."

These day flies were known to the ancients. Aristotle says "that about the time of the summer equinox he observed on the shore of one of the rivers which empties into the Bosphorus, little sacs, from which insects would creep out and fly about until evening, then grow weary and die at the setting of the sun. They were called on this account day flies."

On a quiet May or June evening these insects may be seen flying about, sometimes in great numbers, their gauze-like wings irradiated by the rays of the setting sun. They fly without any visible motion of their wings, and seem to drink in joy and pleasure in the few hours which lie between their appearance and disappearance, their life and death.

They measure from 17 to 19 millimeters without the tail filaments, which in the female are of the same length of the body, but in the male double the length.

The larvæ inhabit the water, and have upon each side of the back part of the body six tufts or tassels; the head runs forward into two points, and has fine hairy feelers; the legs are smooth, the front ones the strongest and adapted for digging. They are fond of hiding under stones or burrowing into the sandy shores, and make a very curious tunnel, something like a double barreled gun, which is often fifty-two millimeters deep.—*From Brehm's Animal Life.*

EPHEMERA, OR DAY FLIES.

The Seal Islands of Alaska.

The seal islands are a mere group of rocks, situated in Behring Sea, enveloped in fog during one-half of the year and shrouded in snow the other half. There are two seasons at the seal islands—the humid and the frigid. During the humid season there is no sun visible, nor is there darkness, for this print might easily be read at any hour of the night, without artificial light, in what is there accepted as summer. But during the humid, foggy, long day season, there is not a moment when the roar of seals may not be heard for a mile at sea off the coast of those islands. During the frigid season the days are cut very low in the neck and quite short in the skirt, so that they would hardly be worth while mentioning were it not for the exceedingly emphatic weather, which drives the seals away to sea, and makes itself felt even by the oleaginous natives; and a gale howls all the time. During the frigid season the surf never ceases to whip itself into foam upon the shores. And yet those rocks are cheap at $7,500,000. If we should advertise them for sale at $10,000,000—allowing ourselves a profit of $2,500,000 on the purchase of Alaska—they could be sold.

The islands in question were called by the Russians the Pribylov group—so named in honor of their discoverer, who was cruising around about one hundred years ago in search of sea otter, which were then found to be almost as scarce but not quite so dear as now in the Aleutian chain. The Pribylov group consists of the islands of St. George, the most southerly and the first discovered, St. Paul, Otter Island, and Walrus Island. A few seals haul out upon Otter Island, but none upon Walrus Island. The seals killed by the lessees of the islands are all taken upon St. Paul and St. George. The maximum number for St. Paul is 75,000 seals each year; for St. George, 25,000; making altogether the full quota of 100,000 seals per annum.

The seals begin to land there about May 1, unless prevented by ice, and the killing (except for food) does not begin before June 1, by which time they are there in thousands. By July 1 there are millions of seals upon the two islands—doubtless four millions upon St. Paul, and a million upon St. George. Literally, they are in countless numbers. They are estimated by counting all those lying within a well marked small section of the breeding grounds and then measuring the entire space of the "rookery," as it is called, after they all leave later in the season, and allowing a given number to each square yard or rod. This is the only process by which the number of seals resorting to the islands can be approximated. "Seal fisheries" is not only a misnomer, but it is absurd when applied to the mode of taking skins.

When skins are wanted, the natives walk to the "rookeries," crawl along the sand until they arrive in a line between the seals and the water, then spring to their feet, yell and flourish clubs simultaneously, and the selected victims, destined for sacrifice upon fashion's altar, stampede up the beach, and once started, are driven like sheep to the slaughter. They pull themselves along as one might expect a dog to travel with his forelegs broken at the knees and his spine over the kidneys. For locomotion on land, the fur seal depends mainly on his fore quarters, the hind flippers being dragged along. At sea, the hind flippers serve mainly as steering apparatus, though they have some propelling power, being twisted like the propeller of a screw steamer; but the fore flippers perform most of the propulsion in the water as well as on land.

The hair seal, on the contrary, derives more propelling power in the water from his hind than from his fore flippers. The seals on St. Paul and St. George Islands are often driven two or three miles from the "rookery" to the killing ground adjacent to the warehouse where the skins are salted. The killing is easy enough after the seals are once arrived at the ground selected for the slaughter. Suppose one thousand seals to be driven up, forty or fifty are cut out from the large drove. The smaller group is moved a few rods away from the others, and then knocked down by men with hickory clubs five feet in length. Being knocked senseless, the seal is quickly stabbed to the heart, and generally dies a painless death, after receiving the knock down blow. The work is divided; some men knock down, some stab, and some draw knives around the neck and flippers and along the belly, so that the skinners have only to separate the skin from the blubber. All the men employed in this work are natives. The skinners are experts, with such professional pride as prohibits dulling their razor edged knives upon the outside of the skin, which contains more or less sand from the drive.

All the time of the knocking down the seals in the main drove sit on one hip like dogs, panting, growling, and steaming, but apparently not interested in the fate of their friends dying before their eyes, nor caring for what may befall themselves. They do not seem to be at all sensitive on the subject of death. They can be driven up to and over the warm, bloody carcasses which cover the ground, without manifesting any concern whatever. The skins are taken off with wonderful rapidity by the natives, and with very few cuts or slashes. As soon as the skins are cool, or at the end of a day's killing, they are hauled to the salt house and laid in bins, the flesh side up and salted. In the course of a week they are taken from the bins and examined. Those in which the curing process has not been perfected have more salt applied to the pink spots, after which they are again packed in layers to await the bundling process, which takes place at any convenient time after the booking.

The system with which the work is pursued has been reduced to such an exactness that, though the season begins after June 1, generally not before the 10th or 12th, the one hundred thousand skins are sometimes aboard the vessel for shipment to San Francisco by July 25, and always before August 1. Neither King Solomon nor the Queen of Sheba—no, nor the lilies of the field—ever wore richer raiment than the modern seal skin cloak; but when the skin is taken from the animal to which nature gave it, when it goes into and when it comes out of the salt, or when it is first sent to market, it is not what it appears later upon fashion's form.

Before the fur seal skin becomes the valuable article of commerce which goes into the manufacture of a fashionable garment, it is shaved down on the flesh side until it is not much thicker than a sheet of letter paper, the long, coarse hairs must be plucked out, and the fur dyed; it may be a brown or almost black according to the prevailing taste, which now runs to darker hues than formerly. The raw skins are sold at trade sales in London before they take on their artificial hue, the greater portion of their cost to the "consumer" being added after their purchase at the sales. Returning them to this country, paying duties, and the expense of making them into garments, constitute the major portion of the final cost.—*Overland Monthly.*

Chinese Fishermen.

The Chinese and Japanese exhibits at the International Fisheries exhibition must be novel and striking. An article in *Nature* calls attention to the extraordinary ingenuity displayed in utilizing the most ordinary and unpromising objects for the purpose of fishing. Thus in Swatow they employ a boat drawing a few inches of water, with the rail nearly level with the surface. A narrow plank fixed along one side is painted white, and the light of the moon falling on it causes the fish to mistake it for water. They jump over the plank into the boat, when they get entangled in moss or grass. At Ichang, a wild animal, such as the otter, is trained, not to catch fish, but to frighten them into the net; while at Ningpo cormorants are regularly and systematically trained to fish. These and many other devices shown at the exhibition mark the Chinese as the most ingenious and accomplished fishermen in the world.

The Postage Reduction.

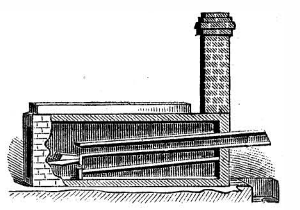
There has been a good deal of squibbing in the newspapers because, after October 1, it will cost as much to send a letter around the corner as it will to send it to San Francisco. But one thing at a time.—*Tribune.*

And the next thing is the quick delivery of letters in cities and towns. More benefit can be secured to the public by the prompt delivery of letters than by the reduction of postage.

RECENT INVENTIONS.

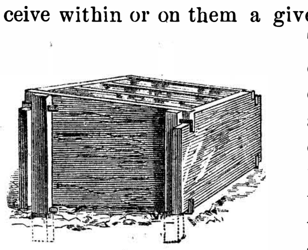
Bagasse Furnace.

