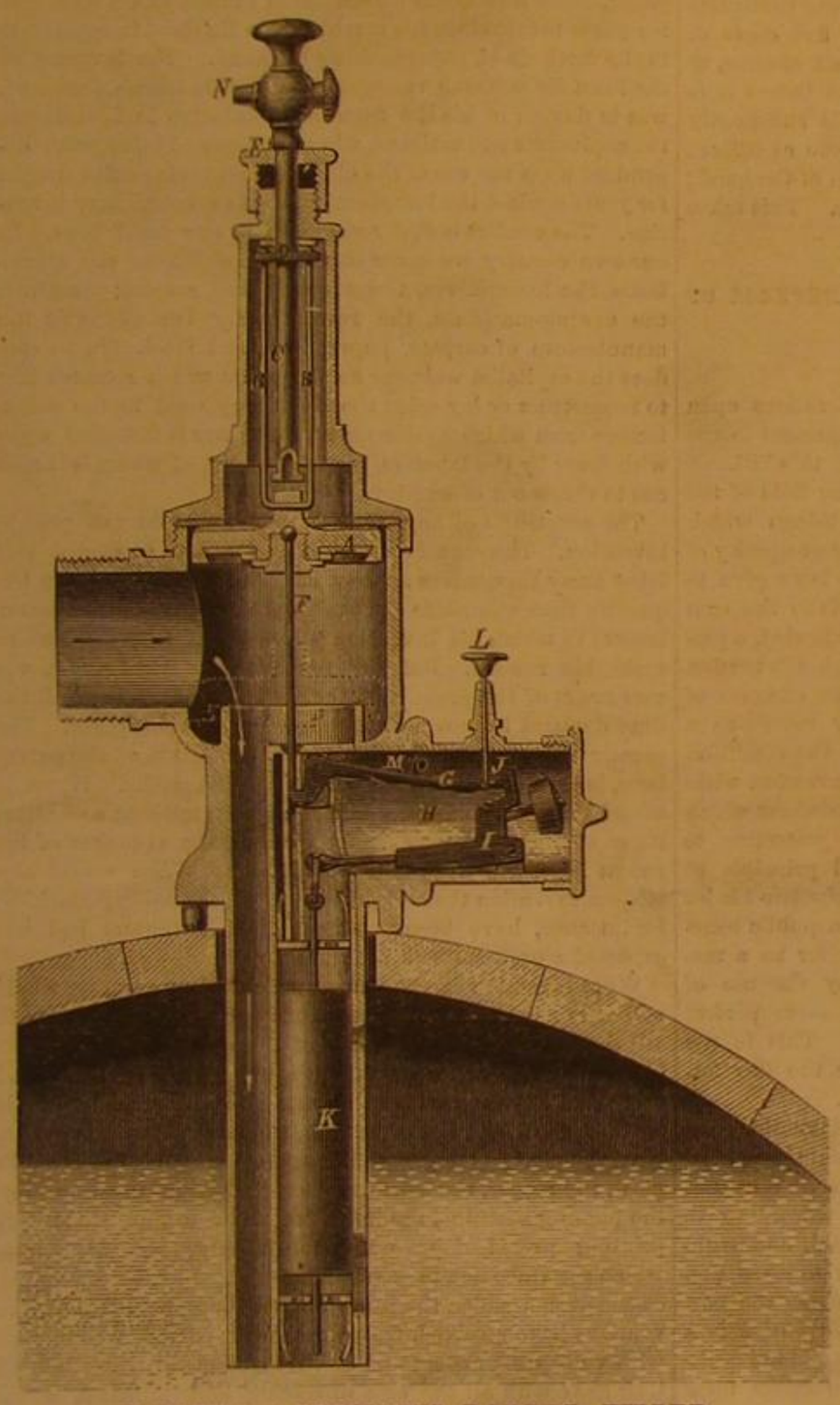
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Improved Automatic Barrel Filler.

There are many extensive branches of business in which the filling of barrels and casks with liquids forms a considerable proportion of the labor to be performed. Among these may be enumerated distilleries of turpentine and alcohol, vinegar manufactories, breweries, oil refineries, etc. In all these industries it is desirable to fill the casks uniformly to a certain point; but with petroleum oils it is not only desirable but essential to leave a certain space for expansion to prevent internal pressure from causing leaks during storage and transportation—a primary cause of danger from fire.



CATLIN'S AUTOMATIC BARREL FILLER.

In filling barrels with sufficient head to perform the operation rapidly there is also the liability of waste and inconvenience from running over, as it is impossible to obtain barrels of uniform capacity, and the attendant is required, on this account, to give his entire attention to a single cask and lessen the flow before the barrel is nearly full in order to enable him to cut off the stream with sufficient suddenness to prevent overflow.

It is obvious that an instrument that will automatically and uniformly cut off the flow when the level of the liquid in the cask has risen to a given distance from the bung-hole, would not only secure the removal of all the difficulties specified, but would enable a single attendant to supervise several barrels at once, and thus greatly expedite the process.

Such an instrument is the ingenious device illustrated herewith, of which Fig. 1 is a perspective view, and Fig. 2 a vertical section. It works accurately and equally under all pressures. It is claimed to be the only self-closing filler that fulfills these conditions. The inventor is so well assured that they will give perfect satisfaction that he allows them to be used a specified time to test their merits before they are permanently accepted as a purchase. They are adapted to fill all kinds of liquids and fit bung-holes of two inches diameter and upwards, with special sizes having long discharge tubes, for filling lager beer and ale, with a short section of flexible pipe to enable the latter liquors to discharge underneath the surface to prevent foaming.

The machines are made in the best manner—the body part of red or gun metal, and the discharge pipe of a superior quality of seamless drawn tubing; and are has been taken to construct them so as not to be affected by liquids containing acids. It is claimed that with ordinary careful usage they will last many years without repair. They are easily repaired when necessary, as duplicates of any part of the machine are furnished to order, and it is only a few moments' work to take them apart and put them together.

It takes from three fourths of a minute upward, according to the pressure, to fill a barrel. The adjustment to fill the barrel full or to leave any desired part of three gallons out, is done simply by turning a brass ball, as hereinafter described, and it is provided with a neat and handy device for drawing samples, which can be done whether the filler is running or not. The mechanism for tripping the valve is simple and reliable, and is shown in Fig. 1, in section; Fig. 2 being a perspective view of the apparatus, with a portion of the cask broken away to show the manner in which it enters the cask.

The course of the liquid as it passes into the cask is indicated by the arrows in Fig. 1; the instrument being shown set in the proper position to trip the valve when the liquid rises to the required level.

It is set as follows: The valve, A, being in the position shown by the dotted line, the link, B, slips down over the hollow stem, C, till the collar, D, is brought loosely down over a ledge formed around the lower end of the stem, C. The hollow stem, C, slides in a hole through the screw cap, E, so that when the valve is down in the position shown by the dotted line, drawing up the hollow stem by the knob at its top draws up the link, B, into the position shown, and as the valve is attached to the link, it is also raised to the position shown in Fig. 1.

From the bottom of the valve descends a vertical rod, F, which, passing through the top partition of an included section of pipe, abuts upon a ledge formed on the end of the pivoted lever, G. This lever acts in a chamber, H, projecting at right angles from the body of the instrument, as shown, which chamber also contains another counterpoised lever, I, having a catch at J, and connected by a small link at the opposite end with a float, K.

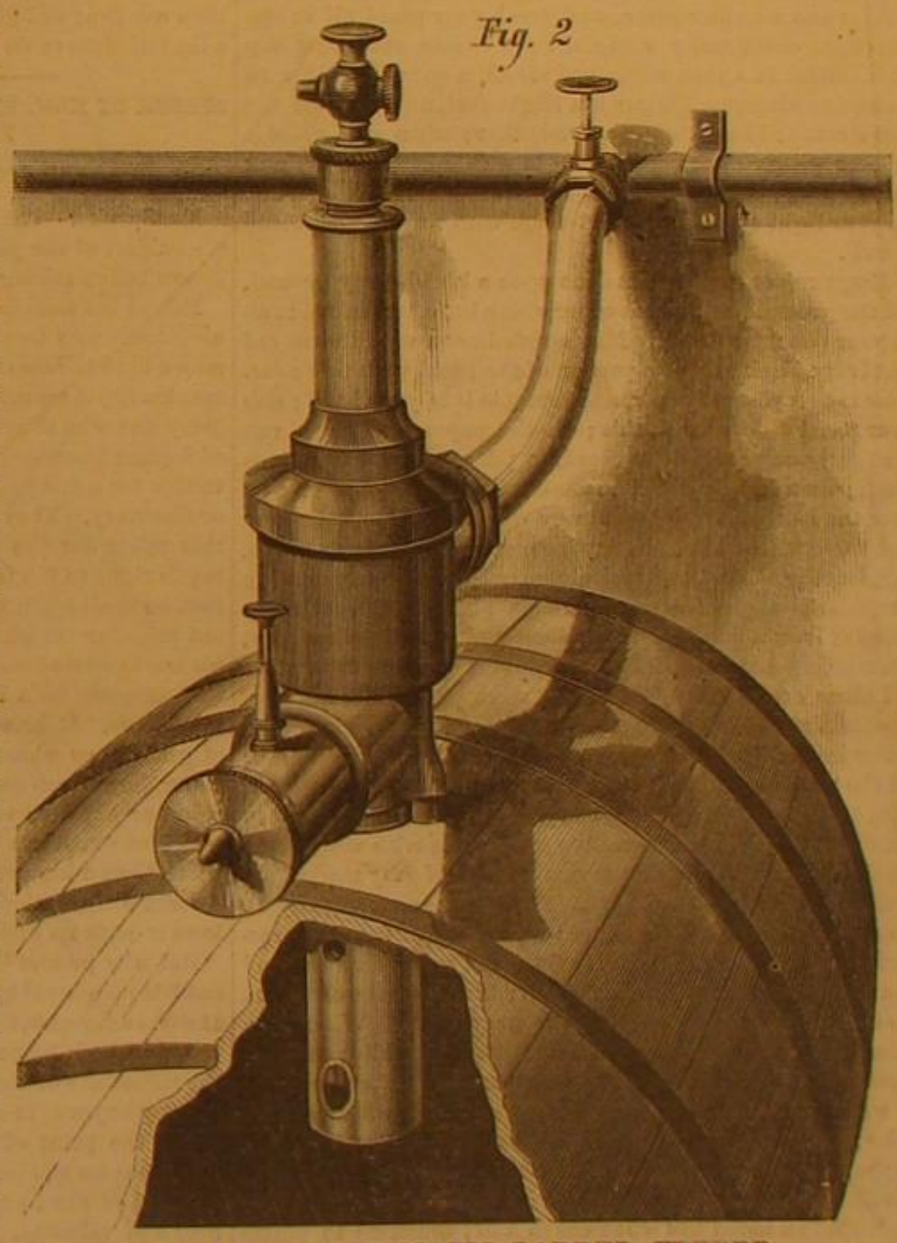
When the valve has been raised to the position shown in Fig. 1, as above described, the button, L, is pressed downward, and the end of the small vertical rod which it carries depresses the end of the lever, G, bringing that end under the catch, J, and the ledge at its opposite end under the end of the rod, F. The hollow stem, C, being then pressed down the valve is supported until it is tripped by the rise of the fluid, which slightly raising the float releases the end of the lever, G, from its engagement with the catch, J. A small spring, M, then immediately raises the lever, G, and withdraws the ledge from under the end of the rod, F, when the valve immediately drops, and the flow is instantaneously stopped.

The float, K, is guided by spindles sliding in central guides so that its friction is extremely slight. The adjustment of the brass ball or counterpoise on the lever, I, varies the level at which the flow is cut off, so that it may be stopped to leave any desired part of three gallons as unfilled space. The action of the instrument is, as we can personally attest, extremely delicate and reliable.

A small tap, N, is placed at the top of the hollow stem, C, through which samples may be drawn, whether the barrel is filling or not—a great convenience in oil-refining establishments.

This ingenious invention was patented, in the United States (February 16, 1869, and January 25, 1870) and in Great Britain, through the Scientific American Patent Agency, by S. C. Catlin, Cleveland, Ohio, whom address for rights to manufacture, or for machines.

Fig. 2



CATLIN'S AUTOMATIC BARREL FEEDER.

TO IMITATE MARBLES WITH PAINT.

The following are the principal marbles for adaptation to general use in decoration: Sienna, black and gold, Saint Ann's, verd antique, Egyptian green, rouge roi, Italian jasper, dove, black bardilla, Derbyshire spar, and granites.

The "Painter, Gilder, and Varnisher's Companion" gives the following directions for imitating these marbles:

Sienna is the most useful of any, as it is well adapted for decorating halls, staircases, etc. Out of a variety of ways of doing it, the following is the best: Prepare your ground work as smoothly as possible, with a light buff color made from Oxford ocher; mix a variety of tints, as follows: Dark vein color, made with ivory black and Indian red; by adding white to this you will produce a few different shades of neutral tints. Make a few tints from Indian red and Prussian blue, with white; place these conveniently on a large palette; now give your work a thin coat of the buff paint; while wet, take a large feather, dip it into turpentine, then into the dark vein color; with this form a leading vein right across your panel or slab, giving it a broken or irregular appearance; strike a few straggling veins from this; now use your feather and neutral tints, and put in some smaller veins, breaking it into small, irregular pieces on, or springing from, the leading vein. Avoid as much as possible giving it that formal appearance which so many grainers affect, as it is unnatural. Always remember this, that there is very rarely, if ever, a circle, a square, or a straight line in any marble. Now badger it well until it is soft and mellow; when dry, take a piece of old silk, dip it into linseed oil and rub it very sparingly over the work; now take a feather and thin white mixed with turpentine, go over your work with it, touching it in an irregular manner in and about the veins; soften or blend it with the badger as you go on, then put in a touch of solid white here and there among the veins. Now use Oxford ocher and raw sienna, with occasionally a little crimson lake; with these glaze over your work in parts, taking care always to put the darkest parts in connection with the leading vein; now use a pencil and ivory black, and put in some sharp touches on and about the leading vein; this, if properly done, will make the veins appear sunk, or give them depth.

For black and gold marble prepare a smooth black ground; slightly oil it; place on your palette some white, Indian red, Oxford ocher, black, and a little orange chrome; now use a large pencil, and take up a portion of the whole or part of these colors on your pencil; roll it across or lengthways of your board, leaving it in irregular patches; now connect

gether by fine lines in the same colors; fill with irregular fine lines, running in the same th short lines or touches crossing and connecting w use a dark lead color, and fill in the spaces the lines in parts with it, then put here and there on of these a touch of lighter lead color; when dry, you at the patches of color into better form, if required, a black and a pencil, and give them depth by glazing in aces with touches of white.

Saint Ann's is very similar in the form of its vein to black and gold; the patches of color are much smaller and more crowded together; it is done in exactly the same manner on a black ground, using white alone for the veins, then fill up the same with lead color.

Verd antique, or ancient green, is done upon a black ground; oil the work as before; mix several shades of green, made from Prussian blue and chrome yellow; arrange these on your palette, and a little Indian red. Take a feather, dip it into your darkest green, and go over the whole of the panel with it, using it freely; follow in the same manner with the lighter shades, occasionally using a little of the Indian red; then take some black, and put in a quantity of irregular broken patches with it, allowing the green to run in broken lines through them; now put in some solid patches of white, in form like broken pieces of flagstone or earthenware, and in size from a quarter of an inch to two inches. When dry, glaze over all with a green, made with Antwerp blue and Italian pink, using also a little crimson lake; in places touch up the whites again, making some solid, others transparent; then edge them round with a fine line of black.

For Egyptian green, use black ground. Take a sash tool, and glaze over your work with the darkest green you can make from Prussian blue and chrome yellow; now use the feather and a lighter green, and streak your panel all in one direction, occasionally using a little Indian red; now dip your feather in a thin white, and streak it over the other in a slanting direction, giving it a slight curl, and crossing the first streaks; blend these well together; when dry, glaze it all over with a bluish green, made with Antwerp blue and Italian pink; this color is perfectly transparent. Now touch up your light streaks here and there with white, and blend it well.

Rouge roi, or royal red is done upon a bluish gray ground. Oil the ground; mix burnt ocher with a little Indian red; rub in your panel with this. Mix a rich brown with Indian red and ivory black; cover a portion of the panel with this color. Now take a piece of paper, and crumple it in your hand; dab your panel all over with this; dip the paper into black, rub it slightly on your palette board, to take off the superfluous black; then lightly dab it on the dark parts of the panel; go over the whole of it the same way with light blue, then here and there with white. Now wipe out a vein in places with a rag, leaving the gray ground clear; make some long, running irregularly across the panel, others short, and varying in breadth from a fine line to an inch and a half; when dry, glaze it in places with Indian red and black, using the Indian red alone occasionally; make the veins pure white in parts, in others transparent.

For Italian jasper the ground color is a light green drab; oil the ground. Mix together Indian red and Victoria lake; with this rub in several large and small patches, inclining to a circular form; mix a few olive green tints with white, blue black, and raw sienna, and several shades of gray made from ivory black and Prussian blue. Place these conveniently on your palette, also a little ocher; dip your feather into turpentine, and then into the olive tints, and run it between, and round, and across the patches of red; blend these well; then go over in the same way with the gray tints. When dry, glaze over the gray and olive tints with pure white; making them solid in places, in others transparent. Soften or blend it well; glaze the dark parts here and there with crimson lake; while this is wet, take a feather, or small overgrainer, dipped in very thin white, and draw it over some of the smaller of the dark parts, giving it something the appearance that an onion has when cut in half; touch up in places with dark color.

For dove marble the ground color is a bluish lead color. Dip your feather into turpentine, then into black ground in oil; streak your panel with this; use white in the same way; when the black has stood a little while, blend them well together as you go on; then put in a few touches of solid white, and soften.

For black bardella, the ground color is a very light lead-color. With a feather and black, figure all over in lines running into each other, very close in places, some very fine, with short lines or strokes crossing; soften a little. When dry, glaze over with thin white, a little stronger in some places than others; touch up the lines with fine lines of black.

Derbyshire spar is a compound of the fossil remains of shell fish and other inhabitants of the deep. Ground color, a light gray. Glaze over your panel with thin color, made with Vandyke brown and black; rub in a little Indian red occasionally. Crumple a piece of paper in your hand, lightly dab your work over with it; now take a rag and a narrow square-pointed stick, and form the halves of shells, fish, bones, etc.; then spurt in a little turpentine—this will open or spot it. When dry, glaze over with the same colors, and make the fossils partly solid with white; then sharpen or edge them with a fine line of black.

