SCIENTIFIC AMERICAN

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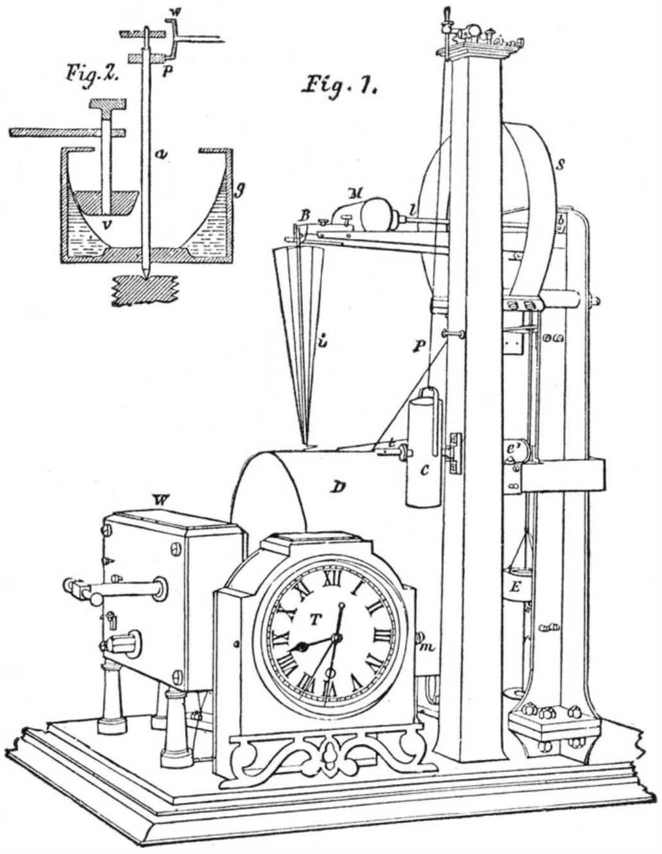
IMPROVED CRANK SHAFT LATHE.

We illustrate an exceptionally large lathe for turning crank shafts, constructed by F. Berry & Sons, of Sowerby Bridge, Eng. *Engineering* gives the following description: The lathe is quadruple geared, and is 48 inches from the center to the top of the bed. This latter is 43 feet long, 11 feet broad in its widest part, 2 feet 3 inches deep, and weighs 40 tons. Upon the bed there are fitted four sliding carriages, one furnished with a compound slide rest, and the other three with pillar rests. All the rests have a traverse of 2 feet 9 inches, and all the carriages are self-acting longitudinally, by means of screws 4½ inches in diameter. A complete set of change wheels is provided for screw cutting, and quick traverse of the carriages can be effected by means of pulleys fixed on the ends of the screws. The face plate is 8 feet 3 inches in diameter, and the spindle in the fast headstock is 16 inches in diameter by 20 inches long in the front neck, and 12 inches in diameter by 15 inches long in the back neck, and is made of steel. The massive size of this magnificent tool will be best appreciated from a consideration of the weight of the various parts. The fast headstock, including the spindle and gearing, weighs 12½ tons, the loose headstock 4½ tons, and the total weight of the lathe is about 90 tons.

THE EARTHQUAKE RECORDER.

During the past session of the Philosophical Society of Glasgow, a paper was read giving a description of an apparatus which had been designed for the purpose of recording the time of occurrence, the duration, and the nature and magnitude of the motions in an earthquake. In the light of recent events this paper has a special interest. The author was Mr. Thomas Gray, B.Sc., F.R.S.E., recently a member of the professional staff of the University of Tokio, Japan, and now assistant to Sir William Thomson in the physical laboratory of the University of Glasgow. He stated that the apparatus had been made by Mr. James White, the well known scientific instrument maker of that city, and that it is to be used by a former colleague, Professor Milne, of Tokio, in the investigations which are being carried out by him as one of the committee appointed by the British Association for the investigation of the earthquake phenomena of Japan.

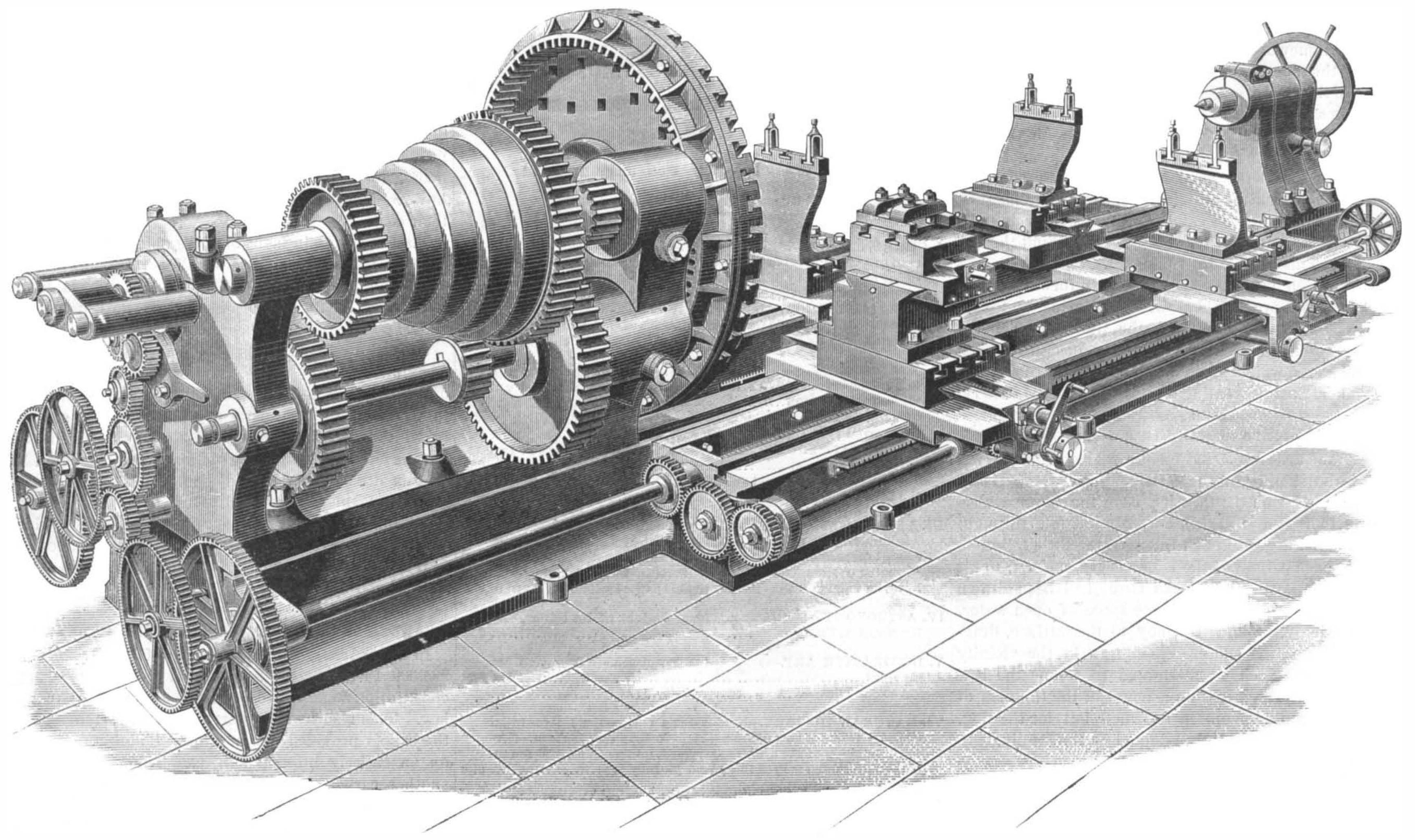
An earthquake, he remarked, generally consists of a considerable number of separate to-and-fro movements of a part of the earth's surface. These movements are irregular in period during any one earthquake, and vary very much as to period, duration, and magnitude in different earthquakes. From past experience in Japan, it is inferred that the instrument described in the paper may have to record motions varying from one-tenth of a millimeter to ten millimeters in amplitude, and from one-fifth of a second to something near one second in period; while the duration of the earthquake may vary from half a minute to about four minutes.



THE EARTHQUAKE RECORDER.

In order to determine the amount of movement, it is found convenient to record three rectangular compounds of it—two horizontal and one vertical. The horizontal compounds are recorded by means of the two pendulums indicated at P, Fig. 1. Each of these pendulums consists of a hollow brass cylinder, *c*, filled with lead, and suspended by a silk thread. The cylinder is held deflected from the position in which it would hang with its center of gravity vertically under the point of suspension by means of a thin tube, *t*, which terminates at one end in a sharp, vertical knife edge. One of these tubes is continued by a long and very light index of aluminum foil; while a similar index is attached to the tube on the other pendulum, close to the knife edge, and with its length at right angles to that of the tube. The knife edge rests in a flat V, cut in a hard steel plate, and the point of suspension is regulated by means of screw adjustments, capable of giving motion in three directions at right angles to each other, until it is very nearly vertically above the knife edge, and at such a height that the knife edge bears along all its length. The points of suspension are so adjusted that the planes through the axes of the tubes, *t*, and the suspending threads are at right angles to each other. In this way the indices are parallel to each other, and they are arranged to be in a horizontal plane.

The vertical component of the motion is recorded by means of the mass, M, supported on the end by the lever, *l*, by means of the spring, S, and actuating the vertical index, *i*. To the crossbar, B, which is sharpened to a knife edge on its upper side, there is firmly attached the lever, *l*. The sharpened edge of B rests in a flat V-shaped groove formed on the under side of a steel plate, while the spring is attached to the lever by links working round knife edges. The mass, M, is considerably further from the knife edge than the spring, S, the reason for which is that a moderately long period of free vibration can thus be obtained without an inconveniently long spring. By placing the point of attachment of the spring a little below the line joining the knife edge and the center of inertia of the mass, M, the period of vibration is lengthened to some extent, and it is still more increased by a box, which is mounted on a long horizontal axis and supported at one end of the lever, *l*. In order to give rigidity to the index, *i*, without making it massive, it is made of a very thin tube of aluminum, which is prevented from bending sideways by fine silk threads attached to its point, and to light crossbars of aluminum at its upper end. The threads are kept stretched by means of



IMPROVED CRANK SHAFT LATHE.

a light but stiff spiral spring, which presses against the top of the tube. To the point of the index a very flexible piece of aluminum foil is attached, which projects in a horizontal direction, and can be raised or lowered by a thread which passes up the center of the tube and round a pin fixed in the end of the box, B.

These three components of the motion are written on a band of smoked paper, wound around a drum, D, which is kept continuously rotating by a train of clockwork, W. The ends of the indices are arranged to lie in a line parallel to the axis of the drum, so that the corresponding vertical and horizontal components can be easily detected. The pressure of the point of the indices, which write the horizontal components on the paper, can be adjusted by means of threads attached near the ends of the indices, and passed over studs fixed in the pillar which supports the pendulums.

The clockwork, W, is driven by means of two weights acting on separate driving wheels, one on each side of the first pinion, thus, at the same time, giving a pure couple to the pinion, preventing excessive weight on the bearings of the weight barrels, and avoiding the necessity for maintaining power to keep the clockwork in motion during winding. The clockwork is governed by means of a governor in the form shown in section in Fig. 2, where *g* is a light cylindrical box, partly filled with glycerine or some such liquid, and mounted on a vertical axis, *a*, which in this instrument works in jewels at top and bottom. By means of the pinion, *p*, and the crown wheel, *w*, the box, *g*, is geared to the clockwork. The governing action is obtained by causing the liquid to come in contact with a fixed vane, *v*, which can be turned to different distances from the side of the box so as to vary the speed.

The action of the apparatus is as follows: Suppose that the earth moves in a direction at right angles to the plane of one of the deflected pendulums, then, since that pendulum is very free to move round a vertical axis, the inertia of the bob of the pendulum causes it to turn relatively to the remainder of the apparatus, and, consequently, the point of the index attached to it will move across the drum through a distance depending on the length of the pointer, and the distance of the instantaneous axis of the bob from the knife edge. There will not, however, be any motion of the other pendulum. The same is true of motions at right angles to the other pendulum, or to the lever, *l*; and hence if the motion be inclined to all of these, each one will indicate its own component, thus determining the nature, magnitude, and direction of the movement.

The duration of the earthquake is obtained from the known rate of motion of the drum, D, and the length of the record on the smoked paper.

The time of occurrence is obtained by means of the time piece, T, and a system of magnets and circuit-closing apparatus. The circuit-closer is shown at E, and consists of a small pendulum, the bob of which is made to turn a light metallic tube, *r*. This tube is carried on a point resting in a conical hole in a rod rigidly attached to the framework, and it is pivoted to the pendulum by a point resting in a conical hole pierced in a small block on the end of a fine spring, so attached to the bob of the pendulum that the conical hole is under its center of inertia. The lower end of this tube hangs in the center of a dimple formed by capillary attraction in the surface of a cup of mercury, over a thin iron pin fixed in the bottom of the cup.

When the framework of the apparatus is slightly shaken, the point of the tube cups into the mercury, and thus closes the circuit of the electro magnets, e_1 e_2. The electro-magnet, e_1, attracts an armature, to the end of which is attached an index, the point of which is in the same line with the ends of the indices for writing the motions on the drum, D, and thus makes a mark on the smoked paper, which shows at what part of the shock the circuit was closed. The magnet, e_2, at the same time relieves a catch, and allows the weight, *m*, to fall, turning a shaft which passes through behind the dial of the clock. This shaft is provided with two small projecting wheels, which push the dial suddenly forward on the hands. The hands are provided with ink pads, and thus leave a mark on the dial indicating the time at which the circuit was closed. Immediately after the circuit is closed through the mercury, it is again broken by means of a simple circuit-breaker, thus preventing useless waste in the battery.

Presence of Mind in a Dog.

The Boston *Journal* says that on Jan. 23 last, Elmer Wier, aged ten, while skating on the mill pond at Salem, Mass., ventured out too far on the thin ice, near the lower sluiceway, where there is a powerful current, and fell through. A Newfoundland dog, who had followed the little fellow to the shore, at once perceived the lad's danger, and ran to his assistance. The boy, in the mean time, had been drawn under the ice. The dog made a large space of open water, and diving quickly, brought the boy to the surface, dragging him thence to the shore. Some men in the vicinity who witnessed the accident attempted to rescue the lad, but were unable to reach him on account of the thinness of the ice, and he would have been drowned but for the dog. The animal was a waif recently adopted by the family."

Hydrophobia from Skunk's Bite.

Several New Jersey farmers have lately lost a number of cattle and hogs, hydrophobia showing itself in an unmistakable manner, and their conclusion is, that the bite of a skunk was the origin in several cases.

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NULLIFICATION OF THE PATENT LAWS.

The House of Representatives passed January 22 two bills which seriously affect the value of all patents or inventions not directly used for manufacturing purposes.

The first, No. 3925, to regulate practice in patent suits, throws the burden of costs upon the plaintiff in all suits for infringement by purchasers "in good faith," where the damages recovered are not $20 or over; and further compels the plaintiff to give bond at the beginning of the suit to pay all costs that may be adjudged against him, and also a sum not exceeding $50 for the defendant's counsel fees, in case the defendant prevails.

The second, No. 3934 (submitted by the Patent Committee as a substitute for bills numbered 311, 419, 1134, 1250, and 1956) provides that the use of a patented article, purchased in open market for personal benefit, and not for manufacturing purposes, shall not be liable for damages or profits, but in all cases the manufacturer and vender only shall be held liable. It further provides that when the infringement lies in the use of an article made by the defendant or his employe, for his own benefit and not in the manufacture of an article for sale, the measure of recovery shall be a license fee, to be fixed by a jury in case no license fee has previously been established.

The effects of a law, of the nature of the bill first mentioned, have been fully considered in recent issues of this paper. The number of valuable patents that would be practically nullified by it is very great, and would include a majority of all patents on household conveniences, stoves, lamps, and other articles of domestic utility and ornament; agricultural tools and implements; mechanics' and machinists' tools; electrical batteries and appliances; carriage trimming and saddlery hardware; "notions" of every sort, toys and so on almost endlessly.

Should the second bill pass the Senate and become a law, it would by its first section make it extremely difficult for a patentee to protect himself against infringement in connection with any article of easy manufacture and wide utility. He could not reach the market of the fraudulent manufacturer or vender, for the purchasers and users would be "innocent"; and as a rule he would find it equally hard to discover the actual trespasser, or collect from him if found.

By its second section the proposed law would take away from the patentee all real control of inventions that anybody might choose to manufacture for his own use, and express, when sued, a willingness to pay a "reasonable" license fee for the privilege; a provision that would cover all devices used not only by individuals but by all corporations, as railway companies and the like, where it would be to the user's advantage to manufacture the article for himself.

We will suppose an improvement in railway appliances. To one having the exclusive right to manufacture the device the patent might be of great value in providing an assured and stable business, even if no special charge were made for the use of the invention as such. If every railway company could manufacture the article for their own use in their own shops, the inventor's business would be ruined. If, on the other hand, the article were one on which a royalty could be charged, the forcible substitution of a license fee therefor would not recompense the inventor, for after all it would ultimately lie with the companies who might wish to manufacture the article to fix the license fee.

The Patent Committee seek to justify the bill by referring to the complaints of annoyance arising from the practice of persons owning patents or pretending to own them, in allowing the use of an article for a term of years, and then demanding damages.

That there have been annoyances of this nature is not denied; nor is it questioned that Congress could properly provide means for stopping such abuses. Inventors and owners of property under patent rights may well protest, however, that the alleged wrong should not be corrected at their cost.

The large vote in favor of these obnoxious bills (ayes 114, nays 6) would indicate a small membership in the House familiar with the condition and needs of our manufacturing industries, or favorably disposed toward inventors as a class.

Under these conditions it devolves upon owners of property under patent rights, and all those directly employed or interested in industries based on such rights, to seek the protection of their property and interest, as far as they may, by addressing remonstrances to the Senate against the concurrence of that body in legislation of this character. Action in this direction must needs be prompt, and it can scarcely be too urgent, as powerful interests are clearly at work in Washington to incite and encourage legislation which cannot be other than disastrous to all honest patentees.

We give elsewhere the text of the two bills that have been passed by the House.

ANOTHER MOVEMENT FOR A SWISS PATENT LAW.

In July, 1882, by a majority of 5,000 in a total vote of 295,000, the people of Switzerland refused to amend their constitution so as to provide for the enactment of a patent law. This result was in part attributed to the fact that on the ballots provided was a proposed highly unpopular law on an entirely different subject. There is now, however, another earnest movement on foot for again bringing the question of a patent law before the people. At the Swiss National Exhibition, held last summer at Zurich, the matter was actively canvassed, and an impromptu convention held, at which the need of furnishing protection of law to Swiss inventors was declared immediate and urgent. Although some branches of business seem to have been favored in Switzerland by the privilege heretofore enjoyed of making free use of the inventions of all other nations, it was pointed out that in some of the leading departments of Swiss industry the national progress had been slow because inventors had no encouragement to develop inventions at home; this also led many of their inventors to settle in other countries, where they could have the advantages of patent protection. A striking instance of this was furnished in the presence at the exhibition of the venerable Charles Edouard Tacot, president of the Association d'Horlogerie, who, in early life, came to America principally to patent a valuable invention, which was followed by five subsequent inventions, and the realization of competency, before he returned to his native home at Neuchatel. Now, it is said, this veteran inventor has since made several inventions which he declines to make public in his native land, because the moment he should do so they would be everybody's property.

BORACIC ACID; ITS SOURCES.

Except in chemical experiments, and very slightly in medical practice, we scarcely make use of boracic acid in its own form. But combined with soda, so as to form a biborate, it gives us the well-known borax ($2BO_3+NaO+10H_2O$); and inasmuch as we have in America such developments of boracic acid and its compounds as leave all other parts of the world utterly out of the line of competition, it is well to look briefly and see what we can learn as to the probable nature of the origin of the acid itself, and of the manner in which its combinations are made.