We give an engraving of a furnace in which green bagasse may be burned as a fuel in the manufacture of sugar and molasses in the localities where fuel is scarce and expensive. The invention consists of a chute or chutes contrived, in connection with the furnace, for feeding the fuel along where it is exposed to the heat of the furnace or the flue leading therefrom to the chimney a suitable distance, and for a length of time enabling the fuel to dry and heat, so that it will burn with good results when it finally discharges into the furnace. In evaporating and other furnaces the inventor proposes to arrange the chute to enter the furnace from the back, where the fuel will have the benefit of the whole length of the run of the flame under the evaporating pans from the furnace to the chimney. This invention has been patented by Mr. John Hill, of Independence, Kas. (Box 224).



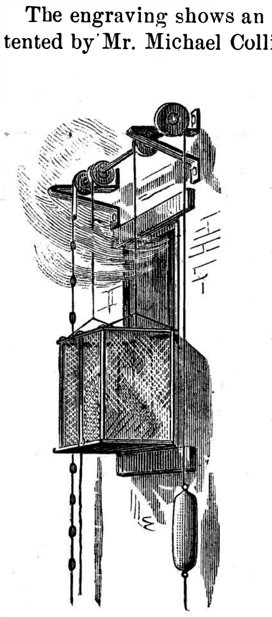
Hot Bed Frame.

This is a frame for plants, and is to be used for either hot or cold beds. It is shown as applied to hot bed frames. Such frames are usually made of front, back, and end boards, all nailed or permanently secured together to receive within or on them a given number of glazed sashes. The invention shown in the engraving consists in a knockdown frame, having its ends adjustable toward or from each other to suit different widths of sashes. The frame is made for better protecting the plants in the bed of the frame from frost. The end pieces are provided with metal hooks which engage the side pieces and hold them firmly in their places. This invention has been patented by Mr. John A. Tracht, of Galion, O.



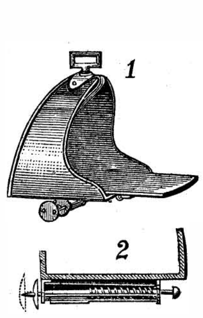
Improved Fire Escape.

The engraving shows an improved fire escape recently patented by Mr. Michael Collins, of Pittsfield, Mass. At any convenient point along the front of a building, preferably at the roof coping or cornice, are fixed strong brackets supporting bearings in which is placed a shaft carrying grooved drums, on which are wound ropes or chains for supporting the cage or platform of the escape. The cage is counterbalanced by a weight suspended by a rope wound on a drum on the shaft in a reverse direction, a rope or chain having hand grasps is attached to the weight to secure a quick elevation of the cage, and a rope is attached to the cage for pulling it down. There is a friction drum on the shaft having a brake, which is operated by a rope hanging alongside of the cage, and provided with hand grasps, so that the descent of the cage may be easily controlled by any one in it. The cage carries a platform which may be let down on any window or door sill to facilitate the entrance to the cage. This entire apparatus is to be made of metal, and is therefore practically fireproof. It may be used to great advantage for other purposes than that of a fire escape.



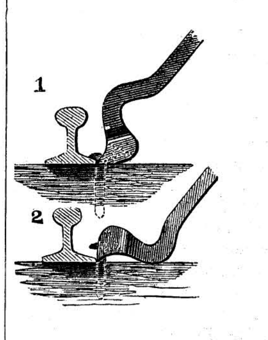
Stirrup for Riding Saddles.

The improvement shown in the engraving consists in a toe guard and tilting arranged to insure a certain and ready escape of the feet of the rider, in case of accident, so that should the rider be thrown from the horse he will not be dragged by the stirrup. In this stirrup a thin strip of metal is connected with the top of the yoke at the back, and extends to the front of the bottom plate, where it is secured. The foot plate is pivoted to the rear of the bottom plate, and is capable of tilting with the foot, while the thin metal strip above mentioned prevents the toe from catching in the yoke. A novel spur is attached to this stirrup. It consists of a sliding rod carrying a rounded and perforated button, behind which are the spurs, which cannot touch the horse unless the button is pushed back by pressure of the stirrup against the sides of the horse. When pressure is exerted on the bottom the spurs are protruded, and the horse is pricked more or less according to the amount of pressure applied. Fig. 1 is a perspective view, and Fig. 2 is a sectional view of the stirrup and spur. This invention has been patented by Mr. Philip Ganzhorn, of Washington, Ill.



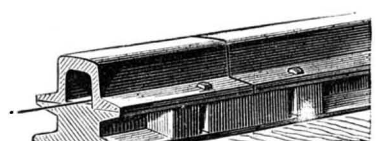
Improved Claw Bar.

The engraving shows an improved claw bar recently patented by Mr. Aron Hamm, of Sayre, Pa. This implement is used for drawing nails and spikes, and is more especially designed for drawing spikes from railroad ties. The invention consists in bending the bar and recessing it at the claw end as shown in the engraving, so that the spike may be started with the point of the claw as shown in Fig. 1, and afterward entirely removed by the reverse side of the claw, as shown in Fig. 2. This invention permits of withdrawing the spike without the use of a bate and without bending the spike. All communications regarding this device should be addressed to Mr. James N. Weaver, of Sayre, Pa.



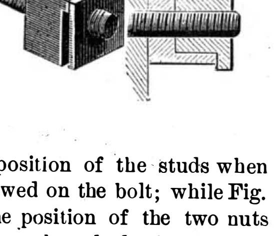
New Railroad Rail and Rail Joint.

This rail consists of a hollow steel cap of less height than the ordinary rail, with a base of about the usual breadth. The bottom part of the rail is of iron having a flange at the upper and lower side, and having along the upper side a rib over which the steel part of the rail fits. There is in each side of the lower part of the rail a deep groove in which are placed steel splice bars at the rail joint. These bars are slotted to admit of fastening them by means of spikes driven through both members of the rail. It is designed to arrange the two parts of the rail so as to break joints, and the re-enforcement of the rail at the joints by the splice bars makes it as strong, if not stronger, at these points than anywhere else. This invention has been patented by Mr. Peter A. Locke, of Silver Cliff, Colo.



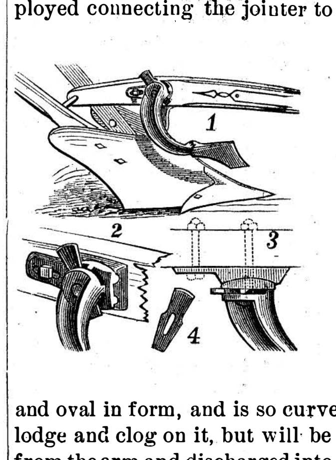
Improved Nut Lock.

This invention consists of a nut of two parts, one having a cavity in the face or top eccentric to the bolt hole, and a stud projecting from one corner of the face, together with another part, forming a check nut by having a boss eccentric to the bolt hole, and also having a projection or raised part on its face, which engages with the stud on the nut first named when the parts are in the non-interlocking position, and can be both together screwed on to the bolt. Then by turning one part of the nut while the other part is not turned, the eccentric boss of the one binds in the eccentric cavity of the other nut, thereby locking the nuts on the bolt securely. Fig. 1 is a face view of the nut; Figs. 2 and 3 are detail perspective views, the former showing the position of the studs when the nuts are ready for being screwed on the bolt; while Fig. 4 is a sectional view, showing the position of the two nuts when the check nut has been turned to lock the cam surfaces. This invention has been patented by Mr. John Ford, of Portneuf, Quebec, Canada.



Improved Plow Jointer.