There are several granites; they may be done almost any color and yet be correct. The principal ones are the gray and the red, or Aberdeen granite. You may do them all in the same manner. Prepare the ground, if for gray, a light gray, if for red, a light salmon color. Provide yourself with a flat brush made of very stiff bristles, about an inch long and four inches broad; shape a piece of wood about six inches square, with a handle to it something like a child's battledore; rub in your ground color; now dip the flat brush in thin black, hold the wood in your left hand, and press the brush upon it, springing the bristles in the direction of the panel; this will throw the color on in spots. Follow in the same manner with white, if for gray granite; and with black, red, and white, if for Aberdeen. They may be done in the following manner with good effect: Provide yourself with a very porous or open sponge; dip it into black, mixed with beer; then stipple your ground with it; when dry, throw in your white in oil color; and so on with any other color. In all glazing colors it is advisable to use a little sugar of lead, as they are most of them bad dryers. I should also recommend Rowney's tube colors for finishing marbles, as they are the best colors, are very finely ground, and are as cheap in the end as any you may grind yourself.

When you have finished marbling let the work stand for a day or two; then gently rub it down with the back or smooth side of a sheet of sand paper; this will take off the knits or bits of skin which may be upon it, without scratching it; now give it three coats of the best pale polishing copal varnish, allowing an interval of two days between each coat. Let this stand for three weeks; then cut it down with ground pumice stone and water, using a piece of wash-leather or rag for that purpose. When you have got it tolerably smooth and level, wash it well with plenty of clean water, taking particular care to clean off all the pumice-stone; give it five coats of varnish. It ought now to stand for three or six months, at the least, before it is polished, for if it is done before it is almost certain to crack. When the varnish is sufficiently hard, cut it down with finely-ground pumice-stone as before; then use rotten stone and olive oil, using the ball of the hand; then use flour and oil; finish off with dry flour. This takes a deal of time to do properly, if well done.

SPEECH OF HON. THOMAS A. JENCKES, IN DEFENSE OF THE PATENT SYSTEM.

[Delivered in the House, April 22, 1870.]

Mr. Speaker—There are some general considerations upon the subject of the patent laws which I wish to present to the House before asking a vote upon the passage of this bill.

Patent laws are based upon the belief that the field of the useful arts may be extended, and that many things which may add to the comfort, the well-being, and the prosperity of mankind, yet remain to be discovered. These laws give to every one who thus by his inventive genius adds to the sum of human knowledge in either of the ways indicated, a protection for a few years to the exclusive use of his invention or discovery. They offer a premium upon the exercise of this talent for the benefit of mankind. They recognize a man's right to the fruit of his own mind, upon the condition that he shall teach the public how to use his invention without price forever after the termination of the period for which his use is exclusive. Property in ideas, and protection to that property for a limited period, is the vital principle of these laws. If he who can teach us how to make two blades of grass grow where but one grew before, is a public benefactor, how much more so is he who constructs for us a machine or explains to us a chemical process by the use of which one man can bring about a greater and more perfect result than a hundred men could do before? This is the domain of invention, and so far as it is genuine, the law follows it with its protection for seventeen years.

But why protect it at all, say many. If an invention had not been perfected by this patentee to-day, it would have been at some subsequent time by some other inventor. Why not wait and let it be produced in course of time, according to the necessities of the art in which it is developed, and without any expense to the public? This objection touches precisely the point of the whole matter, and affords the best argument for the patent laws. It admits that invention is a question of time, and that the results of invention are desirable and valuable. The patent laws offer a premium upon the earliest time. If it be known that any art or manufacture could be improved by invention in any particular, the question is, is it likely that such improvement will be made sooner by protection of the inventor, or will it be delayed indefinitely without such protection? The solution of this question does not rest in speculation. The history of inventions determines it. The loom is as old as civilization, but the power-loom was perfected under the stimulus and protection of the patent-laws. So was the machinery for spinning. The philosophy of steam may have been ancient, but the steam-engine is a creature of the patent laws.

These are but individual instances. They might be increased till the mind and memory would be burdened by the catalogue. The assurance that thought, skill, and inventive talent may gain fame, honor, and fortune, by an early solution of the problems in science and art that are pressing upon us, brings into the enjoyments of this age improvements and discoveries that might not have been known for centuries later. The theologians will not admit that any new developments or discoveries can be made in religion; the politicians have not advanced much in their arts beyond those we read about in ancient history; in the fine arts the greatest genius of the present day can hardly hope to excel "the old masters;" in architecture nothing has been produced within the last five hundred years to surpass that which has been known, admired, and reproduced for twenty-five hundred.

The sphere, therefore, in which original genius and inventive talent can best obtain recognition, honor, and reward is that of science and the useful arts. Therein, under the protection and fostering care of laws like that which we now reproduce, has been the greatest progress of the world within the last century, and in many branches of those arts the progress has been greater within the memory of living men than in the entire previous historic period. As the desires and necessities of mankind are the same in all generations, there must be some reason why this advancement is found in the nineteenth century instead of in the ninth or the tenth, or in any of those centuries which are mere barren wastes in the history of civilization. Certainly one reason is because there is some incentive in this era for the development of improvements in this sphere. It cannot be found in the necessities and desires of the race alone, for those have been always the same; and those who have ministered to their wants and necessities, with the means known to previous generations, have been the most strenuous opponents of the introduction of these new inventions.

It is not true, as argued by one of the most illustrious of the opponents of the patent laws in our time, that manufacturers will welcome and adopt an invention which seems to be called for by the necessities of their particular manufactures. This has never been the case where the profits of capital and labor have been disturbed by a new invention which created a revolution in a particular art or manufacture. "It may seem a paradox," says a distinguished author discussing "the rights and wrongs of inventors," "but it is no less true, that inventors' patrons are among their most inveterate opponents." The inventor of the machine for making paper, Fourdrinier, was driven out of France, and it took him ten years to introduce his machine into England in opposition to the methods of paper-making by hand. The inventor of the loom for weaving variegated patterns in fabrics, Jacquard, was in danger of his life from his co-laborers in Lyons; and the capitalists and artisans, whose money and labor were dependent upon the use of the old looms for their profits, fought for years against the introduction of the revolutionary invention. The conflict is still recognized in our tariff laws. In our own country we know of the opposition to the steamboats, the locomotives, the mowing and reaping machines, the sewing-machines, the revolutionary inventions in the manufacture of carpets, paper, iron, and steel. In no case does the capitalist welcome an invention which requires him to reconstruct or lay aside the machinery used in the manufacture from which he derives a profit; nor is it looked upon with favor by the laborers, nine out of ten of whom it threatens to throw out of employ.

The necessities of any art or manufacture do not prompt invention. The conservative tendencies both of capital and labor array themselves against it. The inventor is more frequently than otherwise disconnected with the trade or manufacture to which his invention applies and from which he seeks his reward. But the necessities of the public, the consumers of the product of the art and manufacture, all the time demand improvement and increased cheapness. The premium to inventors by the limited protection of the patent laws, is thus directly in the interest of the public. When it is said that an invention would have been made at some time if not at the time it was made, without the stimulus of the patent laws, who can tell at what time? When would any modern invention that might be named, the sewing-machine, for instance, have been produced if the inventors had not expected a profit upon it?

What invention can be named which this generation would willingly have parted with and consented to have postponed till the next century, by reason of the extravagant price we have paid for it under the patent laws, whose stimulus and protection have caused it to be made in our time? Would we then, part with the cotton-gin, the locomotive, the steamboat, the electric telegraph, the sewing-machine, the cast-iron plow, the reaper, the machines for gathering the hay crop, the planing machine, the improved steam-engine, the rotary printing press? I have mentioned only those inventions which are embodied in wood and metal. But for the small consideration which the inventors or those working the inventions have received, would we have parted in our time with vulcanized rubber and its thousand uses; with illuminating gas; with all the arts of dyeing and printing, which have extracted from waste weeds and the refuse of the gas factories, the colors which vie with the Tyrian purple; with the wonders of the lithographic and photographic arts; and with all those wonderful substances, with almost magic properties, which are the products of chemistry as applied to the arts? I challenge a reply from the most bigoted opponent of the patent laws.

These inventors have been questioning nature, and her kind responses have been a benefit to themselves as well as benefactions to mankind. But while the law has encouraged them, capital, from its conservative instincts, has always been opposed to them. Those who have invested their means in the machinery and apparatus which is well known, and in common use, in any particular branch of manufacture, do not like to be confronted with an inventor who can demonstrate that he can produce the articles manufactured in a better and cheaper manner, by a method which requires new investments of capital and makes the old apparatus comparatively worthless. The manufacturers of the old musket did not welcome the inventors who brought them the breech-loader and the magazine rifle, requiring new tools for their construction and consigning the old to the scrap heap.

Invested capital would never encourage or adopt new and revolutionary inventions. It would be a benefit to all now engaged in manufactures if no new improvement was made in their machinery for twenty years, or until it was worn out. They would be saved the cost of making the changes required by the new invention. There is an historical anecdote which illustrates perfectly the relative position of the capitalist who believes that he has assured possession of the art in which his capital is invested, and the inventor whose

invention would render those investments of little value. It is a remarkable incident in the history of the lost arts, preserved in the curious gossip of Petronius.

"A certain skillful workman used to make crystal vases as strong as vases of gold and silver. He produced an incomparable masterpiece. It was a chalice of astonishing beauty, which he thought worthy of Cæsar only, and which he felt a pride in offering to him. Tiberius highly praised the skill and the rich present of the artist. This man, wishing to increase still more the admiration of the prince, and secure his favors to a greater degree, begged of him to give back the vase. He then threw it with all his might on the marble pavement of the apartment; the hardest metal could never have resisted this terrible shock. Cæsar appeared moved, and was silent. The artist, with a triumphant smile, picked up the vase, which had only a slight dent, and which by striking it with the hammer was soon brought to its original state. This being done, no doubt remained in his mind that he had conquered the good graces of the Emperor and the esteem of an astonished court. Tiberius asked him if he was the only one who knew how to work crystal in so remarkable a manner. The workman immediately answered that no one possessed the secret. 'Very well,' said Cæsar, 'let his head be struck off without loss of time; for if this strange invention were known, gold and silver would very soon have not the least value.'

"Thus did the Emperor Tiberius encourage artists and the arts."

And in the same way do our manufacturing capitalists encourage inventions and inventors. They unconsciously imitate Tiberius, and although they cannot, like Cæsar, strike off the impertinent inventor's head, they too often have turned him off to starve. But under our patent laws, as they were established in 1836, the inventor, if he be prudent and thrifty, is assured of a certain compensation. Under the existing constitution of the Patent Office, its seal is evidence that its possessor is entitled *prima facie* to a new and useful invention. The number of persons skilled in the useful arts and the business to which they appertain, has largely increased. There are many skilled persons who can estimate with approximate correctness the value of every new invention. Under this American system of patents, in itself as great an invention as any that are protected by it, inventions have become commodities of marketable value. No inventor now needs to sacrifice his invention for subsistence. Some, perhaps, have anticipated the period of their greatest usefulness; but every genuine invention now has its value, a great portion of which can with ordinary care and prudence, be realized by the inventor.

Without this protection we should return to the era of "secrets," when every valuable discovery was carefully guarded by its possessor, or parted with only upon terms which required the purchaser to be equally silent and uncommunicative. The public obtained no useful knowledge of the art, and but a limited advantage from the working of the discovery. The evil consequences of that system were twofold. The knowledge of many valuable inventions and discoveries died with their possessors, and are now among the lost arts; on the other hand, empirical processes of fictitious value were imposed upon manufacturers under the guise of "secrets" in the arts, and the whole subject of invention and the character of inventors became discredited and debased. The injury to the progress of the useful arts by these pretended secrets has been greater a thousandfold than any that has arisen from the abuse of even the most imperfect system of patent laws.

Now every invention published through the Patent Office adds something to our knowledge, and, if useful, increases the material wealth of the world. And I do not hesitate to say that the sum of these values, the aggregate increase to the wealth of this country, from the inventive genius of the people fostered and protected by the patent laws, has been greater than that derived from all the protective tariffs passed since the Government was organized under the Constitution. A protective tariff deals only with the known elements of labor and skill; as with cottons produced in this country with the same machinery, labor, and skill as they are produced in England and France, and with iron as produced in Scotland or Wales. But invention takes a stride forward of the known mechanism and processes, and calls for a higher degree of skill. Who can estimate the effects of the invention of the cotton gin upon this country? Not its value in money merely, but its effects socially, morally, and politically? Consider the results from the leading inventions I have named, and see how small are the results from the manufacture of coarse cottons and pig iron when compared with the great interests these inventions have created in the country.

The most distinguished of the opponents of the patent laws has argued in favor "of putting an end to the notion that every person who invented anything had a right to a patent," and that "the giving of patents was a matter of grace and favor in well-selected and discriminated cases, in the exercise of a discretion, by an authority intrusted with that discretion;" and in his superlative wisdom he expressed the opinion that "at the period of progress in the history of the arts and trade at which they had arrived, they could do much better without these props. He called them props because they were meant to be so, but he believed that at present they were nothing but obstructions and hinderances to trade and the arts." This was said of the patent laws of Great Britain, where there is no preliminary examination and investigation into the rightfulness of the inventor's claim, but where any one can take a patent by paying the fees, if he claim to be either an inventor or the person who first introduced an invention into that country.

Our American system of patent law defies such narrow, carping, illiberal, and unjust criticism. It acknowledges and declares that the first and original inventor of anything new and useful has a vested right to its protection by a patent for a limited term, upon the compliance by the inventor with certain mild and prudent conditions. It provides for a discrimination which shall determine what the invention is, not as a matter of grace and favor, or in the exercise of an uncontrolled discretion, but as a matter of right as between the inventor and the public. It is not based upon the idea that invention has reached its highest flood, and must soon be subject to a returning ebb; or if the results of invention be likened to a structure, it does not consider that it is now complete and perfect, finished and furnished, and that the "props," which the patent laws were, may now be knocked away; nor does it consider that these laws are obstructions and hinderances to trade and the arts.

Under the beneficent provisions of these laws the results of the inventive genius of our people have developed, and are now being developed, in almost geometrical progression. Never at any time in the history of the world have so many and so valuable inventions been made known through the Patent Office. The inventors of all nations seek this country for the protection of its laws. Every invention thus acquired, as well as any now produced at home, is the planting of a new industry which needs no other protection from legislation, to grow and prosper, than that which is afforded by these laws. The rise of this inventive genius is not like that of the tide which must reach its limit and recede, but like the increase and swelling of a river, which will not diminish while its course, which is that of time itself, shall continue.

There is nothing of which this nation may be more justly proud than its progress in the industrial and useful arts. No greater and more beneficial results to mankind have been attained in the whole history of the race than have been accomplished within the last three quarters of a century and in this country. If we look back over the whole history of invention we are surprised to see how meager and barren it is, compared with what has been achieved almost within our time. The country acknowledges always this great glory which its citizens have acquired. The nation takes pride in the record of the results of that inventive genius which is preserved in one of the grandest temples ever dedicated to art and science by any nation or in any age; and it knows that great as is its renown in arms, in the spread of liberty, and in the success of free government, there is no brighter coronal that adorns the Republic than that which is enwreathed from the contributions of its inventors to science and the useful arts.

Enameling Metals.

Enamels, says "Byrne's Handbook for the Artisan," are metallic surfaces covered with a thin coating of glass of various colors, and which is sometimes partially transparent, but generally opaque. The enamel or glass is ground to powder, mixed with some vehicle, such as turpentine, or oil of spike, and spread on as a thick coating of paint, and when dried, the whole is heated just sufficiently to fuse the enamel and cause it to adhere to the metal.

The work is placed within a muffle, which is in many cases a miniature arched vault open at one end, placed in the midst of a small furnace, and surrounded by burning fuel, which keeps it at the red heat, although the fuel cannot possibly touch the work. In other cases the furnace is made of sheet-iron; it then measures externally about twenty inches long, twelve wide, and ten deep, and is mounted on wrought-iron legs that support it, so that the opening or door, which is at the one end, may be on the level with the eye of the artist, whilst from the opposite end proceeds the flue leading into a chimney. The whole apparatus bears some resemblance to a German stove; or rather, to a laundry stove considerably elevated; but the muffle, or a heated chamber corresponding therewith, is always provided for the reception of the work to be enameled, to protect the same from the flame and smoke of the fuel.

Many of the enameled works can hardly be said to be polished artificially, as the luster is produced simply by the process of fusion; thus the enameled faces of watches, when the ground has been fired, only require the figures to be added, as the vitreous surface is mostly smooth enough from the fusion without being polished; and, in less favorable cases, the work is only ground to a level but dull surface, and afterwards just raised to the melting point, so as to fuse the surface, and thereby give it the polish.

The backs of gold watches and numerous articles of jewelry, including mourning-rings, are so enameled as to show various devices or inscriptions in gold upon a ground or general surface of enamel, in this case the work is engraved, all the parts where the enamel is to appear being cut away by the graver, and the spaces are afterwards filled in with the pulverized enamel, which is burned in; and lastly, the whole is polished down to a uniform surface.

Formerly, nearly all the enameled works were polished by the lapidaries who used, first, the horizontal lead mill with fine emery for grinding; secondly, lead with rotten-stone and water; and thirdly, the leather lap or buff-wheel with putty powder. But the enamelers of the present day mostly polish their own work, and employ either an ordinary lathe with a mandrel, upon which the laps are screwed like chucks, the cylindrical edges of the laps being alone used, or they employ a polishing-lathe similar to those of cutlers and others.

The French enamelers commonly selected, instead of emery, a hard white pulverized porcelain, called white emery, which is manufactured at the manufactory of porcelain at Sèvres, and they afterwards polish with yellow tripoli; the first is applied on a lead or wooden wheel, and the latter on a buff

When enamels are polished by hand, the work is first roughed down with slips of Water of Ayr stone and water, used after the manner of a file; after which the different artists use slips of boxwood, mahogany, or metal, first with pumice-stone, and then with crocus, nearly as for gold.

The Currant Worm, and How to Circumvent Him.

A correspondent of the Essex county (N. Y.), *Republican* thus describes this destructive pest, and tells how to stop its ravages: "The species of worm that gives us the most trouble in this vicinity, is about ¾ of an inch in length, of a dark green color, and presenting a spotted or mottled appearance. The miller that deposits the eggs is about the size of the common bee miller, with broader wings, and of a dark brown color. They deposit their eggs about the 10th to the 15th of June, on the under side of the leaves, generally on the new suckers, and close to the ground. The eggs are white, and glued to the stem of the leaf in a row, the ends nearly touching—not only on the main stem, but also on the branch stems, there being sometimes one hundred on a single leaf. They hatch in three or four days, the young worm crawling from the stem to the thin part of the leaf, where it at once begins its work of devastation, being invariably blessed with a ravenous appetite. The first indication of their presence will be seen in the leaf in which they were hatched, being pierced with holes about the size of a pin head, each worm making a separate hole. They continue to gnaw round and round until the several holes meet, and the leaf is entirely consumed, when they all emigrate in a body to the leaf above, which soon disappears; and so on, leaving nothing but the withered stems behind them. After following up to the top of the sprout they started on, they then separate, and go off to different branches of the bush. They live about 25 or 30 days on the bush, when they fall to the ground, change to the chrysalis form, work themselves into the ground, and there remain until about the first of next June, when they reappear in the form of a perfect miller, to repeat the operation of the year before.