Until within a very few years all the borax found in the market was a factitious article, made by the direct combination artificially of boracic acid with carbonate of soda. And all the boracic acid came from one source, and this source being controlled by a single firm, the borax trade was practically a monopoly. This source was a series of marshy grounds commonly called the boracic acid lagoons of Tuscany, though the term is absurd, for there is no extent of water deserving any such name. They are only swampy spaces which are everywhere bubbling with hot water and steam. The hot water comes up from the earth charged with boracic acid in solution, but the proportion is so small that a great amount of evaporation is necessary before the acid can be separated by crystallization. This had been long known, but the expense of fuel for the evaporation was so great that the work was of small practical results, until in the second decade of this century the idea occurred to M. Larderel of making fire fight fire, that is, of using a certain amount of the hot water to evaporate a certain other portion. The plan was successful, and after having made a complete revolution in the borax history of the world, it continues in operation to this day, though its importance is now greatly diminished, as we may have occasion at some future time to see. The acid comes from below in solution, but before inquiring as to its probable origin at that point, let us look for whatever light the American history of boracic acid can give.

Near the lower end of Clear Lake, in California, about eighty miles north and a little west of San Francisco, is an enormous deposit of sulphur, covering many acres. This mass lies in such a form as to make a bluff projection along the side of a narrow valley, from ten to twenty feet in height. The entire bulk, as originally lying, was in large part pure sulphur, much of it most beautifully crystallized, but it also held disseminated everywhere through it veins and layers of cinnabar. And though hundreds of tons of sulphur were made and sold at a good profit, it was found that the yield of quicksilver from the cinnabar was of much more value, and it has for a number of years been worked for that alone.

The manifestations of heat and fierce energy of some sort in all parts of the sulphur bank were violent, and doubtless are so still. At one place a cavern was opened in the sulphur working, perhaps fifteen feet in diameter, filled at the bottom with a perfectly black boiling mass of fluid, while the roar from somewhere below was deafening. Any crevice in the bank was so hot that the hand could scarcely be held in it, and the suffocating gases, chiefly carbonic acid, were so copious in their emission that even the fleet-footed jackass rabbits were often suffocated in passing through narrow cuts. We have not unfrequently seen birds lying dead in the same places; they had probably settled down to enjoy the warmth, and remained too long. The slow-moving rattlesnakes might be expected to succumb, as they did. This was the sulphur bank.

By the side of the bank in the valley was, and doubtless is now, a spring from which ran a small stream down into Clear Lake. This spring was a nearly saturated solution of boracic acid in water. We have made many pounds of the acid from it by simple solar evaporation. We have no record at this moment of its strength, but crystallization always commenced with the commencement of evaporation, and the resulting bulk was nearly equal to the original depth of the water in the pan. This bulk was made up entirely of the lenticular scales of boracic acid (its characteristic form), discolored, it is true, at first, but needing only a recrystallization to give their full weight of the acid, equal in look and in purity to that in any laboratory.

This spring is perhaps unique; we know nothing like it on record. Another near it is similar, but its water holds in solution a certain amount of magnesian alum, and the boracic acid which we made from it was never pure.

These Clear Lake springs have been thus mentioned because it has been the common understanding that boracic acid was a volcanic product, and came up to us from deep sources in the earth's crust. It is true we have no certain data from which to reckon, but all the evidence seems to indicate that the sulphur bank here noted, like the other solfataras of the Coast Mountains, including also the noted geysers between Calistoga and Cloverdale, as well as numberless other hot springs, entirely superficial in all its relations, and has no connection with the "internal heat" of the earth. This item may be found to have important bearings when we come to consider the strange and apparently inexplicable features which pertain to the combinations of boracic acid with the bases lime and soda in California and Nevada.

Of the borax, which is its own base, we have practically no knowledge. We only assume that it exists in great quantities, and is oxidized in some manner, perhaps by the decomposition of water. A remarkable fact in relation to its extended distribution is, that the water of the Pacific, all along the coast south from San Francisco, holds it constantly in solution, as though jets of it were being emitted from fissures or apertures in the sea bed.

We will see at another opportunity, that in times past there have been outpourings of it for very many hundreds of miles, and that the combinations which it formed are without parallel anywhere else on the earth's surface.

PROPORTIONS FOR VESSELS OF LIGHT DRAUGHT.

In our paper of Dec. 8 we set out briefly, and necessarily, therefore, in an imperfect manner, some of the advantages which in our judgment must follow the construction of sea-going vessels of such form that they shall draw but little water. Now, before taking up the objections which can be urged against this mode of ship building, it is well to state definitely what it is that we have in mind.

The form which we propose is so totally unlike anything which we are in the habit of seeing, that the first idea will be to reject and ridicule it. And yet it may perhaps be worth a sober second thought; and we will launch our craft anyway, and see how she will float.

We do not go quite so far as the circular iron-clads devised for the Russian navy, though theoretically they are excellent; but the plan which we have been incubating involves craft whose breadth of beam shall be three-fourths of their length over all, and this breadth continued fore and aft to an extreme degree. Assuming definite figures will give us more precise means of statement, and we will therefore make our calculations for a ship whose extreme length is 160 feet and her breadth 120. This extent of beam seems at first startling and impracticable, but we shall grow accustomed to it, we hope, by and by; and though it gives us an approximation toward half an acre of space of hold for stowage of cargo, yet we may as well learn to look quietly at it and see if there is not a possibility of turning it to good account.

The breadth of 120 feet is continued to within twenty feet of both bow and stern, whence a broad, even curve joins the two sides. The sides of the vessel are thus straight, but this is not on the water line. We propose that her bottom shall show not a straight line in any part, in any direction. Built as we have planned she will carry 2500 tons, and when loaded will draw a few inches over five feet of water. From the middle of her length the curve of her bottom will rise one foot only in sixty-five feet; in the next ten feet it will rise four feet, bringing it to her load water line, and will continue on the same curve for the remaining five feet; so that her broad, flat bow is shelving forward above the water.

The curve sternward is very nearly the same, except that the curve may rise a little more abruptly above the water line. The curve beamward rises one foot in the first fifty-four feet, in the next five, and continues on that curve to the full breadth. The curves at both bow and stern are adjusted to these measurements.

This represents the shape of the ship's bottom as clearly, perhaps, as it is possible to do it without actual use of a model. And there is no part of these details which we do not deem of importance. The first and great thing of all to be secured is exceedingly light draught, so that the ship shall *sit on* the water instead of going down into it. This is attained on her breadth, but it would be fully as much so, and a trifle more, were she entirely flat, rising not at all until her bow and stern, and her sides were reached. But she needs something more than mere power of floating; she must move over the water readily, and of course, therefore, be so formed as to displace and replace it with the least possible resistance. We believe that the form we have described does this, at all events comes nearer to it than the forms which have been so long in use.

Her bow does not enter the water with either a shoulder or a knife-blade. Notwithstanding that it is very broad, it shelves forward in such a way that it is constantly *lifting over* the surface that it meets, instead of plowing through it, and we believe cannot be made, no matter with what speed it is driven, to carry a "bone in its mouth."

The gradual, though slight, rising curve from her mid-length forward is an additional relief to the forward resistance, and the curve from the same point aft is sufficient to allow free recovery without forcing her to "drag water." And in both these respects the lateral curves are adapted to aid.

It will be noticed that we have said nothing of keel. This was done designedly. We propose to build and strengthen the ship's bottom as usual. Of course an external keel may be displayed or not, as shall be preferred. The idea which has been prevalent in this design has had reference to vessels driven by power and not by sails, and our own choice would be decidedly for a movable keel (not a center board, but much greater in length), so that, in case of necessity, advantage could be taken of every inch of her extreme lightness of draught.

We have spoken thus far only of the ship's bottom, but her upper works will vary much from what we are in the habit of seeing. In this ship of 2500 tons we propose a depth from deck to keelson of only ten feet. It will give her abundant room for stowage, and is all she needs. But with this depth she will be but five feet out of water, and the first impression is that she will be swept by every sea, except in the smoothest of water. This is in part an error, for her great buoyancy will in large degree prevent any such effect of the waves. They will not come on board of that which *does not resist them.*

But that they will do it to a certain extent is doubtless true, and we expect it and provide for it. We have a space of 160 feet by 120; of this we propose to utilize as deck surface but 100 by 80. This portion is raised above the level given, the ten feet; a "house" is built, as is so constantly done, five feet more or less in height, as may be deemed best. This leaves a space of fifty feet clear from the bow, twenty feet on each side, and ten feet at the stern, over which seas may break without injury or inconvenience. They are occupied by nothing, and the sea runs off from them as from the sides of an ordinary ship. With such buoyancy as a craft like this possesses, she will ship fewer seas on her real deck than one built as vessels are built now.

A.

CARE OF PATTERNS.

One of the largest expenses of the producers of cast metal articles from toys to machinery is that of patterns. These must be made of the finest stock and by the most skilled workmen. All patterns are made originally of wood, which in the case of light articles are exchanged for duplicates in metal at once, just as the wood block for engraving is exchanged for the stereotype or the electrotype. But large patterns, as for beds for lathes, planers, and other heavy machines, and many other articles, must necessarily be of wood in permanence. How to keep these patterns in good condition when not in constant use has been a puzzle to many, but moisture proof as well as fire proof buildings have filled that demand. A greater annoyance and anxiety is caused by the difficulty of classification and arrangement, so that any particular pattern may be found at once. Where the patterns are limited to a certain stock of reproduced machines, it is easy enough to arrange the patterns in suits, each part of a completed machine to be kept in one compartment. But where the demands on a foundry are of a miscellaneous character, it is impossible to keep a referable list with ordinary classification.

A shrewd manufacturer has overcome this difficulty by adopting the alphabetical order of the dictionary, a name being given to each pattern and piece when made, and entered upon a kept dictionary in the office, another, a duplicate, being kept in the pattern house. Illustrations might be given to show how the thing works, but this is not necessary. It is sufficient to say that under a single letter, G, there are no less than 200 entries, but all so distinct and discriminated that no difficulty is found in locating them in their alphabetical departments, or in charging them to each handler, as pattern room, foundry, or designing (draughting) room. By the addition of numerals to the alphabetical plan it is easily seen that any number of convenient subdivisions may be made.

A Bill to Reduce the Lifetime of a Patent to Five Years.

The above is the official title of a bill introduced by the Hon. J. A. Anderson, of Kansas, being H. R. 3617. The full text is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That section forty-eight hundred and eighty-four of the Revised Statutes is hereby amended by striking out the word "seventeen" and inserting in lieu thereof the word "five;" and that all acts or parts of acts inconsistent herewith are hereby so modified as to be made consistent.

In another column we publish the two bills lately passed by the House designed to establish free trade in patents. Of the 331 members only six voted against these bills, and not one spoke against them. It may therefore be presumed that Mr. Anderson's bill will soon be passed, perhaps by a unanimous vote. From the House of Representatives our manufacturers and inventors have nothing to expect but the most hostile legislation. Their only hope is in the Senate. It behooves those who have property or business interests at stake, and who believe in the maintenance of the patent system, to lose no time in presenting remonstrances to their senators.

Prize for an Original Essay on Sanitary Science.

The Worshipful Company of Grocers, of London, have issued an announcement, offering a prize of $5.000 for the best essay on the above subject. This prize is awarded every four years, and is open to universal competition, British and foreign.

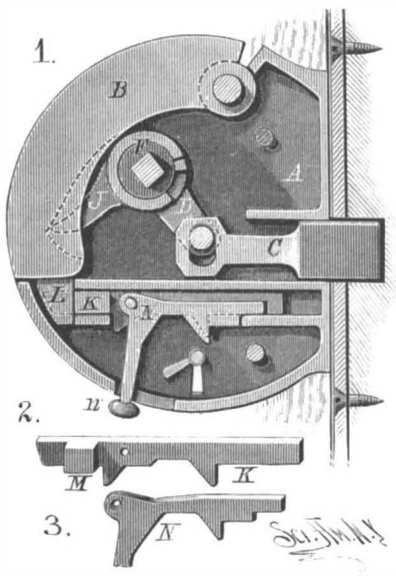
LOCKING LATCH.

The lock casing is composed of a fixed section, A, and a movable section, B, pivoted to the top. The bolt, C, slides in suitable guides in the casing, and its inner end is provided with a slot through which a pintle passes, which is on the end of an arm, D, secured to a nut through which passes a knob bolt, so that by turning the knob the bolt will be moved inward or outward. The nut is surrounded by a collar having a notch in its upper edge, into which a tooth projecting from the nut passes. The collar is provided with a downwardly projecting arm, J, which passes into a recess in the inner surface of the hinged part, B, of the casing, which is made solid, so as to be as heavy as possible.

The latch bolt, K, slides between guide ridges projecting from the inner surface of the back of the lock casing, and is provided with downwardly projecting lugs, shown in Fig. 2, that strike against the ends of the ridges and limit the movement of the bolt in the direction of its length. The part, B, of the casing is furnished with a loop at its lower end, into which the end of the bolt, K, passes when the hinged part is lowered; a block, M, on the bolt prevents it from being forced through the loop too far. To the latch bolt is pivoted an elbow-shaped tumbler, N, Fig. 3, one arm of which passes through a slot in the bottom of the lock casing. The horizontal arm of the tumbler is made with a beveled recess for receiving the bit of the key, and with an offset in its lower edge a short distance from the end. In Fig. 1 the parts of the lock are in such a position that the door cannot be opened, for if the knob be turned, the end of the arm, J, will strike the part, B, of the casing, which cannot be raised, as the end of the bolt, K, is passed through the loop, L. In order to release the hinged part, B, the tumbler, N, must be raised either by a key or by hand, and then pushed toward the outer edge of the lock casing, thereby withdrawing the latch bolt from the loop.

The bolt cannot be moved outward without raising the tumbler, since the offset comes in contact with the lower ridge; when the bolt is moved inward, the bottom edge of the tumbler slides on the ridge and drops automatically, thereby locking the bolt in place. When the latch bolt is in its forward position, the knob, E, may be turned, when the part, B, will be raised by the arm, J, and the bolt, C, moved inward. When the arm is released the weighted hinged part, B, drops into its normal position, and the bolt, C, is pushed outward. As the lock requires no spring, its construction is materially simplified.

This invention has been patented by Mr. Elijah Nyswonger, of Hanford, Cal.



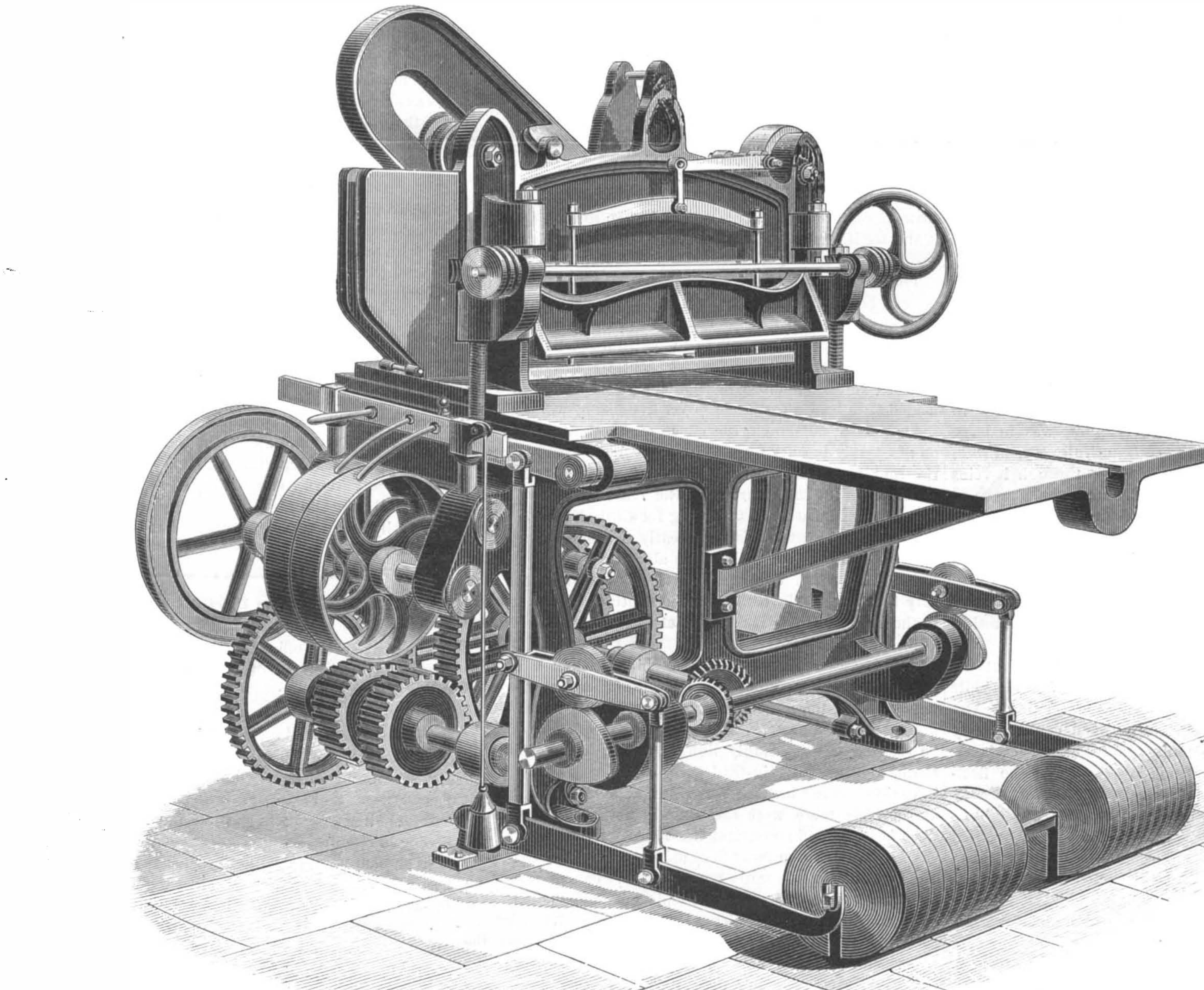
NYSWONGER'S LOCKING LATCH.

A new anti-vivisectionist organ called the *Champion* is about to appear in England.

AUTOMATIC MACHINE FOR CUTTING PAPER AND CARDBOARD.

Machines for trimming paper, cardboard, etc., such as generally employed, offer the inconvenience that, although they perfectly perform the office for which they are designed, they require long and tiresome maneuvering. It is necessary, in fact, for the workman, after determining the position of his pile of paper, to tighten up the press by means of a hand wheel in order to hold the material in place, and afterward (when the machine is not run by a motor) to actuate by hand the winch that moves the knife carrier through a train of gearing.

The Lhermite machine, shown in the accompanying engraving, is designed to suppress such inconveniences, while at the same time giving a larger product than machines of ordinary construction do, owing to the successive maneuvers that their mechanism requires.



AUTOMATIC MACHINE FOR CUTTING PAPER AND CARDBOARD.

This machine consists of a table supported by two cast iron standards strengthened by cross braces. Upon this table are mounted two cheeks, between which slides in sloping slots the knife carrier. This latter is guided by two rollers which revolve upon axles that are fixed to the extremities and to the upper part of the cheeks.

The pulley that receives the driving belt is mounted upon one of the sides of the machine, and transmits motion, through a series of gearings, to two toothed wheels which actuate the connecting rod and the lever of the blade carrier.

When it is desired to use the machine, the pile of paper or cardboard is first squared up, and then the workman presses with his foot upon a pedal, which, through the intermedium of a series of levers, causes the descent of a gauge which is situated in the interior of the press plate. The object of this gauge is to determine accurately the line of the cut and to facilitate the placing of the paper upon the table. After this the driving belt is shifted to the fast pulley, and this sets in motion the gearings, which cause the revolution of a shaft that is placed beneath the table, and that carries a cam at each extremity.