This is an improved device for connecting the plow jointer to the plow proper, for facilitating the adjustment of the jointer, and also for facilitating the discharge of the sward, manure, or rubbish into the furrow to be properly covered, and to cause it to escape from the supporting arm of the jointer and prevent clogging thereon, as is common with jointers attached in the ordinary way. A curved arm is employed connecting the jointer to the plow, so contrived, by connecting to the back of the mould board of the jointer and curving therefrom toward the furrow side and thence upward to the furrow side of the beam, that any sward, straw, manure, and other matters rising up with the furrow slice, raised by the jointer and tending to pass over the mould board, will pass on to the arm, which is smooth and oval in form, and is so curved that such matters cannot lodge and clog on it, but will be drawn by the furrow slice from the arm and discharged into the main furrow, so as to be effectually covered up. This arm is made to terminate in a rose clutch, and the jointer is provided with a counter part and is bolted to the arm, making a substantial connection, which is readily adjustable. To connect the arm to the beam, so that it can be readily shifted to swing the jointer up and down, and also to shift it laterally to the main plow, the arm has a disk head, firmly bolted against a wedge which is interposed between it and the flat face of a washer the back of which is made convex, and it is fitted in a plate having a concave front face, and being adjustable along the plow beam to alter the pitch of the washer, which is confined in its position by a bolt. Fig. 1 shows the attachment applied to the plow. Fig. 2 shows the disk end of the curved arm. Fig. 3 is a horizontal section of the beam connection, and Fig. 4 shows the wedge. This invention has been patented by Mr. David Woodward, of Clinton, Mich.



The Bottom of Lake Winnipiseogee.

Captain Eugene Sullivan, a submarine diver, from Boston, who recently made an unsuccessful search for the body of E. L. Dunklee, drowned in Lake Winnipiseogee, saw some things of an interesting character while under water. What is know as Eagle Island, he says, is really the top of a hill, which rises some 100 feet from the bottom of the lake, with just the brow of the hill protruding from the water. This hill is very steep, and is covered with cliffs and ledges, many of which are from 30 to 40 feet high. At some distance from Eagle Island is a vast plain, thickly covered with eel grass and literally alive with eels of all sizes. Captain Sullivan also encountered large shoals of horn pouts near this plain, and, in fact, reports fish of all kinds to be very numerous and in some cases very large.

The "finny denizens of the deep" seem to take kindly to the human intruder on their domains, and swarmed around him in large numbers, nibbling at his armor and carefully inspecting every portion of "the rare curiosity from up above." The diver also discovered a spring of very cold water bubbling up from the bottom of the lake, and surrounded with quicksands, into which he walked and commenced sinking, but was promptly pulled out by his men above when the proper signal was given. Of course, if the body of a person who has been drowned should rest on the quicksand surrounding one of these springs, it might speedily be ingulfed never to appear again, and perhaps this will stand for one reason why bodies of many persons lost in the lake have never been recovered.

A New Pass through the Andes.

The recent discovery of a pass, hidden for centuries, in the mountains between Chili and Argentine Republic, near Lake Nahuelhaspi, may have a powerful influence upon the development of a region which has been one of the world's neglected corners. By this pass the route from the extreme western outpost of the Argentine Republic, across Chili at its narrowest part, to the Pacific coast, is only seventy miles long, so that a railway can be built directly across the point of South America from the Gulf of San Matras, through the pampas, to a Chilian port at the head of the gulf which lies between Chiloe Island and the mainland. A railway is now in process of construction from Buenos Ayres, in a northwesterly direction, by way of Mendoza to Santiago, but the route made available by the Barilochi pass is less than one-half the length of that one. Perhaps this discovery and the explorations of Chilian and Argentine soldiers will open to improvement the region which corresponds in respect to the climate with the United States. We are apt to forget that the greater part of South America lies in the hot zone, and only the southern point, which is owned partly by Chili and partly by the Argentine Republic, lies in the latitude of the New England and Middle States, and the route through the newly discovered pass is in the latitude which corresponds to the latitude of this city. Vast plains there await development.—*New York Times.*

Bleaching Sponges.

The following process was, says *New Remedies*, devised by Mr. John Borham, and has been in use in Bellevue Hospital for a considerable time:

Soak the sponges, previously deprived of sand and dirt by beating and washing, in a one per cent solution of permanganate of potassium. Then remove them, wash them thoroughly with water, and press out the water. Next put them into a solution of one-half pound of hyposulphite of sodium in one gallon of water, to which one ounce of oxalic acid has been added, and leave them in the solution for fifteen minutes. Finally, take them out, and wash them thoroughly.

By this treatment the sponges are rendered perfectly white. Many sponges contain a more or less dark-colored, brownish core. If treated only with permanganate and acid, the core is either not bleached at all, or if it has been somewhat bleached, the tint is apt to grow again darker. By the above modification, every portion of the sponge is rendered white, and remains so.

Proposed New Ship Canal in England.

A ship canal is projected from Bristol Channel across the peninsula of Somerset and Devon to the English Channel. The length of the canal will be 62 miles; the waterway will be 125 feet wide at the surface, 36 feet at the bottom, and 21 feet deep, the dimensions being similar to the grand ship canal of Holland from Amsterdam to the Helder. Such a canal will accommodate ships of 1,500 tons drawing 18 feet. The cost of the new canal is estimated at about fifteen millions of dollars; and twelve per cent annual dividends on this cost are expected.

Public Exhibitions for 1883.

The following is a list of the principal public exhibitions for 1883, at which the most recent improvements and new inventions will be shown.

STATE, PROVINCIAL, ETC.

American Institute, New York	Oct. 3, Dec. 1
Arkansas, Little Rock	Oct. 16, 20
California, Sacramento	Sept. 10, 15
Canada Dominion, St. John, N. B.	Oct. 2, 5
Canada Western, London	Oct. 1, 3
Cincinnati Industrial, Cincinnati	Sept. 5, Oct. 6
Colorado, Denver	July 17, Sept. 30
Connecticut, Meriden	Sept. 18, 21
Delaware, Dover	Sept. 24, 29
Illinois, Chicago	Sept. 24, 29
Illinois Fat Stock, Chicago	Nov. 14, 22
Indiana, Indianapolis	Sept. 24, 29
Iowa, Des Moines	Aug. 31, Sept. 7
Kansas, Lawrence	Sept. 3, 8
Kansas, Topeka	Sept. 10, 15
Kentucky, Lexington	Aug. 28, Sept. 1
Louisville, Louisville	Aug. 1, Nov. 9
Maine, Lewiston	Sept. 18, 21
Manitoba Provincial, Portage la Prairie	Oct. 1, 6
Maryland, Baltimore	Oct. 15, 20
Massachusetts Horticultural, Boston	Sept. 18, 21
Michigan, Detroit	Sept. 17, 21
Minnesota, Owatonna	Sept. 3, 8
Minn. Agri. & Mech., Minneapolis	Aug. 27, Sept. 1
Mississippi, Aberdeen	Oct. 22, 27
Mississippi Stock Breeders, Meridian	Oct. 29, Nov. 3
Montana, Helena	Sept. 10, 15
Nebraska, Omaha	Sept. 3, 8
New England, Manchester, N. H.	Sept. 4, 7
New Jersey, Waverley	Sept. 17, 21
New York, Rochester	Sept. 10, 15
North Carolina, Raleigh	Oct. 15, 20
Nova Scotia, Truro	Sept. 25, Oct. 1
Ohio, Columbus	Sept. 3, 7
Ontario Provincial, Guelph	Sept. 24, 29
Ontario Central, Hamilton	Oct. 2, 5
Oregon, Salem	Sept. 17, 22
Pennsylvania, Philadelphia	——
Rhode Island, Providence	Sept. 25, 28
St. Louis, St. Louis	Oct. 1, 6
South Carolina, Columbia	Nov. 13, 16
Texas, Austin	Oct. 16, 20
Toronto Industrial	Sept. 11, 22
Tri-State, Williams Grove, Pa.	Aug. 20, 26
Vermont, Burlington	Sept. 10, 14
Virginia, Richmond	Oct. 31, Nov. 2
West Virginia, Wheeling	Sept. 10, 15
West Virginia Central, Clarksburg	Sept. 18, 20
Wisconsin, Madison	Sept. 10, 14

COUNTY AND LOCAL—NEW YORK.