"My method of fighting these plagues is as follows:

"Keep close watch of the bushes after they are fully leaved out, examining very closely the lower leaves on the new shoots, and as soon as you see one that is perforated with small holes, pick it and drop it into an old pail, and so go carefully over all the bushes every other day, as long as the worms continue to hatch, which will be about 2 or 3 weeks, and burning the leaves plucked. Be sure and pick each time, going over the bush, every leaf gnawed by the worms. I have about 75 as fine bushes as you can see, while most of the current bushes in this vicinity are entirely destroyed. I have had to be vigilant and persevering, but I have conquered so far, which is some satisfaction, as well as the pleasure of having all the nice currants I want to use."

Hints to Wearers of Kid Gloves.

It is not generally known, even by those who wear kids almost exclusively, that the durability and set of these articles depend very much upon how they are put on the first time. Two pairs may be taken from one box, of exactly the same cut and quality, and by giving different treatment when first putting the hands into them, one pair will be made to fit much better, and to wear double or nearly that length of time longer than the other. When purchasing gloves people are usually in too much of a hurry; they carelessly put them on, and let them go in that way then, thinking to do the work more completely at another time. When this is the case a person is sure to meet with disappointment, for the glove is made to fit never after, and no amount of effort will make a satisfactory change. Never allow a stretcher to be used, for the gloves will not be likely to fit as well for it. All of the expansion should be made by the hands; if the kids are so small as to require the aid of a stretcher, they should not be purchased, as they prove too small for durability, comfort, or beauty. When selecting gloves, choose those with fingers to correspond with your own in length; take time to put them on, working in the fingers first, till ends meet ends; then put in the thumb and smooth them down until they are made to fit nicely. A glove that fits well will usually wear well, at least will wear better than one of the same kind that does not fit well. When the ends of the fingers do not come down right, or when they are so long as to form wrinkles upon the sides of the fingers, they will chafe out easily; where the stretcher has to be used to make the fingers large enough, the body part will be so small as to cramp the hand, so that it cannot be shut without bursting the seams of the kids. Some recommend putting new kids into a damp cloth before they are put on, and allowing them to remain until they are moistened. With this treatment they can be put on much easier than otherwise, and will fit very nicely until they get dry, but on second wearing there will be an unnatural harshness about them, wrinkling in spots, and they will not fit so perfectly as at first.

MANUFACTURES OF CINCINNATI.—The Secretary of the Cincinnati Board of Trade has prepared an exhaustive statement of facts and figures regarding Cincinnati manufactures of all branches. He shows the total value of the products manufactured for the year ending March last, to be one hundred and four millions, six hundred and fifty-seven thousand, six hundred and twelve dollars, being one hundred and twenty-three per cent increase since 1860. The value of iron manufactured was seventeen millions; food, sixteen millions; clothing and liquors, each about eleven millions; number of establishments, three thousand and eighty-four; number of hands employed, fifty-five thousand two hundred and seventy-five; cash capital invested, forty-nine millions, eight hundred and twenty-four thousand, one hundred and twenty-four

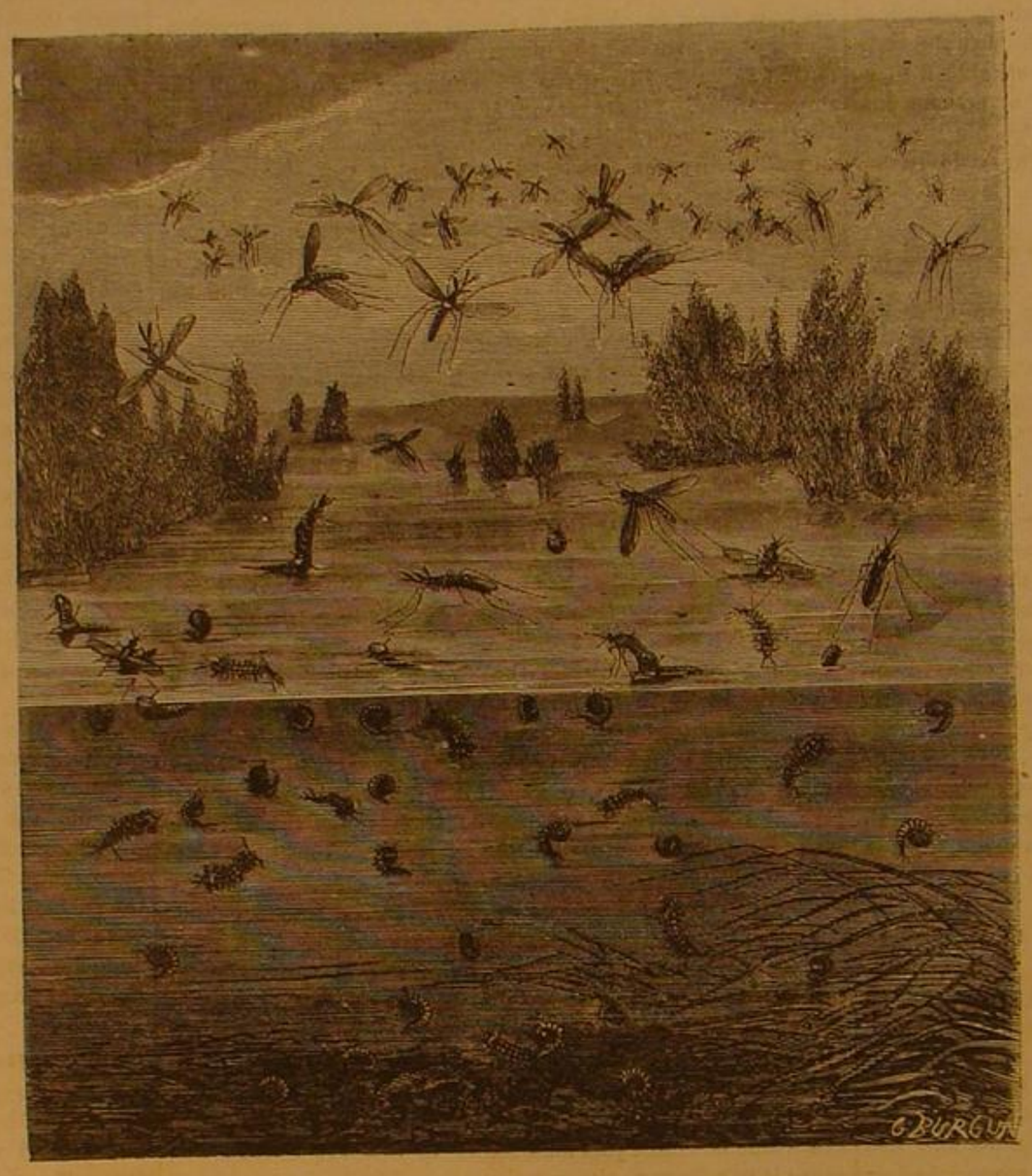
MOSQUITOES.

[By Edward C. H. Day, of the School of Mines, Columbia College.]

The natural history of insects is a subject full of interest, in many ways, to the thinking man, but in none more so, perhaps, to persons accustomed to notice only the growth of the higher animals, than in the history of their development. The earliest rudiments of the embryo chick sketch out a likeness of the future bird; but the creature first hatched from the insect egg, seldom bears any resemblance to the perfect parent form. Were it not such a familiar occurrence, who would dream that the gay butterfly came from the grub-like caterpillar, or that the delicate fly was but a metamorphosed grub? Who among us have sufficiently reflected on the superhuman philosophy that interposes the deathlike torpidity of the chrysalis state, between the two active periods of this wonderful life-history? We learn how apt people are to overlook even the most obvious truths, if in any way contrary to preconceived prejudices, from the fact, that the history of the meat fly was not written until the middle of the 17th century, when an Italian doctor demonstrated that maggots were the offspring of such flies and not the results of spontaneous generation.

The metamorphoses or transformations of insects may be complete, as in the cases above cited; or more partial, as in that of the grasshopper, in which the larval and the pupal forms resemble the perfect insect externally in every thing, except in the imperfect development of the wings. Between these extremes, in the amount of the transformation there is in the different kinds of insects every degree of variation; but in all cases, the first, or larval stage, is the period of growth; the pupal, chrysalis, or nymph stage is generally one of more or less suspended animation; while the perfect condition, or that of the insect, commonly so termed, is always the period of reproduction. The perfect insect never increases in size; such as it leaves its chrysalis, such it remains; little flies do not grow to large ones, popular opinion to the contrary notwithstanding. Their function is to provide for the continuance of the species; they alone are sexual, and their existence is devoted to developing, fecundating, and laying their eggs, and in some instances, to providing food for the future wants of their offspring. We only know of a few very exceptional instances in which the larvæ of insects have the power of reproducing larval forms like themselves.

Our engraving represents a lively scene—the transformations of our summer pest, the mosquito.



METAMORPHOSES OF THE MOSQUITO

All our readers have probably watched the little active worm-like beings, that in the summer are to be seen in every open rain-water tub, now resting still at the bottom, now jerking themselves from place to place, now hanging head downwards from the surface, and now again jerking themselves into the depths. These are the playful infants of the blood-thirsty savage; or, in other words, the larval form of the mosquito, the guise in which it appears when first hatched from the egg. Their approach to the surface of their ocean is like that of the whale, for respiration; but the similitude begins and ends here; for our liliputian leviathan breathes through a tube at almost the hinder extremity of his body, instead of through his mouth. Mingling among the suspended larvæ, near the surface, we see sundry little objects curled head and tail together. Touch one of these and it reveals a grotesque being, with a body resembling a monstrously developed head and an attenuated hind-body or abdomen, terminated by a pair of little fins, by means of which it propels itself along with a motion as comical as its form.

This is the pupa stage of our future foe; corresponding to the chrysalis stage of the silkworm. It floats, when undisturbed, back upwards at the surface, no longer breathing through the tail-like tube, but now through two openings on the back of the head-like body. By and bye, when all within is ready for the final transformation scene, its skin will split along the back and be converted into a fragile skiff, suited to the tiniest of fairies, and lo! then appears within it, a creature worthy of so frail a craft; a delicate, transparent fly, with filmy wings and the slenderest of limbs; a creature decidedly to be admired for its beauty, but, if of the female sex, to be as decidedly dreaded for her habits. For, be it known, it is the female mosquito that is our foe; the males are by no means such monsters in miniature; but are of a retiring disposition, not given to frequenting courts and camps, but content to lead a joyous inoffensive life "beneath the greenwood tree." They may be recognized by their beautifully feathered antennæ or feelers—those of the female being plain. The first moments of the perfect mosquito, until it gains the use of its emancipated wings, are ones of imminent peril; should its frail vessel be shipwrecked by an unpropitious breeze, its occupant helplessly cast upon the waves, may either be drowned or fall a victim to some larger tyrant of the watery realm. Unfortunate as would be such a fate for the mosquito, the human observer would probably quote the proverb concerning "an ill wind," etc. But once safe on the wing, the mosquito is now ready to receive the attentions of her admirers, and to pay her attentions to mankind during the intervals; and she will soon deposit on the surface of a stagnant pool a batch of eggs, to give rise in about a month to a host of offspring as vicious as herself. We have noticed in New York City, a few first representatives of the tribe, that have survived the winter in damp cellars and basements, appearing about the beginning of May. In the middle of June a second and larger supply appears; but finally, towards the end of July, the real reign of terror commences. We have no doubt but that these are the successional generations multiplying beyond all calculation.

Did space allow it, there would be much more to be said regarding the mosquito; but we can add but one remark. We are frequently asked, Of what use to man is the mosquito in the economy of nature? A French writer suggests in reply, that could our most villainous parasites discuss the question, they would probably decide that it was man who was created to supply them with blood. But he adds less sarcastically, these are subjects beyond the depth of our feeble intelligence; it is prudent not to endeavor to fathom them.

Mechanical Properties of Ice.

Wm. Mathews contributes to *Nature* an interesting experiment, of which the following is a condensed account:

A plank of ice 6 inches in width and $2\frac{3}{8}$ inches in thickness was sawn from the frozen surface of a pond, and supported at each end by bearers exactly six feet apart. From the moment it was placed in position it began to sink, and continued to do so until it touched the surface over which it was supported, drawing the bearers with it, so as to make their upper ends converge. At its lowest point it appeared bent at a sharp angle, and it was rigid in its altered form. The total deflection was 7 inches, which had been effected in about as many hours under the influence of a thaw, during which the plank diminished slightly in width and thickness. On observing the under surface of the plank near the point of flexure, I noticed a number of very minute fissures extending a short distance into the ice, but they certainly were not sufficient to account for the flexure of the plank.

The question at once suggested itself, was the change of form in the ice plank due to fracture and regelation? I did not think it was, but the experiment was not decisive. Some weeks afterwards an opportunity occurred of trying it under other conditions. During the last frost we cut out another ice plank. Its length was 6 feet $9\frac{1}{2}$ inches, its width varied from $6\frac{1}{4}$ to $6\frac{1}{2}$ inches, and its thickness was $1\frac{7}{8}$ inches. Two large bricks, of a width exceeding that of the plank, were set up on end, on a horizontal surface, exactly six feet apart, and the plank was laid upon them at 5 P.M. on the 12th of February. At 3·15 P.M. on the 13th it was continuously curved from end to end, so that it only rested on the edges of the bearers, and the middle point of its upper surface was deflected $1\frac{1}{4}$ inches below the line joining its two extremities. The temperature was 26° Fah. The curved plank was perfectly rigid, as was proved by taking it off the bearers and inverting it. I examined it again on two subsequent days with the following results

Feb. 14th, 9·30 A.M. Temp. 29·5° Fah.

	Inches.
Deflection of upper surface below chord	2⅜
" of lower surface below its original horizontal position	2¼

Feb. 15th, 9·30 A.M. Temp. 30° Fah.

Deflection of upper surface below chord	2⅜
" of lower surface below its original horizontal position	2¼

During the whole of this interval, in which the temperature never rose above the freezing point, there was no indication of fracture in the plank, nor did the optical continuity of the ice suffer the slightest interruption. On the 15th it began to thaw, and the bearers having become frozen to the ground, and the plank to the bearers, the suspended portion was unable to yield to the strain produced by its gravitation; and when I re-visited the plank on the afternoon of the 15th, it was broken into half-a-dozen pieces.

These experiments were very rough and imperfect; we intend to renew them on some future occasion, and to conduct them with much greater care and proper mechanical appliances, when we hope to be able to bend an ice plank double, without destroying its continuity.

The following conclusions may fairly be drawn from them:

1. A mass of ice may change its form under strains produced by the gravitation of its particles, without becoming fractured, and without returning to its original form when the strain ceases.

2. The change of form takes place at temperatures both below and above the freezing point, but is greatly accelerated in the latter case.

If we conceive an ice plank, instead of being placed horizontally between bearers, to be laid with its narrowest face upon a plane of small inclination, with its upper edge horizontal, and its ends confined between vertical walls converging in the direction of motion, with its under surface deliquescent, so that friction would almost be annihilated; and if we further imagine the diminution of gravity due to resolution along the plane to be compensated by increasing the length or diminishing the thickness of the plank, the plank would alter its form in a way presenting a striking resemblance to the actual movement of a glacier. Its central portions would move more rapidly than its lateral ones; its surface more rapidly than its base; and when the strain upon its particles exceeded their cohesive power, it would fracture obliquely to the axis of the channel.

If the conclusions drawn from the experiments above described are legitimate, plasticity must be admitted by the side of sliding, and fracture and regelation as one of the constituent elements of the theory of glacier motion, and a more important place in that theory must be assigned to the views of the late Principal Forbes than has for some years been conceded to them.

Nickel Plating.

The following is the substance of the patent granted to Dr. Isaac Adams, March 22, 1870. The process is said to be very successful:

This improvement consists in the use of three new solutions from which to deposit nickel, by the electric current: First, a solution formed of the double sulphate of nickel and alumina, or the sulphate of nickel dissolved in a solution of soda, potash, or ammonia alum, the three different varieties of commercial alum; second, a solution formed of the double sulphate of nickel and potash; third, a solution formed of the double sulphate of nickel and magnesia, with or without an excess of ammonia.

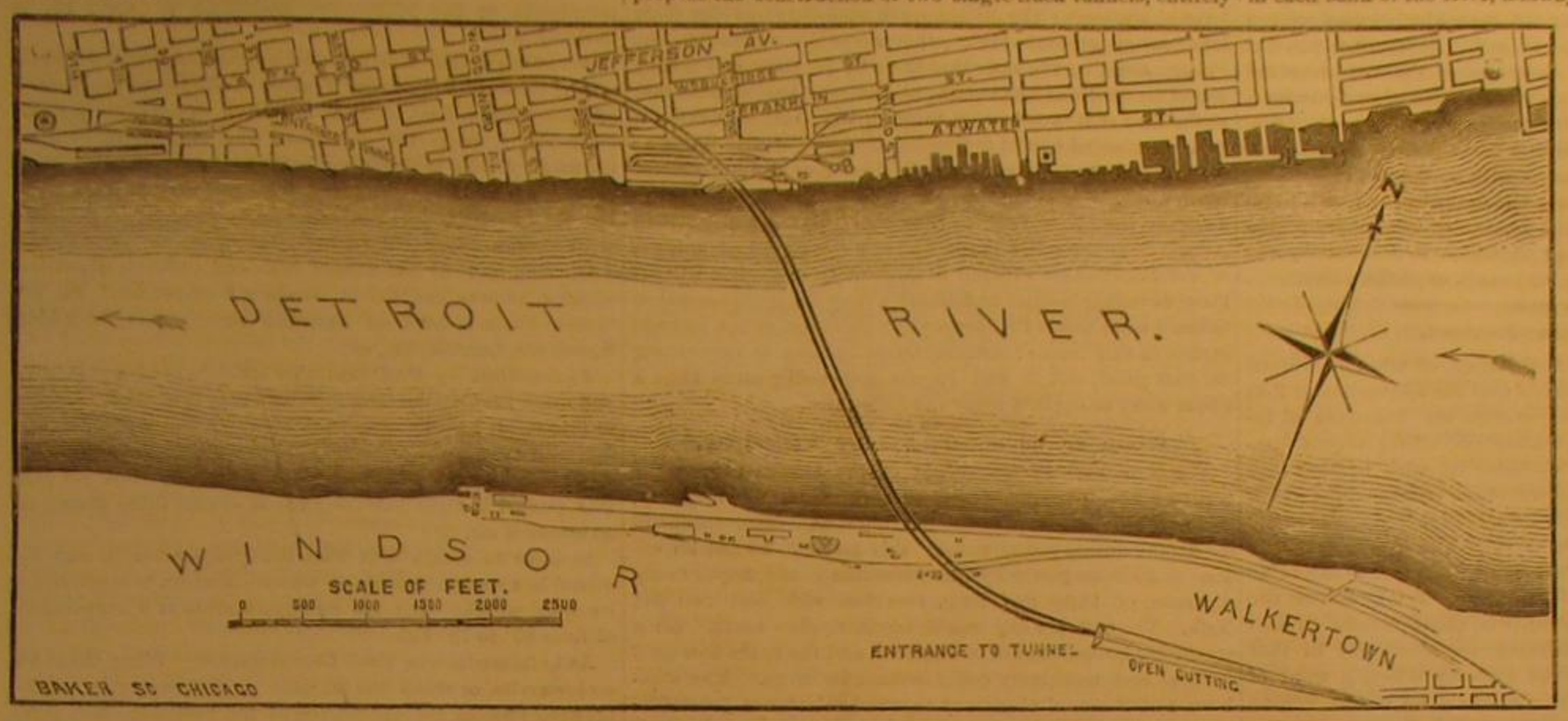
I have found that a good coating of nickel can be deposited by the battery process from the solutions hereinbefore mentioned, provided they are prepared and used in such a manner as to be free from any acid or alkaline reaction.