These two cams support, each of them, a roller mounted in the center of a cross piece which is itself connected by rods with a large horizontal lever that pivots upon a fixed point at the base of the frame.

This lever and the one symmetrical with it carry at their forked extremities an iron bar provided with a certain number of iron rings that form a counterpoise which may be varied at will.

At the moment the machine is set in motion the cams allow the rollers, and likewise the counterpoises, to descend, and the effect of this is to produce a tractive stress upon two vertical connecting rods, which act through their upper extremities upon two levers that are connected with the press plate by means of nuts that receive two screws mounted upon the extremities of the plate. The press is thus locked automatically, and the driving pulley, continuing its motion, causes the descent of the blade, which cuts the paper and at once ascends again. At this moment the cams lift the counterpoises, and consequently the press plate, and the machine stops alone by means of a small counterpoise which is attached to the extremity of a cord that draws the belt shifter toward the loose pulley.

The operation being finished, the machine is ready to begin another cutting, and it is then only necessary to place the paper in position and set the machine running again.

As the piles of paper, cardboard, etc., to be cut are necessarily of variable height, the press plate had to be made adjustable at will with respect to the levers that actuate it. To effect this the press is provided with two endless screws that are united by a horizontal shaft which carries a hand wheel. These screws gear with two pinions that are provided with helicoidal teeth and that are keyed upon the traction screws of the press plate.

Upon acting on the hand wheel, these two screws are caused to revolve in the nuts which they carry at their lower part, and which are connected with the upper levers of the locking apparatus. The operator can thus regulate the height of the press above the table according to the height of the pile of paper.—*Annales Industrielle*

THE PROPELLER BONE.—A CONTRIBUTION TO SCIENCE.

BY DR. C. MARION DODSON, BALTIMORE, MD.

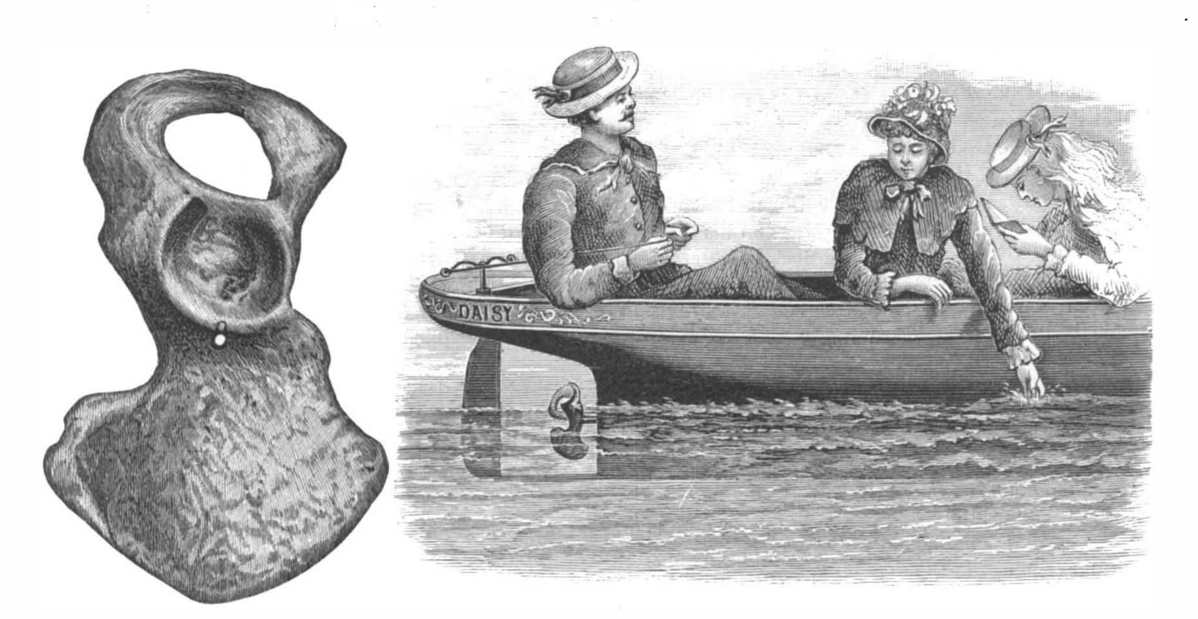
"The thing that hath been, is that which shall be;
And that which is done is that which shall be done;
And there is no new thing under the sun."

The innominate can now be appropriately called the propeller bone.

The early anatomists, in giving names to the various bones composing the human skeleton, called many by such as their analogy presented to existing objects; in doing so they permitted their fancies to be very much enlarged and exaggerated. So many points of dissimilarities will have to be allowed if we would fully concur with them. In giving names to the bones of the pelvis, with their natural articulations and soft parts, without much stress of imagination they could appropriately speak of them collectively as forming a true *basin*. Nor was much difficulty perhaps presented when they disarticulated the osseous structure that formed that cavity, and gave to its separate bones their appropriate names. On each side of this basin the bones soon unite, and in the adult have so blended as to present a very large bone, whose irregular shape and roughened outlines gave them no clew or resemblance to any known form or object, hence they called it the innominate or nameless bone.

This large, ugly bone, which up to the present time no one has seen fit to grant shape or form, is a facsimile of a *marine screw propeller*, with angles, shape, and performances similar to those used for propelling sea going vessels. To demonstrate this proposition, a pleasure boat fifteen feet long was fitted up and driven by one of these bones very satisfactorily.

In conducting the experiment all that was changed was to place a piece of flat bone so as to span the obturator foramen, which only replaces the obturator membrane that exists normally. While this is not necessary, it prevents the water from flowing through the aperture as well as to counterbalance the ilium end, which is more dense in structure and presents so many processes. Another similarity may be noticed: one innominate with its opposite fellow presents a right and left hand screw, which according to nautical nomenclature are known as twin propellers, and are both modes of marine propulsion. In pursuing this analogy still further, independent of the striking resemblance in form that exists, there is still a strong coincidence as to the use the propeller and the innominate bone bear as auxiliaries to motion. Both act only as accessories; the former, acted upon by an internal force generated within the vessel, sends her through a yielding medium; the latter, though a little more passive, performs the same subordinate office in the human economy by affording attachments for levers and appliances which are so regulated and adapted by a perfection of machinery and force as to give to man his remarkable power of locomotion. In this investigation two changes were made in the arrangement of this bone that differ from it as presented in the body. One, as stated, was to close the hole with solid material; the other consisted in reversing the surfaces, making the internal the driving one. This was done because if placed vertically to the end of the boat the large depressions and holes are hid, and present to the eye a smooth and more graceful appearance. These abnormal changes did not give as good results as when conformity to the natural condition was followed. Why this was a fact no theory was available to explain until it was solved by reference to the SCIENTIFIC AMERICAN, August 30, 1879, which describes Deane's patent propeller, whose blades are represented having depressions with holes through them. He claims these holes are necessary to partially overcome the vacuums created by all other propellers, and gives to his its peculiar merit and advantage. Strange to say, these depressions with holes are found upon this bone, and are arranged upon just such a scientific principle as claimed in his invention.



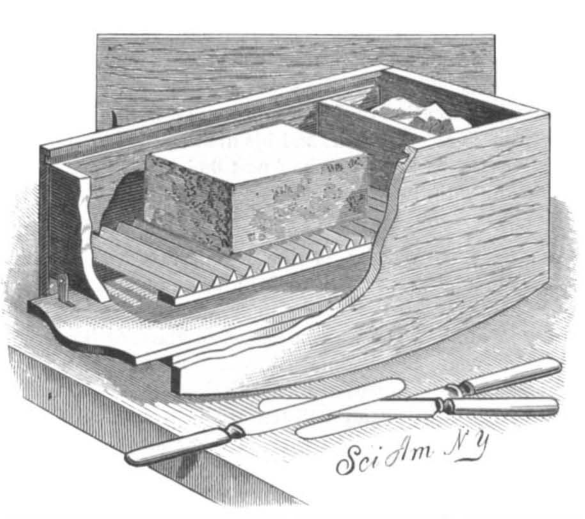
THE PROPELLER BONE.

From the above it is apparent that this nameless bone has double claims for restitution and justice; and when future anatomists are planning their modern works, the old innominate should be no longer slighted, but by its *push* gain for itself either an appropriate name or be granted a more definite shape. As a summary, we have only added another link to the strong chain of evidence that speaks so potently to prove that many of our modern inventions, and especially those that are to be the most important factors for man's development and advancement, are but duplicates and principles fully illustrated and operative in a being that the Good Book admonishes us to investigate if we would know for ourselves.

THE awards at the Foreign Exhibition in Boston were distributed January 1. They consisted of 386 medals and diplomas to exhibitors, exclusive of a number of such marks of distinction to various United States and foreign officials. It is stated that there have been in the neighborhood of 300,000 visitors to the exhibition.

COMBINED KNIFE BRICK BOX AND GRINDER.

The box for holding the knife brick has a grater bottom, of any approved kind, on which the brick rests, so as to be ready to be ground whenever the dust is wanted for scouring knives or other objects. The brick may be shifted along the grater by hand for grinding off the dust when wanted, but the box is arranged on rockers, so that it may be tilted and the brick made to slide backward and forward on the grater, thus making a much neater and cleaner device than if the brick were moved by hand. The scouring board is arranged to slide in the box under the grater, so as to receive the dust. At one end of the box is a cell for holding the cork, chamois skin, or other rubber to be used in the scouring process. The engraving represents the construction so clearly that further description is unnecessary.



WOOD'S COMBINED KNIFE BRICK BOX AND GRINDER.

This invention has been patented by Mr. John F. Wood, of 4 Spring Street, Boston, Mass.

A Cheap Ice Box.

Make or buy two boxes, one of which shall be two or three inches smaller all around than the other. Line the smaller one with sheet zinc, soldered at the seams and turned over and nailed to the edge of the box. Make a hole in the middle of the bottom, and put a zinc or lead pipe through the bottom and solder it well to the zinc lining; this must be long enough to project below the outer box when they are put together. A block may be nailed to the inside of the bottom of the outer box, and a hole bored to correspond with the place of the tube in the inner box.

Fill the bottom of the large or outer box with pulverized charcoal or charcoal and sawdust, deep enough to allow the top of the inner box to sit low enough for a cover under the cover of the outer box. Put the inner box in place, and fill all around between the boxes with the pulverized charcoal; place some strips of wood between the two boxes on a level with the top of the inner box, put a zinc-lined cover upon the inner box and a tight wood cover upon the outer. If the lead pipe at the bottom is long enough, bend it up for a siphon, to prevent air from circulating and to allow the water from the melted ice to escape.

Deafness Caused by Pressure on the Ears.

Narrowing of the external auditory canal from cracks in the cartilaginous portion is a recognized cause of deafness, apart from the liability to which it gives rise of the retention and accumulation of cerumen. Dr. Moure has seen this narrowing caused by the pressure of a handkerchief worn over the head and tied closely under the chin, which forms the head-dress worn by the peasant women in some districts. Deafness produced in the same way is not uncommon in nuns who wear the *cornette* pressing tightly against the pavilion of the ear. The treatment of this condition consists in gradual dilatation by means of laminaria tents.—*Lyon Medical.*

A Substitute for Emery.

Some improvements in the manufacture of artificial stone and of a substance which can, with advantage, take the place of emery have been produced by Mr. B. Hess, of Bayreuth. The artificial stone manufactured according to this invention consists of serpentine (or kindred minerals), soapstone, feldspar, mica, quartz, and fireclay, or some of these variously combined according to the purpose for which the stone is intended. These substances, says the *Building News*, are pulverized, mixed, and moistened, and after having been pressed into the required forms are burned at a white heat. Thus treated, they acquire a hardness that will permit them to be used as fireproof building materials, as pavement, as mill and grind stones, as floor plates, as wall panelings, as crucibles, smelting pots, stone vessels, mill rollers, and the like.

The minerals serpentine or soapstone as chief ingredient, feldspar as binding material, and also mica, quartz, and clay are first ground more or less fine in the usual manner. For building purposes, paving stones, pavement plates, and mill stones, the patentee usually employs about 40 parts of serpentine or soapstone, 10 parts of feldspar, and 2 parts of mica, which are well mixed and moistened with so much water that the mass remains conglomerate if compressed by hand. The mass is then pressed or stamped in moulds made of iron, wood, or other suitable material, to the desired forms in such manner that when the forms are taken apart the mass will be so consistent that it will retain its form unchanged. The stones, plates, vessels, or other objects are afterward well, but slowly, dried in an appropriate manner under the influence of a gradually increasing temperature, and are finally burned in a strong white heat.

In manufacturing plates for tables, floor plates, wainscoting, and similar objects, six parts of fireclay may be added to the mixture of minerals specified above. For grind stones the patentee preferably employs a mixture of 40 parts of serpentine ground fine and burned beforehand, 10 parts of feldspar, and 5 parts of quartz sand. For crucibles, smelting pots, or other stone vessels, he prefers to employ about 40 parts of soapstone, 10 parts of feldspar, and 6 parts of fire clay, which are ground fine, well mixed while dry, and then water is added until the mass can be manipulated on the potter's wheel, as is the case with porcelain. The crucibles or smelting pots thus formed are gradually but thoroughly dried and then burnt in a very intense white heat, whereby an unusually fire proof, perfectly acid proof, vessel is obtained, specially adapted, for instance, for melting gum by varnish makers, etc., no alteration in the color of the mass to be melted taking place. The same mixture which is used for crucibles will also serve for manufacturing mill rollers, which, after drying, should be carefully turned and finished on the wheel or a suitable lathe. For manufacturing a substitute for emery, the serpentine or a kindred mineral is ground as fine as required, then burned at a strong white heat, and after cooling is sifted or bolted, and finally sorted. This substitute for emery thus produced is, according to the patentee, eminently superior in hardness, sharpness, and durability to the best emery, and is admirably suited for grinding, polishing, and cleaning metals. The proportions stated above are well suited for the purposes for which they are prescribed, but they may be modified without departure from the essential characteristics of the invention. Serpentine consists of about equal parts of silica and magnesia with water; soapstone or steatite invariably has a larger proportion of silica, nearly 2 to 1 of magnesia, and less water than serpentine; but if either can be made into a substitute for emery at a commercial price, it will appear strange that the discovery has not been made before, though that clearly consists in calcining the mineral, a feature which forms the substance of the invention.

Lithograph Stones.

Mr. Stuart, of Edinburgh, proposes to strengthen stones, which have thus been weakened, by applying to them a backing of granolithic. This material, it appears, when placed in contact with a roughened surface, adheres with such tenacity as to form, with the stone it is attached to, one solid mass. Its capacity for sustaining pressure is known to be great, and if additional strength should be required, bars of steel can easily be introduced while the material is in a soft condition. Treated in this way, a lithographic stone of an inch in thickness becomes thoroughly serviceable, and will, it is said, continue so till worn almost to a film. Blocks of the ordinary thickness thus become capable of furnishing the material for two or three printing stones, while slabs that would otherwise be too thin for use can be turned to profitable account.

ASPECTS OF THE PLANETS FOR FEBRUARY.

MARS

is evening star; though exceeded in size and brightness by Jupiter and Venus at the present time, he wins the first place in the monthly presentation on account of the occurrence of the most interesting epoch in his course, his opposition with the sun. This event takes place on the 1st at 6 o'clock in the morning. Mars then turns to us his broad, round face, the earth directly intervening between his ruddy disk and the sun, thus bringing the two planets to their nearest approach to each other. This is true in general terms, but not strictly accurate. If Mars and the earth revolved in circular orbits, fixed with respect to each other, the distance between them at opposition would be the same. But the orbits of both planets are elliptical and not fixed in regard to each other, while no two following oppositions happen in the same part of either orbit. Therefore, the distance between the planets varies greatly at different oppositions. When Mars at opposition is in perihelion, or nearest to the sun, and the earth at the same time is in aphelion, or farthest from the sun, they are as near together as they can be, or about 35,000,000 miles distant. When Mars at opposition is in aphelion, and the earth at the same time is in perihelion, the two planets are at their greatest distance, or about 62,000,000 miles. The former was the case at the opposition of 1877, for it occurred nine days after Mars had reached perihelion. The grand appearance of the fiery red planet at that time will never be forgotten by those who witnessed it. A great event also immortalized its passage—the discovery of two moons, moving with wonderful speed about their primary, and measuring probably less than ten miles in diameter, the smallest known worlds that belong to the solar system. At an opposition in 1719, when Mars was only two degrees and a half from perihelion, he shone with such awe-inspiring brightness as to cause a panic among the superstitious, who had firm faith in his malignant influence.

The present opposition is one of the most unfavorable for a near prospect of our celestial brother. As the earth is one month past perihelion, and Mars near aphelion, they are nearly as far apart as possible. It is not expected that Deimos and Phobos, the two moons, will be visible even in the most powerful telescopes.

Oppositions that occur in August or September bring the earth and Mars to their nearest point of approach, while those that occur in February or March find them most widely separated. The most favorable oppositions for observation of the planet take place at intervals of fifteen years. The last one was in 1877. Therefore we must wait until 1892 for another.

Who can tell what the great telescopes in 1892 will reveal under more experienced hands, in the clear air of mountain observatories, and with the gigantic refractors that will then be in operation? Continents, islands, seas, canals, atmosphere, clouds, morning and evening twilight, raging storms, clear skies, and polar ice may then be eclipsed by discoveries as unexpected and as permanent as the twin satellites that were brought into existence by the Washington telescope under Professor Hall's skillful manipulation.

Meantime, the present opposition of Mars must not be neglected. He is now, and will be during the month, a conspicuous object, shining with a fiery red light unlike that of any other planet, so striking in its character as to suggest to the poetic Greeks the distinguishing epithet of the God of War. He may be found on the 1st in the northeast, rising about sunset, and making his transit at midnight. Jupiter is 15° west of him, and the first magnitude star Regulus, the Lion's Heart, about the same distance southeast.

When Mars is in opposition as seen from the earth, the earth is in inferior conjunction as seen from Mars. If observers could be transported to his domain before the event, they would behold the earth dwindled to a beautiful star, shining in the Martian sky as evening star like Venus in our sky near her inferior conjunction, and, unlike Venus, accompanied by a moon, to make the celestial picture more beautiful. Bright as Mars appears, his diameter is not much more than half that of the earth, and about double that of the moon. The ruddy planet has a peculiar interest for terrestrial observers, as he possesses the most intelligible features of any celestial object within our reach, for the moon is dead, and Venus is hid in a blaze of light that the eye can hardly fathom.

It takes Mars 780 days to revolve from opposition to opposition again, or to complete his synodic period. During this time, the earth makes two revolutions in her orbit, and then it takes her fifty days more to catch up with him. Oppositions of Mars occur at this average interval, and may be approximately calculated. The present opposition occurs on the 1st of February, 1884. Three more occur in succession in March, 1886, April, 1888, and May, 1890, when will follow the much desired occultation of 1892.

The right ascension of Mars on the 1st is 9 h 2 m.; his declination is 21° 37′ north; and his diameter is 15″.

Mars sets on the 1st about half past 7 o'clock in the morning; on the 29th, he sets a quarter after 5 o'clock.

JUPITER

is evening star. Although he has passed opposition, he is increasing his distance from the earth and approaching the sun; as we follow his course in the heavens, he is a magnificent object in the star spangled canopy that nightly unveils its glory to our admiring eyes. He is now more than an hour high at sunset, and traverses the sky with stately step till about an hour before sunrise, when he slowly sinks below the western horizon. He is still *facile princeps* among the bright twinklers that surround him. He wields his starry scepter from a point of the sky nearly between Castor and Pollux on the north and Procyon on the south, Mars follows his lead at a respectful distance, while brilliant Orion and glittering Sirius precede him toward the southwest.

Jupiter is a most desirable tidbit for the telescopists. Mr. Denning of Bristol is a special student of the Jovian alphabet as exhibited in incongruous symbols on his disk. Just now, efforts are directed toward the exact determination of his rotation period, for an irreconcilable difference is found between the time of the rotation of the red spot and that of the white spot. It is considerate in our big brother to put forth these diverse symbols from time to time on his shining surface, in order to whet terrestrial curiosity. Like figures on a blackboard, they form the data for the solution of great physical problems that at present baffle the ingenuity of terrestrial brains.