Alleghany, Angelica	Oct. 2, 4
Broome, Whitney's Point	Sept. 11, 14
Carthage Union, Carthage	Sept. 25, 27
Cattaraugus, Little Valley	Sept. 3, 6
Chautauqua, Jamestown	Sept. 5, 8
Chemung, Elmira	Oct. 2, 5
~~Columbia, Chatham~~	
Columbia, Hudson	Sept. 25, 27
Cobleskill, Cobleskill	Sept. 25, 27
Cortland, Cortland	Sept. 11, 13
Delaware, Delhi	Sept. 11, 13
Dutchess, Washington Hollow	Sept. 18, 21
Erie, Hamburg	Sept. 25, 28
Essex, Westport	Sept. 25, 27
Franklin, Malone	Sept. 26, 28
Fulton, Johnstown	Sept. 4, 6
Genesee, Batavia	Sept. 20, 22
Greene, Cairo	Sept. 5, 7
Herkimer, Herkimer	Sept. 10, 13
Jefferson, Watertown	Sept. 18, 20
Lewis, Lowville	Sept. 11, 14
Livingston, Geneseo	Oct. 3, 4
Montgomery, Fonda	Sept. 11, 13
Moravia Union, Moravia	Sept. 18, 20
Niagara, Lockport	Sept. 27, 29
Oneida, Rome	Sept. 17, 21
Onondaga, Syracuse	Sept. 18, 21
Ontario, Canandaigua	Sept. 25, 27
Orange, Middletown	Sept. 18, 21
Orleans, Albion	Sept. 27, 29
Oswego, Mexico	Sept. 11, 13
Otsego, Cooperstown	Sept. 24, 27
Putnam, Carmel	Sept. 11, 14
Queens, Mineola	Sept. 25, 27
Rensselaer, Lansingburg	Sept. 11, 14
Rockland, Spring Valley	Oct. 2, 4
Rushville Union, Rushville	Oct. 5, 6
St. Lawrence, Canton	Sept. 11, 13
Sandy Creek, R. O. & B., Sandy Creek	Sept. 5, 7
Saratoga, Ballston Spa	Sept. 11, 14
Schenectady, Schenectady	Sept. 25, 28
Schoharie, Schoharie	Oct. 2, 4
Schuyler, Watkins	Oct. 3, 5
Seneca, Waterloo	Sept. 26, 28
Sinclairville, Sinclairville	Sept. 11, 18
Steuben, Bath	Sept. 25, 28
Suffolk, Riverhead	Oct. 2, 4
Sullivan, Monticello	Oct. 2, 4
Tioga, Owego	Sept. 11, 13
Tompkins, Ithaca	Sept. 25, 27
Washington, Sandy Hill	Sept. 4, 7
Wayne, Lyons	Sept. 24, 27
Western New York, Rochester	Oct. 2, 5
Wyoming, Warsaw	Sept. 19, 20
Yates, Penn Yan	Oct. 2, 4

MAINE.

Aroostook, Houlton	Sept. 28, 29
Cumberland, Portland	Sept. 11, 14
Franklin, Farmington	Oct. 9, 11
Kennebec, Readfield	Oct. 2, 4
Knox North, Hope Corner	Oct. 9, 11
Lincoln, Damariscotta	Oct. 2, 4
Oxford, Norway	Oct. 2, 4
Oxford West, Fryeburg	Oct. 9, 11
Penobscot West, Exeter	Sept. 25, 26
Piscataquis East, Milo	Sept. 26, 27
Sagadahoc, Topsham	Oct. 9, 11

NEW HAMPSHIRE.

Grafton, Plymouth	Sept. 25, 27
Oak Park, Greenfield	Sept. 18, 19

VERMONT.

Addison, Middlebury	Sept. 3, 5
Caledonia, St. Johnsbury	Sept. 18, 20
Dog River Valley, Northfield	Sept. 25, 27
Franklin, Sheldon	Aug. 29, 31
Lamoille Valley, Morristown	Sept. 25, 27
Mad River Valley, Waitsfield	Sept. 18, 19
Orange, Bradford	Sept. 25, 27
Poultney, Poultney	Sept. 18, 20
Rutland, Rutland	Sept. 5, 7
Union, Bellevue Park	Sept. 5, 7
White River, Bethel	Sept. 18, 20

MASSACHUSETTS.

Amesbury and Salisbury, Newburyport	Oct. 2, 6
Barnstable, Barnstable	Sept. 23, 25
Berkshire, Pittsfield	Oct. 2, 4
Berkshire Central, Lee	Sept. 12, 13
Bristol, Taunton	Sept. 25, 27
Deerfield Valley, Charlemont	Sept. 20, 21
Essex, Haverhill	Sept. 25, 26
Franklin, Greenfield	Sept. 27, 28
Grafton, Farmers' Club	Sept. 13
Hampden, Chicopee	Sept. 25, 27
Hampden East, Palmer	Sept. 18, 19
Hampshire, Amherst	Sept. 20, 21
Hampshire, Franklin, etc., Northampton	Oct. 3, 5
Highland, Middlefield	Sept. 13, 14
Hingham, Hingham	Sept. 25, 26
Hoosac Valley, North Adams	Sept. 18, 19
Housatonic, Great Barrington	Sept. 26, 28
Lancaster Farmers' Club	Sept. 26
Marshfield, Marshfield	Sept. 12, 14
Martha's Vineyard, West Tisbury	Oct. 2, 3
Middlesex, Concord	Sept. 25, 27
Middlesex North, Lowell	Sept. 25, 26
Middlesex South, Framingham	Sept. 18, 19
Nantucket, Nantucket	Sept. 5, 6
Plymouth, Bridgewater	Sept. 19, 21
Union, Blandford	Sept. 19, 21
Westboro, Westboro	Sept. 27
Worcester, Worcester	Sept. 20, 21
Worcester North, Fitchburg	Sept. 25, 26
Worcester Northwest, Athol	Oct. 2, 3
Worcester South, Sturbridge	Sept. 13, 14
Worcester Southeast, Milford	Sept. 25, 27
Worcester West, Barre	Sept. 27, 28

RHODE ISLAND.

Washington, West Kingston	Sept. 18, 20
Woonsocket, Woonsocket	Sept. 18, 20

CONNECTICUT.

Chester, Chester	Sept. 26
Clinton, Clinton	Oct. 3
Danbury, Danbury	Oct. 1, 6
Fairfield, Norwalk	Sept. 11, 14
Farmington Valley, Canton	Sept. 25, 28
Guilford, Guilford	Sept. 25
Killingworth, Killingworth	Sept. 27
Milford and Orange, Milford	Sept. 18, 19
New London, Norwich	Sept. 25, 27
New Milford, New Milford	Sept. 27, 29
Southington, Southington	Oct. 9, 11
Tolland East, Stafford Springs	Oct. 10, 11
Union, Huntington	Sept. 19, 21
Watertown, Watertown	Sept. 25, 27
Westbrook, Westbrook	Oct. 10
Willimantic Farmers' Club, Willimantic	Oct. 2, 4
Windham, Brooklyn	Sept. 18, 20
Woodbridge and Bethany, Woodbridge	Oct. 3, 4
Woodbury, Woodbury	Sept. 12, 13
Woodstock South, Woodstock	Sept. 25, 27

NEW JERSEY.

Atlantic, Hammonton	Sept
Bergen, Hohokus	Sept. 25, 27
Burlington, Mt. Holly	Oct. 9, 12
Cumberland, Bridgeton	Sept. 5, 6
Egg Harbor City	Sept.
Hunterdon, Flemington	Sept. 25, 27
Monmouth, Freehold	Sept. 11, 14
Moorestown, East Moorestown	Sept. 14, 15
Morris, Morristown	Sept. 11, 13
Salem, Woodstown	Sept. 11, 13
Somerset, Somerville	Oct. 2, 4
Sussex, Newton	Oct.
Union and Middlesex, Plainfield	Sept. 24, 27
West Jersey, Woodstown	Sept. 12, 13

PENNSYLVANIA.