When these solutions are used, great care must be taken, lest by the use of too high battery power, or from the introduction of some foreign matters, the solution becomes acid or alkaline. I prefer to use these solutions at a temperature above 100° Fah., but do not limit my invention to the use of these solutions at that temperature. I therefore claim—1. The electro deposition of nickel by means of a solution of the double sulphate of nickel and alumina, prepared and used in such a manner as to be free from the presence of ammonia, potash, soda, lime, or nitric acid, or from any acid or alkaline reaction. 2. The electro deposition of nickel by means of a solution of the double sulphate of nickel and potash, prepared and used in such a manner as to be free from the presence of ammonia, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction. 3. The electro deposition of nickel by means of a solution of the double sulphate of nickel and magnesia, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction

PAST, PRESENT, AND FUTURE.—You cannot overstate our debt to the past; but the moment has the supreme claim The past is for us; but the sole terms on which it can become ours are its subordination to the present. Only an inventor knows how to borrow, and every man is or should be an inventor. We must not tamper with the organic motion of the soul. 'Tis certain that thought has its own proper motion, and the hints which flash from it, the words overheard at unawares by the free mind, are trustworthy and fertile when obeyed, and not perverted to low and selfish account. This vast memory is only raw material. The divine gift is ever the instant life which receives and uses and creates, and can well bury the old in the omnipotency with which nature decomposes all her harvest for recomposition.—*Ralph Waldo Emerson.*

PROPOSED TUNNELS UNDER THE DETROIT RIVER.

We are indebted to the Chicago *Railroad Gazette* for the following engravings of the proposed tunnels under the Detroit River, to connect the Michigan Central Railway, at Detroit, with the Great Western Railway of Canada. The plans, estimates and surveys are by Mr. E. S. Chesbrough, well known as the engineer of the Chicago Lake Tunnel and Water Works.



PLAN OF THE DETROIT RIVER TUNNELS.

It must be borne in mind that the Detroit river is in reality a strait, connecting three of the greatest lakes in the world with others nearer the seaboard, and that through this strait all the commerce between the East and the West must pass; a commerce which is now enormous in extent, is increasing rapidly, and must increase for many years to come, as the yet unoccupied territories, large enough for nations, are settled and become productive.

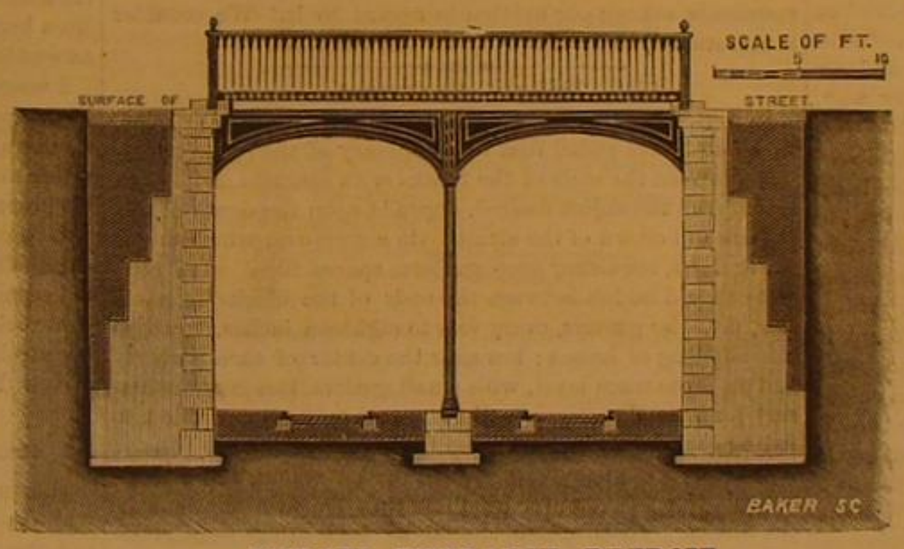
At the present time cars are transferred between the Michigan Central and the Great Western by ferry boats. But the business of these roads is increasing so rapidly, and the extension of the system of roads in the West, which find their outlet over these lines, is so great, that it has become of the first importance to reduce the time and uncertainty of transit to the minimum.

The preliminary surveys and borings in the river bed, made to the full depth of the tunnel, discovered the path across the river, shown in the accompanying map, which passes the entire distance through stiff blue clay, a soil of the most favorable character for works of this kind. Occasional pockets of sand and gravel, so common in the drift formation of this section, were found, and these may produce temporary hindrances, but only such as are readily surmounted by the modern appliances of tunnel construction.

The proposed line (including approaches) may be said to begin at the station of the Michigan Central Railroad, in Detroit, and will be on the surface to First street. Between First and Cass streets there will be an open cutting, but by a favorable grade of the street, the line will get under cover at Cass street, and for a short distance will be under a girder covering.

The rising grade of the street and the descending grade of the tunnel make it practicable to commence arching at a distance of forty-seven feet, which will first be an open cutting; then a double-track tunnel or covered way will be built. At a distance of ninety-two feet from the Detroit portal the circular form of tunnel will begin. From that point there will be two single-track tunnels extending to the portal on the Canada side, from which an open cutting will extend for about half a mile and thence the track will run on the surface for about one third of a mile to the junction with the Great Western Railway, two miles distant from the Windsor Station.

The length of the tunnels from the Detroit to the Canada portal will be each 8,568 feet. The engineer has been led to propose the construction of two single-track tunnels, entirely separate, instead of one larger one sufficient to accommodate a double track, because by this plan the total amount of excavation will be considerably reduced, the liability to accident in regular traffic will be greatly lessened, and also by the important consideration that in the event of accident or any obstruction occurring in one tunnel, the other will still be ready for use, and the passage of trains be not even temporarily prevented.



TUNNEL ENTRANCE, DETROIT.

SIZE AND ARRANGEMENT OF TUNNELS.

The tunnels will be cylindrical in form, and will run parallel, fifty feet apart. The interior diameter of each is eighteen feet six inches. The shell of brick masonry will be two feet thick in all that part of the line under the bed of the river, but at each bank this will be reduced to one foot six inches.

The grade is one in fifty on each side of the river, with 1,000 feet of level line under the bed of the river.

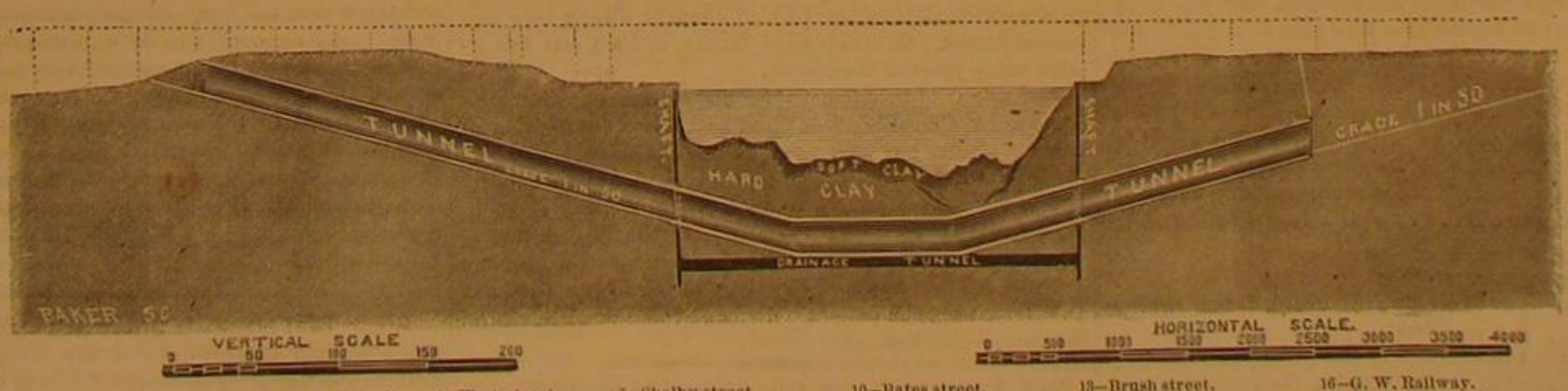
In addition to the main tunnels, a small drainage tunnel, with an interior diameter of five feet will be built, extending across the river considerably below the main lines and midway between them. This will be first constructed in order to drain the main tunnels while the work progresses as well as afterward, and also to develop fully the character of the soil at the commencement of the work.

A working shaft, ten feet in interior diameter, will be sunk in each bank of the river, midway between the main tunnels, and connected with them by lateral drifts, each with an interior diameter of nine feet, as shown in the accompanying sketch. The engineer estimates that without sinking any working shafts in the river, the work can be completed within two years, allowing a margin for extra precaution where the water is deepest.

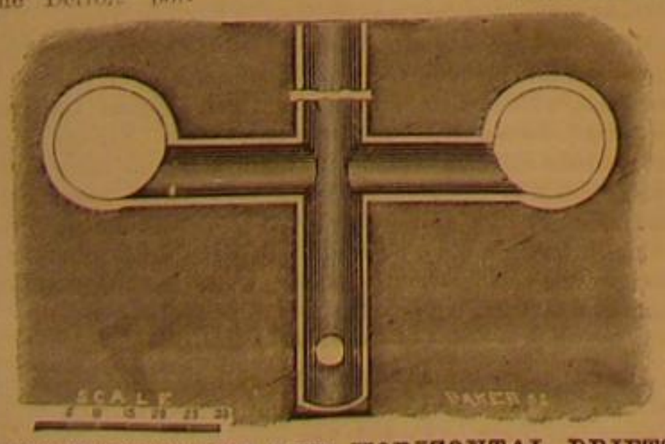
The estimates for excavation and masonry are as follows:

	Cubic yards.
Excavation in open cutting	299,000
Excavation in tunnels	233,000
Brick masonry (exclusive of drainage tunnel)	68,000
Stone masonry	3,700

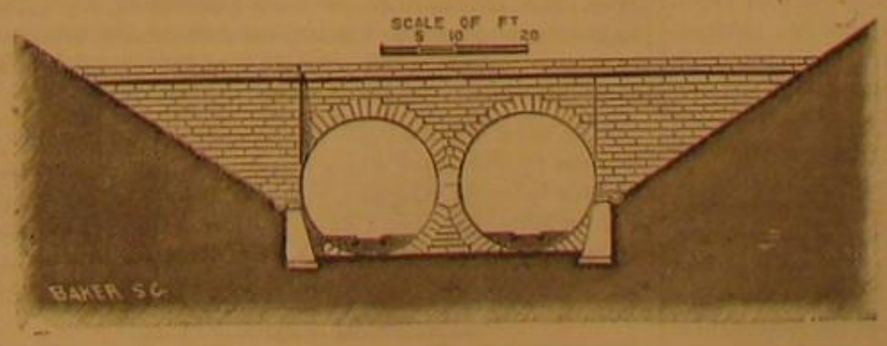
The estimates for the entire cost of the tunnels and approaches, including a permanent double track, with steel rails, right of way, etc., amount to $2,650,000. The capital proposed for the work is $3,000 000 The work, when completed, will be a monument to the enterprise of the builders and the genius of the engineer, and one of the greatest accomplishments of modern engineering science.



SECTIONAL ELEVATION—DETROIT RIVER TUNNEL—1 1-3 MILES LONG.



WORKING SHAFT AND HORIZONTAL DRIFTS



DETROIT RIVER TUNNELS—ENTRANCE NEAR WINDSOR.

Architectural Ruins in Greenland.

At the recent session of the National Academy of Sciences in Washington, Dr. Hayes, the Arctic explorer, read an interesting paper on the Northmen of Greenland. The speaker first gave an interesting description of the ancient ruined chapel of Krakotck, in Greenland—which he visited last summer and photographed, standing on the banks of the fiord, where Erric and his followers founded their first colony in 986. The walls were composed of rough unhewn stones, and were four and a half feet thick. The doors and several windows are still perfect, and the window over the chancel has a perfect Norman arch. The church was fifty-three by twenty-eight feet, surrounded completely by a wall forming a church yard, in one corner of which was the almonry, and near by the bishop's house. Ruins of other buildings were found in the vicinity, reaching along the south bank of the fiord toward the interior to the early settlements of Garda and Brattolid. At this latter place there is a church ruin, in the form of a cross, which was probably the cathedral, where, as is known from the old Icelandic records, seventeen successive bishops administered the ordinances of the Church of Rome, the first being appointed in 1117, and the last in 1406. The ancient population of this region was about seven thousand, composed of Norwegians, Danes, and Icelanders, who had fled from oppression and tyranny.

Their conversion to Christianity dates back to King Olaf, about 1001, in which year Lief, son of Erick, in sailing westward in search of adventures, discovered America, which he called Vineland, sailing south as far as the latitude of Boston. The destruction of the Northmen in Greenland occurred in the early part of the fifteenth century, and from a combination of causes; their trade in beef and fish with Norway was suddenly cut off by war, the "black death" which desolated Europe probably reached them, they were set upon by hordes of Esquimaux, and another cause was a physical one—a steady reduction of temperature and increased severity of climate. Of this there are many evidences, as early records make little mention of ice as a disturbing cause in the seas, while at present the coast is almost inaccessible from this cause. This accumulation of ice is largely from the sea, but mainly from the land, and is in the navigation of

creasing year by year. From these causes the Northmen became extinct. The nearest inhabitants to the pole at present are a few wandering and fast dwindling families along the north shore of Baffin's Bay, extending to latitude 78, and these in a few years will become extinct.

Upon the conclusion of the reading, Professor Henry said that the subject of Arctic explorations was now before Congress, and there were strong probabilities of an appropriation for further investigations into the mysteries of the regions surrounding the North Pole. If, as Dr. Hayes stated in his paper, climatic changes have taken place there, it devolved upon scientific men to find data for the cause of such changes. If we adopt the theory that the earth was once a body of fire, as the sun now is, and that it had gradually cooled and hardened, then, arguing upon this hypothesis, it was evident that the germ of life had been formed at the poles, and, as a natural consequence, it would first become extinct there. This was, perhaps, the only manner by which to account for the gradual depopulation of the land north of Baffin's Bay.

Aero-Steam Engines.

The advocates, says the *Engineering*, of what is known here as the Warsop system claim that the application of that system to a boiler and engine prevents the formation of incrustation, does away with priming, and effects a considerable economy of fuel. Now we have no wish to deny that under certain circumstances results have been obtained which appear to warrant the above claims, *in those particular cases;* but what we object to is, that these results should be made the foundation of totally fallacious arguments as to the value of the "aero-steam" system of working. It may be that the injection of heated air into a boiler is, under certain circumstances, a good way of promoting the circulation in that boiler and thus preventing the evils by which a want of proper circulation is attended; but it by no means follows from this that the injection of air is the best way of producing circulation under all circumstances. On the contrary, until we have clear evidence afforded to us that the injection of air so far improves the economic evaporation of, not a bad, but a thoroughly good boiler, as to more than repay the cost of forcing in that air, we shall regard the system merely as a means of counteracting faults of construction which should not have any existence.

As with the boiler so with the engines. Non-condensing engines having unjacketed cylinders, supplied with steam at from 40 lb. to 50 lb. per square inch, and worked with but little expansion, have in certain cases showed more economical results when worked with a mixture of steam and air than when worked with steam alone in the ordinary way. But we submit that such engines—although we regret to say that large numbers of them exist—are not fair examples of steam machinery, and that the credit to be derived from beating them in economy is but very small. Given an engine consuming say 8 lb. or 10 lb. of coal per indicated horse power per hour, and the difficulty of making such alterations as will produce a more economical result is not great. If the aero-steam engine is to take a high position in the future, it must do far more than this; it must be proved to be more economical both as regards fuel and maintenance than steam engines of thoroughly good construction, such as are turned out by our leading makers; and at present we have but small hope that any such proof will be forthcoming. In making this assertion, we have no wish to discourage Mr. Warsop, Mr. Parker, or others, who, like them, are experimenting on the use of steam and air in combination; but what we desire to point out is, that that they would save themselves much useless present labor and expense, and future disappointment, if, instead of contenting themselves with beating indifferent steam engines, they would ascertain carefully and without prejudice just what their respective systems can or can not effect under the best conditions under which they can be applied. Engineers well know that for a certain sum of money a steam engine can be constructed to develop a certain power with a certain consumption of fuel. Let it be proved that by the adoption of the "aero-steam" system there can be constructed for the same sum an engine developing a greater power with the same consumption of fuel, or the same power with a less consumption of fuel, and without any increased cost for maintenance, and the value of mixed steam and air engines will be established.

The American Society of Engineers and the Darien Canal.