The right ascension of Jupiter on the 1st is 8 h. 0 m.; his declination is 21° 11′ north; and his diameter is 43·8″.

Jupiter sets on the 1st at half past 6 o'clock in the morning; on the 29th, he sets at half past 4 o'clock.

VENUS

is evening star, and by far the loveliest of the brilliant quartet of planets that shed their radiance upon the winter nights. She possesses a charm that surpasses the majestic bearing of Jupiter, the warlike aspect of Mars, or the serene glow of Saturn. She is increasing in radiant beauty, while her three rivals have passed their culminating point, though the diminishing brilliancy will scarcely be discernible during the month. Observers who watched her course in January did not fail to admire the bewitching grace of her presence in the glow of twilight. Sometimes she hung on the dark edge of sunset clouds, shining through the rifts that revealed the clear sky; sometimes she challenged admiration in a twilight of molten gold. But she was surpassingly lovely when her light of "purest ray serene" was seen amid the crimson afterglow that lit up the western sky on some of the unaccountably beautiful sunsets that have shed a glory not of earth upon the path of the departing sun.

Venus is moving rapidly north, coming into northern declination on the 11th, and, at the end of the month, being 14° north of the sunset point. Her apparent approach to Saturn is another pleasing feature of her course, while still another is found in the fact that at the close of the month she will be above the horizon for three hours after sunset.

The right ascension of Venus on the 1st is 23 h. 5 m.; her declination is 7° 19′ south; and her diameter is 12·8″.

Venus sets on the 1st a few minutes before 8 o'clock in the evening; on the 29th, she sets about 9 o'clock.

SATURN

is evening star. He has not made so fine an appearance for fifteen years, and may be easily known as the bright star nearly half way between the Pleiades and Aldebaran. He is near his greatest northern declination, near perihelion, and near the point where his rings are most widely open, these favorable positions all culminating next year. Nearly thirty years must pass before the same conditions are repeated. Saturn is in quadrature on the eastern side of the sun on the 22d at noon-day. He then rises at noon-day, is on the meridian at 6 o'clock in the evening, and sets at midnight. Half his course from opposition to conjunction is completed, half his race as evening star is ended.

He is now a superb object in the telescope, and astronomers are diligently at work to see what may be learned from the markings on his disk. Mr. Ranyard of the Royal Astronomical Society observed in November a narrow belt on Saturn's surface of a bluish brown-color not quite twice as broad as the Cassini division of the ring. Such narrow belts are rarely seen on this planet, though not uncommon on Jupiter.

The right ascension of Saturn on the 1st is 4 h. 6 m.; his declination is 19° 2′ north; and his diameter is 18″.

Saturn sets on the 1st at half past 2 o'clock in the morning; on the 29th, he sets about a quarter before 1 o'clock.

NEPTUNE

is evening star. There is nothing noteworthy in his present course, excepting his quadrature with the sun on his eastern side on the 7th, at 9 o'clock in the morning, preceding the arrival of Saturn at the same goal fifteen days.

The right ascension of Neptune on the 1st is 3 h. 5 m.; his declination is 15° 35′ north; and his diameter is 2·6″.

Neptune sets on the 1st a quarter after 1 o'clock in the morning; on the 29th, he sets at half past 11 o'clock in the evening.

URANUS

is morning star, and pursues his monotonous course without any incident worth recording.

The right ascension of Uranus on the 1st is 11 h. 52 m.; his declination is 1° 37′ north; and his diameter is 3·8″.

Uranus rises on the 1st at 9 o'clock in the evening; on the 29th, he rises at 7 o'clock.

MERCURY

is morning star throughout the month. He reaches his greatest western elongation on the 31st at 11 o'clock in the evening, and is then 26° 12′ west of the sun. He would at that time and for a week before and after be favorably situated for observation as morning star were it not for his great southern declination. Sharp eyes may pick him up about an hour before sunrise, for at elongation he rises an hour and three-quarters before the sun. He will be found 1° 30′ south of the sunrise point in the constellation Capricornus. The sky and atmosphere must be exceptionally clear to lure him from his hiding place.

The right ascension of Mercury on the 1st is 19 h. 30 m.; his declination is 19° 17′ south; and his diameter is 8·4″.

Mercury rises on the 1st not far from 6 o'clock in the morning; on the 29th he rises about 6 o'clock.

THE MOON.

The February moon fulls on the 10th at 48 minutes after 11 o'clock, standard time. As she swings her ponderous globe between us and the other planets, she first draws near Neptune on the 4th, the day of her first quarter, passing 11′ south. She approaches Saturn on the 5th, passing 1° 18′ south. She is at her nearest point to Jupiter on the 9th, to Mars on the 10th, to Uranus on the 13th, and to Mercury on the 24th. She celebrates the additional day in February by a close conjunction with and in many localities an occultation of the planet Venus. Unfortunately, the rare and beautiful phenomenon occurs at a quarter after 10 o'clock in the morning, when it can only be seen in the telescope.

Life Saving Appliances at Sea.

Every little while some terrible calamity on the ocean deeply stirs the public mind, and awakens the apprehension of all who "go down to the sea in ships," as did the fearful disaster which occurred off Gay Head, on the coast of Martha's Vineyard, just east of Long Island, on the morning of January 18. Here was one of the stanchest of the iron steamers engaged in our coastwise trade, with seven life boats, a life raft, and several hundred life preservers, and yet, when the vessel struck the reef and sank in sight of land, 100 lives were lost to only about 30 saved. The life saving appliances were abundant and of approved kind, but the circumstances were such, on a rough coast in a high sea, that they were of comparatively little use, most of those saved having been rescued by help from outside of the ship. As touching the insufficiency of present means, and the need of a better equipment for such emergencies than has yet been devised, the *Tribune* says:

"In the appliances for rescuing people from stranded vessels near enough to the shore to establish communications, and also in the models of life boats, and in the projection of signals and life lines from shore stations, there have been important practical improvements during the past twenty years. But when we come to the problem of saving life in disasters at sea or under any circumstances where the wrecked ship must furnish the appliances to be utilized, it does not seem that much progress has been made. The boats are always of doubtful availability, to begin with. It is necessary, in carrying boats on a sea-going vessel, so to place and secure them as that they shall be at once accessible in case of need and safe from the accidents arising from stress of weather. Of course, this is very difficult, for if they are too accessible they are liable to be carried away in a storm; and if they are secured too firmly, they may not be available at a critical moment. As a rule the davits are swung inboard, the boats secured by canvas covers and bands, the plugs and oars removed, and the fall tackle rove. In theory only a few minutes are required to cut off the bands and cover (which is laced), put in plug, oars, and crew, swing the davits outboard, and lower away. But nine times out of ten the plug and oars have to be searched for, and then the blocks of the fall tackle are jammed, and then the patent clip which ought to release the boat when it touches the water fails to work. Sometimes one end is released only, and then of course the boat's crew are pitched overboard.

This accident has often occurred. And when a vessel has struck and has a heavy list, as in the case of the City of Columbus, the boats on the lower side become useless, while it is doubly hard to launch those which are on the side out of water. Should a vessel founder in a gale at sea, the chances are that it will be impossible to launch any of the boats, even if they have not been stove or carried away before the crisis comes. And even if one or two can be launched, the danger of their being dashed against the vessel before they can get away is so great as to leave little prospect of escape. As to life rafts, while many ingenious contrivances of the kind have been invented, we do not remember an instance of the preservation of life through their means at sea. The truth is that as a rule neither boats nor rafts will live in the seas in which ocean steamers founder, and even in the case of life boats which cannot sink, they could only keep their occupants above water long enough to let them perish from exposure. As to life preservers, they may help a cool swimmer, but it is doubtful whether in a seaway they can ever preserve from drowning for any length of time persons unable to swim, and delicate women. For when the sea is high it is difficult even for an expert swimmer to keep his head above water. He must watch his chances to take breath, and must constantly dodge the heavy waves, or he will have the life literally beaten out of him. This is what happens to he majority of those who trust to life preservers in a high sea.

"What is wanted is some life saving appliance which needs no preparation; which is always in full working order; which will float its occupants high out of water; which can be got clear of a stranded or foundering vessel without swamping or staving. It is clear that none of the life saving apparatus at present in use on sea-going vessels fulfills these requirements, and equally clear that no apparatus which does not fulfill these requirements can be of much practical service in emergencies. It is a difficult problem to solve, no doubt, but there ought to be enough inventive genius in this country to solve it, and it ought to be taken in hand more earnestly than ever, seeing what is at stake."

Correspondence.

Pneumatic Propulsion of Vessels.

To the Editor of the Scientific American:

In your issue of January 5 I notice an article on the pneumatic propulsion of vessels, the writer of which appears to hold several erroneous ideas as to the action of the air on the water. His plan is to have two keels with a space between them for the air to rush along to the stern of the vessel, and there escape. Now, the air would have more power to propel the boat with only a simple nozzle at the stern, looking straight backward. In his plan, the air on escaping from the nozzle would pass along between the keels in a solid body, at the same pressure as the surrounding water. On passing along it must necessarily be in contact with a greater surface of the boat than the water, so that the friction on the one would be greater than that on the other, therefore, instead of assisting to propel the boat forward, it would be retarding its progress.

THOMAS HENDERSON.

Nashville, Tenn., January 15, 1884.

Present Steam Engine Practice.

To the Editor of the Scientific American:

Under the heading of "Present Steam Engine Practice" in your issue of Nov. 7, 1883, you open up perhaps *the* most interesting subject to the mechanical mind, and although your remarks seem to me very unsatisfactory, they may call forth from your numerous subscribers more comprehensive ideas.

You rightly assert most of the increase of power is due to increased piston speed, but the other "reasons" quoted, with the exception of the modern engine possessing "generous ports," are entirely fallacious; minimum friction, careful balancing, and exact workmanship, etc., do not affect the power developed, however much they enhance the effective horse power.

You omit altogether the higher boiler pressure of modern practice that plays so important a part in the development of both increased power and economy of fuel: and by not stating the relative speeds of the engines mentioned in the last paragraph, you deprive your readers of the opportunity of studying them comparatively.

We must also bear in mind increased economy by higher grades of expansion is attended with a decrease in the power developed; it is therefore ambiguous to consider improvements in both these directions as due to the same causes, and I am consequently rather skeptical as to the correctness of the examples given.

If your readers will supply examples of such improvements with all the necessary data for a complete comparative examination, we shall have practical information not only interesting but most instructive, and I fear we shall find the improvement is not so great as your article would lead me to suppose.

JAMES H. MAN.

Denver, Colo., Nov. 19, 1883.

[We think the majority of engineers will agree that our article coincided with practical experience and was substantially correct.—ED. S. A.]

The Beet Sugar Industry.

To the Editor of the Scientific American:

An inquirer in SCIENTIFIC AMERICAN Notes and Queries, No. 18, December 29, 1883, asks questions on the beet sugar industry. It is thriving in California. The attempts made in Maine, Massachusetts, and Delaware to establish it were very satisfactory in the sugar richness of the beets worked, but the discouragement was in the lack of the raw material. The proper organization for an abundant production of the root is the only need to insure its establishment in the northern sections of our country.

WM. CARTWRIGHT.

Oswego, N. Y.

How to Annihilate Tornadoes.

To the Editor of the Scientific American:

My scheme to blow up tornadoes with gunpowder, as stated in the issue of December 8, has drawn out a correspondence of Mr. Bert Davis, of Topeka, Kas., in that of January 12. Mr. B. D. holds that a dug-out is after all the safest place to get into, when chased by a tornado.

So no doubt it is for individual personal safety. One man of nerve can, however, with my plan, save a whole village—man, beast, and buildings. Our friend Mr. B. D. will see reasons to change his views regarding cyclones and tornadoes, by reading the elaborately written article by Mr. John D. Parker, U. S. A., in your valuable paper of November 17, 1883. It is now well known that the course of tornadoes in the United States is from S.W. to N.E. In the southwest part of town or village exposed to tornadoes is the place for preparation to meet the tornado. If the keg or barrel of powder could be fired from a large mortar, it would be more effective in the upper air and less destructive below. There is always a certain amount of danger in keeping the commercial powder in the heart of towns, as is necessarily done so far. It would be to the interest of our Western tornado exposed towns, to keep all their surplus powder in extra powder houses in the southwest part of their town.

Such one or more powder houses can be exploded by one man, a town officer, from a safe dug-out northeast of them, to annihilate the tornado threatening to annihilate the town. The premonitory signs of a coming tornado are even now not altogether unknown. An approaching tornado is easily heard and seen, in the form of a dust, electrical, funnel-shaped cloud, etc. The towns in the probable track of a tornado can receive notice of its coming by telegraph or telephone, to prepare to make the tornado at least skip the town with a light charge of powder, or to perhaps annihilate it with a heavy charge, situated and fired as already stated.

JOHN F. SCHULTZ.

New York, January 18, 1884.

A Bread Recipe.

To the Editor of the Scientific American:

For the benefit of the numerous readers of your paper I send you an account of the manner of bread making as practiced by my cook for nearly ten years. The bread so made I have eaten ever since 1876, and find it the sweetest and most palatable bread I have ever tasted. It is made as follows:

Take a tin pail or earthen pitcher holding half a gallon; put in one teaspoonful of sugar heaped up, one-quarter teaspoonful fine salt, one-quarter teaspoonful bicarbonate of soda, or sal soda will answer if no other is at hand; on these pour one pint of boiling water, when this has cooled so as not to scald the flour, add flour enough to make a rather stiff batter. This must be beaten up well for at least *five minutes.* Place the pitcher or pail in a larger pail containing hot water, as hot as you can bear your hand in, but not scalding, and put it somewhere on the stove or other convenient place to keep hot, in six to eight hours it will have risen to the top of the pail. Make a sponge with *hot* water, add the yeast made above, keep sponge *hot,* and in one hour it will be ready to knead and mould into loaves, which if kept *hot* will rise quickly and can be baked as ordinary bread.

Keep everything hot if you desire success, but not so hot as to scald. My apparatus is on the glue kettle principle, and kept hot by *jacketing* the outside pail with felt and applying a small "Evening Star" night lamp under it. A tablespoonful of oil lasts all night. Set the yeast at 10 P.M., and it will be ready at 5 or 5:30 A.M. next morning. Brown bread made as above is excellent, and white bread is as white as snow.

S. H.

Dust Causes Brilliant Sunsets.

Professor S. P. Langley, astronomer at Allegheny Observatory, Allegheny, Pa., lately gave to a *Tribune* reporter the following views upon the topic of the transmissibility of light through our atmosphere:

"At first I supposed the sunset matter a local phenomenon, but when the reports showed it to have been visible all over the world, it was obvious that we must look for some equally general cause. We know but two likely ones, and these have been already brought forward. One is the advent of an unusual amount of meteoric dust. While something over ten millions of meteorites are known to enter our atmosphere daily, which are dissipated in dust and vapor in the upper atmosphere, the total mass of these is small as compared with the bulk of the atmosphere itself, although absolutely large. It is difficult to state with precision what this amount is. But several lines of evidence lead us to think it is approximately not greatly less than 100 tons per diem nor greatly more than 1,000 tons per diem. Taking the largest estimate as still below the truth, we must suppose an enormously greater accession than this to supply quantity sufficient to produce the phenomenon in question; and it is hardly possible to imagine such a meteoric inflow unaccompanied with visual phenomena in the form of 'shooting stars' which would make its advent visible to all. Admitting, then, the possibility of meteoric influence, we must consider it to be nevertheless extremely improbable.

"There is another cause, which I understand has been suggested by Mr. Lockyer—though I have not seen his article—which seems to be more acceptable—that of volcanic dust; and in relation to this presence of dust in the entire atmosphere of the planet, I can offer some little personal experience. In 1878 I was on the upper slopes of Mount Etna, in the volcanic wastes, three or four hours' journey above the zone of fertile ground. I passed a portion of the winter at that elevation engaged in studying the transparency of the earth's atmosphere, I was much impressed by the fact that here, on a site where the air is supposed to be as clear as anywhere in the world, at this considerable altitude, and where we were surrounded by snow fields and deserts of black lava, the telescope showed that the air was filled with minute dust particles, which evidently had no relation to the local surroundings, but apparently formed a portion of an envelope common to the whole earth. I was confirmed in this opinion by my recollection that Professor Piazzi Smith, on the Peak of Teneriffe, in mid-ocean, saw these strata of dust rising to the height of over a mile, reaching out to the horizon in every direction, and so dense that they frequently hid a neighboring island mountain, whose peak rose above them, as though out of an upper sea. In 1881 I was on Mount Whitney, in Southern California, the highest peak in the United States, unless some of the Alaska mountains can rival it. I had gone there with an expedition from the Allegheny Observatory, under the official direction of General Hazen, of the Signal Service, and had camped at an altitude of 12,000 feet, with a special object of studying analogous phenomena. On ascending the peak of Whitney, from an altitude of nearly 15,000 feet the eye looks to the east over one of the most barren regions in the world. Immediately at the foot of the mountain is the Inyo Desert, and on the east a range of mountains parallel to the Sierra Nevadas, but only about 10,000 feet in height. From the valley the atmosphere had appeared beautifully clear. But from this aerial height we looked down on what seemed a kind of level dust ocean, invisible from below, but whose depth was six or seven thousand feet, as the upper portion only of the opposite mountain range rose clearly out of it. The color of the light reflected to us from this dust ocean was clearly red, and it stretched as far as the eye could reach in every direction, although there was no special wind or local cause for it. It was evidently like the dust seen in mid-ocean from the Peak of Teneriffe—something present all the time, and a permanent ingredient in the earth's atmosphere.

"At our own great elevation the sky was of a remarkably deep violet, and it seemed at first as if no dust was present in this upper air, but in getting, just at noon, in the edge of the shadow of a range of cliffs which rose 1,200 feet above us, the sky immediately about the sun took on a whitish hue. On scrutinizing this through the telescope it was found to be due to myriads of the minutest dust particles. I was here at a far greater height than the summit of Etna, with nothing around me except granite and snow fields, and the presence of this dust in a comparatively calm air much impressed me. I mentioned it to Mr. Clarence King, then director of the United States Geological Surveys, who was one of the first to ascend Mount Whitney, and he informed me that this upper dust was probably due to the 'loess' of China, having been borne across the Pacific and a quarter of the way around the world. We were at the summit of the continent, and the air which swept by us was unmingled with that of the lower regions of the earth's surface. Even at this great altitude the dust was perpetually present in the air, and I became confirmed in the opinion that there is a permanent dust shell inclosing the whole planet to a height certainly of about three miles (where direct observation has followed it), and not improbably to a height even greater; for we have no reason to suppose that the dust carried up from the earth's surface stops at the height to which we have ascended. The meteorites, which are consumed at an average height of twenty to forty miles, must add somewhat to this. Our observations with special apparatus on Mount Whitney went to show that the red rays are transmitted with greatest facility through our air, and rendered it extremely probable that this has a very large share in the colors of a cloudless sky at sunset and sunrise, these colors depending largely upon the average size of the dust particles.

"It is especially worth notice that, as far as such observations go, we have no reason to doubt that the finer dust from the earth's surface is carried up to a surprising altitude. I speak here, not of the grosser dust particles, but of those which are so fine as to be individually invisible, except under favoring circumstances, and which are so minute that they might be an almost unlimited time in settling to the ground, even if the atmosphere were to become perfectly quiet. I have not at hand any data for estimating the amount of dust thrown into the air by such eruptions as those which recently occurred in Java and Alaska. But it is quite certain, if the accounts we have are not exaggerated, that the former alone must have been counted by millions of tons, and must in all probability have exceeded in amount that contributed by meteorites during an entire year. Neither must it be supposed that this will at once sink to the surface again. Even the smoke of a conflagration so utterly insignificant, compared with nature's scale, as the burning of Chicago was, according to Mr. Clarence King, perceived on the Pacific Coast; nor is there any improbability that I can see in supposing that the eruption at Krakatoa may have charged the atmosphere of the whole planet (or at least of a belt incircling it) for months with particles sufficiently large to scatter the rays of red light and partially absorb the others, and to produce the phenomenon that is now exciting so much public interest. We must not conclude that the cause of the phenomenon is certainly known. It is not. But I am inclined to think that there is not only no antecedent improbability that these volcanic eruptions on such an unprecedented scale are the cause, but that they are the most likely cause which we can assign."