Armstrong, Kittanning	Sept. 11, 14
Beaver, Beaver	Sept. 11, 15
Bedford, Bedford	Oct. 9, 12
Berks, Reading	Oct. 2, 5
Bradford, Towanda	Oct. 2, 4
Butler, Butler	Sept. 18, 20
Canton Union, Canton	Sept. 19, 21
Carbon, Lehighton	Oct. 2, 5
Chartiers Valley, Canonsburg	Aug. 21, 23
Chester, West Chester	Sept. 20, 22
Columbia, Bloomsburg	Oct. 10, 13
Crawford, Conneautville	Oct. 3, 5
Cumberland, Carlisle	Sept. 25, 28
Dauphin, Harrisburg	Oct. 2, 5
Dayton, Dayton	Sept. 25, 28
Delaware, Elwyn	Oct. 3, 6
Doylestown, Doylestown	Oct. 2, 5
Eastern Farmers' and Mech. Institute	Sept. 11, 14
Erie, Erie	Sept. 25, 28
Fayette, Uniontown	Sept. 25, 28
French Creek Valley, Cochranton	Sept. 12, 14
Gratz Driving Park, Gratz	Sept. 18, 21
Harford, Harford	Sept. 26, 27
Indiana, Indiana	Oct. 2, 6
Jefferson, Brookville	Oct. 2, 5
Juniata, Port Royal	Oct. 3, 5
Keystone, Kutztown	Sept. 18, 21
Keystone and Buckeye, Sharon	Sept. 12, 15
Lackawanna, Scranton	Sept. 18, 21
Lancaster, Lancaster	Sept. 17, 21
Lawrence, New Castle	Sept. 11, 14
Lebanon, Lebanon	Oct. 9, 12
Leechburg, Leechburg	Sept. 27, 29
Lehigh, Allentown	Sept. 25, 28
Luzerne, Wyoming	Sept. 11, 13
Lycoming, Williamsport	Oct. 2, 4
McKean, Port Alleghany	Oct. 9, 11
Mercer, Stoneboro	Sept. 25, 27
Mercer Central, Mercer	Sept. 5, 7
Northern Montour, Washingtonville	Oct. 16, 19
Northampton, Nazareth	Oct. 2, 5
Northumberland, Sunbury	Sept. 18, 21
Northwestern, Corry	Oct. 3, 5
Oil Creek Valley, Titusville	Sept. 25, 27
Oxford, Oxford	Sept. 26, 28
Petroleum, Parker's Landing	Sept. 25, 28
Potter, Coudersport	Sept. 25, 28
Punxsutawny, Punxsutawny	Sept. 24, 28
Rich Hill, Jacksonville	Sept. 26, 27
Ringtown, Ringtown	Sept. 18, 21
Schuylkill, Orwigsburg	Sept. 25, 28
Synder, Selinsgrove	Oct. 4, 6
Somerset, Somerset	Sept. 25, 27
Sullivan, Forksville	Oct. 2, 4
Susquehanna, Montrose	Sept. 18, 19
Troy, Troy	Sept. 25, 28
Union, Lewisburg	Oct. 3, 6
Union City, Union City	Sept. 18, 21
Venango, Franklin	Oct. 2, 5
Warren, Sugar Grove	Sept. 11, 13
Washington, Washington	Sept. 25, 28
Washington Union, Burgettstown	Oct. 2, 4
Wayne, Honesdale	Oct. 10, 12
Wellsboro, Wellsboro	Sept. 19, 22
Wyoming, Tunkhannock	Sept. 26, 28
York, York	Oct. 2, 5

DELAWARE.

Peninsular, Middletown	Sept. 18, 20

MARYLAND.

Baltimore, Timonium	Sept. 4, 7
Cecil, Elkton	Oct. 2, 5
Frederick, Frederick	Oct. 9, 12
Harford, Bel Air	Oct. 9, 12
Kent, Warton Station	Sept. 11, 13
Washington, Hagerstown	Oct. 16, 19

ENGINEERING INVENTIONS.

Mr. J. A. Wheeler, of Vandalia, Mo., has recently patented a lubricator for engine cylinders, the object of which is to provide for giving a regular and graduated supply of oil to engine cylinders and valves by automatic means operated by the engine. It consists in the combination, with an oil cup, of a plunger feed rod, acting to supply a quantity of oil to the steam pipe.

Mr. S. R. Jones, of Lacon, Ill., has obtained a patent on an improved car coupling, which possesses some features not found in any previously patented coupling. In the drawbar the inventor arranges a hook coupler which swings down to receive the link. A crank device is thrown down by the shock of the cars coming together, and engages the link with the coupler without the aid of any attendant. Arrangements are made for coupling cars of different heights with Mr. Jones' coupler.

A novel hydraulic pile driver has recently been patented by Messrs. J. W. Surprenant and J. E. Ferguson, of Astoria, Oregon. The invention consists of a bent pipe ~~adapted to fit~~ against the side of the pile and in a longitudinal groove in the pile. The pipe is held against the pile and in the groove, and is provided with means for raising it after the pile has been sunk. Means are provided for coupling a hose pipe with the pile pipe. If water is forced through the pipe and ejected from the lower end of the same, it washes away the sand under the pile and causes it to descend into the ground.

MECHANICAL INVENTIONS.

An important improvement has recently been patented for rendering elevator cars safe from falling in the event of the hoist rope breaking. The apparatus was designed especially for freight, coal, and mining purposes, but it may be used on passenger elevators with equal advantage. A series of stops are so arranged that, in case of accident, they fall and lodge under the car, stopping its descent immediately. Messrs. E. L. Parker and S. Peterson, of Queensville, Ind., are the patentees.

Mr. John S. Griffin, of Newburg, Cleveland, O., has patented an improved rolling mill, for rolling springs and sleigh shoes, and tapering the same on the flat sides and edges. On a shaft above the rolls double cams are mounted directly above the bearing blocks, so that when the shaft is rotated the double cams will press on the bearing blocks, and will thus depress the journal boxes of the upper roller and move the roller, so as to impart the proper form to the spring or sleigh shoe.

Mr. William Whitely, of Housatonic, Mass., has recently secured a patent for a safety stop for elevators. A frame passes across the top and down the sides of the carriage, and connected with it by cams and links, and partially supported by a weight and cord, so that the descent of the carriage within the frame will apply the cams and stop the downward movement when it is desired. Upon the bolts that connect the cam links with the top of the carriage are placed rubber blocks, to relieve the jar when the descent of the carriage is stopped by the cams.

An ore roasting furnace of the class where a cylinder is fitted for revolution within the furnace, has recently been patented by Mr. R. L. Thompson, of Boulder, Colo. The ore is fed in a continuous stream through a hopper into the cylinder, which is heated externally by a furnace. Air is supplied by a blower; in its passage into the cylinder it becomes heated, thereby effecting economy in the use of fuel. As the cylinder revolves the ore is lifted by tubes to the upper side and then dropped to the bottom, and is thus worked till discharged into a flue, through which it passes exposed to the action of a flame from the furnace, and is finally landed on a hearth.

A machine for amalgamating the gold and silver in pulverized ores, is the subject of letters patent recently issued to Mr. William E. Harris, of New York city. In using this machine, pulverized ore and heated water are introduced into a wooden cylinder in about the proportion of three hundred pounds of water to a ton of ore. When the cylinder is about seven-eighths full, two pounds of bromine or bromide of sodium for each ton of ore is added, and steam is admitted into space between the wooden cylinder and the iron casing to keep the contents of the wooden cylinder hot. The cylinder is revolved until all the gold and silver in the ore is thoroughly bromidized, so that it will readily amalgamate with quicksilver. A suitable quantity of quicksilver is then introduced into the cylinder, and the revolution of the cylinder is continued for two or three hours, after which the contents are treated in the ordinary manner to separate the amalgam from the ore.

AGRICULTURAL INVENTIONS.

Mr. James F. Miller, of Spring Station, Ind., has patented an attachment to mowing and reaping machines to prevent the knives and knife bar from becoming clogged with dirt in the groove of the finger bar. The attachment consists of a plate attached to the finger bar in such a way as to effectually cover and close the joint between it and the back of the knife bar. The said plate serves also as a substitute for the cleats commonly employed to hold the knife bar down in its place.

A simple and effective device for use in barns to distribute hay to the outer parts of the loft as it is discharged from a carrier, has been patented by Mr. Frank Baylis, of Amenia, N. Y. An apron is hinged at its lowest part to the beams of the barn by an iron rod, and it is supported at its upper part in an inclined position by bars attached to the rafters. The hay when dropped from the carrier slides down the apron and is projected to the outer part of the mow.

MISCELLANEOUS INVENTIONS.

A simple and convenient ribbon holder has recently been patented by Mr. John Mellette, of Winamac, Ind. A wire having its ends bent passes into the center of the ribbon holder, and is folded over to rest on the ribbon in such a way as to prevent its unrolling except as desired for use.