At one of the latest meetings of the American Society of Engineers, a report from a committee on the route was read. This, says the *World*, excepting an introduction which is overloaded with superabundant patriotism and eloquent "hifalutin," is an intelligent discussion of the claims of the Darien "through cut" canal and the Tehuantepec lock canal. It is open to the criticism that it does not give full information as to the advantages which the Darien route possesses, but prefers to mention all its disadvantages, while in the case of the Tehuantepec few disadvantages and all the advantages are given. These are the points which the report makes against the Darien route:

The canal there cannot be a "through cut," nor one without locks, owing to the heavy tides; the difficulty of construction is at once increased by the terrible climate; the rains of that intertropical locality render dams and locks out of the question (but if this is established, together with the former point showing their need, the whole discussion is terminated); the expense will be out of all proportion to the return, being a maximum of $225,000,000; there are no harbors at either side of the isthmus, nor any means of getting coal or wood (neither were there at Suez); there are no telegraph lines to Panama (but there will be soon); as the isthmus is out of the direct line of trade, the United States would have great difficulty in defending it or protecting its neutrality (but hardly greater than other nations would have in endangering or attacking it). The advantages of the Tehuantepec route are, that it lies wholly within the Republic of Mexico; that, although one hundred and fifty-six miles long, there are lagoons on the Pacific side and a river on the Atlantic, which reduces the canal proper to fifty miles in length; that in the Cordilleras of the center the hills are not numerous and the table lands are of moderate hight; that there is a "pass" on the Pacific slope to the sea; that the cost in time and money would be one-third less than in crossing the Darien line; that as the road to it must pass through the Gulf of Mexico, it can be defended by the defense of the two gates to that sea; that there are safe harbors at each side; that an immense distance would be saved in the journey from New York, equal to a voyage from New York to Liverpool (this is a really strong point); that the soil, climate, and other material advantages of Tehuantepec are superior to those of Darien. But will all these advantages—and undoubtedly they are great—counterbalance what seems the insuperable objection of the lockage system in ship canals? Admiral Davis' opinion is very strong on that point, and it will require something more than a smart sneer to explain away the difficulties.

Steam to be Superseded by Electricity.

The New York correspondent of the Boston *Journal* describes a new invention for displacing steam by electricity, and says that lathes, pianing machines, and other mechanical arrangements are driven by this power. To run an engine of 20-horse power by this invention would require only a space of three feet long, two feet wide, and two feet high. The cost per day would be thirty-five cents. On a steamship no coal would be required, and the space now used for coal and machinery could be used for cargo. The stubborn resistance of electricity to mechanical use heretofore has, it is believed, been overcome. A continuous battery has been secured and other difficulties removed, principally through the coil of the magnet. If the invention works as well on a large scale as it does on the machinery to which it is now applied, steamships will soon ply the ocean under the new propelling power. A machine of great capacity is being constructed, and will soon be on exhibition in New York. The whole thing, mighty enough to carry a Cunarder to Liverpool, can be secured in a small trunk.

[The above paragraph has been sent to us by several correspondents, asking our opinion in regard to it. We consider it sensational, and not worthy serious attention.

Ballard Pavement.

In describing this improvement in our issue of April 23d, we should have added that the frequency of the space necessary between the ends of the blocks with concrete filling, to accomplish the object desired, depends upon the depth of the gutters and crown of the street. On streets over which much water flows, requiring deep gutters, spaces filled with concrete should be left between the ends of the blocks in each row, near the gutters, every foot to eighteen inches, to avoid side slipping of horses; but near the center of such streets, and on those more level, with small gutters, this is not necessary for horses' protection. Such spaces only every six to ten feet in each row, filled with the well rammed concrete filling, will firmly wedge and strengthen the pavement, and also as effectually prevent water from entering between the ends of the blocks. These spaces should be from three fourths to one inch wide; and the wedge-shaped space, for the reception of the wedge-shaped or key filling from curb to curb, should not exceed one inch in width at the top, for which the proper bevel to the blocks should be given.

Death of an Eminent Chemist.

F. T. Otto, Professor of Chemistry at the Polytechnic School of Brunswick, died on the 13th of January, after a long and painful illness. He was born in Saxony, in 1809, and had resided many years in Brunswick.

Professor Otto was famous for his edition of "Graham's Elements of Chemistry." At first he made a translation of Graham's book, but with each edition introduced so many changes that the last edition may be regarded as an entirely new work. There are few books so useful to the student in the laboratory as Otto's Chemistry, in the last edition of which he was assisted by Buff, Kopp, Zamminer, Kolbe, and Fehling, the best lights of chemistry in Germany. Otto also published books on poisons, on vinegar, and on agricultural industry, which arehighly prized.

The Vertical Multiplier.—Since the publication on page 251, current volume, of Professor Fithian's interesting paper on the "Vertical Multiplier," we have received a deluge of letters, criticising the propositions contained in that paper. Not having room for their publication, we have at the request of Professor Fithian, referred them to him, as he is anxious to obtain a full expression of the opinions of scientific men concerning his theories.

Wire-Rope Tramways.—It appears that the method of transport by wire-ropes which was tried on an experimental line near Leicester, England, last year, has made considerable progress since that time. Thirteen lines, varying from short distances to four miles in length, have been constructed, and upwards of 100 miles are in course of preparation or under contract.

Entomology.—We propose, during the season, to publish a series of finely illustrated articles upon the metamorphoses of insect life, written expressly for the Scientific American, by E. C. H. Day, of the School of Mines, Columbia College. We think they will prove not only instructive, but very interesting to all classes of our readers.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Solid Extract of Malt.

Messrs. Editors:—Allow me to state that the solid extract of malt, or "solid beer," as it is termed by the pretended inventor of the preparation of which you have given a description in the Scientific American of April 23, is nothing new.

According to the "Lehrbuch der rationellen Praxis der landwirth: Gewerbe" (Practical Treatise of the Industries Founded upon Agriculture), by Prof. F. J. Otto, Braunschweig, 1860-1862, vol. I. page 197, a hopped wort evaporated to solid consistency, was, at that time, brought into commerce by a certain Mr. Rietsch, in Moravia. This preparation was termed by Mr. Rietsch, perhaps not quite properly "getreidestein"—corn-stone, "bierstein"—beer-stone, or "zëilithoid."

In using more or less roasted malt and different quantities of hops, he was enabled to obtain a "beer-stone" for the various kinds of beer, as Bavarian beer, porter, bock-bier, Scotch ale, Lambik, etc., etc.

As described by Prof. Otto, this article was of a yellow or yellowish brown color, and so brittle that it could be broken to pieces. It held five per cent of water, but was nevertheless well conservable. Exposed to the air it became moist, soft and sticky, for which reason the extract, when yet hot, was poured in tight barrels or boxes, so that there should be no access of air.

In order to obtain beer from this preparation, it was dissolved in a certain amount of water—from six to seven times its own weight—and set in fermentation at a temperature of from 65° to 72° Fah.

As to its usefulness, Prof. Otto remarks: "When there are no breweries, or when the climate is not favorable to the brewing process, the application of the beer-stone may serve a good purpose. It ought, however, not to be disregarded, that carefully-brewed lager beer, or porter and ale, can more easily be conserved in hot climates, than it is possible to conduct their fermentation and to take care of young beer. It is very desirable that in this case, as in many others, exaggerated praise should not bring this article into discredit, as it may be useful under certain circumstances. When there are breweries, beer will perhaps never be brewed from beer-stone; it may be said to be best adapted for porter and similar kinds of beer, but Bavarian beer prepared in this place from beer-stone could not at all be compared with such beer as was brewed in the ordinary way."

I would also add that Dr. Vander Weyde, of New York, improved on this plan, and patented a few years ago a process attaining effervescence by the addition of carbonic acid water to the solid or liquid extract of malt. According to his process, different drinks are prepared in the same way as soda water is by different sirups; but in place of the sweetening sirups, concentrated extracts of lager, ale, porter, etc., are added in the quantity of a spoonful to the glass of carbonic acid water, and in this way a very agreeable although not alcoholic drink is obtained. Adolph Ott.

New York city.

A Singular Phenomenon---Explanation Wanted.

Messrs. Editors:—Mr. Andrew Palmer, of this place, while using a circular saw having a screw with a plain bearing, the full size of the mandrel (or shaft), run up against one end to prevent play; and while the saw was running at its usual speed, applied kereosene to the point or bearing for the purpose of lubricating it, when the ends of the mandrel and screw adhered firmly to each other, of course stopping the mandrel, while the belt by which it had been driven continued to play over the pulley. Upon removing the mandrel and screw from the frame for the purpose of separating them, it was found impossible to do so, except by the use of the cold chisel, and they were cut into very near, but not exactly at the joint. After refitting, the experiment was repeated with substantially the same results. If you deem the matter of sufficient general interest, I hope an explanation of the phenomenon from you or some of your correspondents, and more particularly what the kerosene had to do with its occurrence.

Northville, N. Y. S. Bingham.

Good Tunneling.—A great underground work is the Ernst August Gallery—one of five belonging to a metal mine in the Hartz. The mouth of it is at Gittelda, in Brunswick. It is 10 ft. high, 6¼ ft. wide, and has a fall three-fifths of an inch in a yard. Like a railway tunnel (but it is twice the length of the longest), it was begun simultaneously at various different points, and finished in thirteen years. The gallery is 6¾ miles in direct length; but if its lateral branches are taken into account, and a subterranean gallery, navigable for boats, which opens into it, the Ernst August Galleries are said to be not less than fifteen miles long. All the junctions of the different sections fit accurately into each other, the precision of the results having been partly insured by the aid of a magnet, weighing 200 lbs., which influenced the compass through the solid rock 65 ft. deep, and which was kept in one of the working-places, while the compass was held in the other.

Relief Line Engravings.—We call attention to the advertisement of Jewett and Chandler, which appears in its appropriate place. This firm has executed the fine diagrams that have accompanied the Annual Reports of the Commissioner of Patents, and are now prepared to undertake orders from other parties.

Flying Hotels.

It seemed a few years ago, when Mr. Pullman came out with his "palace" sleeping cars as if the climax of comfort for travelers had been reached, and certainly seems so now since the arrival to-day from the Pullman Pacific Company's Car Works of the new Portable Hotel "Algoma," one of a set of four which that Co. has just completed under the direction of George M. Pullman, President of the Co., for the accommodation of excursion travel. These portable hotels owe their existence to the great success of the "Hotel Express" system, which has been in use on the Pacific railroads for the last six months, and of which they are really an elaboration and extension. They differ from the "Hotel Express" cars in that they are even more elegant than these; that they are intended for special excursions to the Pacific, not for regular travel, and that they ply on any road between the Atlantic and Pacific.

The portable hotels are made, finished, and furnished in the most elegant manner possible, and contain state rooms, private drawing rooms, general parlor, kitchen, etc., furnished with all the essential comforts of a home. Their dimensions are fifty-five feet long by ten feet wide, which is the same as the smallest size of Pullman Palace Cars. They are calculated to accommodate from twenty to twenty-five guests. They are mounted upon twelve wheels, painted externally in wine color and gilt, as the other Pullman cars, and cost, with their outfit of plate, etc., $22,000 each.

The *modus operandi* of the portable hotel system is something like this: A party of twenty—say at Boston, for a Boston party has already chartered the "Riverside," one of the four, for a trip to the Pacific—secures a portable hotel at eighty-five dollars a day for the trip. This is about four dollars a passenger, the same rate which the single traveler now pays for a seat in a drawing room car by day, and a berth by night. With the car (or hotel, as you please) they get a steward, cook, and two waiters, pay for whose services is included in the rate above mentioned. They purvey for themselves, the steward acting as their business agent in the procuring of extra supplies, transportation, etc., along the route. It is estimated that a party can live sumptuously for about two dollars each, under this arrangement. They attach their "hotel" to the best trains of whatever road they intend to travel, and detach it whenever they arrive at a city, a point, or a junction where they desire to switch off for any purpose. For instance, arriving at Ogden, and wishing, of course, to investigate the mysteries of Brigham Young's harem, their hotel is switched upon the Utah Central Railroad, and in a jiffy they are in Salt Lake City. Having "done" that quaint capital of the Mormon Zion, they proceed to join the express train on the main line, serving in the same way such of the mining districts or points of mountain scenery as they may wish to see more thoroughly. Wherever they go—through mountain fastnesses, over alkaline deserts, or where not—they have their home with them. The pleasures of home and travel have never been combined in this wonderful way before. We have no doubt of the perfect success of the enterprise, and cannot help a little self-felicitation, just now, upon the fact that this paper was the first journal to approve and press before the public Mr. Pullman's scheme of dining cars, as initiated in the "Delmonico," some two years since. Though there are special reasons why this system should succeed preeminently in the Pacific Railroad travel, we do not by any means believe that it will long be confined to that route.—*Chicago Evening Post.*

Machines for Preparing Rhea Grass.

A short time since there appeared in our columns an advertisement from the Government of India offering a reward of £5,000 for the production of the best machine for the extraction of fibers from the Rhea grass and preparing it for market. The conditions upon which this prize was offered will doubtless be remembered by all interested in the subject, and we need not, therefore, refer to them again on the present occasion. The great drawback which has hitherto prevented the utilization of this grass has undoubtedly been the difficulty of extracting the fiber, the manual process being so expensive as almost to amount to a prohibition of fiber manufacture being carried on. *Engineering* states in its last issue that during the last twenty years or so, a number of machines have been brought out for extracting fiber, but none of these have been considered entirely satisfactory. Up to the present time the common mode of extracting the fiber from such plants as the aloe, is by soaking the leaves in water till the vascular matter has become rotten, and then beating off this decayed matter from the fiber with a wooden mallet, or scraping it off with a blunt knife. This process is not only a slow and nasty one, but is attended with much waste of fiber; it also discolors, and what is most important of all, weakens the fiber. At the London Exhibition of 1862, two American gentlemen named Sandford and Mallory exhibited a machine for extracting fiber from aloe, plantain, or pine-apple leaves. This machine has been used in America, but would scarcely be found either sufficiently simple or cheap for the ryots of India, its cost being about £45. What is wanted is a cheap machine of simple construction, by which the fiber can be easily extracted; and we think it only due to those of our readers who have contemplated entering the competitive list for the above-mentioned prize to state that a machine, possessing, so far as our present information goes, all the necessary requirements, has already been invented in India by Mr. Donald Cruikshank, representative of the Telegraph Construction and Maintenance Company. No preparation of the leaves is required for this machine; they are taken to it green, just as they are cut from the bushes, and in the wonderfully short space of two minutes the fiber in the leaves is brought out stripped of vascular matter, and in admirable condition. The rotting process not being necessary with this machine, the deteriorations in color, as well as in the strength and fineness of the fiber, which follow upon the adoption of that process, are avoided. A correspondent of an Indian cotemporary asserts that the samples from Mr. Cruickshank's machine were "fine, delicate, and even; not one was cut or broken; and the material would readily fetch £50 a tun in the home market." Assuming that the efficiency and simplicity of the machine is equal to anything that is likely to be set up in competition with it for the offered prize, we very much doubt whether it is likely to be surpassed in point of cheapness. It is so easily worked, we are informed, that any native may be taught to use it in an hour's time, and its construction is so simple that it can be sold at 10 rupees (£1 sterling).

Making Soap.

Every farmer's wife, says the *Ohio Farmer*, is proud of a barrel of soap, but some are so unfortunate as to seldom get one. They try hard enough, but the ashes are sometimes poor, or the right proportions of lye and grease are not used; at other times the soap appears to be good when put up, but changes entirely after standing a few days. The last trouble usually arises from getting the soap too strong and diluting with water. If very strong it will be thin and dark, and by adding cold water and thoroughly stirring, the color is changed many shades lighter, and the mass thickened, giving it the appearance of a number one article, when in reality it is very poor.

Hickory ashes are the best for soap making, but those from sound beech, maple, or almost any kind of hard wood, save oak, will answer well. A common barrel set upon an inclined platform, makes a very good leach, but I much prefer one made of boards set in a trough in V shape, for the strength of the ashes is better obtained, and it may be taken to pieces when not in use and laid up.

First, in the bottom of the leach put a few sticks; over them spread a piece of carpet or woolen cloth, which is much better than straw; put on a few inches of ashes, and from four to eight quarts of lime; fill with ashes, moistened, and tamp down well—tamp the firmest in the center. It is difficult to obtain the full strength of ashes in a barrel without removing them after a day's leaching, and mixing them up and replacing. The top should be first thrown off, and new ashes added to make up the proper quantity. Use boiling water for second leaching.

Take about four gallons of lye, and boil up thoroughly with this twelve pounds of clear grease, then add the lye as it is obtained, keeping a slow fire, and stirring often, until you have a barrel of soap. After boiling the grease and four gallons of lye together, it may be put in a barrel and the lye added there, which will form good soap if frequently stirred, but the heating process is the best when weather and time will permit the work to be done.

The Carilloneur.

In Belgium, "the classic land of bells," the carillon is a national institution. A carillon consists of an octave or more of bells, capable of playing tunes with variations of all sorts, either by machinery alone, or by a professional man called a *carilloneur*, who plays upon a keyboard connected by wires with the bells. Every town in Belgium has its carillon and carilloneur.

At the appointed time the carilloneur, very lightly clothed, with his fists carefully protected with thick leathern gloves, and the sleeves turned up to the elbows, takes his seat at the keyboard. After smiting a few of the pegs, by way of prelude, he begins the performance. His fists and feet soon deal with his colossal instrument after a wonderful fashion. He begins by a simple air with a simple accompaniment, putting down a deep pedal bell here and there, which resounds through several bars, while an air is being played on the smaller treble bells. Attentive listeners all over the town are eagerly waiting for the first variation; and as the variations succeed each other, the skill of the performer is more and more severely tried. No one who has not seen and heard carillon music would believe the complicated passages that can be performed on this unwieldy instrument.

The talent and the taste for carillons is a little dying out, even in Belgium; but in the last century, when music was less easily obtained by the people, this essentially popular form, this music for the million, was carried to an extraordinary degree of perfection.

The music of Van den Gheyn is still extant in manuscript at Louvain. A few exquisite fragments have been printed and published by the Chevalier van Elewyck, and can be played upon the pianoforte or organ with considerable effect. There are, however, few carilloneurs now living capable of playing this music upon the bells. The effect must indeed have been exceedingly grand; for, in every sense of the word, this bell music is good music. It resembles the finest inspirations of Bach and Handel, and is written in the style of their occasional preludes for the organ and *suites* for the harpsichord. But Van den Gheyn never loses sight of the bells, and everything is written with a peculiar insight into the sound-producing qualities of the carillon. The extreme resonance of bells is always considered. The passages are so constructed as never to run into discord, while the great bells are introduced with the same grand and massive effect which Bach so often displays in his pedal passages.

The New Metals Caesium and Rubidium.

Caesium was first discovered in the residues from the evaporation of 80,000 lbs. of the Durkheim spring water—afterwards Pisani found it as a mineral, called pollux, to the extent of 34 per cent.

Recent researches have not added very materially to our list of minerals, but our knowledge of the properties and uses of caesium has considerably increased. There appears to be large quantities of caesium in the deposits of the famous Stassfurt mine, chiefly associated with carnallite; it has also been found in the salt brine of other mines, and in the minerals triphyline, lepidolite, and petalite. The lithia, mica of Hebron, Maine, was found to contain 0·3 per cent caesia and 0·24 per cent rubidia.