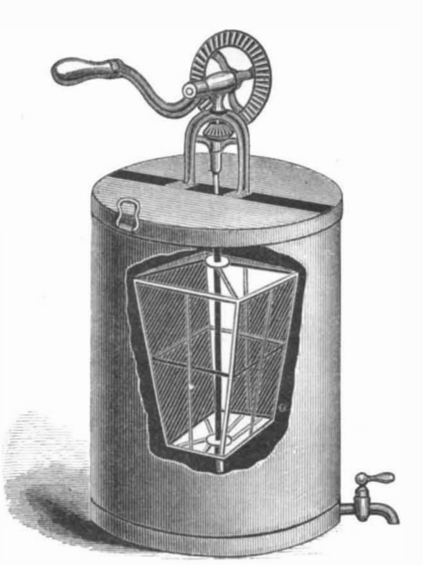
Delicate Mechanical Work.

The extreme nicety of workmanship possible with the delicate machinery of the present day is well represented by the following incident. A city contemporary published, from the London *Times,* an account of a visit of the German Emperor to a great needle manufactory at Kreuznach. There "a bundle of superfine needles was placed before him, 1,000 of which weighed less than half an ounce, and he expressed his astonishment that eyes could be bored in such minute objects. Thereupon the foreman of the boring department asked his Majesty to give him a hair from his beard, and receiving it, he bored an eye in it, threaded it, and handed back to the astonished Emperor this improvised and most peculiar needle."

This statement coming under the eye of a Newark mechanic, he resolved to try the experiment. He took a hair of his own beard, and, on the first attempt, bored it, reamed the eye, threaded it with silk, and mailed the needle to the editor of the New York *Sun,* in which he had seen the original statement.

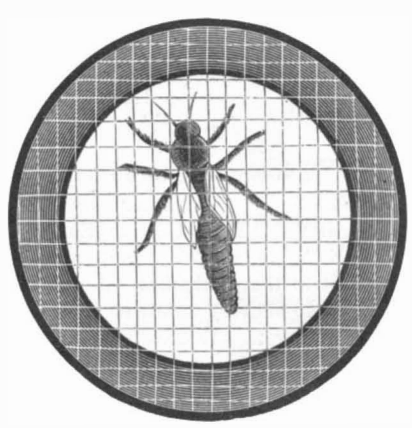
BEE FARMING IN NEW SOUTH WALES.

The operations in bee culture going on in Parramatta, says the *Town and Country Journal*, are well deserving of being ranked as bee farming; and as will be seen, the operations are carried on after the most approved system of the German apiarians, which differs only in the form of hive used and a few minor details from the approved system followed in Britain and America. The advantages of following any system in which the bar-frame hive is used intelligently are so manifest, in comparison with the keeping of bees in ordinary boxes, that, as the former become



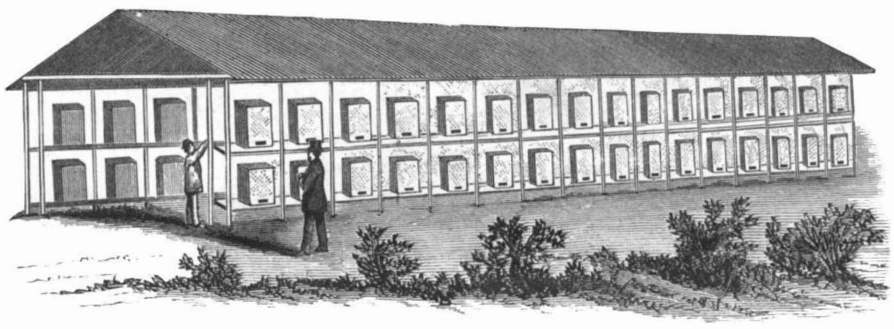
CENTRIFUGAL MACHINE, SHOWING INSIDE.

THE BEE MASTER, WITH FRAME OF HONEY.



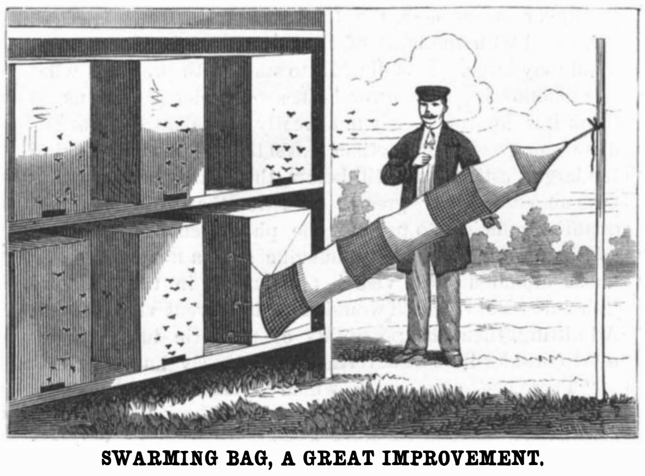
THE QUEEN CAGE.

more common in the colonies, we can see a great future for the honey industry in this country, and an early approach of the time when, instead of importing, we shall be heavy exporters of honey of quality unsurpassed by any in the world. But to get at the history of the company whose operations are illustrated in this issue: It appears that in December, 1881, a skilled bee master, Wilhelm Abram, arrived in Sydney from Germany, where bee culture is a recognized industry. There are institutions which are subsidized by the State, and are under the care of scientific entomologists, for the purpose of teaching the art of bee culture to those desirous of making it their study, and at such an institution Mr. Abram was trained. He brought with him certificates of qualifications from no less authority than that of the celebrated Dathe. On his arrival in Sydney Mr. Abram placed himself in communication with Mr. S. MacDonnell, of this city, an enthusiastic amateur bee keeper. Mr. MacDonnell saw the opportunity which the advent of Mr. Abram gave to establish a bee farm on a commercial scale and conducted by a skilled apiarian, and conceived the novel idea of working it as a joint stock venture. Four well known gentlemen in Sydney joined him and Mr. Abram in the venture. As it was intended that the operations of the company should eventually be with Italian bees, a race superior in many important respects to the ordinary black bee, the concern was named the Italian Bee Company. Mr. Abram was appointed salaried manager and Mr. MacDonnell honorary secretary.



OUTSIDE OF THE BEE HOUSE.

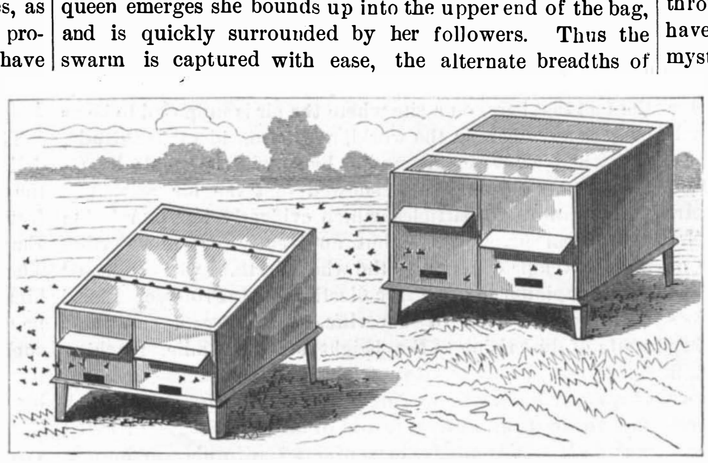
Mr. Abram, before leaving Germany, had purchased some of the prize swarms at an exhibition of Italian bees in Germany, and the Italian Bee Company commenced operations with these on a rented piece of ground at Parramatta, in January, 1882. An importation of prize queens from America was made, and the operation of queen rearing was entered on. In the mean time a number of colonies of the common black or English bee afterward had been secured and transferred to frame hives, and as Italian queens were reared, the black queens were removed and replaced by Italians, the progeny of which replaced the black bees, as the latter died out. Much attention was not paid to producing honey until the race of Italian bees should have been firmly established, and the result was that in the spring of last year there were about 80 colonies of gold-banded Italians actively at work. The company before this secured the fee simple of a piece of ground in Kissing Point Street, Parramatta, where operations are now conducted. There, a few weeks since, on visiting the establishment, we saw the hives opened, the frames containing beautiful sheets of comb removed (the gentle Italian bees showing no signs of anger during the operation); the comb was then placed in a centrifugal machine, which threw the honey out by centrifugal force, leaving the comb undamaged and ready to be returned to the hives for the bees to fill over and over again with nectar.



SWARMING BAG, A GREAT IMPROVEMENT.

The bee master is an adept at his profession. Pipe in mouth, he opens hive after hive, blowing a whiff of smoke upon them, to give the bees something else to think about when they seem any way refractory, a projection from the stem of the pipe allowing this to be done conveniently. The hives used are of the German bar-frame kind. They open from the back, and each hive is two stories high, so that ample space can be given to the bees when they are storing honey rapidly. The main house is about 150 feet in length, 10 feet high, 10 feet wide, and two tiers of hives are arranged on each side, as shown in the sketch.

The swarming bag is one of the best things we have seen in bee culture. It is about 6 feet in length and 1 foot in diameter, and formed of alternate lengths of calico and mosquito netting, each length having a ring of cane inside, to hold out the bag as shown in the sketch. When the bees are about to swarm, the bag is fastened on to the front of the hive and the other end fastened to a stake. When the queen emerges she bounds up into the upper end of the bag, and is quickly surrounded by her followers. Thus the swarm is captured with ease, the alternate breadths of mosquito netting and calico making the interior light and enticing for the bees to enter and cluster. They are then shaken into a bar-frame hive.



QUEEN BREEDING HIVES.

The queen breeding hives are much smaller than the others, and are arranged at distances of about 20 feet apart alongside the fences. Two or three frames of brood comb are put into each hive, with a queen cell coming to maturity. When the queen bee hatches out of the cell, she makes a flight (the only flight of her life) in order to meet a drone or male bee. She is then fertilized, and becomes the mother and queen of a family, laying eggs at the rate of 2,000 daily when the season is good and stores abundant.

The centrifugal machine is used for extracting honey without destroying the comb. The caps with which the bees seal up each cell of honey are sliced off with a very thin bladed knife of simple form, and the frames are set in the metal basket of the inside of the machine. Then, by turning the handle, the honey is thrown out and runs down the sides of the machine, from which it is drawn by a tap. In this way absolutely pure honey is got without any other substance whatever, and without injuring the bees or annoying them. The queen cage is drawn to scale, as is the queen or mother bee seen inside. In America, and in other places, these queen cages and mother bees are sent by post, and thus hives are strengthened and the breed of bees improved. One of the objects of the bee farm at Parramatta is to send out queens and improve the race of bees, as well as the hives and the quality of the honey. There is abundant room for improvements of the kind. From this country the very finest honey ought to be exported in quantity, although at present very poor stuff is sent us from places where glucose mixtures are worked up for honey. The bees at Parramatta are doing excellently well this season, as are also the Italians recently received by us from Queensland.

Aquatic Spiders.

Waiting beside a mill pond on a mild, balmy day last March, a slight wind prevailing, but not enough to ruffle the surface of the water, I noticed a spider let himself down into the water from one of the trees bordering upon the pond, and as soon as it reached the water the web or strand was severed with such a length attached to his person as to act as a sail and serve to assist his propulsion, with the favoring breeze, to the other side. Numerous spiders followed the same procedure with webs of varying lengths from three to eight feet. I supposed this was their method of crossing from side to side in search of more abundant food.

I may, perhaps, be only repeating what was before well known, but as it was new to me I give it for what it is worth.—*George C. Henning, Amer. Naturalist.*

Psychical Research.

A body calling itself "The Society for Psychical Research" is addressing a series of what must surely be serio-comic interrogatories to the public in relation to "hallucinations" and "dreams." An invitation is thrown out to all the weak-minded people who think they have seen "ghosts" or "specters," or been "touched" by mysterious shades, and to all the dreamers who dream dreams of the nature of "coincidences," to state their experiences.

Here is a grand opportunity for the mad folk outside Bedlam. If it were not for the trouble involved, we should like to peruse the mass of "communications" these invitations will be certain to call forth.

There are, however, some preliminary questions which ought to be asked: Indeed, has any "society" of presumably sane men a moral right to instigate the crazy public to formulate its "mysterious" experiences? We know that the most disastrous consequences sometimes ensue to weak brains from dwelling too intently on subjects of the nature of "fixed ideas." It is, therefore, doubtful whether this sort of thing ought to be allowed. No sober minded person can doubt that *all* impressions of seeing, or hearing, or feeling spiritual manifestations must be morbid. Such things exist only in the imaginations of the persons who are subject to them.—*Lancet.*

Two New Processes for Making Artificial Ivory.

We translate from the *Chronique Industrielle* the following description of a new process for making artificial ivory from the bones of sheep and goats and the waste of white skins, such as kid, deer, etc.:

The bones are macerated for ten or fifteen hours in a solution of chloride of lime, and afterward washed in clean water and allowed to dry. Then they are put with all the scraps of hide, etc., into a specially constructed boiler and dissolved by steam so as to form a fluid mass, to which is added 2½ per cent of alum. The foam is skimmed off as it rises until the mass is clear and transparent. Any convenient coloring material is then added, and while the mass is still warm it is strained through cloth of appropriate coarseness and received in a cooler, and allowed to cool until it has acquired a certain consistence so that it can be spread out on the canvas without passing through it. It is dried on frames in the air, and forms sheets of convenient thickness. It is then necessary to harden it, which is accomplished by keeping it for eight or ten hours in an alum bath that has not been used before. The quantity of alum necessary for this operation amounts to 50 per cent by weight of the gelatine sheets. When they have acquired sufficient hardness, they are washed in cold water and let dry on frames as at first. This material works more easily and takes as fine a polish as real ivory.

Another method of making a durable artificial ivory is described in the *Zeitschrift des Apotheker-vereines:* A solution of caseine is made first with 200 parts of casein in 50 parts of ammonia and 400 parts of water, or of 450 parts of albumen in 400 parts of water. To either of these solutions are added 420 parts of quicklime, 150 parts of acetate of alumina, 50 parts of alum, 1200 parts of gypsum, and 100 parts of oil. The oil must be added last of all. If dark colored articles are to be made of it, 75 to 100 parts of tannin may be substituted for the acetate of alumina.

After the ingredients are thoroughly kneaded together to form a homogeneous paste, it is passed through rollers to form tablets of any desired size. These are dried and then pressed into moulds that have been heated, or they may be finely pulverized and then put in hot moulds and exposed to powerful pressure.

When the articles are finished they are put in a bath made by dissolving 1 part of white glue and 10 parts of phosphoric acid in 100 parts of water. The object is then dried, polished, and varnished with shellac.

How to Treat Sudden Wounds.

The subject of one of the lectures by the Society for Instruction in First Aid to the Injured, delivered by Dr. D. L. Woodbridge, of this city, was "What to do in case of a sudden wound when a surgeon is not at hand." He said in part:

An inexperienced person would naturally close the lips of the wound as quickly as possible, and apply a bandage. If the wound is bleeding freely, but no artery is spouting blood, the first thing to be done is to wash it with water at an ordinary temperature. To every pint of water add either five grains of corrosive sublimate or two and a half teaspoonfuls of carbolic acid. If the acid is used, add two tablespoonfuls of glycerine, to prevent its irritating the wound. If there is neither of these articles in the house, add four tablespoonfuls of borax to the water. Wash the wound, close it, and apply a compress of a folded square of cotton or linen. Wet it in the solution used for washing the wound, and bandage down quickly and firmly. If the bleeding is profuse, a sponge dipped in very hot water and wrung out in cloth should be applied as quickly as possible. If this is not available, use ice, or cloths wrung out in ice water. If a large vein or artery is spouting, it must be stopped at once by compression. This may be done by a rubber tube wound around the arm tightly above the elbow or above the knee, where the pulse is felt to beat; or an improvised tourniquet may be used. A hard apple or a stone is placed in a folded handkerchief, and rolled firmly in place.

This bandage is then placed so that the hard object rests on the point where the artery beats, and is tied loosely around the arm. A stick is then thrust through the loose bandage and turned till the flow of blood ceases.

The Duties of Car Tracers.

All the railroad companies whose lines are fed by many branches, find it necessary to employ what are known as car tracers, or lost car agents. His work is often more difficult than those not familiar with railroad affairs may perhaps imagine. Empty cars are quite often switched on to side tracks and run into the yards of other companies 1,000 miles from the point from which they started. There they get mixed up with the cars of other companies, and are sent to destinations they were never intended to reach. Consequently, the companies lose trace of them, and find it necessary to call upon their car tracers to find them and report their whereabouts to headquarters.

In hunting for a lost car the car tracer often finds it necessary to travel for weeks over thousands of miles of railroad. He must stop at innumerable freight yards and walk along side tracks for miles, examining the cars that come within the pale of his observation. He may find car 5,870, which belongs in New York, badly battered up on the side track of some obscure road in Texas: or perhaps he will discover a freight car that has not been heard of for several months up-end in a pool with its number under water. Then, again, he may ascertain that a missing cattle car has been run off to the western terminus of some road that has been consolidated with one or two other lines. At all events, his task is a difficult one, and one that requires him to be traveling almost constantly in various directions.

Said a car tracer to a Missouri *Republican* reporter: "Some people think I have a soft job, but they are not familiar with my duties. I have been car tracing a long time, and am compelled to say that some of the cars I was sent out to find nearly a year ago are still missing. The other day I struck a junction on one of the railroads running through Illinois, when I happened to see a strange looking object near the track that looked like a sort of canal boat with windows in it. Smoke curling from a stove pipe that protruded through the roof of the concern convinced me it was occupied. Out of curiosity I walked up to the concern in order to get a better view of it. On close examination I found it contained letters and a number on its side. Referring to my book, I discovered it was the identical car I had been trying to find for six months. The railroad company had established a station there, it appears, without building a station house for the accommodation of the public. Determined to supply the deficiency, the residents of the neighborhood had confiscated the car, placed it in a conspicuous place near the track, cut holes in it for windows, and converted it into a depot. I reported my discovery, and shortly afterward the company hauled the car away, disregarding the protests of the residents against the proceeding. Sometimes we find the remains of demolished cars at the foot of some high embankment, sometimes cars with their roofs sticking above the surface of some pond, and sometimes we never find them at all."—*The Railway Review.*

TROUVE'S ELECTRIC JEWELS.

ELECTRIC JEWELRY.

We take pleasure in presenting to our readers a series of electric ornaments for ladies' wear, that has recently been devised by Mr. Gustav Trouve, of Paris. We reproduce herewith, from the *Chronique Industrielle*, cuts representing some of these objects and showing how they are constructed and illuminated.

In Fig. 1, No. 1 represents a pin for a lady's head dress decorated with diamonds and rubies in equal numbers and alternating with one another. The rubies and diamonds have not the usual cut of these gems, but consist of small lenses whose foci have been accurately determined. The luminous source itself always occupies an invariable position, that is to say, the center of the sphere; notwithstanding the variable dimensions of the glass vessel and the inequality of the centering of the carbon filament that it contains.