A roll for ribbons, tape, etc., which is both light and inexpensive, has recently been patented by Mr. John Mellette, of Winamac, Ind. A strip of veneer or thin sheet of wood is cut out by a die or otherwise, in such a form as when folded and glued they make a complete roller much lighter and stronger than the ordinary solid wood or pasteboard ribbon roll and costing less.

Mr. M. W. Newcomb, of Marysville Kas., is the patentee of a new improvement in photographic plate holders, by which accuracy of focus and rapidity of work is accomplished. The plate holder is reversible to receive different sized plates on opposite sides of the holder. This invention is important to photographers who have several persons to photograph on different sized plates about the same time.

An ornamental napkin holder, to take the place of the ordinary ring holder, has been patented by Mr. C. S. Dikeman, of Waterbury, Conn. The napkin when folded rests in a U-shaped receptacle having feet for its support. Within the napkin receptacle is a chain on which the napkin rests. To remove the napkin the chain is drawn down and the napkin is raised. The new holder combines ornamental as well as useful qualities, and may be made of almost any material.

A patent for protecting wooden piles of bridges, docks, etc., from worms and insects or from the effect of alternate wetting and drying, has been patented by Mr. D. H. Valentine, of Brooklyn, N. Y. A mould is placed around the pile which is to be treated, after it has been driven into the ground. Portland or other cement is then poured into the mould after the water has been pumped out. After the cement becomes hard the shield is removed, when a canvas shield is stitched around the pile to protect the cement.

An apparatus for heating barrels after being set up in truss hoops, so that the staves will retain their curvature and not straighten out when the hoops are removed, has been patented by Mr. Paul Weidmann, of Brooklyn, N. Y. The barrel to be heated is placed on a metal stand perforated with holes, through which hot air is forced from a furnace or heater by means of a blower; a cylindrical drum covers the barrel to prevent the escape of the hot air.

An invention to facilitate the removal of the carbon deposited upon the inner surfaces of the stand pipes of gas works, has recently been patented by Mr. John Clark, of New York city. The invention consists in a pipe clearer, made with a cutter having a central perforation to receive a rod, which is provided with collars above and below the cutter. The rod serves as a hammer to force the cutter through the pipe. The rod is also provided with a cap to keep it in the center of the pipe while the tool is being used.

A spring bed bottom, constructed in such a manner as to be strong and durable, and in which the springs will not be liable to get out of place, has recently been patented by Mr. Charles J. Mengel, of New York city. With cross springs are connected re-enforcing springs, the ends of which rest upon the middle bends of the cross springs, and are held from lateral movements by longitudinal connecting wires placed above and below. The cross springs are kept in place by passing the lower wires through loops formed upon the upper wires and passed down through perforations in the said springs.

A new process for the manufacture of beer, sirup, distilled liquors, etc., has recently been patented by Messrs. A. E. & W. E. Feroe, the former residing at Albany and the latter at Poughkeepsie, N. Y. The principal feature of the invention consists in the process of forming a mash from corn meal by boiling it for about an hour in water, and letting it cool down to a temperature of 150° to 160°, adding a small quantity of malt flour, and putting the material through sundry other simple processes, producing, it is claimed, a substance equal to barley malt. The inventors show in their patent drawings an apparatus which may be used in preparing the new material, but the invention is not limited to the machinery described, for other appliances may be used for producing the same yeast-like substance.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion ; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

STEEL SQUARE PROBLEMS. Illustrated by sixty engraved plates. By Lucius D. Gould, author of other technical books. Published by Lucius D. Gould, New York.

In the preface the author says that the book is intended to give explicit directions for an easy solution of the many problems that frequently vex builders in the prosecution of their work; such as finding the lengths and angles for cutting braces and rafters, mitering "hoppers" of any number of sides and degrees of elevation, finding polygonic angles, mitering to a level from a raking, assistance in determining width of stairs and heights of risers, and other annoyances, occurring not only in the architect's calculations, but in the carpenter's and joiner's practice. As an aid to the use of the solution of the problems the ordinary steel square is used as the basis of all calculations and the means of their solution and practical use. The book is an eminently practical one.

ACCENTED FIVE-FIGURE LOGARITHMS FROM 1 TO 99,999, WITHOUT DIFFERENCES. By Lowis D'A. Jackson. W. H. Allen & Co., 13 Waterloo Place, Pall Mall, S.W., London.

In this volume, the preface says, the principle of accentuation is so applied as to enable calculations with five figure logarithms to yield results to five figures of numbers without using differences, proportional parts, or anti-logarithms, the simple device of denoting mean values of 0, 3, more or less, by a dot or a dash fitting the logarithm to one number only in one case, thus removing the doubt and avoiding the inaccuracy in the ordinary mode. It is claimed also that this accentuation enables logarithms of trigonometrical ratios to yield more accurate result in angles. The book is a volume of more than 270 octavo pages, and the tables are paged in dictionary style so as to make reference easy and facile.

DIO LEWIS'S MONTHLY, No. 1, VOL. I. Clarke Brothers, 68 Bible House, New York.

The professed object of this periodical is assistance to physical and mental health by giving information, stating facts, and suggesting habits. Some idea of the character of the publication—which is on heavy, uncalendered paper and illustrated—may be obtained from a glance at the table of contents: Horse Riding for consumptives, Insane Asylums, Outdoor Life for Girls, Health for Women, Forgotten Girls, Prenatal Impressions, Weight of Brains, Hygiene, Rabies, Function of Sunshine, and articles of a domestic and homelike character. The personality of the editor is apparent, but besides his contributions there are a number from writers more or less known.

DIE ELEKTRISCHEN UHREN UND DIE ELEKTRISCHE FEUERWEHR TELEGRAPHIE (ELECTRICAL CLOCKS AND FIRE ALARM TELEGRAPHS). By Dr. A. Tobler. Wien, Pesth, Leipzig, 1883. Pp. 194 and 87 illustrations. Price 3 marks—80 cents.

Not the least important of the uses to which electricity is employed is that of regulating our time pieces. The author describes the mechanisms employed for this purpose, with illustrations of each kind. He divides electrical clocks into three classes: first, those which are moved and actuated by a current from the central regulator, so that only a dial and hands are required in addition to the electro magnets. The second class, which are in more general use here, have a complete set of works, but are corrected daily, or hourly, by a current from the normal clock. In the third class a battery furnishes the motive power, instead of weights or springs. They are not regulated by the standard clock, and have no advantage in this respect over any other clock. Half of the book is devoted to the various kinds of fire alarm systems, and describes those in use in Amsterdam, Berlin, Boston, Caen, Frankfort on the Main, Gotha, Leipzig, London, Paris, Stuttgart, and Zurich. Although containing much that is of interest to the general reader, many technical details are also given which will render it of practical value to those engaged in their construction. This work forms vol. xiii. of Hartleben's Electro-Technical Library.

DIE ELEKTRISCHEN LEITUNGEN UND IHRE ANLAGE FUR ALLE ZWECKE DER PRAXIS (ELECTRICAL CONDUCTORS AND PRACTICAL DIRECTIONS FOR PUTTING THEM UP). By J. Zacharias. Wien, Pesth, Leipzig, 1883. Pp. 230 and 72 illustrations. Price 3 marks—80 cents.

In the present state of electrical activity the subject of conductors becomes one of primary importance. This little book contains a complete description of the different wires used, both aerial and subterranean, for telegraphic, telephonic, and illuminating purposes, the method of insulating them, etc. The number and size of poles required for land wires and their probable cost are given, the precautions to be taken against fire from electric lighting wires are described, and many other points of practical interest are given. Then follows a description of how to put down subterranean cables, how to splice the ends and test the connection, precautions to be taken against damage from atmospheric discharges, how to join the cable to the land wire, and how to lay cables on bridges, in tunnels, and under water. Full particulars are given for testing cables and for locating breaks and injuries where the line is not accessible. There is also a short chapter on lightning conductors and earth connections. In the appendix are some useful tables. This book cannot fail to prove invaluable to all who use electricity. It forms volume xvi. of Hartleben's Electro-Technical Library. Copies may be ordered by mail direct from the publisher in Vienna.