There is no doubt that the trap from which is made the Belgian pavement, would be found to contain traces of the rare metals, as they have been generally traced in basaltic rocks. One interesting fact in reference to these two alkalies has been noted, and that is, while rubidia, the same as potash, is taken up by plants, caesia, like soda, is usually rejected—it would appear as though rubidia and potash, and caesia and soda, were the pairs that resembled each other the most closely. Caesium is the most electro-positive of all the metals, and oxidizes so rapidly that Bunsen has not been able to give a full description of its properties. It is difficult to predict what may be the practical uses of these rare elements, but as nothing is created in rain, it is not likely that they will prove exceptions.

Sky Railways.

There are now several short lines of this singular overhead tramway at work, and others in course of construction in England. One, opened last year, is at Messrs. Ellis and Everard's granite quarry in Leicestershire. It is only three miles long, but it very well illustrates the kind of service which the system is fitted to render. It conveys granite from the quarry to the nearest railway station. The arrangement, when seen from a distance, has a good deal the appearance of an electric telegraph; but the posts are higher and stouter, and the wire rope is much thicker than the single wires of a telegraph. A portable steam engine, such as is used by well-to-do farmers for agricultural purposes, drives or rather draws the rope at a speed of about five miles an hour. The boxes hold a hundred weight of stone each, and follow one another merrily along the rope. The full boxes travel along one length or line of the rope; the empty boxes return along the other length; and all of them deftly keep clear of the supporting post, in virtue of the peculiar and ingenious mode of suspension. And so the loads travel on from Bardon Hill Quarry to the nearest railway station. the quarry owners used to employ a large number of horses, vehicles, and men to manage the transport; but now the Wire Tramway Company, who are working Mr. Hodgson's system, do the labor at the rate of thirty thousand tuns of stone per annum. The supporting posts are a hundred and fifty feet apart, except one bold span of six hundred feet across a difficult bit of country. The wire rope is only half an inch thick, and yet it will bear upwards of a hundred laden boxes hanging to it at once, all at different stages of advance between the starting point and the terminus.

Destructive Insects of Foreign Origin.

The *American Entomologist* calls attention to the fact that European insects and weeds are naturalized in America with far more facility than ours are naturalized there, and even crowd out the insects indigenous to us. Thus we have a native currant worm very much like that imported twelve years ago from Europe; but it has never done any damage, while already the latter has in some places almost put a stop to the cultivation of the currant. Our onion fly does scarce any hurt; while the imported fly, which is closely allied, does great damage. It is just the same with the imported bark louse of the apple-tree and the meal-worm beetle. Among other pests of European origin are the Hessian fly, introduced 90 years ago; wheat midge, 40 years ago, the bee moth, cheese maggot, grain weevil, housefly, cockroach, and carpet and clothes moths; and, among weeds, Canada thistle, mayweed, oxeye daisy, burdock, smart weed, shepherd's purse, buttercups, purslane, and chess. In fact, the weeds that a gardener has to contend against are nearly all European. On the other hand, scarcely an American noxious plant or insect has been successfully introduced into Europe, except that the minute ant which infests houses is found in England, and our common water weed, Anacharis Canadensis, is trouling the streams there.

Vegetable versus Mineral Remedies.

Vegetable nature, says *Good Health*, is very rich in what it contributes to physic. And here the observation is worthy of remark, that the most deadly poisons known to the physician are products of the vegetable kingdom. This is altogether opposed to a common belief. When some quack doctor wishes to parade the innocence of his nostrum, he generally takes good care to let the public know that his physic is wholly vegetable.

Just calling to mind strychnia, the active principle of nux vomica; aconitine, or aconite, the active principle of of monkshood; morphia, one of the active principles of opium—the reader will understand that the vegetable kingdom is not of necessity so very innocent. Constructively, too, prussic acid may be called a vegetable poison, seeing that it exists in bitter almonds and laurel water, although it is not from the vegetable kingdom that this acid is usually prepared.

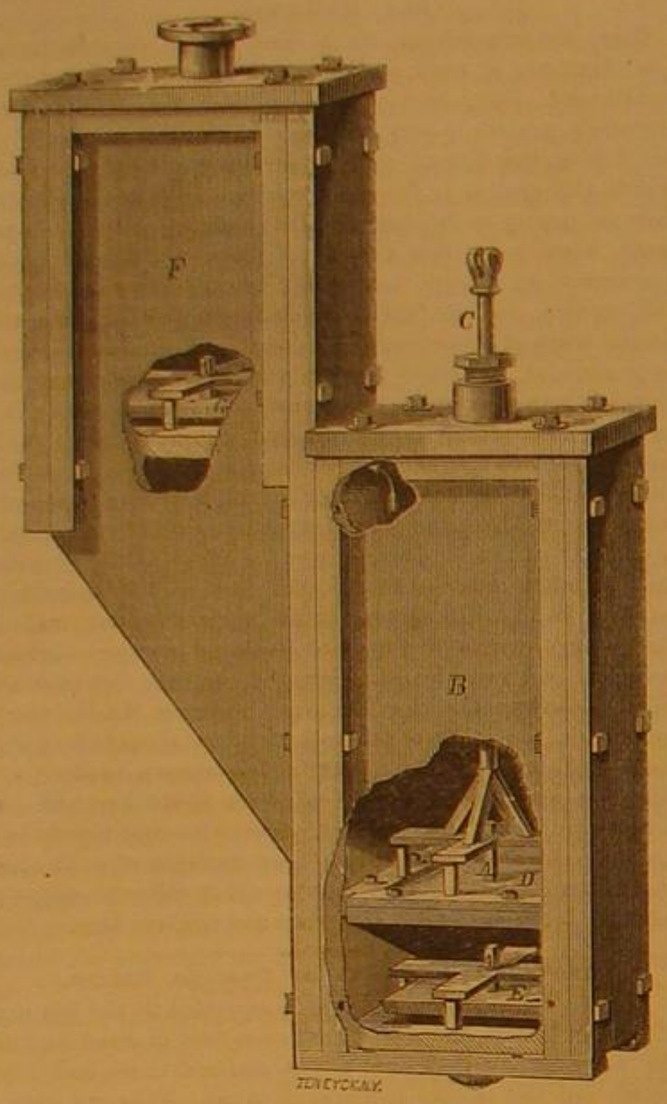
DEEP SEA LIFE AND TAXATION.—Says Mr. Lowe, in a recent speech on the Budget, in the English Parliament. "I will state what I believe to be the true principle of taxation, and will illustrate it by what is in Dr. Carpenter's recent voyage in the Arctic Ocean. He states that they found the frailest and smallest animals living and flourishing at the bottom of the sea under a pressure of three tuns to the square inch. How did they contrive to live? Because the pressure was equalized. And that is the whole secret of taxation."

PATRICK'S IMPROVED PUMP.

Various and numerous as are the devices for raising water, included in the category of pumps, every year brings forth something new in this field. We herewith illustrate a pump recently patented, of simple construction, and for which the inventor claims superior advantages.

Its construction will be readily understood, as the essential point claimed in the invention is the construction of the valves. The valves are puppet valves, of a square form, and play within a guiding frame, as shown, each valve being made tapering to fit its seat, and having a central stem, A, which acts as a guide to its motion. The valves have a small square cut out of each corner, which fit over rectangular vertical bars, attached to the inner side of the barrel of the pump. On the top of each valve and the piston are screwed strips which fit against the sides of the barrel, which may be set outward when desired to take up wear, and keep the valves tight.

B is the lower chamber, from which descends a pipe to the water below. C is the pump-rod, actuated from above by a hand lever, or by other motive power.



When C is raised it carries with it the valve and piston, D, creating a more or less perfect vacuum, which the water rises to fill through the valve, E. When the motion is reversed, the valve, E, closes, and prevents the return of the water which has risen into the chamber, B, and the valve, D, opens to allow the transfer of the water from the under to the upper side of the piston. As the piston rises it now forces the water into the upper chamber, F, where it is held by the valve, G. Successive movements of the plunger thus raise and deliver the water to any required hight, the pump being a combined atmospheric and lifting pump; and the hight of the lower chamber above the water being no more than that to which atmospheric pressure will elevate a water column.

Patented Sept. 7, 1869, by Joel Patrick, Ridge Spring, N. C., whom address for further information.

Phenomena of Storms.

Among the papers read before the National Academy of Sciences at its recent session, was one by Professor Wm. L. Nicholson on "Some of the phenomena attending the great tornado thunder storm in Iowa, Illinois, and Michigan, June 3, 1860." The Professor, during the course of his reading, gave a detailed account of the manner in which the storm-clouds were formed, and the immense destruction which followed in the course of the tornado. The total number of miles traversed by the storm-cloud was 560, across the States above named; the cloud being in the shape of a cone or spout, which in many instances reached the earth, and tore up large quantities of black prairie mud, which it seemed to incorporate with itself, as on every occasion in which the column reached the earth it assumed a darker hue. When the spout reached the Iowa river, the spray was seen to come out of its apex, making a picture even more impressive than Niagara Falls. The evidences of the amazing power of the wind were innumerable. In one instance a joist was driven directly through a tree. At the time of the passing of the spout an odor of sulphur was noticed by many persons, and one of the most curious of the phenomena attending the storm was that many fowls were entirely stripped of their feathers, while the fowls themselves remained uninjured.

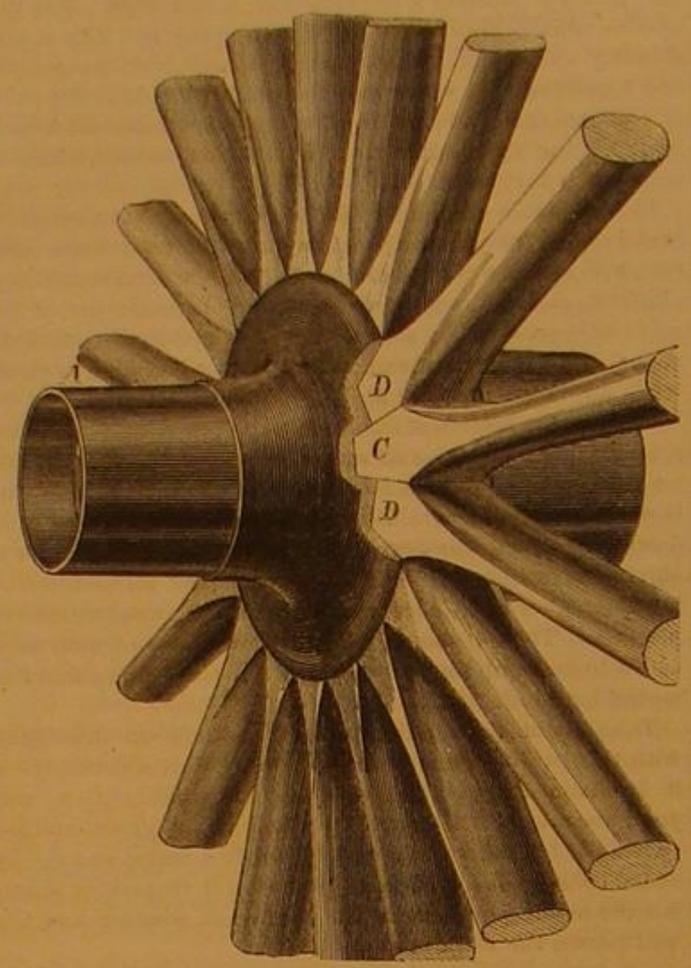
Professor Henry said that the paper was a very valuable contribution, as these storms, in our country, were more frequent than anywhere else, and that scientific men had been censured for not observing them more closely. The cause of these storms or spouts had not as yet been definitely determined. They might be caused from electricity, or they might be a disturbance in the equilibrium of the upper and lower strata of the air, which at times became surcharged with vapor, thereby causing the spouts and the spiral motion assumed thereby.

KEYES' IMPROVED WAGON WHEEL.

We have examined with much interest the invention of which we give engravings herewith, as it is one of those practical and widely applicable devices, which embody many meritorious features in a simple form, and one which, in our opinion, is well worthy the consideration of those interested in the manufacture of all kinds of vehicles for common highways.

Fig. 1 is a perspective view of the central portion of one of these improved wheels, with a portion of one of the iron flanges of the hub broken away to show the way in which the spokes are inserted; and Fig. 2 is a section of the same, revealing the entire construction of the hub, and the manner of inserting and fastening the spokes.

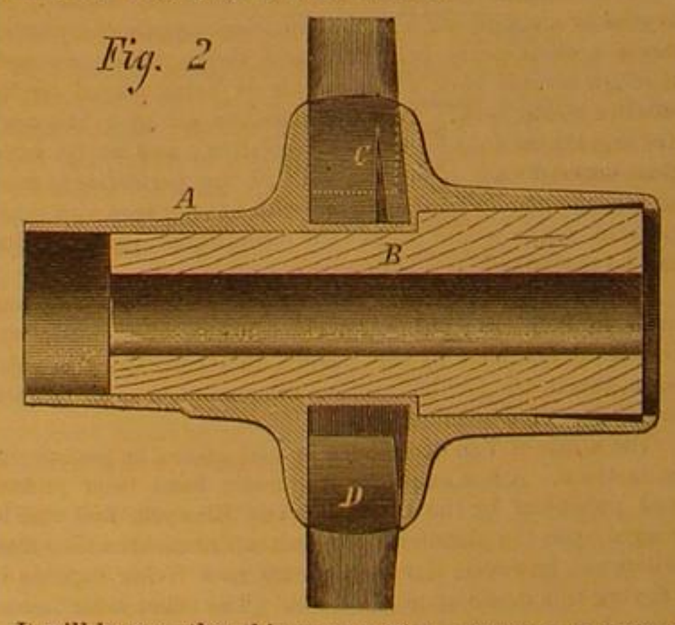
Fig. 1



A, Figs. 1 and 2, is an external hub of malleable cast iron, lined with an internal hub of wood, B, Fig. 2. The inner and larger portion of the external hub, A, is recessed, as shown, and a shoulder to correspond is made upon the internal wood hub, the inner end of the wood hub being made somewhat smaller than the recess in A, as shown.

The internal wooden hub receives the axle box, which is first driven into the wood hub, B, as tightly as possible, and when the axle box is driven in and wedged, the wood hub is forced outward so that it enters and fills every part of the recess, and the shoulders of the recess prevent its moving or working loose. Previous to driving in the axle box, the wooden hub, B, is also fastened to the iron at the bottom of the spokes subsequently to be inserted.

Fig. 2



It will be seen that this construction secures a compound iron and wood hub of great strength, and combines the advantages of both materials as used for the hubs of wheels.

The external iron hub has two very stout flanges which laterally support the tenons of the spokes when the latter are driven, as shown in both engravings; each alternate spoke, C, being wedged, as shown in Fig. 2, and the others, D, Figs. 1 and 2, being shorter, and resting upon ledges of iron which rise between the extremities of the longer spokes, and serve to greatly strengthen the central part of the hub.

The axle box may be driven and retained in the hub with much greater force than in a plain wooden hub with iron bands, and the parts of the whole structure mutually sustain each other under strain. The hubs may be used for new wheels, when the other parts of the wheel are worn out.

These are much cheaper than wooden hubs of the ordinary construction. They are lighter in appearance, and may be silver plated or otherwise decorated to suit taste, and correspond with the character of the vehicle to which they are attached.

It appears to us that they possess greater strength than any hub we have met with, and we doubt not their merits will be apparent to all practical wheelwrights.

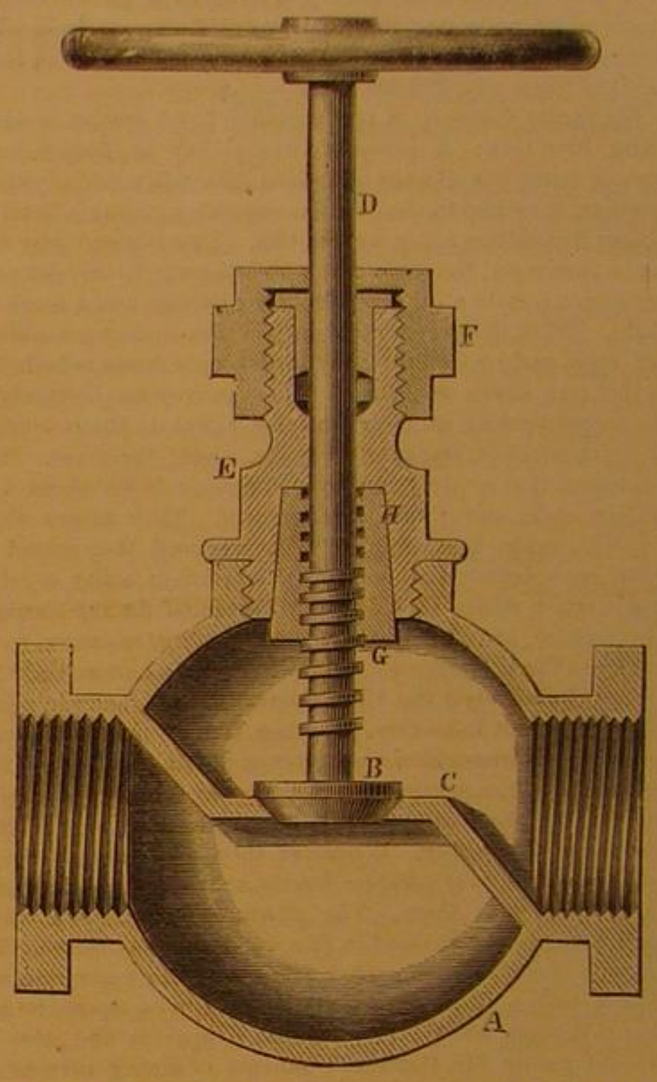
These wheels are manufactured by Thompson & Keyes, of Terre Haute, Ind., and a license to manufacture will be granted to one or two responsible wheel manufacturers in the Eastern States.

REISINGER'S IMPROVED GLOBE VALVE.

The object of this device is to furnish a means whereby a globe valve may be ground to its seat without removing any of its parts, or without removing the pressure from it, and at any time it is desirable to do so; thus obviating the inconveniences attending this process in the common form of globe valves.

The device is simple, ingenious, and, in our opinion, well calculated to secure the ooject for which it is designed.

We give a sectional view of this valve, in which A is the globe or shell, B the valve, D the valve stem, E the stem box, which screws into the shell, as shown; F is the stuffing box, and G is a cone nut, made to tightly fit a conical cavity, H, in



the stem box, in which position it remains stationary when the stem is turned in opening or closing the valve, and the operation is the same as in ordinary globe valves.

When the conical nut, G, is tightly drawn up into the cavity, H, by the valve stem, it retains its position and acts as a nut for the stem for any required period of time.

When the valve leaks from the effect of wear, so as to require grinding, it is raised from its seat, when a tap with a hammer on the end of the valve stem will loosen the nut, G, from the cavity, H. The valve can now be rotated and ground to fit; the nut, G, no longer being held by the friction of its surface upon the walls of the cavity, H.