This result has been obtained very simply by Mr. Trouve, by means of a small metallic socket into which the neck of the lamp is cemented in the desired position. This socket, which in all cases is the same, occupies an invariable position in all the jewels shown in the cut, so that if an accident happens to the lamp the owner of the jewel can himself at once remedy it by opening it and replacing the injured lamp by another one provided with its conductors and its metallic socket, which latter will have in the jewel exactly the same position that the other did, that is to say, the position most favorable for producing the sparkling effects. Fig. 2 shows a section of one of these lamps, which is of 4 volts. Nothing has been neglected in order to obtain a maximum of luminous power and a simplicity in working. The lamp is connected with the little pile through the intermedium of a flexible two wire conducting cord which is concealed under the garments. The pile is put into the pocket, or attached to some part of the dress.

What we have said in regard to the hair pin applies to all the other jewels, so that it will only be necessary to enumerate them. Nos. 2 and 3 are scarf pins—rubies and diamonds. No. 3, in addition to the rubies and diamonds that are arranged around its periphery, is provided with a large side diamond, which projects its rays to a distance and "permits one to read his newspaper in darkness." No. 4 is the head of a cane having two rows of alternating diamonds and rubies around the circumference, and two large diamonds which cast their rays in opposite directions. By substituting a ruby for one of the diamonds, one can at will project white and red rays, which may serve for corresponding with some one at a distance. No. 5 is a sort of diadem designed to be used in ballets. The broad

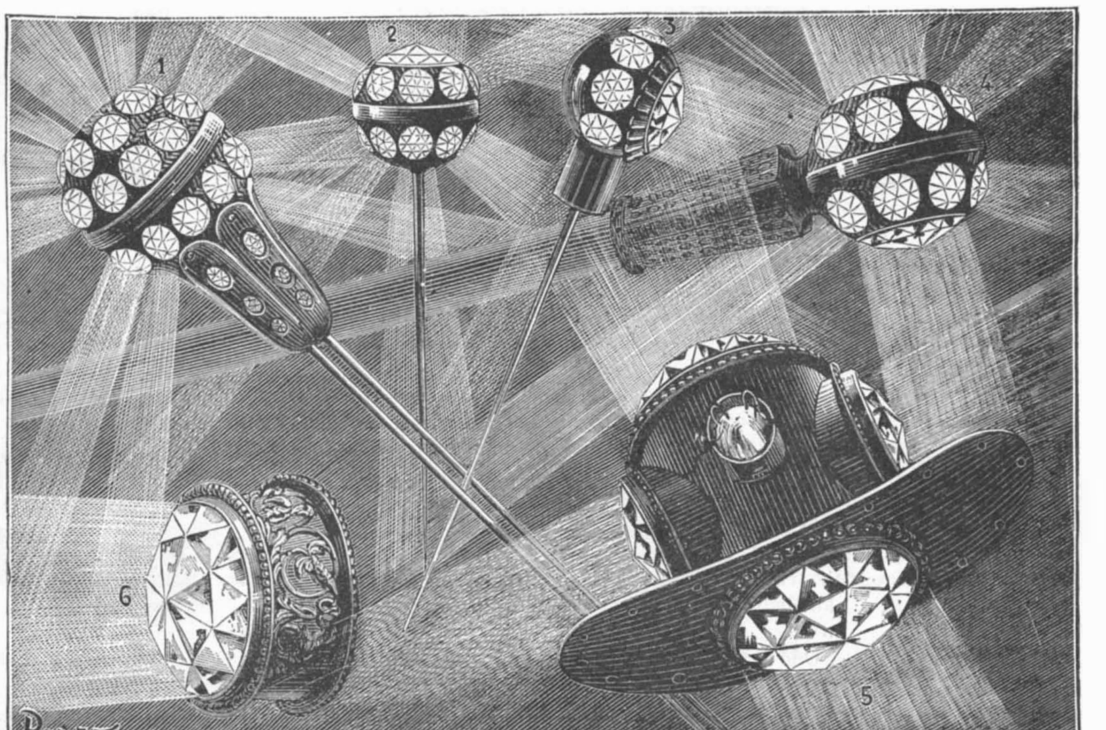


Fig. 1.—TROUVE'S ELECTRIC JEWELS.

rim, which contains a row of apertures, is designed for fastening the object to the danseuse's head dress. This jewel projects white, red, green, etc., lights in four directions, but, were it necessary, it could be constructed so as to project them in five, six, seven, or eight. No. 6 is a large diamond designed for the necklace of a danseuse. The effects obtained from these ornaments are wonderful.

The pile, Fig. 3, consists of elements of zinc and charcoal within a case of gutta-percha hermetically sealed. This pile only acts when it lies horizontally. When vertical, the liquid does not occupy half the height of the case, and the pile ceases to act. It is therefore only necessary to turn over the pile in the pocket to cause the latter to act or to cease its action.

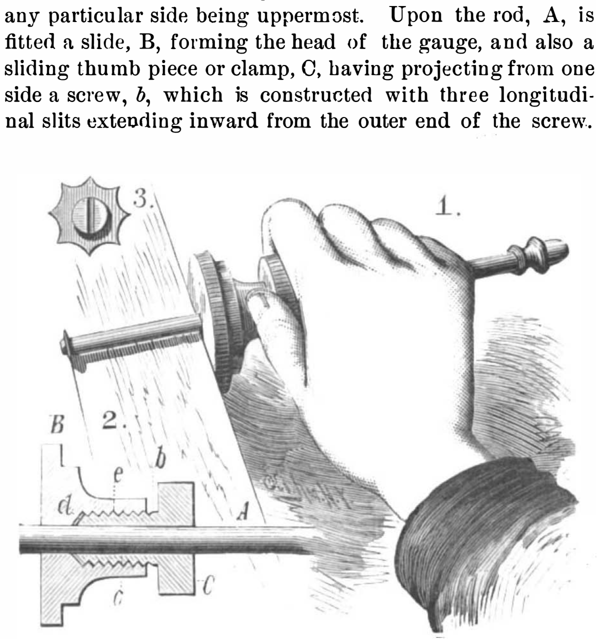
As an accessory to the ballet this has been most successfully used in the dance of the Faradole, at the Grand Opera at Paris. We give an illustration of a danseuse as she appears when adorned with this glowing electric jewelry.

THE London *Engineer* gives quite an amusing account of the rush at the Patent Office on the first day of January, when the new English patent act came into operation. It says:

One enthusiastic inventor, hailing from north of the Tweed, took up his station outside of the door soon after midnight, and his patience was rewarded by the honor of appearing as "No. 1" under the new law. Toward four o'clock he was joined by two others, and when the hour for opening had arrived a small crowd of about fifty eager applicants had assembled; but when they had been disposed of, business became slack. There was, however, a steady influx, and at four o'clock it was found that 266 applications had been recorded. This is by far the largest number ever received in one day. The 1st of October, 1852, when the Patent Law Amendment Act—the statute which has just expired—came into operation, was a busy day, 146 applications having been sent in. On the last day of last year one person, who wished to have the last patent under the 1852 Act, after waiting about some time, handed in a specification at the last minute, satisfied that he had secured the peculiar pleasure he sought. Half a minute to four o'clock a small boy, from a dark corner in the office, sprung himself upon the astonished occupants and handed in two specifications. The man who thought he had got the last was heard to mutter something about that artful little boy, but what it was he muttered does not seem to be a matter of importance to history, as similar remarks have been made before. Contrary to general expectation, the falling off in the work of the office during last year, consequent on the superior advantages offered by Mr. Chamberlain's Act, has not been very great. In 1882 the applications reached 6,241, the largest number ever known, while in 1883 they amounted to 5,993, or a decrease of 249. The diminution first manifested itself in the week ending September 22, just a month after the passing of the act, when there was a deficiency of three, as compared with the corresponding period of 1882. From that time the number of applications fell off steadily, with the result above stated.

SCRATCH GAUGE.

The gauge represented in the engraving can be used by carpenters and others for scratching or scribing. The rod and other details of the device are preferably made of circular form, so that it may be used without restriction to any particular side being uppermost. Upon the rod, A, is fitted a slide, B, forming the head of the gauge, and also a sliding thumb piece or clamp, C, having projecting from one side a screw, *b*, which is constructed with three longitudinal slits extending inward from the outer end of the screw.



SHERMAN'S SCRATCH GAUGE.

The end of the screw is tapered in order to bear against a taper socket, *d*, at the inner end of a threaded portion in the slide, B, so that when the thumb piece is screwed up, the split hollow screw will clamp the rod, holding the slide at its proper position. If preferred, this construction of the thumb piece and slide may be reversed. The marker is a many pointed circular disk, Fig. 3, that may be screwed to the working end of the bar. By the circular construction of the gauge the marker is made more durable, since the different points may be used.

This useful device has been recently patented by Mr. John E. Sherman, of North Attleborough, Mass.

Ocean Signal Stations.

Our weather bureau is of great value to the public, but its usefulness might be greatly increased. The greater the number of stations and the more they are extended over the surface of the globe, the greater the advantage to be derived from them; and stations at sea are as valuable as stations on land, for without a connecting link between land

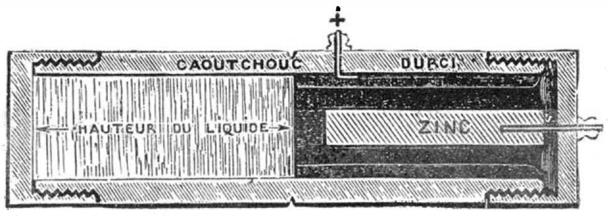


Fig. 3.

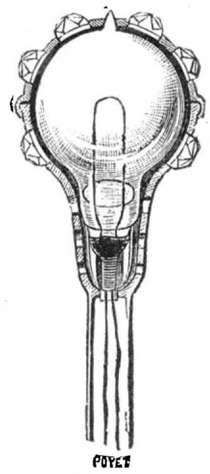


Fig. 2.

TROUVE'S ELECTRIC JEWELS

and land there is a void which prevents the perfection of the whole. The present stations were established when the system was new, before it had developed, and thus it comes that some of them are perhaps not as advantageously situated as they would be were a new arrangement, with the light of the present, to be now ordered.

One important thing we have discovered, and that is, storm centers travel on *general lines* from the west toward the east, and in belts encircle the earth. Sometimes they travel for a thousand or fifteen hundred miles due north, and not unfrequently in crossing the country advance from the northwest to the southeast, and they occasionally for a short distance travel toward the west. But their *general* course is from the west to the east. This being the case on this continent, the more stations in the west, from Mexico to the British Possessions, the better. Then, as these storm centers sometimes travel a great distance from the south to the north, it is also necessary, in order to be prepared for those of an erratic course, to have stations well to the south, along the Gulf of Mexico.

As all storms, or nearly all, enter the territory of the United States from the west, it will be readily seen that the people on the Pacific slope cannot at present receive any forewarning, as there are no stations to the west of them to give the information.

Not only does the Pacific slope suffer from this, but the whole country, for the sooner the whole country receives information of an approaching storm the better. Again, in order to more effectually protect ourselves from the south we need one or more stations in the Gulf Mexico; say three stations from the east coast of Mexico to the west coast of Florida, on a line about midway north and south. On the Pacific slope we should have a row of stations, three hundred to five hundred miles apart and from five hundred to a thousand miles from the western shores, reaching from Lower California to Puget Sound. It is quite evident that there is a demand for these sea stations. If not at present generally acknowledged by sufficient numbers to give it vital support it is nevertheless most desirable, and remains on the docket for action so soon as the public can be fully aroused to the importance of the step.

These stations in the Pacific and Gulf will be of great value to the United States; and as the storm centers, after passing off the coast of the United States, travel toward the east, stations from five hundred to a thousand miles to the west of the eastern shores of Europe would be of inestimable value to the people of the Old World.

The interest in these stations is not confined to any locality; the whole world is interested in them, and the time will undoubtedly come when there will be lines of them from shore to shore.

One of the first plans to suggest itself is to have steam vessels to sail within small circuits, but in stormy and cloudy weather it would be exceedingly difficult to keep them at their posts, and also it would be difficult for a moving vessel to maintain telegraphic communication with the shore, to say nothing of the supply of coal, etc.; so, on the whole, the most practical plan would be to trust to anchorage, either a vessel similar to the "light ships" off the coast, or to have a floating tower so constructed as to offer the least resistance to wind and waves and to maintain the most stability. A number of plans suggests themselves for the towers. They may either be very deep and loaded, so that their base may be a good distance below the surface of the water and the action of the waves, or so contrived as to have a very wide base and with such construction as to offer the least possible surface for the force of the waves, or a combination of these plans might prove the most practical.

But if we can only succeed in anchoring a vessel of any shape and suitable size and construction to accomplish our purpose, I do not think we need fear but what we can manage the rest, and be able to construct such a vessel or tower as will answer the various purposes of light house, signal station, etc., combining means of communication and the giving of information to passing vessels.

From our present knowledge of the depth of water in which this anchorage would be, and the weight of chain required, it would seem impractical to attempt common anchorage such as practiced aboard of vessels, and anything short of a firm hold on to the bottom or bed of the ocean would also seem to be impractical and wanting in the power to hold a vessel firm at the position established; and for such stations it is necessary that the position of the vessel remain fixed at one point, at least as much so as a lightship. The most, and it would seem that the only, practical plan of anchorage in such deep water as the great oceans would be by a system of cable intersections with buoys at intervals, say of a hundred fathoms, or from five to six hundred feet. The depth of the ocean where such anchorages would be desired is from ten thousand to fifteen thousand feet; five hundred feet for a section would make an average of twenty to thirty sections in the deepest places. As these anchorages, when once put down, would be quite permanent and would not require, as aboard of a vessel, to be frequently taken up, *cable*, such as is used on our large derricks, would be better than chains.

It may be asked, how are we to get these buoys, all strung, as it were, on this cable, into position? Let the cable be constructed with the buoys all attached at their regular intervals, and in this manner towed to their respective grounds. Soundings should be taken in advance, in order to determine the necessary length of cable, and allowance be made for the angle at which it would lie in the water. When this has been accomplished, secure the anchor and let go, and like any other anchor there would be no trouble in its finding its way to the bottom and taking hold. Care, however, should be taken to have the connection with the vessel or tower in such a manner as not to interfere with passing vessels; but this would not be difficult to arrange.

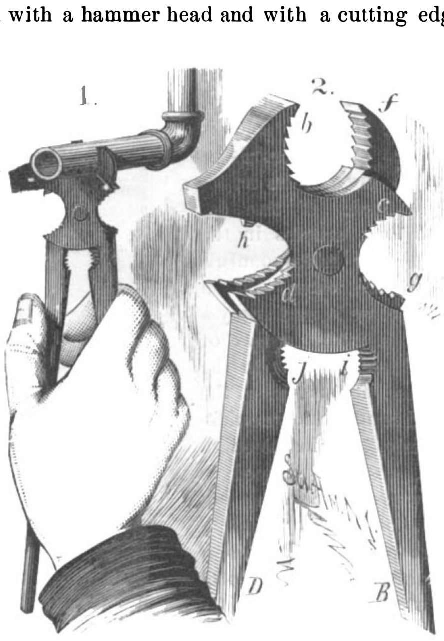
When located these buoys or stations should be manned much after the manner of light ships and life saving and signal stations, with lights, signals, stores, telegraph operators, etc. Rightly constructed, located, and managed, they would be a great benefit and blessing to the world. Then the western borders of continents could be forewarned of the storm some days in advance, and in this respect have the advantage at present enjoyed by the people of the eastern half of the United States.

ISAAC P. NOYES.

Washington, D. C., Jan. 12, 1884.

PIPE TONGS.

The pipe tongs for which letters patent were recently granted to Mr. James L. Strait, of Thomas, Missouri, are adapted to grasping pipes of various sizes, without adjustment, and may be used as nippers and as a hammer. The main head is made hollow, or with a passage through it, and is made integral with one of the handles, B. It is curved out to form the jaws, *b c d*, the grasping surfaces of which are serrated to form teeth; the head is also formed with a hammer head and with a cutting edge at *b*.



STRAIT'S PIPE TONGS.

In the passage in the head is pivoted the second head, which is made integral with the handle, D, and is also curved out to form the jaws, *f g h*, which correspond with the jaws in the first head and are also serrated. Below the heads the handles are curved out to form the jaws, *i j*. The second head is provided with a cutting edge at *f*, which coincides with the cutting edge on the other jaw; these constitute the nippers of the tool. The jaws, *b f*, are larger than *c g*, which are larger than *h d*, which in turn are larger than *i j*, so that the tool is adapted for grasping four different sizes of pipes. This construction makes a tool that is very convenient and adapted for quick and easy use.

Treatment of Balky Horses.

Any one observing the inhuman treatment often bestowed upon balky horses, will indorse the following persuasive measure recommended by the Germantown *Telegraph*. To these remedies others may be added, but the ground is sufficiently covered by these hints to meet all ordinary cases of the sulks in horses:

As long as we can remember, this singular fit of obstinacy in the horse has been discussed, and all sorts of plans given for overcoming it. It must be remembered that what will prove a remedy for one horse will not for another. The original cause of it is, doubtless, neglect and ill treatment of the colt, or after it has been broken to harness. Sometimes stopping a few moments will be sufficient to start the animal again of its own accord. Kind words, patting, a handful of hay or grass, an apple, or a little black pepper put upon the tongue, will induce it to go ahead as if nothing had been the matter. Whipping, at all times, and especially in this case, is the worst resort. We have ourselves induced balky horses to quietly start by some of these means, and one was entirely cured of it by letting it stand until it went on again of its own will. Sometimes the mere turning of the head and letting the animal look in a different direction, or rubbing the nose, has answered; so has tying a string around the foreleg below the knee and drawing it rather tight. Various resorts of this kind should be adopted, but never force.

Beet Sugar.

In these days of tariff discussion, reciprocity treaties, and contests between rival sugar producers and refiners, the public is naturally led to regard the production of cane sugar as its only hope for a supply of the saccharine substance. This, however, is not the case, and it is not putting it too strongly to assert that the world could be supplied with sugar if not another pound of sugar cane were grown. In such an event a substitute could readily be found in the sugar beet, the growth of which, and its manufacture into sugar, is an industry which has already achieved proportions of which few are aware. Already the English market is supplied with beet sugar, to the exclusion of the cane sugar of her own colonies. This is supplied by Germany and France, which have over a thousand beet sugar refineries, all successfully competing with the cane sugar on the European continent.

The manufacture of beet sugar in California has had many set backs, and for a long time it was regarded as a problem of very doubtful solution. But the errors and misfortunes which were the natural effects of inexperience have been gradually overcome, until to-day the industry is in every respect a success. The Standard Sugar Refinery at Alvarado commenced the manufacture of beet sugar in 1879. In the "campaign" of 1879-80 its production of refined sugar was 1,231,966 pounds; in 1880-81, 1,391,688 pounds; in 1881-82, 1,391,680 pounds; in 1882-83, 1,980,583 pounds, while this year it will be about 1,500,000 pounds; making a total of the five years of about 7,596,000 pounds. We are indebted to E. H. Dyer, its General Superintendent, for the following statement of the business of the refinery for the month of October last, which is interesting as going to show the items of expense entailed in the manufacture of beet sugar, and the gratifying outcome.

STATEMENT OF STANDARD SUGAR REFINERY FOR OCTOBER, 1883.

Acid	$300 60
Barrels and packing materials	842 00
Coke	45 10
Bone coal	620 00
Drayage	67 94
Coal (for bone kiln)	523 20
Filter cloth	144 04
Freight (on sugar to San Francisco)	185 40
Incidentals	39 00
Insurance	310 00
Interest	28 62
Lime	308 85
Light	201 00
Oil, tallow, and waste	72 00
Petroleum	4,650 00
Running repairs	174 80
Supplies	344 67
Sales expenses	133 52
Storage on sugar in San Francisco	3 20
Pay roll	3,872 45
Beet account (2,406·88 tons, at $4 60)	11,071 64
Total	$23,938 03
Sugar produced (341,016 pounds)	$34,894 17
Pulp (722 tons, at $1)	722 00
Total	$35,616 17
Expenses as above	$23,938 03
Profit for October	11,678 14
Total	$35,616 17

It will be seen by this statement that pure white sugar made from beets costs about seven cents a pound laid down in San Francisco, but little more than duty free Hawaiian refined grades of cane sugar. Raw sugar could be produced for refining purposes for less than five cents a pound, in sufficient quantities to supply all of the refineries on this coast, with a smaller expenditure of capital than has been invested in the Hawaiian sugar industries by American citizens. Our climate and soil are as well adapted to the production of sugar beets as those of any country where beets have been cultivated for sugar, and are as rich in saccharine, and yield as many tons per acre, the average being about fifteen. There are thousands of acres of the best quality of land on this coast for the production of sugar beets, extending from California to British Columbia, which can be made to produce more sugar per acre than the average cane lands.