AN INTRODUCTION TO THE STUDY OF ORGANIC CHEMISTRY. By Adolph Pinner, Ph.D., Professor of Chemistry in the University of Berlin. Translated and revised from the fifth German edition, by Peter T. Austen, Ph.D., F.C.S. New York: John Wiley & Sons, 1883. Pp. 403. Price $2.50.

Many teachers of organic chemistry, who are familiar with Dr. Pinner's little book in the original, have long been waiting for an English translation that they could place in the hands of their pupils, and Professor Austen deserves their thanks—his chief reward—for having performed that task. The original, which has been received with such favor in Germany, follows as closely as possible the summer course of lectures which Professor A. W. Hofmann delivers in the University of Berlin, some points being added to make it a complete text book. Although Professor Hofmann's name does not appear in the German editions, it is the custom among many of his hearers to keep an interleaved copy of "Pinner" before them while listening to his lectures. In many German universities students commit to memory this little book when preparing for an examination, so complete is it in the essentials and ground principles, so free from unnecessary verbiage and multiplicity of examples. As the translator says in his preface, it is believed that a student who has carefully studied and faithfully recited this book will be able to take up understandingly the larger works. Professor Hofmann's system, which is followed in this book, differs from that of Fownes and others in taking up in succession all the compounds that are or may be derived from a given hydrocarbon, showing their relation to each other, and briefly describing their properties before taking up the next hydrocarbon. Thus in the methyl group we have methyl-hydride (marsh gas), then the chlorides and iodides, the hydrate (alcohol), oxide, (ether), formic acid, amines, amides, etc. The cyanides are also taken up here, because they contain but one atom of carbon. Compounds that contain two atoms of carbon constitute the second group, including ethyl, with its alcohol, ether, acid, etc. Those with three atoms the third group, and so on. In the retrospect beginning on page 174, the compounds already studied are classified as alcohols, ethers, aldehydes, ketones, acids, etc. This arrangement seems to us more scientific, as well as better for the learner, than the order generally adopted. The translator has carefully and faithfully followed the original, in some cases perhaps too closely. The nomenclature is that adopted by the London Chemical Society, and some of the terms, not yet being in general use here, sound rather strange. Several important recent discoveries have been introduced, such as the synthetical production of citric acid, of indigo, and other bodies. In the appendix the best practical methods of ultimate organic analysis, of determining vapor densities and the constitution of compounds are given. A very full table of contents and an exhaustive index greatly enhance the value of the book.

COEDUCATION OF THE SEXES IN THE PUBLIC SCHOOLS OF THE UNITED STATES. Washington, 1883. Pp. 30.

This pamphlet forms No. 2 of the "Circulars of Information" issued by the Bureau of Education. It gives a list of 144 towns and small cities (under 7,500 population), also 177 larger cities, that practiced coeducation in 1882, with their reasons for doing so. There is also a list of 19 cities and towns that practice partial or entire separation of the sexes in their public schools, with their reason for so doing.

R. UNIVERSITA ROMANA. SCUOLA D'APPLICAZIONE PER GL' INGEGNERI. Annuario per l'anno scolastico 1882-83. Roma, 1882. Pp. 180.

From this rather bulky catalogue we learn that the University of Rome possesses a school of engineering that has some dozen professors, ordinary and extraordinary, six "incaricati," and eight assistants. There is a three years' course of mathematics, chemistry, geology, mechanics, etc. The number of students in 1881-82 was 65. Lectures continue from the middle of October to the middle of June, each year.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) J. M. M. writes: We have a lot of white lambskin, that has become soiled by use and spotted with tobacco spit. Will you please be kind enough to inform me how I can remove the spots and dirt, and make them white like new, without injuring them? A. The following, which is used to clean chamois leather, is worthy of trial: Make a solution of weak soda and warm water, rub plenty of soft soap into the leather, and let it remain in soak for two hours, then rub well until quite clean. Rinse well in a weak solution of soda and yellow soap in warm water, but not in water only, else it dries hard. After rinsing, wring it well in a rough towel and dry quickly, then pull it about and crush it well until soft.

(2) J. F. writes: As one of the "solutions" used in making a "chemical barometer" you order 38 drachms saltpeter and 38 drachms salammoniac, in 9 drachms water. Can this be, or should the solids be grains? A. There is evidently a mistake; the solution should be:

Camphor	2½	drachms.
Alcohol	11	"
Water	9	"
Saltpeter	38	grains.
Salammoniac	38	"

(3) J. C. W. asks how to make a paste of flour that will not smell and sour. A. The addition of a small quantity of carbolic acid or oil of cloves while making will prevent its becoming sour.

(4) R. S. M. writes: In your issue of August 4, A. complains of small white insects in his cistern. These insects generally appear in cisterns when the water is admitted, or caught, in warm weather. If a small quantity of lime be put in the cistern, they will disappear. [If the lime used be small in amount, its use cannot be considered objectionable.—ED.]

(5) A. M. asks if iron pyrites can be utilized in any other way besides the manufacture of sulphuric acid, and could it be manufactured at paying rates three or four hundred miles from any large commercial center. A. The only use to which iron pyrites can be put is the manufacture of sulphuric acid, and that is not an economic success in this country.

(6) T. P. H. writes: Following the suggestion of the item of Trouve's experiment of carbon battery for incandescent light, for one lamp I made a battery of 4 cells, the carbons 6 inches square and zinc the same. I found that the lamp would not show up. I then doubled up my zincs with like result. I have added the third zinc, and still no further on. Will you please make suggestions, and should the battery be built for quantity or intensity, and how to do it? A. You do not state what kind of incandescent lamp you use, but it is probable its resistance is too great for your battery. In such case it would be necessary to increase the number of cells. The battery should be connected for intensity.

(7) A. C. L. asks: 1. How much weight will a cubic foot of the gases of decomposed water lift? A. One cubic foot of hydrogen will lift about 442 grains, or a little less than one ounce. 2. Could not the French bronze once mentioned in your paper (composed of ferro-manganese and copper) be used to make electrotypes? A. No.

(8) N. G. B. asks: How can I kill the taste of the cement in the cistern water without injuring it for domestic purposes and drinking? I built a new cistern last spring, but the water tastes so strong I can scarcely use it? A. The best plan for your purpose would be to filter the water through a charcoal filter. Any attempt at modifying the cement by coating it with something else would be too expensive. The addition of half a grain of iron chloride per quart to the water, with a further addition of 1½ grains soda per quart, is used to purify waters for household purposes.

(9) A. G. writes: In heating a drying room for drying match sticks, should I use the heat direct from the boiler or steam, and how should the connection be made? What size flues or pipes should I use, room 14 x 14 feet, by 12 feet high? A. A brick flue from the boiler along the floor of a drying room is often used, and is economical where only a little heat is needed. A steam coil is much better where efficiency is required. One square foot of outside pipe surface to 10 cubic feet of space in the drying room is sufficient for match splints. One inch iron pipe is preferred for such coils.

(10) E. P. B. asks for a cheap boiler or steam pipe covering. I have heard say it could be made of clay, salt, and other cheap ingredients, and put on by any one and answer a good purpose. A. Asbestos and clay as a covering for boilers is much used. Good hair felt with asbestos lining is the best and cheapest, if the economy of heat saving is considered. All clay mixtures are better conductors of heat than hair felt.

(11) C. W. E. asks: 1. What will remove moles from the face without injury? A. The method recommended on page 2582, SCIENTIFIC AMERICAN SUPPLEMENT, No. 162. Croton oil in the form of pomade or ointment is used. 2. What will keep cider sweet? A. When the cider has reached the desired condition of taste, fermentation must be arrested. The addition of 1½ tumblers of horse radish (grated) to each barrel, and thoroughly shaking, is said to accomplish this result. Then, after allowing it to stand for several weeks, rack off, and bung up closely in clean casks. A method is also given on page 4,991, of SCIENTIFIC AMERICAN SUPPLEMENT, 313, in article on "How to make good cider and how to keep it."

(12) A. H. W. H. asks how to make fusee strings used in making powder crackers; and also for touching off small cannons. A. The following are given among the "Firework Formulæ" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 317:

1. Mealed powder	16	parts.
Niter	2	"
Sulphur and charcoal	1	" each.

Mixed and loosely twisted in thin paper.