When the valve is ground tight, the hand wheel is forcibly drawn upward, and causes the nut, G, to engage again with the walls of the cavity, H, when the valve will operate in all respects as at first described.

Thus the valve may be ground at any time, whether under pressure or not, and kept constantly tight without inconvenience.

Patented, Jan. 4, 1870, through the Scientific American Patent Agency, by George W. Reisinger. Address the patentee, or W. O. Hickok, Harrisburgh, Pa., for further information.

ANOTHER illustration of the rapidity of telegraphic communication with India was recently afforded in London. At twenty-five minutes past eleven at night a summary of Mr. Lowe's Budget was forwarded to Bombay by the British Indian Submarine Telegraph Company. The dispatch thus transmitted appeared in the Bombay papers published the next morning. At the office of the Indo-European Telegraph Company experiments took place in the presence of several members of the Indian Council, which gave some interesting results. Communications were sent to Teheran, in Persia, a distance of 3,700 miles, and answers were received in thirty seconds. The time in Teheran was 3·27 P.M., and in London 11·59 A.M. At 12·45 P.M. a message was forwarded from London to Calcutta. This reached its destination in twenty-eight minutes, the time at Calcutta being seven minutes past seven in the evening. The service of the Indo-European Telegraph Company is in connection with the cables of the Government of India through the Persian Gulf.

THE Sandwich Islanders, after having killed Captain Cook and eaten his body, are about erecting a monument to the memory of that great navigator.

THE number of working-women in Paris is computed at 300,000. Thirty cents a day is the average pay they receive

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NEW YORK, SATURDAY, MAY 7, 1870.

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Special Notice to Advertisers.

The circulation of the SCIENTIFIC AMERICAN has become so large that we are compelled to put it to press one day earlier in the week. Advertisements must be handed in before Friday noon, to insure their publication in the issue of the succeeding week.

DRYING LUMBER.

The thorough drying of lumber is one of the most important points in making a durable structure of wood for indoor or outdoor use; and without doubt for most species of timber it is best accomplished, all things considered, by piling it in such a way that currents of air may freely pass through the interstices, and covering it so that rains may not wet it.

There are, however, many species of timber, among which may be mentioned the wood of some of our American elms, which season very slowly by the natural drying process, and many kinds of timber may be dried much quicker by artificial means.

It should be borne in mind that the natural moisture or sap of the wood is a solution of various substances in water, and that it is inclosed in minute capillary cells and tubes which strongly attract and hold it, when in immediate contact with it, but exert this attraction only at an insensible distance, so that when the fluid they contain is removed they will not, by virtue of their structure, re-absorb moisture, unless again brought in contact with it.

Most woods are, however, more or less hygroscopic, and shrink or swell with the dry or moist condition of the atmosphere. It follows from this that no wood unprotected by paint or varnish can long remain much dryer than the condition of the atmosphere around it admits.

But the sensible moisture of the air decreases, all other things being equal, as its temperature increases, and substances having affinity for moisture will absorb or retain much less moisture from the atmosphere at elevated temperatures. The common drying houses, where artificial heat is used, work upon this principle, and are, for the most part, very satisfactory in their operation, as they can be made of any extent, and large quantities of material may be seasoned by their use.

Small quantities of timber may, however, be quickly and thoroughly seasoned by steaming. The philosophy of this process—which, if properly performed, does not injure the strength or durability of the timber—is very simple. A very large percentage of the sap in all kinds of wood is water. This water, heated to boiling, expands sixteen hundred and fifty times. It follows that if wood be heated to 212°, the boiling point of water, the capillary cells can contain only one sixteen hundred and fiftieth as much water as at ordinary temperatures, the expanded water escaping as steam. The proportion of moisture left in the wood is, after steaming, less than that demanded by its ordinary hygroscopic condition. At least we have found it so for certain species of hickory and white ash, which increased in weight after being removed from the steamer and their surfaces had become dry.

The steaming should be done gradually—that is, time should be given for the wood to gradually rise in temperature, and so that the sap may escape gradually from the cells without rupturing them by its expansive force when converting them into steam.

A cylinder, made of galvanized iron, with riveted and soldered joints, makes a cheap and good steamer. The steam should be generated in a suitable boiler and allowed to escape at two or three pounds pressure, which, as we have said, should be gradually reached in proportion to the size of the pieces which it is desired to season. The wood should be heated throughout its mass to 212°, and remain so for a little time. It may be then put aside for use, and will be found fit to work in from one to three days, according to its bulk.

A steamer may also be made of wood, with caulked joints, which will answer the purpose very well. Such steamers have long been employed in steaming wood for bending in carriage making, etc., and most carriage shops are already provided with such an apparatus.

Should any of our correspondents know of any better way to season timber quicker than the one we have described, we shall be glad to hear from them.

EXPERIMENTAL MACHINERY.

In proportion to his lack of scientific knowledge, the inventor has to test by experiment not only the entire product of his inventive genius, but the various elements of his device. Even the most scientific find more or less experiment necessary in perfecting any novel and complicated mechanical combination; and one of the chief elements of expense in carrying out to a successful conclusion any fruitful idea, is the cost of preliminary experiments.

But experiments are valueless unless correct inferences are derived from them, and it is by no means a just inference that because a device works well in a small experimental model, it will perform equally well when made of full working size.

In saying this we do not aim at instructing the scientific, who need no such instruction; but there are many inventors, and useful inventors too, who might save themselves much anxiety, disappointment, and expense, by recognizing the fact that the strength of working parts only increases as the squares of their dimensions, while their weight increases as the cubes of their dimensions; and that the momenta of moving parts vary as the cube of their dimensions multiplied into their velocities, all other things being equal.

It follows from these facts that a machine which works perfectly on a small scale, may, when increased to the proper size for actual service, break its own back or dash itself and the hopes of its originator into one common ruin.

To illustrate these facts let us suppose a beam capable of supporting its own weight when resting upon the ends, without sensible deflection. Increase all its dimensions twenty times, and its strength will be increased four hundred times, but its weight will be increased eight thousand times. Increase all its dimensions one hundred times, and while its strength will be increased ten thousand times, its weight will be increased one million times.

Now suppose this beam to move with a constant velocity of ten feet per second, and its weight to be one hundred lbs. Its original momentum, which is expressed by its weight in pounds, multiplied into its velocity in feet, would be one thousand. After the increase of the dimensions to twenty times their original extent, the beam will weigh eight hundred thousand pounds, and its momentum would be eight millions, or eight thousand times as much as at first, while its strength has increased only four hundred times.

Many a model is built on a scale of one tenth its intended working size. Such a machine when full grown, if built in the same proportions, will have one hundred times the strength of the model, but the momentum of its parts will be one thousand times as great, and create ten times more strain in proportion to its strength than the model has to endure. This leaves a wide margin for failure, provided the model is made the standard for the construction of the machine.

The undoubtedly correct plan is to calculate the strength of parts from the known data at their full size, and then construct the model, not to test the power of endurance, but the essential principle of the device. This, however, supposes greater theoretical knowledge than some inventors possess. They may, however, be certain that when any part of a model shows signs of weakness, that weakness will develop itself in a far greater degree when the size of the machine is increased; and they can thus approximately provide against future trouble in practice.

MEAN EFFECTIVE PRESSURE IN STEAM CYLINDERS.

A very large proportion of the inquiries of correspondents received at this office, have reference to steam engines and boilers; and among these stands prominent the question of pressure in steam cylinders. We propose in this article to make this subject as clear as we can, so that our correspondents may get a better understanding of it than seems to be the case at present among non-professionals.

From the conversion of water into steam to the time the expansive force of the steam is expended in the performance of work, there are four elements of pressure to be considered. First, the pressure in the boiler; second, the initial pressure under which the steam enters the cylinder of the engine; third, the mean effective pressure in the cylinder during the stroke; fourth, the pressure against which the steam makes its exit from the cylinder after the work is accomplished.

There is no constant relation between these pressures, except when all the collateral circumstances and conditions are kept constant. Everything connected with the apparatus, from the boiler to the piston, will affect these relations, in such a way that no calculation can be made, by which they can be determined antecedent to construction. It is true an approximation can be made. That is, the boiler can be made large enough to supply the required amount of steam with a little surplus capacity, and the size of pipes can be computed to convey the steam, etc., etc.; but when all is done, the only means by which the relations of the various elements can be determined, are properly conducted experiments.

As an illustration of how widely these relations may vary in good practice, we may instance the fact, that at the recent fair of the American Institute, there was a notable variation of mean effective pressure, in the cylinders of two first-class engines on trial there, and in favor of the one whose position was *more remote from the boiler supplying the steam.*

The most reliable means of investigating the relations of the elements of pressure, is the steam indicator, which not only indicates the initial pressure in the cylinder, but the precise pressure upon the piston at all points of the stroke. The use of this instrument has shown that the boiler pressure is no index whatever of the initial pressure in the cylinder. The boiler pressure suffers subtraction from throttle valves, from radiation and friction in the passage of steam through the induction pipe, and from passage through valve ports—often quite a noticeable quantity when the parts are badly constructed. And as these things vary, so that hardly two engines can be found in which they are all alike, it is manifestly impossible to settle upon an average ratio between boiler pressure and initial pressure in the cylinder, even in the best practice, and when all the care possible is taken to avoid losses from these sources.

But even were we able to establish such a ratio, we could not deduce from it the mean effective pressure, as that depends upon variable circumstances in different engines. It is true that we can calculate what ought to be the mean effective pressure, when the clearance, dimensions of the cylinder, and point of cut-off are given, provided there were no sources of loss in cylinders. But an examination with the indicator shows that sources of loss exist, and that although on the best engines the losses are generally reduced, they are not altogether eliminated.

In the cylinders of different engines we find variations due to different clearances, to radiation, to perfection or imperfection of the exhaust, etc., etc.

We have perhaps said enough to show our unprofessional readers how many things there are which act to vary the working efficiency of a steam engine; and we re-assert, that the only means whereby accurate knowledge of any engine can be obtained, is through the indicator in the hands of a person skilled in its use, and in the interpretation of its diagrams.

We also trust that correspondents will, when asking for information, see the importance of giving as many details as possible in regard to their engines or boilers, as the case may be, remembering that the only grounds for definite opinion, are facts definitely stated.

Notwithstanding what we have said, the mean effective pressures where the initial pressure is given, can be approximately solved by the use of the following table.

MEAN EFFECTIVE PRESSURES INCIDENT TO A SIMPLE SLIDE-VALVE MOTION FOR VARIOUS CUT-OFFS.

Cut-off at—	Mean pressure (Boiler pressure=1·00).	Cut-off at—	Mean pressure. (Boiler pressure=1·00).
0·1	1·15	0·45	0·62
0·125—⅛	0·2	0·5 —½	0·67
0·15	0·24	0·55	0·72
0·175	0·28	0·625—⅝	0·79
0·2	0·32	0·166—2-3	0·82
0·25 —¼	0·4	0·7	0·85
0·3	0·45	0·75 —¾	0·89
0·333—⅓	0·5 —½	0·8	0·93
0·375—⅜	0·55	0·875—⅞	0·98
0·4	0·57		

BURGLAR-PROOF SAFES AND OXYGEN GAS.

The recent manufacture of oxygen gas on a commercial scale and the facility with which it can be compressed into cylinders, and transported from one place to another, has suggested its use for a purpose little anticipated by the world at large. We find Henry St. Claire Deville employing oxygen to fuse the most refractory metals; we see it used for light; and now it is regularly prescribed by physicians, and will before long be sold by every apothecary. There is another application of it that has little been thought of, and which renders it impossible to construct a burglar-proof safe. The thief in the night can place himself in front of a safe with his two cylinders of compressed hydrogen and oxygen, and, with an oxy-hydrogen blow-pipe, can in a few seconds, burn holes of any size in the hardest metal that was ever invented. He need not try to pick the lock, as a man-hole pierced through the door by the heat of his blow-pipe, will answer his purposes quite as well. The light from the burning metal would be a source of annoyance to the burglar, but the noise could hardly be heard through the walls. It is evident that the only safety is in keeping the burglar out, for if he once gets in with his fire drill, a few minutes is all that he requires to work his way into the strongest safe that was ever constructed. The interposition of solid stone between the sheets of metal might occasion some embarrassment and delay, but there remains the lock with its metal covering, which can be easily burnt off so as to expose its mechanism, or enable the burglar to slide the bolts, or blow off the door with gunpowder. It may well be asked, "What next?"

EARTH CLOSETS AND THE SEWAGE QUESTION.

We have, as our readers are well aware, taken strong ground in favor of the earth closet as a substitute for the water closet; and have based our opinion both upon sanitary and economic considerations. It appears to us, however, that the immense importance of this subject has not seized upon the public mind, and that it fails to be appreciated, except by such as have given special attention to the subject of the disposal of sewage.

We find this subject fully discussed in all its bearings in

the technical journals, and numerous plans—some of them of the most impracticable character—are proposed; but the popular press in this country has been content to drop the subject after a brief discussion, and leave the matter to whatever issue destiny has reserved for it.

In our opinion no current topic is freighted with such import as the question of cutting off the enormous drain of fertilizing matter now permitted to wash away into the sea, and the purification of the waters, which surround large cities, from the pollutions which are now permitted to contaminate them and the atmosphere which sweeps over them.

To inventors the earth closet system opens a wide field for improvement, one in which few patents have been taken; and the success, which will, in our opinion, ultimately attend the disposal of sewage in this way will depend much upon the convenience and comfort secured by inventive skill.

The details of the earth closet system, as they exist at the present date, have been already placed before our readers, but it may not be amiss to quote from a recent article of Prof. Charles A. Joy, of Columbia College, the following comprehensive summary of its advantages:

The disinfecting property of dry earth, humus, clay, charcoal, peat, bone-black, ashes, and other solid substances, has long been known, and all of these bodies have been applied in one way and another for the prevention of bad odors, for the filtration of water and absorption of gases. The bodies of the dead have, with most nations, been buried beneath the soil, and thus all danger likely to arise during their decay has been removed.

In the thickly-populated regions of the East, necessity has impelled the inhabitants to have recourse to the same principle in the disinfecting of all fecal matter; but in a sparsely-settled country great carelessness is apt to creep in and to maintain its supremacy, long after a large increase of population imperatively demands as much care in the removal of all excremental matter as it does in the proper disposition of dead bodies.

The action of dry earth is not only chemical but physical, and consists mainly in the absorption and removal of the water necessary to the decay of organic substances; the formation of dangerous gases is thus prevented, and the animal matter is left to a slow decay (combustion) and no odors can arise.

A small amount of earth is sufficient to disinfect a considerable quantity of putrid or offensive matter, and for this reason its use has been strongly recommended in hospitals in cases of bad sores and wounds.

The recent learned researches of Pettenkofer on the causes of typus and cholera have led to the conclusion that these dangerous diseases prevail in regions where the water from sewers, out-houses, sinks, etc., approaches near the surface. In fact, the cholera was traced along the water-courses, and the upper part of the same valley would be left untouched, while the lower portions were subjected to the ravages of the disease. During a dry season the disease was less likely to appear than during a wet. The incontrovertible conclusion forced itself upon the mind of Pettenkofer that there was nothing more dangerous than to have the water near a dwelling contaminated by the diseased fecal excreta of the population, and he sought for some remedy for this startling evil. If he had heard of the epidemic in the National Hotel at Washington, and of the fever that proved so fatal at the Pittsfield Seminary, he would have had some further confirmation of the accuracy of this theory.

The advantages and importance of earth closets must be apparent to every one who has followed us thus far in our article. They require very little architectural change, and can be put anywhere when a vault is not already dug; they are entirely without odor, and preserve in the best way the full agricultural value of the manure.

Surely, a system that will save many lives, keep up the good health of the family, avoid waste of valuable manure, and is cheap and easy of application, ought to be universally substituted for the wasteful, dangerous, unhealthy custom handed down to us by our forefathers.

THE GREAT SUBMARINE BLAST IN THE HARBOR OF SAN FRANCISCO.

It is well known that extended preparations have been making for several months under the direction of Col. Van Schmidt, C.E., to remove what is known as Blossom Rock, the most dangerous obstruction in the magnificent harbor of San Francisco.

That so important an engineering work should have been brought to so successful a conclusion reflects great credit upon the skill of Col Van Schmidt, and the particulars of this feat of submarine blasting will be interesting to our readers.

A careful survey of the rock was made at the outset in order to ascertain the irregularities of its surface. This being done, and plans being drawn, a coffer dam was constructed around a portion of the rock to be removed, and moored by means of a scow loaded down with heavy stones.

The water was stopped from entering the dam by sand bags placed about its base, and an iron turret was erected within it. This turret was then sunk three feet into the rock and cemented fast. A platform fifty-six feet long and twenty feet wide was then erected, and an engine and hoisting apparatus placed thereon, together with a building in which to lodge the workmen and prepare their meals.

The plan of excavation was to scoop out the interior of the rock, leaving an external shell of sufficient thickness to resist the pressure of the surrounding and superincumbent water, and finally to shatter and scatter the shell by blasting. The thickness of the shell was about six feet.

Pillars of rock were left to sustain the shell, and when these were removed they were replaced by timber supports. The space excavated measured in the clear 140 by 50 feet, and it is estimated that about 40,000 cubic feet of stone were taken out. The shape of the surface of the rock was nearly oval, but for a distance of about 120 feet it sloped very little. The hight of the highest pillar inside was 29 feet, and the lowest four feet. The stone was a porous sandstone. When struck with a hammer it fell to pieces readily, and revealed a series of seams running through it. There was no mixture of slate or granite, or any of the harder kinds of stone in it.

Of the twenty-three tuns of powder used, about half was contained in English ale casks, double coated with a heavy pitch varnish inside and outside so as to be water-proof. The other half of the powder was in seven boiler tanks of wrought iron, firmly bolted, the largest measuring eight feet in length and two feet in diameter. The barrels were placed close to the side of the excavation, near the junction of the arch or roof with the floor, so as to blow away the arch from the lowest point of the excavation reached. They were placed resting on their sides. The seven boilers were laid through the center of the chamber, the largest in the middle, where the roof was highest. This disposition was made to equalize the force on each part of the rock. A perforated piece of gas pipe, two and a half feet in length, charged with fine gunpowder, ran into each barrel from the end, with a piece six feet long into the boilers, charged in the same way. These different tubes were connected with insulated electric wires, which passed from one barrel to another, the end in each tube consisting of a fulminating cartridge.

The insulated electric wires connecting the barrels were incased in gutta-percha. When the powder was arranged in the excavation, and the connections made secure, this wire was drawn up through a tube in the shaft, and placed on board a bark situated about one thousand feet from the rock. Here it was connected with an electric battery. The coffer dam was then removed, and the water permitted to fill up the excavation, and so act as a tamping.