On the continent of Europe great improvements have been made in machinery and technical skill in the manufacture of beet sugar, and the percentage of the saccharine properties of the beet is greatly increased by intelligent cultivation. More has been accomplished in the improvement of machinery, quality of the beet, and the technical management of the business in the last two years than during the ten years preceding. Still, the consumption of sugar increases faster than the production, and we shall soon be forced to resort to the sugar beet to meet the increasing demand. The United States ought to produce sufficient sugar for her own needs, and there is sufficient land on the Pacific coast adapted to the purpose to accomplish this.—*Sacramento Union.*

Fire Extinguishing Apparatus for Small Mills.

Some time ago we called the attention of our manufacturers and others to the importance of a more general adoption on all the floors of manufacturing establishments of water buckets, axes, and other hand appliances which might be useful in combating fire.

The *Manufacturer*, published at Toledo, Ohio, takes the subject up, and gives some figures as to the cost of supplying factories with simple means for self-protection against fire.

Among mills and factories where the capital invested is too small to admit of the outlay for pumps, hose, and sprinklers, usually provided in larger establishments, says the writer, a large proportion remain without any means of suppressing any fire that may break out in the premises, though the ravages of the element in this class would indicate some preventive measures as an absolute necessity.

Forty-five dollars is a liberal estimate for the cost of casks, buckets, and auxiliary apparatus, in an ordinary four story mill. The apparatus will last for many years, and may be the means of saving the property at any moment. A suitable arrangement for such a mill would be as follows:

For each floor two good water casks, with covers to exclude dust, four pails, two axes, two crowbars, and one saw. For water casks, empty oil barrels are as good as any, if not the best. These should be fitted with covers like cheese box covers, setting loosely over the casks, and having handles on top to lift them off by. All the salt that the water will dissolve should be put into the casks, both for its effect on fire and as a preventive of freezing. One cask on each floor should be placed near the stairs and the other as remote from the first as practicable; over and about each should be hung two pails, an ax, and bar, for reaching quickly such fire as may lodge in any concealed space, and by the cask on each floor nearest the stairs, a medium sized hand saw. Wooden pails are unfit for this use, owing to their liability to warp, shrink, and fall to pieces when handled at a critical moment. Fire pails should either be of leather, paper, or metal, well galvanized or otherwise protected, preferably the latter two, which neither shrink, crack, nor deteriorate with age.

The cost of such an equipment for such a mill would be about as follows:

8 casks at $1.00 each	$8.00
Covers for same at 25c. each	2.00
16 paper pails at $4 80 per dozen	6.40
8 axes at $1.25 each	10.00
8 bars at $1.00 each	8.00
4 saws at $1.50 each	6.00
Salt	.60
Painting and placing in position	2.00
Total	$43.00

These figures are sufficiently liberal to cover all freights and other charges, and are for goods of the best quality. Every article should be marked in large letters, "Not to be removed except in case of fire," and instant discharge should be the penalty for disobedience of this rule. Somebody should be charged with the duty of examining the casks at stated intervals, keeping them full, and seeing that the other articles are in their places. With these precautions and light expenditures, provision is made for extinguishing any fire discovered in season, with apparatus easily understood and requiring no previous drill for its application, and which has proved adequate in a vast multitude of cases.

Fireproof Starch.

The *Clothier and Finisher* gives the following mode of preparing a starch for rendering fabrics coated with it incombustible, which the writer says has been successfully tested in practice. Cover ten parts of pulverized bone ash with fifty parts of hot water, and add gradually six parts of sulphuric acid. Stir the mixture thoroughly, and stand aside in a warm place for two days, with occasional stirring. Then dilute with a hundred parts of distilled water, and filter. To the clear liquid add five parts of sulphate of magnesium (Epsom salts) dissolved in fifteen parts of distilled water, and stir in ammonia until the liquid smells distinctly of it. A white precipitate will be formed, which is to be pressed in a linen cloth, dried in a moderately warm place, and then finely powdered.

Two parts of the powder (which is a phosphate of ammonia—magnesia) should now be ultimately incorporated with one part of tungstate of sodium and six parts of wheat starch, with enough of indigo to impart a very faint bluish tint. In preparing this starch composition, care must be taken that no iron is introduced in any part of the operation, as this would cause the production of an ugly yellowish tinge or of yellowish spots on the fabrics treated with it. The powder resulting from the above described procedure forms "incombustible starch." For use, it should be stirred in about double the quantity (by volume) of cold water, and enough boiling water should be added, with continued stirring, to produce a viscous liquid, into which the fabric must be dipped, or treated as usual in using ordinary starch in the laundry.

Patent Bills Recently Passed by the House of Representatives, and now Before the Senate.

The following bill (H. R. 3925) was passed in the House of Representatives, Jan. 21, under a suspension of the rules:

Be it enacted, etc., That in any suit hereafter brought in any court having jurisdiction in patent cases for an alleged use or infringement of any patented article, device, process, invention, or discovery, where it shall appear that the defendant in such suit purchased the same in good faith for his own personal use from the manufacturer thereof, or from a person or firm engaged in the open sale or practical application thereof, and applied the same for and to his own use, and did not purchase or hold the same for sale, or to be used in or for any manufacturing process, if the plaintiff shall not recover the sum of $20 or over, he shall recover no costs, unless it shall also appear that the defendant, at the time of such purchase or practical application, had actual knowledge or notice of the existence of such patent, or unless the defendant puts in issue the plaintiff's right to recover anything in the suit. *Provided*, That nothing herein contained shall apply to articles manufactured outside of the United States: *And provided further*, That said purchaser or user upon request by the owner of the letters patent alleged to be infringed by him shall make known the vender, and time, and place of purchase of the article or articles for the use of which complaint is made.

SEC. 2. That in all suits hereafter brought as aforesaid against a defendant other than a manufacturer or seller of such patented article, device, process, invention, or discovery, the plaintiff shall, at the commencement of such suit, give a bond, to the approval of the clerk, with sufficient surety, to be conditioned that the plaintiff will pay all costs and attorneys' fees that may be adjudged against him; and if the defendant shall finally prevail in such suit, the court shall allow costs, and a reasonable sum, not exceeding $50, for counsel fees to the defendant, which shall be recoverable by suit, in the name of the clerk, upon said bond, or by fee-bill on execution. A failure by the plaintiff to give such bond shall, on motion, be ground for the dismissal of the suit.

The following bill (H. R. 3934) was passed by the House of Representatives Jan. 22 by a vote of 114 ayes to 6 noes:

Be it enacted by the Senate and House of Representatives of the United Stases of America in Congress assembled, That no damage or profits shall be recovered either in law or equity from any defendant for the infringement of a patent, when it shall appear upon the trial that he was a mere user for his own benefit, and not in the manufacture of an article for sale, of any article or device purchased for a valuable consideration in open market, without notice, and the same was subject to the patent sued on; but in all such cases the manufacturer or vender only shall be liable for damages or profits; *Provided*, That any such user shall be liable for damages and profits for infringement of such patent from and after the time he shall have received notice that the article was subject to such patent if he continue to use the same.

SEC. 2. That when in any case the use complained of was an article or device made by the defendant or his employe for his own use and benefit, and not in the manufacture of an article for sale, the measure of recovery shall be a license fee. If in such cases a license fee shall not have been established under the patent or patents sued on, then in any action at law the jury, and in any action in equity the court, shall ascertain what, under all the circumstances of the case, would be a reasonable license fee: *Provided*, That nothing herein contained shall apply to articles manufactured outside of the United States: *Provided further*, That nothing herein contained shall apply to machinery held for sale or to be used for any manufacturing process whatever.

The report of the committee was read, as follows:

The Committee on Patents, to whom was referred sundry bills numbered 419, 1134, 311, 1956, 1250, report the following bill as a substitute for all:

Much complaint has grown up in the country from the practice of persons owing patents, or pretending to own them, allowing the use of an article, sometimes for years, and then sending an agent around and demanding damages from the holders of the article. Great annoyance has been the result. The committee have drawn the substitute so as to protect the innocent of a patented article, purchased in good faith in the open market, from such annoyance. The manufacturer and seller of a patented implement is the party that ought to be held liable, and not the user of the article who bought and used it innocently, or in other words who did not know he was infringing a patent.

The committee recommend the passage of the substitute.

Many of the members were absent at the time of the passage of both of the above bills, and not a single voice appears to have been raised in protest against these ruthless attacks upon the industries of the country.

ENGINEERING INVENTIONS.

A means for preventing condensation in steam cylinders has been patented by Mr. Charles W. Crawford, of Brazil, Ind. It consists in the application of a current of hot air to jacketed cylinders, a blower being used to maintain circulation from heater to the cylinder and back, and the air being heated, in any suitable heater, to a temperature greater than the steam in the cylinder.

A detecting bar for railway switches has been patented by Mr. James A. Bonnell, of New York city. This invention covers detecting bars used at night or during fogs to ascertain if a train is on a switch before throwing or setting the switch, and is an improvement on a detecting bar patented by the same inventor in July, 1881. By this device the splitting of trains on switches is avoided, even if the switchman cannot see the signals.

An improved car coupling has been patented by Mr. Charles Uebinger, of St. James, Ind. The drawhead is of the usual construction, the coupling pin is held on the outer end of a projecting arm, and this is connected with a lever projecting from the top of the car, where it will strike a similar lever from an approaching car, and so drop the pin through the coupling link; there is also an arm or apron guide on the bottom of the drawhead, to engage a similar one on the approaching car, for guiding the link.

An ore concentrator has been been patented by Mr. Alexander D. Clarke, of New York city. It is an improved device for washing off and removing particles of sand in placer mining, and catching the heavy and float gold. The flow of sand, ore, etc., is conducted upon a screen by an inclined chute, from whence another inclined chute conducts it to a transverse gutter, and thence it flows into suitable settling tanks, the chute that conducts the water from the screen being inclined in the inverse direction from the chute that conducts the water upon the screen.

A superheating attachment for steam boilers has been patented by Mr. James A. Stout, of Belleville, Ill. This invention is designed for portable and traction engines, and provides for a novel construction of superheater to take the place of ordinary steam dome, so the steam will be superheated by the gaseous products of combustion as they pass to the chimney; the dome has its heads formed of cast metal rings at its opposite ends, and is combined with the smoke box end of the boiler; the dome also has combined with it a steam supply pipe connecting it with the boiler, preventing foaming or priming, as well as economizing fuel and water.

MECHANICAL INVENTIONS.

A saw tooth swage has been patented by Mr. Samuel J. Chalfant, of Albion, Cal. It consists of an anvil block adapted for being held in a vise, with jaws and a clamping lever for holding removable saw teeth with the points on the anvil, for drawing or swaging with a light hammer, to widen and sharpen the points, the dies being changeable for different forms of teeth, so that worn teeth may be sharpened and perfectly refitted.

A shingle sawing machine has been patented by Messrs. William F. Dake and James H. Seek, of Grand Haven, Mich. The object is to facilitate the utilization of saw mill refuse in making shingles, and for this purpose the saw frame has an endless chain of bars provided with dogs and driven by chain drums, a worm and worm wheel, and a belt and pulley from the saw mandrel. The machine has a movable table, with a guide plate and spring, so that wedge pieces and slivers will push back the table and escape.

AGRICULTURAL INVENTIONS.

An improved cultivator has been patented by Mr. Henry D. Teller, of Starrsville, Ga. By this invention single beam cultivators can be readily adjusted to use as covering plows, and to work deeper or shallower in the ground, as desired, the construction being durable and effective.

A check row attachment for corn planters has been patented by Mr. William W. Robinson, of Ida Grove, Iowa. This invention provides for the operating of the seed dropping slide by the advance of the machine, and covers a novel combination and disposition of parts to facilitate the planting of corn in accurate check rows.

MISCELLANEOUS INVENTIONS.

An improved bracket has been patented by Mr. Jonas Herrmann, of Columbus, Ohio. It is a novel design, adapted for holding a crossbar out from the wall, the cross piece being very securely held, while it is at the same time easily removable.

An improved faucet has been patented by Mr. Joseph H. Dorgan, of Plattsburg, N. Y. The principal object of this invention is to make more easy and convenient the adjustment of the faucet in barrel or cask, with provision for accommodating the faucet to different sized barrel plugs.

A broom support has been patented by Mr. William T. Shaffer, of Evanston, Wyoming Territory. The invention provides for a new and improved pocket or receptacle for holding the broom when not in use, the pocket straightening the bent straws and holding the broom fixed in its proper shape.

A crock cover has been patented by Mr. Daniel W. Frost, of Keokuk, Iowa. This invention provides a crock cover with recesses for holding it on the crock in such a way that the bail of the cover can be used to lift the crock, and the cover can be adjusted to fit different sized crocks.

A clothes drier has been patented by Mr. Robert R. Richardson, of Laramie City, Wyoming Territory. It is an improved combined clothes horse and press or closet, which can be erected or folded easily and rapidly, does not occupy much space when folded, and when in use the sides and doors may be swung open and expose the clothes to the air.

A draught equalizer has been patented by Mr. John Bowers, of Brookville, Ill. It is so constructed that, when three horses are employed, each one will exert a like draught. The middle horse has a two-third leverage over the horse on the other side of the tongue, and a compound leverage over the outside horse on the same side of the tongue.

An improved cotton press has been patented by Messrs. F. L. Faison and George M. Newell, of Wake Forest College, N. C. This invention covers a new construction and combination of parts, including a grooved rail, flanged and grooved rollers, endless rope, thrust bars, follower, drum, and axle, with rock shaft, levers, slide bolts, connecting rods, side doors, etc.

A weather strip has been patented by Mr. Ira Paddock, of Greeley, Kansas. It combines a curved metallic strip with a curved flexible strip, the former doubled and the latter clamped within its fold and secured to the bottom of the door or sash, a spring being attached to the door and to the strip, adapted to hold up the latter as the door opens and closes.

A fire escape has been patented by Mr. Samuel Norris, of Halifax, N. S., Canada. This invention provides for an endless belt with pockets and strengthening chains, suspended bearings to carry an endless belt roller, brake straps, brake levers, and brake cords for controlling the escape, the whole designed to facilitate the escape of people and removal of property from burning buildings.

A pencil holder has been patented by Mr. Bernhard Eybel, of New York city. The object of the invention is to facilitate the adjustment of leads in pencil holders and provide a simple construction. According to this device, the lead is forced outward into position by turning its tapering end in one direction; or withdrawn by revolving it the opposite way, so the pencil can be carried without breaking off the point of the lead.

A combined letter box and mail bag has been patented by Mr. Carl Friedrich Teller, of Offenbach-on-the-Main, Germany. The invention provides for a mail box with a sliding bottom, and when the box is to be emptied a locked bag is passed under the bottom in such manner that, with this especial construction, the letters may be dropped into the bag, and when the box is emptied the bottom is pushed back and the bag closed.

An improved pitman rod connection has been patented by Mr. George E. Waggoner, of New Hampton, Mo. It is more especially intended for the connection of a harvester or mower and sickle bar, the solid eye of the pitman rod having a fitted thimble connected with the jaws of the sickle bar head by a screw bolt and jam nut, with means to fix the thimble, a presser box behind the eye of the pitman in the jaws of the head, and a set screw and jam nut to take up the slack.

A fireproof sheet, for use for curtains, theater scenes, roof covering, etc., has been patented by Mr. Junius Nagel, of Vienna, Austria. It consists of either a mixture of asbestos with a zinc oxide, asbestos with magnesia, or asbestos with lime, or a mixture of all these in different proportions according to the proposed use, the mixtures being saturated with a sulphate of alumina, or a chloride of some metal, or a mixture of these solutions, and a particular manner of applying the same to a wire netting or cloth.

A dynamo electric machine has been patented by Mr. Jonas Wenstrom, of Orebro, Sweden. This invention provides for the more complete utilization of excited magnetism than heretofore; the bulk of the wire is enveloped in iron, and the excited magnetism in all directions meets iron for conducting it where wanted, this iron serving as a frame connection between all parts of the machinery, and allowing the armature to move freely between the polar surfaces, and in very close proximity thereto.

A disinfecting tank for the disposal of sewage has been patented by Mr. James J. Powers, of New York city. It combines with a settling tank another one for disinfecting and a small one tor receiving the disinfecting liquid, the latter arranged for automatically discharging the disinfecting liquid into the disinfecting tank. The fluids are withdrawn from the latter by a siphon, the outer end of which has an automatically closing valve, and is in a smaller tank connected with absorption or drain tiles.

A balloon propeller has been patented by Mr. Kansas D. Davis, of Cole City, Ga. This invention is intended to control the motions of a gas balloon, by attachments to the car or its frame; there are outwardly projecting arms with supporting sleeves, reversing wings, and sailing wings with means for operating them by driving shaft with reverse cranks and connecting rods, also a specially devised rudder and apparatus for arresting flight, as well as to control ascent and descent.

An improved coffee and tea pot has been patented by Mr. Frank Rosebrook, of Elmira, N. Y. The coffee or tea pot has a perforated false bottom, the true bottom beneath which is tapering or conical, in the middle of which is a faucet; the coffee or tea is placed on this false bottom, and then the desired water is added, after which the pot is placed inside another vessel of suitable construction to hold water all around, and the larger vessel is placed over the fire, thus extracting the flavor and the aroma from the tea and coffee, so that none of it will be lost.

NEW BOOKS AND PUBLICATIONS.

RELATIVE PROPORTIONS OF THE STEAM ENGINE. By William Dennis Marks. J. B. Lippincott & Co., Philadelphia.

This is the second edition of a work originally published in 1878, with two added chapters, on "The Cheapest Point of Cut-off" and "The Errors of the Zenner Valve Diagram." The author is Whitney, Professor of Dynamical Engineering in the University of Pennsylvania, and undertakes to give rules and formulæ for proportions of different parts of engines, so that the engineer may conveniently work out the design and details of any specially desired construction, to meet new circumstances, or better perform the work now done by engines ill adapted for their purpose. The book fills a place, for those who have the designing of engines, which is hardly taken by any other work in the English language, but there will be general regret that the author did not treat more extensively of the economical point of cut-off, the grounds for the proper consideration of which he has stated in such comprehensive terms.

FOR MOTHERS AND DAUGHTERS. A Manual of Hygiene for Women and the Household. By Mrs. E. G. Cook, M.D. Fowler & Wells, New York.

The importance of physical culture for women, with especial reference to their duties in the household and the raising and care of children, are prominently treated in this book; there is a chapter on bread and butter, with analysis of processes of digestion; hygiene and ventilation are discussed, and the rights and education of children, etc.

A BACHELOR'S TALKS ABOUT MARRIED LIFE AND THINGS ADJACENT. By William Aikman, M.D. Fowler & Wells, New York.

This is a pleasant volume on social life, that cannot be out of place on any drawing room table, where its happy thoughts and cheerful spirit will contribute to the home comforts that the bachelor is always supposed to be in want of.

THE WINE PRESS AND THE CELLAR. By E. H. Rixford. D. Van Nostrand, New York.

This volume is the result of the researches of a practical man investigating the subject for his own benefit as a wine maker, and so deals but lightly with anything touching the theoretical side of the business, while affording a valuable collection of facts from his own experience and from the writings of various authors in the English and foreign languages. The author is evidently familiar with the commencement and progress of the business of grape culture and wine making in California, and his book, while showing some of the errors they have heretofore made, is itself an evidence that a much better understanding now prevails of what is needful for success in this line.