2. Niter	2	oz.
Sulphur	1	"
Mealed powder	16	"
Charcoal	4	"

Mixed and packed in slender continuous paper tubes.

(13) J. W. writes: I have need of a composition similar to that used on the parlor match, and as nearly tasteless and odorless as possible. What shall I use? A. Igniting compositions are generally manufactured of some form of phosphorus mixed with oxidizing agents, with which it will readily inflame by friction. The following is a practical receipt:

Phosphorus	½	part.
Potassium chlorate	4	"
Glue	2	"
Whiting	1	"
Finely powdered glass	4	"
Water	11	"

Also see formula given in answer to query No. 19 in SCIENTIFIC AMERICAN for April 14, 1882. We do not know of a compound of this kind that would be tasteless. Neither can we recommend tasting of such mixtures.

(14) U. H. P. asks how to make a tank for cyanide plating solution for silver, made with wood bottom and ends, and plate glass sides, what is best cement for joints? Would water glass be good to paint inside of tank for above purpose? Give best process for putting a heavy plate of tin on knives and forks by dipping or otherwise, so as to be smooth? A. Use a cement made of—

Resin	6	pounds.
Dried red ocher	1	"
Calcined plaster of Paris	½	"
Linseed oil	¼	"

Water glass is soluble in water, and therefore we do not think it adapted for this purpose. The best method of tinning is by dipping. First thoroughly cleanse the articles by dipping in a solution of sulphuric acid and water, then scour with sand, and finally wash well with water. Heat the articles and sprinkle sal ammoniac over them and then dip. When a thick enough coat has been obtained, wipe the articles off cleanly with a piece of tow See the article on Electro-metallurgy in SCIENTIFIC AMERICAN SUPPLEMENT, No. 310.

(15) F. H.—1. To prepare sheepskins for mats. Make a strong lather with hot water and let it stand till cold; wash the fresh skin in it, carefully squeezing out all the dirt from the wool; wash it in cold water till all the soap is taken out. Dissolve a pound each of salt and alum in 2 gallons of hot water and put the skin into a tub sufficient to cover it; let it soak for 12 hours, and hang it over a pole to drain. When well drained stretch it carefully on a board to dry, and stretch several times while drying. Before it is quite dry, sprinkle on the flesh side 1 oz. each of finely pulverized alum and saltpeter, rubbing it in well. Try if the wool be firm on the skin; if not, let it remain a day or two, then rub again with alum; fold the flesh sides together and hang in the shade for two or three days, turning them over each day till quite dry. Scrape the flesh side with a blunt knife and rub it with pumice or rotten stone.

2. Fur skins are tanned by first removing all of the useless parts and softening the skin by soaking, then remove the fatty matter from the inside and soak it in warm water for an hour. Next mix equal parts of borax, saltpeter, and sulphate of soda in the proportion of about ½ oz. of each for each skin, with sufficient water to make a thin paste; spread this with a brush over the inside of the skin, applying more on the thicker parts than on the thinner; double the skin together, flesh side inwards, and place it in a cool place. After standing 24 hours wash the skin clean, and apply in the same manner as before a mixture of 1 oz. sal soda, ½ oz. borax and 2 ozs. hard white soap, melted slowly together with out being allowed to boil; fold together and put away in a warm place for 24 hours. After this, dissolve 4 ozs. alum, 8 ozs. salt, and 2 ozs. saleratus in sufficient hot rain water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for 12 hours; then wring out and hang it up to dry. When dry repeat the soaking and drying two or three times till the skin is sufficiently soft. Lastly smooth the inside with fine sandpaper and pumice stone.

(16) C. E. B. writes: 1. I am making a 2″x4″ horizontal engine. What size and kind of boiler should I use for it—not too expensive? Also what size pump should I use for it? A. A vertical tubular boiler having 20 to 25 feet heating surface. 2. Can I rig the above size engine so as to develop a one horse power with it by not using too high steam pressure? Some say it will not develop one-half a horse power under 30 pounds pressure per square inch, running 300 revolutions per minute. What power do you calculate it? A. With 30 pounds pressure and 300 revolutions it would be but about one-half of one horse power. If you double the pressure, it would be one horse power. 3. Would the manufacture of the above size engine be profitable? A. There would probably be some sales, but the demand is not large.

(17) T. E. O. asks: 1. What can I use to polish brass faucets and keep them bright? A. Rotten stone and kerosene oil. 2. How can I clean brass shells for breech-loading guns? A. Clean with oxalic acid and polish with rotten stone and oil. 3. What is a "leaded" gun, and how remedied? A. A leaded gun is one in which lead becomes attached to the inner surface of the barrel. The remedy is to keep the gun clean. 4. Will boiling water remove impurities from it such as decayed animal matter; if not, what will? A. Boiling water tends to purify it, but it does not entirely remedy the evil. 5. How can I keep frogs from going into my well and dying there? The well is curbed to the ground. A. Better clean out your well, and then stop all avenues of access to small animals.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

E. L. H.—The mineral or whitish powder appears to be the mineral kalinite, or alum, a sulphite of potassium and aluminum of but very little commercial value.—H. S. T.—No. 1 is a carboniferous slate. No. 2. Pyrite (iron sulphide) in quartz. No. 3 is a slate containing pyrite.

COMMUNICATIONS RECEIVED.

On Sun Spots. By Cap. J. M.

On the Position of Science and Scientists. By W. N. L.

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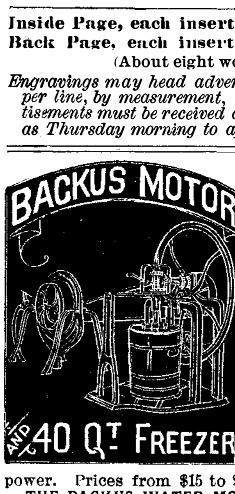

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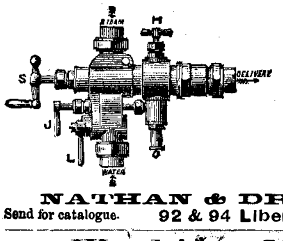

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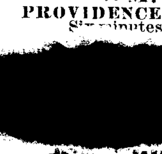

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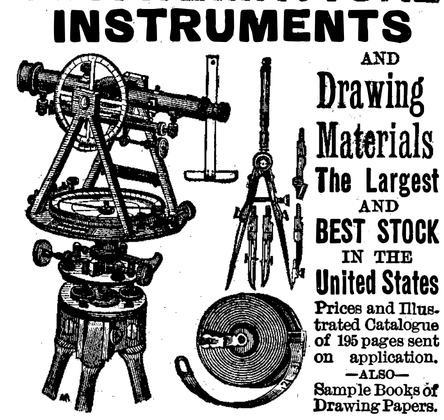

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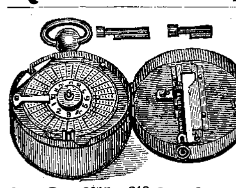

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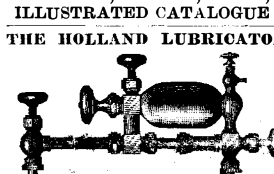

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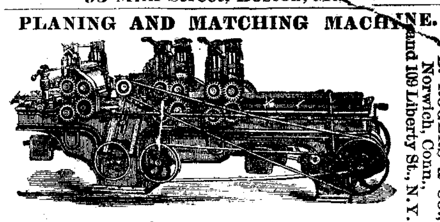

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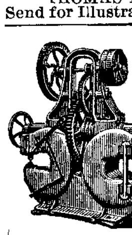

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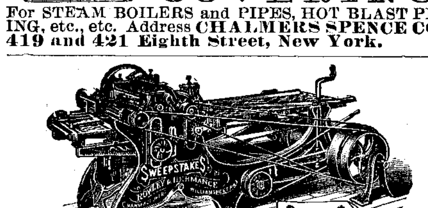

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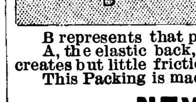

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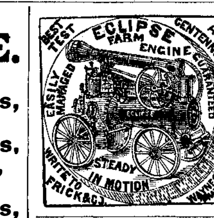

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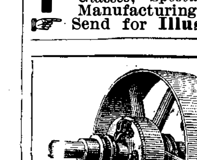

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