HYGIENE AND SANITARY SCIENCE. A hand book. By George Wilson, M.D., F.R.S.E. P. Blakiston, Son & Co., Philadelphia.

The author of this book, which has now reached its fifth edition, is a medical officer of health for the Mid-Warwickshire sanitary district, England. The scope of the work is very comprehensive, embracing analyses of water and food, examinations as to warming and ventilation, hospital management, removal of sewage, disinfection, etc., with a chapter on vital statistics, and a synopsis of the most important English laws and regulations of health boards. Works of this character are valuable public educators in a direction to which attention cannot be too frequently directed.

HEALTH IN THE HOUSEHOLD, OR HYGIENIC COOKING. By Susanna W. Dodd, M.D. Fowler & Wells, New York.

Many useful hints and recipes are here given for "hygienic" cooking. The book cannot fail to be of great value in every household, to those who intelligently appreciate the author's standpoint. The great majority of people will probably differ widely from many of the ideas advanced, but there are few of those who differ most positively therefrom but will, on careful consideration, concede that it would be a public benefit if our people generally were better informed as to the healthful mode of living the author contends for.

ELECTRICITY, MAGNETISM, AND ELECTRIC TELEGRAPHY. By Thomas D. Lockwood. D. Van Nostrand, New York.

This book the author does not claim to be more than a hand book, a carefully arranged elementary work, leading the learner up to the higher problems of the science, yet it covers a wide range of topics, the language is simple and direct, and the author has evidently given us here the results of careful investigations, gone into solely from practical motives. The text is in the form of questions and answers throughout, a mode of giving information best calculated to eliminate vagueness of statement and hold the mind to a closer analysis of the severally succeeding topics, which is of primary importance with all beginners in the very complex science which the present state of electrical development affords.

ABORIGINAL AMERICAN AUTHORS AND THEIR PRODUCTIONS. By Daniel G. Brinton, A.M., M.D., Philadelphia.

The vivid imaginations of the Indians, their love of story telling and appreciation of style, coupled with language of much power and resource, produced a literature of much quaintness and in some cases brilliancy. The native admiration of eloquence is clearly discernible in their deep seated reverence for the orator. The book shows the aboriginal authors and their works, and is divided into the literary faculty of the native mind, and narrative, didactic, oratorical, poetical, and dramatic literature.

THE ART OF BOOK BINDING. H. P. Du Bois. Bradstreet Press, New York.

This is an historical essay of the art of book binding, from the earliest times, and will be of most value and interest to pronounced bibliophiles.

THE steam pumping machinery of Messrs. Guild & Garrison, of Brooklyn, N. Y., is illustrated in an elaborate catalogue which the firm are sending out at the beginning of the year.

A SHOE AND LEATHER TRADES DIRECTORY, with statistics of the business and record of the most important news in that industry for 1883, makes a handsome volume just issued by the *Shoe and Leather Reporter*, for free distribution to its subscribers. The book distinguishes the manufacturers, tanners, and curriers from those who are only dealers, and notes the several specialties of each. Pennsylvania has 831 tanners and leather dealers, a decrease of 71 from the number in the business in 1882; New York State has 434 tanners and curriers, which is noted as 101 less than the number in 1882.

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) M. G. M. asks how peanut oil is purified and deodorized? A. In European mills the nuts are first cleaned, then decorticated, and winnowed, by which the kernels are left perfectly clean. These are crushed like any other oil seed, and put into bags which are introduced into cold presses; the expressed oil is refined by passing through filter bags. The residual cake is ground very fine and pressed under three tons to the inch in the presence of steam heat; this affords a second quality of oil inferior to the cold pressed. The usual product is one gallon of oil from one bushel of nuts by the cold process, besides the extra yield by the hot pressing. In France, where the oil is most largely prepared, three expressions are adopted: the first gives about eighteen per cent of superfine oil, fit for alimentary purposes; the second, after moistening with cold water, affords six per cent of a fine oil suitable for lighting and for woolen dressing; the third, after treating with hot water, yields six per cent of oil applicable only to soap making. The cold pressed oil is almost colorless, of agreeable odor, and bland olive-like flavor. On the European market large quantities of it are passed off as olive oil.

(2) J. H. M. asks: 1. How to render a piece of muslin non-combustible? A. See article on "Incombustible Tissues," SCIENTIFIC AMERICAN SUPPLEMENT, No. 245. 2. How is sherry wine made? A. The juice is deposited in butts of 108 gallons each, and after the first fermentation is racked from the lees, each butt receiving from two to ten gallons of spirit, according to the quality of the wine, the inferior sorts requiring most re-enforcement. The wine is subsequently flavored with a liqueur called *dulce*, made from the must of over-ripe grapes, the fermentation of which has been checked by the addition of overproof spirit, and colored by an admixture of *vins de color*, which is simply must boiled until it is reduced to one-fifth of its bulk and has acquired the consistency of treacle. It is deep reddish-brown, and has a harsh and bitter flavor. By means of this agent all the popular shades of color are given to the sherry.

(3) D. R. P. asks for a receipt for bluing revolvers and gun barrels, also the mode of employing same? A. The bluing of revolvers is done by first finishing every part to an even polish, and then heating in a muffler till the desired color is obtained. For a blue finish, clean every part to an even color finish, and apply nitric acid, 1 part, diluted with 10 parts water until a blue film is produced upon the surface. Then wash with warm water, dry, and wipe with linseed oil.

(4) W. H. L. asks for the quickest way to dry large oak hubs and avoid cracking. Does steaming affect the solidity of the wood? How soon after steaming can it be made to assume its former solidity? A. To dry oak hubs, pile them in a drying oven so that there will be room for circulation of steam and air between the blocks. Turn steam into the oven so as to moisten the surface of the blocks, and also steam into coil for heating. Close the oven tight; keep it closed until the blocks are heated thoroughly, so as to boil the water out from the interior, which will take four to six hours. Continue the steam in the heating coil, and shut off the steam from the wood for a few hours more with a little ventilation, when they will be found thoroughly dry without cracking or checking.

(5) R. H. B. asks: What material to use to make a hone surface on wood, such as is put on razor strops, and how proceed? A. Levigated oxide of tin, prepared putty powder, 1 oz.; powdered oxalic acid, ¼ oz.; powdered gum, 20 grains; make into a stiff paste with water, and evenly and thinly spread it over the strop. This is said to give a fine edge to the razor. If it cannot be used as it is, we recommend that it be mixed with sufficient glue to cause it to adhere to the wood.

(6) W. J. P. asks: Does the height of a balance wheel affect its running, as regards the atmospheric obstructions it may meet? A. Practically, no. 2. Or will a wheel run as easily under a machine, close to the floor, as above it? A. Yes; as easily, if the atmosphere around the wheel be not confined.

(7) H. C. A. asks: 1. How to make a good imitation of snow? A. This depends upon your object. Scraps of paper are used in theaters; negatives are spattered so as to produce this effect. Salt is likewise used by photographers. 2. I have a large lithograph and would like to put a gloss to it—will it do to varnish it? A. Float the lithograph in varnish.

(8) S. H. J. writes: I have a piece of apparatus used to register the number of vibrations per second of a wire by means of an electric current. The current is broken and closed by the wire. What solution is there, if in which paper is soaked and then drawn between the ends of the conducting wires, a mark will be made? I have tried iodide of starch paper, but the mark made is not instantaneous, which is necessary.

A. Iodide potassium	½ lb.
Bromide "	2 lb.
Dextrine or starch	1 oz.
Distilled water	1 gal.
You might also try:	
Nitrate ammonia	2 lb.
Muriate "	2 lb.
Ferricyan. potassium	1 oz.
Water	1 gal.

(9) J. A. S. asks: 1. Could I generate enough steam in a boiler 4 in. square by 12 in. high to propel a machine at the rate of 50 revolutions per minute that requires the foot power of one man to propel? A. We think not. 2. Also, would plates one-eighth in. thick be thick enough to withhold the pressure? A. One-eighth inch thick is sufficient for wrought iron plates if the boiler is cylindrical, but not if square, whether it be wrought or cast iron. 3. What kind of oil would be best to heat with? A. Your question is rather indefinite, but for a stove heated with oil we think you will find good kerosene as good as anything.

(10) I. P. S. asks: 1. How to prepare a cement to mend broken alabaster ornaments? A. Use glue sold by druggists for cementing china and glass ornaments. 2. Why are not steam engines with oscillating cylinders more generally used? A. The oscillating steam engine in the present advanced practice of engine building cannot compare with other forms of engine.

(11) T. H. R. asks: What is the best method of getting rid of the quality of stickiness in boiled linseed oils? How can such stickiness in canvas or calico cloth dressed with such oil be overcome? A. The stickiness of linseed oil is one of the properties of the oil in question, and cannot be got rid of unless decomposition takes place. For your special purpose we would recommend that the articles coated be thoroughly exposed to the air, and the oil oxidized. By this means it will harden, and the condition sought for will be to a great extent accomplished.

(12) E. F. writes: I have a large sheep skin mat on my floor which has troubled me for some time back by seemingly sweating. The carpet on which it lies is perfectly dry and distant from any damp spot. The skin becomes very wet, necessitating drying every few days. Please explain the cause of this and any remedy I may apply to prevent it. A. The sheep skin mat is probably cured with salt or salt and glycerine. When the air is moist, these ingredients absorb the moisture from the air. The remedy is to wash and redress with borax water and dry in the sun. Stretch the skin while drying.

(13) W. B.—For information on English railroad building you had better refer to some work on the subject. Speed of ordinary trains about the same as in the United States, 30 to 35 miles per hour. First class trains, 40 to 60 miles per hour. The humming noise along the telegraph lines is caused by the wind blowing across the wire, setting the line into vibration in the manner of an Æolian harp, the poles acting as a sounding board. Do not know of any better way of preventing the noise than to use covered wire near the offices. Do not anchor the main line to the office or building—come into the office with a slack copper wire covered and dipped in paraffine.

(14) L. L. writes: 1. Two steam boilers are supposed to be in a vacuum, and both made of material exactly the same in thickness, strength, etc. The diameter of the second boiler is say one hundred times greater than that of the first. Both boilers and their contents are deprived of all weight. No flues are supposed to be used. A pressure of one hundred pounds of steam to the square inch is all the first boiler will stand. Will the second boiler stand the same steam pressure (viz. one hundred pounds to the square inch)? A. No. The strength of the boiler will be inversely as the diameter. 2. Two circular iron water tanks are presumed to be in a vacuum, and are also made of material the same in thickness and strength. The diameter of the second tank is say one thousand times greater than that of the first. The depth of both tanks is exactly the same. We deprive both tanks of the weight of the material of which they are made. Both tanks are full of water in a state of perfect tranquillity. The pressure against the side of the first tank is all it will stand. Will the water in the second tank burst the side of the tank? In the above questions only pressure is to be considered. A. Yes.

(15) O. C. writes: 1. I am using a projecting lantern with an oil lamp, but I desire a better light. For what little I use it I cannot afford the oxyhydrogen or electric light. In looking over the back numbers of the SCIENTIFIC AMERICAN I find in vol. xlvi., No. 25, a description of Dr. Regnard's incandescent lamp, and would like to ask a few questions about it. 1. Is it practical? 2. Is it safe? A. 1 and 2. We think both practical and safe. 3. Is there such a piece of apparatus in the market, and if so, where can it be obtained? A. It is not for sale in this market. 4. If not, will you please give full directions so that I can make one. Also where I can get the necessary material? A. We have published all the information we have on the subject. 5. If this is not practical, can you suggest any improvement on the common oil lamp for intensity of light? A. Although the light referred to would probably answer your purpose, we would suggest that you use a lamp with a wide wick turned edgewise toward the object. Place a concave reflector behind it, and between the lamp and the slide, place a good condenser composed of two or three plano convex lenses. A lantern arranged in this way ought to give good results. An oxyhydrogen light would not be very expensive, and would be preferable to anything else.

(16) W. K. writes: 1. I see in your reference book that neither zinc nor steel are marked as conductors of electricity; would like to know if they are conductors or not? A. They are both conductors of electricity. 2. At what distance will an electro magnet attract iron, causing it to move, provided the iron is not too large for the magnet to move? A. The attraction of a magnet for its armature is inversely as the square of the distance. The greatest distance depends on the strength of the magnet, but in any case it is not very great. 3. Is chemically pure zinc better to make a voltaic pile with than ordinary sheet zinc? A. Yes.

(17) W. A. asks: 1. If perpetual motion has ever been invented? A. No. 2. What is the exact meaning of such a machine? A. A machine to produce force out of nothing. 3. Was there ever a premium, or is there still one offered for its invention? A. No.

(18) G. W. M.—Scotch pig iron as given by Thurston is as follows:

Carbon, combined	3·00	3·40	per cent.
Carbon, graphitic	0·28	0·46	"
Silicon	3·50	2·93	"
Phosphorus	0·98	0·75	"
Sulphur	0·02	0·04	"
Manganese	1·58	1·62	"
Copper	0·10	0·07	"
Iron and loss	90·54	90·73	"
	100 00	100·00	per cent.

(19) J. G. T. asks if there is a powder made for removing ink blots, etc., from paper, and if so, of what is it composed? Also if there is a liquid for the same use, and what it is composed of? A. We know of no powder that is really effective in removing ink; but of solutions there are several. A solution of chloride of lime and acetic acid is often used. Oxalic and citric acids are employed for this purpose. See article on inks, SCIENTIFIC AMERICAN SUPPLEMENT, No. 157.

(20) C. S. writes: In a planer to dress staves, which is the best velocity to give to the cutter, also to the speed, and how do I determine, or what is the proportion of the speed of feed to that of the cutters. A. The question in regard to speed of stave machines is very indefinite. The kind of staves, hard or soft wood, and the condition of the lumber, whether there is much or little to come off, should regulate the speed of the feed—half foot per second may be the average speed. The cutters may have from 1,000 to 1,500 turns per minute. A trial with good judgment is worth more to you than the advice of those that are not acquainted with your machine or lumber.

(21) S. C. T. asks: How can I remove grease from painted machinery (a Campbell printing press) without removing the paint or polish? Also, what will keep the polished steel and castings from rusting? Also, what will loosen the parts, when gummed with oil? A. Benzine or naphtha will remove grease without removing the paint if used quickly and carefully. A slight film of good sperm or lard oil is as good as anything for preventing rust. Kerosene oil injected into a gummed joint will loosen it. Use good oil, and you will not be troubled with gumming.

(22) W. B. asks if there are any patent ovens used in baking japanned work, or how to construct a good one, and what are the materials used in japanning and how to prepare them, or is there any work published on japanning? A. There are no patent ovens required to bake japan varnish. Any room suitable for the quantity of work required to be baked at one time, so arranged as to be safe from fire, and to be heated to 250°, will do the work. We would not recommend you to attempt to make the varnish; it is a peculiar business. Buy the varnishes of the colors that you require. You have varnish agencies in St. Louis. We know of no work treating especially upon this subject.

(23) C. J. H. asks how sugar is made from Indian corn, also if it is possible to make sirup from old rags, paper, etc.? A. For the manufacture of sugar or glucose from corn, see a full account in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 98, 259, and 260. Jelly has been made from old rags, paper, and old boots, but this system has not usurped the public favor over the old.

(24) T. J. M. asks: 1. Can the ink used by copper plate printers be bought ready for use, and where? A. Yes. Write dealers in printing ink who advertise in our columns. 2. How is it applied to the plate? A. It is rubbed into the lines, and the surplus wiped off with a cloth and a little whiting. 3. How many impressions will each application of ink be likely to give? A. One. 4. Can I get a book of instruction on "copper plate" and "relief" printing? A. Write any of our industrial book publishers.

(25) C. E. B. asks: 1. How to make a cheap and easily made vulcanizer to vulcanize rubber for hand stamps? A. For this information we refer you to the article on "The India Rubber and Gutta-percha Industries," SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 249 and 251, especially the latter, where vulcanizers are described on page 3992. 2. What is the difference between the setting of the type for the first Polyglot Bible and that of other type setting? A. The setting of the type for a Polyglot Bible is different and more complex than other type setting, because of the text being represented in several languages. The *Complutensian* or first was printed in four languages; *Hutter's Polyglot* in twelve languages. Some of the editions contained the *Hebrew, Syriac, Chaldee*, and *Samaritan* texts, with their *Latin* versions.

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

J. M. G.—The mineral is pyrite (iron sulphide), and may carry gold. An assay costing $5.00 would determine this.—J. T. C.—The shiny particles of mineral are small plates of mica. We do not think the mineral contains gold. An assay costing $5.00 would determine the presence of precious metals.—J. A. R.—The mineral is one of the varieties of feldspar, and may carry a little zinc with it. In order to ascertain this it would be necessary to have it assayed. The expense of this would be $5.00.

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January 15, 1884,

AND EACH BEARING THAT DATE.

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Sealed Proposals will be received by the undersigned until February 4, 1884, at 7:30 P. M., for the construction of a Fire Alarm Telegraph in the city of Elmira, in accordance with plans and specifications on file in the office of the Mayor of said city. Elmira, N. Y., January 4, 1884. S. T. ARNOT, Mayor.

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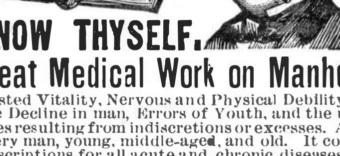

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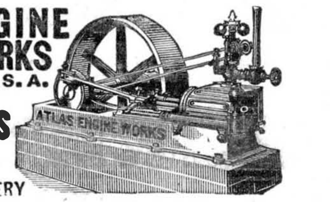

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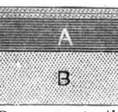

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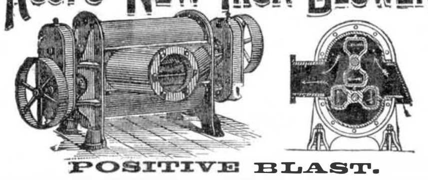

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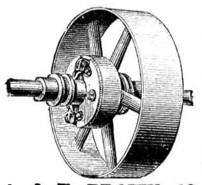

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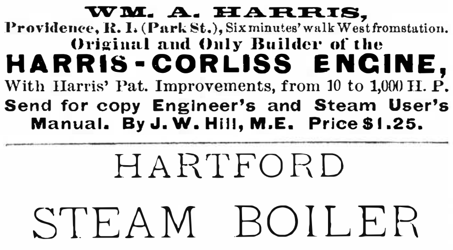

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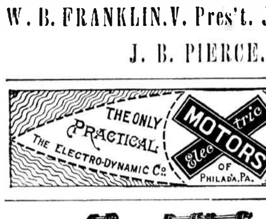

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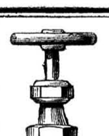

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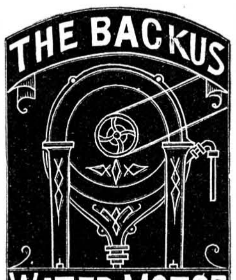

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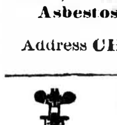

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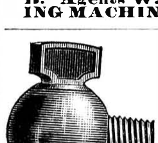

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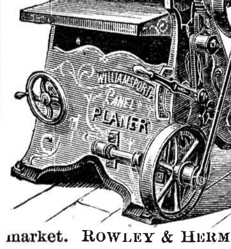

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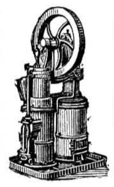

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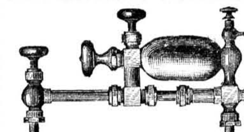

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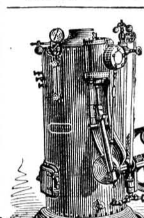

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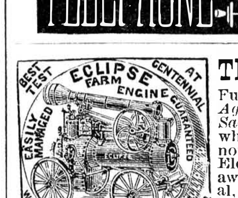

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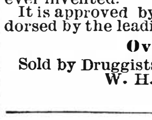

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