It being understood that the blast would be fired on the 23d of April, a very large concourse of people gathered to witness it. Everything appears to have worked properly, and the explosion threw a column of water and rock one hundred feet in diameter, one hundred feet into the air. It is believed the operation has been entirely successful, and that the rock will give no further trouble.

The method employed seems very ingenious, and is, so far as we are aware, entirely novel.

THE PHYSIOLOGICAL ACTION OF MAGNETISM.

The above is the title of a pamphlet recently published by D. Appleton & Co., of New York, containing an account of some novel and curious experiments, by John Vansant, M.D., originally published as a contribution to the *Journal of Psychological Medicine*.

It is claimed that the investigations of Dr. Vansant demonstrate the fact that the force of a permanent magnet is capable of exercising an influence upon the functions of living beings. The idea that magnetism can produce a functional effect in living organism has occasionally existed as a vague notion, but has not obtained among the modern school of physiologists; yet it is admitted that electricity, heat, mechanical motion, chemical affinity, and light, are capable of affecting the functions of living beings, both animal and vegetable; all but the last-named (and that, too, perhaps) having the unquestionable power to produce even the death—cessation of all functions—of the highest animal. Dr. Vansant, therefore, maintains that analogy, before experiment, would indicate that magnetism, the *correlative* of these forces, would act in a similar manner if properly brought to bear, and we think the force of his reasoning will hardly be denied.

There are other strong reasons which support this view, among which the most noticeable is that Coulomb, Faraday, and others, have established experimentally the fact that all ponderable bodies, when properly placed between the poles of a magnet, take up, on account of the magnetic influence, either an axial or equatorial position, and founding thus the two great classes of magnetic and diamagnetic substances, ascertained that animal flesh and tissues generally belong to the diamagnetic class. From this Dr. Vansant reasons that if a suspended muscle, for instance, in its entirety, is turned by the power of a magnet from an axial into an equatorial position with reference to the poles of the latter, *every particle* of that muscle takes up a similar position; each fasciculus, each sarcous element, each atom, must take a new position at right angles to its former one; and that the result of this action, when followed out to its logical conclusion, must inevitably be that magnetism is capable of effecting a *molecular change* in animal tissues, and, as the functions of organs of all kinds must be considered to depend on molecular changes in their tissues, magnetism would be able to affect these functions.

We cannot, however, do justice in our limited space to the able line of argument by which the author of the paper under review establishes the fact that, from the nature of this force and its correlations to other forces, it is absurd to doubt its influence upon living organisms. Our readers will be more interested in the experiments instituted to prove that magnetism does exercise the influence attributed to it.

These experiments were chiefly made with straight bar magnets upon living vegetable and animal organisms. Dr. Vansant assigns as a reason for the non-observance of magnetic influence upon living beings, the fact that the most ordinary form of magnet is the horseshoe or bent magnet, the proximity of the poles of which renders it ineffective for the purpose of such experiments upon large animals. We quote *verbatim* the description of one set of the experiments made with tulips:

I took for experiment three small flourishing tulips (*Tulipa gesneriana*) in full bloom, flowers red, growing in the same pot within four inches of each other. These plants, which I shall designate as A, B, C, were about equally vigorous, almost exactly of the same size, and were watered and kept in a light room at a genial temperature. If there was any advantage in vigor, it was in favor of A. By means of a steel-bar magnet, capable of lifting with one pole about an ounce of iron, I applied *Boreal* (+) magnetism—the southward end—to tulip A, drawing the pole slowly from the surface of the soil in the pot to the top of the plant along the stalk and larger leaves, and repeating this maneuver for about three minutes. I then made a similar movement over tulip B, but substituted *Austral* (—) magnetism—the northward end—for that first used. Tulip C was left untouched. Almost immediately there was a contraction or shriveling of the petals visible in both of the plants touched, but especially in A. Soon, however, the contraction disappeared from B, while in A it continued unabated. About twelve hours afterwards I placed a small straight magnet, some four inches long by one sixth of an inch in diameter, so that its + pole, resting against the scape of A, and its — pole against that of B, should keep up the same kind of magnetic action as first applied; and the instrument was left in this situation for thirty-six hours.

At the end of that time the flower of A was very much withered and evidently dying, the leaves of the plant were curled, the healthy green color was faded, and the whole had a declining aspect. The flower and leaves of B, on the contrary, looked equally as fresh and of as good color as those of C, which were untouched by the magnet; and even, I think, the flower was more expanded and the red of a deeper shade. After about eighty hours from the beginning of the experiment the flower of A was quite dried up, while that of B, though more shriveled than C, was far less withered than A. The green leaves of B appeared just as healthy as those of C, but the leaves of A were more than ever curled and pale.

Experiments were also performed with other plants, as verbenas, geraniums, etc., with somewhat different but no less striking results. To show the remarkable results attained by experiments upon the lower animals, we give the account of a single one made upon a common earthworm:

I took a small, vigorous earthworm (*Lumbricus terrestris*), and applied to it, alternately, the southward (+) and the northward (—) poles of a steel magnet six inches long, able to raise about one ounce with either pole. At first the worm appeared much stimulated, especially by the — pole, as indicated by its stretching itself out to its greatest length. The alternate gentle touches with the magnetic bar were then rapidly repeated, and in about three minutes the worm coiled itself closely and immediately died.

A spider was killed by the rapid and alternate applications of the opposite poles of a small horseshoe magnet. Progressive experiments with animals of higher grade proved the universal influence of magnetism and the positive character of its effects.

A single experiment performed on the human body is all we shall extract from this interesting paper:

Mr. M., a strong, unimaginative man, had facial neuralgia of malarial origin. I applied the — pole of the same small magnet last described over the seat of pain, for about one minute. In five minutes he complained of the pain being worse. I then made an application of the + pole, and in less than a minute the pain almost subsided. After about an hour there was a recurrence of pain for a short time, but much lessened in intensity. This person was led to *expect* relief by the *first* form of application.

Other more striking experiments were performed, but space will not permit a description of them. From the results of these experiments Dr. Vansant constructs a table giving those organs which belong to the (+) class and those belonging to the (—) class, with the effects of *Boreal* and *Austral* magnetism applied to each part. These effects comprise a remarkable array of symptoms, and indicate that magnetism may yet take high rank in the list of remedial agents.

THE ARTIFICIAL PRODUCTION OF ICE AND COLD.

The artificial production of cold is well understood by scientific men; but the language descriptive of the principles involved in the operation, is still enveloped in too much technicality for the popular understanding, and hence very little is known on the subject by the world at large.

The use of heat is one of the necessities of mankind. Its application in the preparation of food, distinguishes man from the lower animals. Artificial warmth for our dwellings is practiced everywhere, and new inventions for this purpose make their appearance every year; but no one thinks of cooling down his house in the summer, or of keeping up an equable temperature throughout the year. There is great want of information in regard to cold, and the present season of the year appears to be an appropriate one for the discussion of the subject.

Heat and cold are relative terms. At the north pole where the temperature is fifty or sixty degrees below zero, a house built of blocks of ice would prove a comfortable shelter; but a house of ice in our climate, would not be inhabited from choice.

Another reason why heat is better understood than cold is that we employ steam as a motive power, whereas cold has no similar application. During the last thirty years the use of ice for many household purposes has been increasing; and as the value of cold for the preservation of food has become familiar to us, the demand for some artificial substitute for ice has begun to make itself felt; and very important questions of the transportation of meat and of cheapening the price of food are involved in it.

When ice changes to a liquid, a large amount of heat is necessary; and if this heat is not supplied to it, it will abstract it from surrounding objects and make them proportionately colder. That is the way in which ice acts as a cooling agent. We need not however, confine ourselves to ice, as there is a universal law involved in the subject, namely, that when a solid is changed to a liquid, a certain amount of heat is absorbed. Every soluble salt, therefore, produces cold when thrown into water; and the finer it is, and the more rapid its solution, the greater the cold. It is upon this principle that chemists have compounded cooling mixtures; a large number of which would be available for household use, if the materials were not so expensive. There has been a great revolution in chemical manufactures during the last twenty years, so that many salts which were formerly entirely out of the question, are now approaching more and more within the range of probabilities; and it may therefore be worth while to revive our recollection of some of them. Take, for example, nitrate of ammonia. This salt mixed with water will cool the surrounding liquid to very nearly zero.

Sal ammoniac, salpeter, and water, produce cold 10 degrees above zero. These salts are becoming large articles of manufacture, and they are available for the production of cold on a small scale. Snow and common salt, or pounded ice and salt, are familiar to everybody, and give us cold six degrees above zero. When nitrate of soda and snow are mixed, we arrive at zero. But as ice and snow cannot be had in the summer time, excepting at considerable expense, they must be left out of the question.

Mr. Gallety has shown that when citric acid and crystallized carbonate of soda, in powder, are stirred together, the mass gets into a pasty state, and in a short time becomes quite liquid. If equivalent portions of the substances are used, the temperature falls from 60° Fah. to 8° Fah. All elementary works on physics contain tables of a large number of salts suitable for freezing mixtures, all of which have been mentioned in our columns and need not be repeated here. We have also described the methods by compressed air, by the employment of ether, by the condensation of gases; and our purpose at this time is not so much to state how the cold can be produced, as to call attention to the many uses to which this agent could be applied, if it could be furnished to us easily, cheaply, and in unlimited quantity. A very large number of chemical processes could be carried on with the assistance of cold, that are now left untried, on account of the expense, while others are imperfectly accomplished, for the want of suitable refrigerating apparatus.

In all manufactures dependent upon fermentation, it is of the utmost importance to be able to keep the liquors cool. This is accomplished by distributing them over a large surface, by keeping the liquids in cold cellars, or surrounding them with ice. The famous lager beer of Germany is so called, because it is stored or put into *lager* for months and sometimes for years, in such a temperature as to be kept from turning sour by too rapid fermentation. It is possible that all of this time and much of the expense of providing storage could be saved, by cheap methods of artificial refrigeration. In the manufacture of sugar on the plantations, one of the greatest difficulties to be overcome, is the fermentation of the sugar, even before it has been expressed from the cane; and after the stalks have been crushed, there is always a loss, notwithstanding the expedients resorted to of combining the sirup with lime or some other base, until it can be transferred to the vacuum boilers. A very great saving both in time and material, and in the increased yield of sugar, could be effected by means of cold, if there were any cheap way of producing it. The quality of wines is often improved by concentration, which is accomplished by freezing out the water from the spirit. Vinegar and other liquors are improved and concentrated in the same way.

There is another class of chemical industries that depend upon cold for their success. In Germany, a large quantity of sulphate of soda is annually made from the refuse brine of the salt mines, and from the evaporation of the waters of the ocean, by taking advantage of the mutual decomposition produced by cold in solutions of sulphate of magnesia and chloride of sodium. The operation is limited to the winter season and can only be carried on in cold climates. This large industry would be at once put within control, if the tanks containing the mixed salts could be cooled by artificial means; and there is a large number of similar chemical reactions that could be successfully carried on by the action of cold. These industries will come up in proportion as we cheapen our cold, and the world generally will be surprised to see how much can be accomplished by the absence of heat.

The question of the transportation of animal food from great distances, is one that ought to interest everybody; and numerous plans have been proposed for accomplishing it. Refrigerating cars, portable ice houses, and ships with felted tanks, have been suggested, but none of them have been fairly tried. A large proportion of the cost of meat is in the feeding and transportation of the live stock, often for days and weeks, and over great distances. By being able to slaughter the cattle near the point where they are raised, a large saving could be accomplished, and the cost of food to the consumer would be greatly reduced. This is becoming a vital question; and now that numerous inventions have been made for producing cold economically, some of them will undoubtedly be tried, until we discover one that will stand the test of experience. There are three ways by which the result can be accomplished:

1st. By employing freezing mixtures.

2d. By the vaporization of liquids through mechanical means.

3d. By the liquefaction and vaporization of gases, by heat and chemical affinity.

The first of these methods can be employed in the household, but would be too bulky for transportation or use on a large scale.

The second one affords excellent results in the ether machines, and is the one longest in use.

The third has been less tried, but is the one that attracts the most interest at the present day. Thirty years ago, Faraday discovered that gases were the vapors of volatile liquids, and, by ingenious contrivances, was able to prove the law by the liquefaction of a large number of gases. Among other gases, he converted ammonia into a liquid at a low pressure, and at the ordinary temperature of the air, but it did not occur to him that he had in this way given to the world the best source of cold hitherto known.

The great affinity of ammonia for water accomplishes results that require mechanical force with ether and other volatile liquids. We first apply heat to the ammonia and convert it into a liquid by condensing it at six or seven atmospheres of pressure. We then remove the heat, and instantly the liquid ammonia begins to rush back into the water from whence it was a moment before expelled, and in passing from the liquid to the gaseous state it requires a large number of units of heat, which it will take from the nearest objects; if water surrounds the vessel containing the liquid ammonia, it is at once frozen, and if liquids are employed that do not easily freeze they will be made very cold, and can be used to cool large bodies of air or to prevent fermentation.

The advantages of the chemical freezing machine appear to be very great, and the system is likely to take precedence over all others.

For new details in reference to Carré's ice machine and the employment of carbonic and sulphurous acids, we must refer to articles on the subject in previous volumes of our journal.

THE VALUE OF PATENTED INVENTIONS.

The question is often asked, "How many out of the great number of inventors ever succeed in making their inventions profitable?" We reply that the chances for success in the department of invention fully equals, in our judgment, those of any other branch of business. We do know that many of the leading industries of the country were founded upon patented improvements, and are successful at the present moment simply by reason of the protection afforded by such patents. The frequent transfer at our office of patent rights and the information derived from our correspondents of their success in selling territorial or shop rights, substantiate our belief that patented inventions are valuable when managed with good business tact. As an illustration bearing upon this point we refer not only to the remarks of Mr. Jencks, but call the attention of our readers to the illustrated description of an improved awning published on page 344, Vol. XXI., of the SCIENTIFIC AMERICAN. The assignee of the patent, Mr. J. B. Armstrong, President of National Bank at Urbana, Ohio, now writes: "I have sold $9,000 of awning territory in ninety days, and *scarcely begun*. I expect to sell $40,000 this summer." The invention is a good one, and the assignee is a thorough business man, who understands the value of advertising.

FIRE BRICKS FROM BAUXITE.

The tendency of modern industry is to use very high temperatures for the extraction of ores and for metallurgical purposes, and this requires crucibles and bricks of the most refractory material. The discovery of a bed of aluminous earth in the department of Beaux, France, has led to a series of researches that promise satisfactory results. The mineral bauxite differs materially from clay in being simply a hydrated oxide of alumina and iron without any silica. It is entirely infusible, and crucibles and fire bricks made of it remain unchanged when ordinary fire-clay material loses shape and partially fuses. Besides its application for purposes above indicated, bauxite is extensively employed in the manufacture of sulphate and other salts of alumina, and of the metal aluminum. Diligent search ought to be made for this mineral in the United States, and the proper place to look for it would be among iron ores. It is often mistaken for iron ore, as its color is like that of some varieties of hematite; it occurs disseminated in grains in compact limestone, and is sometimes spongy and porous like volcanic tufa. When perfectly pure, bauxite is composed of sesquioxide of alumina, 52·00; sesquioxide of iron, 27·60; and water, 20·40; but its composition varies considerably. Some varieties contain small quantities of silica and lime. It differs especially from kaolin in not being a silicate but an oxide of alumina. Some well-known minerals analogous to it are gibbsite and diaspore.

DEATH OF NIEPCE DE SAINT VICTOR.

Niepce De Saint Victor, to whom the world is indebted for the introduction of albumenized paper and photography upon glass plates, died suddenly of apoplexy in Paris on the 7th inst., at the advanced age of seventy-two years. He had been engaged for many years in researches and experiments in photography, especially with a view to photographing colors, and was well known to all who are acquainted with the history and progress of the art.

The first specimens of photography ever seen at this office were sent us by Niepce de Saint Victor. They consisted of a picture of the present Emperor Napoleon, and some photographs of zoological specimens. They were noticed in this paper at the time and attracted much attention, many visitors calling at our office to see them.

Niepce de St. Victor was a zealous, enthusiastic, and persevering worker in the field of photography, and the art owes much to his researches during a period dating from about the year 1847 up to the time of his death.

THE ALBERT PRINTING PROCESS.

We are indebted to Mr. Edward Bierstadt, of this city, for specimens of the new process of printing invented by Professor Albert, of Munich. The printing plates are produced by photographic agency; but the impressions are made with the ordinary printers' inks. A glass plate is covered with bichromatized gelatin. On this a second film of the gelatin is placed. This film, being sensitive to light, is exposed under the negative, whereby those portions of the gelatin film, on which the light acts, are rendered hard and insoluble in water, the remaining portion being soluble and capable of receiving moisture. The plate is then plunged into cold water, and those portions of the film which were covered and protected from light by the negative, will imbibe moisture, the other portions will reject it. The plate is now rolled with fatty ink, as in lithographic printing. The moist parts will reject the ink, the other parts will receive it. The inked glass plate is then printed by pressure between rollers, and the result is marvelous, being nothing less than the production of a photograph in printing ink, with all the fidelity and delicate shadow of the finest silver-printed photos. The working of the process is soon to be commenced in this country.

THE FALL OF THE OLD STATE HOUSE AT RICHMOND

Just as we are going to press, the wires bring the sad tidings of the fall of the old State House in Richmond, Va., by which catastrophe the State, and the country at large, have lost many valuable and influential citizens. At the present writing there are fifty-three reported killed and a large number badly wounded.

The incidents of this sad event are of the most painful and touching character, and the whole country throbs with sympathy for the bereaved and suffering survivors.

The cause of the accident is considered by an experienced architect to be as follows: The girder which gave way was composed of two pieces of timber bolted together, making, when combined, an area of 13 by 20 inches. It was formerly supported by columns, which were subsequently removed to improve the appearance of the Hall of the House of Delegates. In the center of the girder was a mortise, which reduced the available strength to 9½ by 20 inches. The fatal error was in making interior changes without examining the girders with reference to their capacity to endure the new stress placed upon them.

This is another severe warning to architects and the public at large, teaching the stern lesson that buildings of all kinds, but particularly those in which large congregations assemble, should not only be erected under the supervision of men of assured skill, but that alterations and repairs require, if possible, even greater skill to provide against hidden weakness and subtle defects.

A DOUBLE PLOW.—English farmers, who could not afford the expense of the steam-plow, have lately been turning their attention to plows drawn by a single team, and managed by one man, but turning over two furrows at a time. There have been two public trials, got up by the farmers of Cumberland, at Whitehaven and Aspatria. No less than a dozen implements were submitted for competition, constructed by several different makers. Nearly all the work was well done, and the success of the double plow was considered as established. The first prize at both trials fell to the lot of Messrs. Howard, of Bedford, for a light and simple implement carried on three wheels.

NEW BOOKS AND PUBLICATIONS.

PARIS BY SUNLIGHT AND GASLIGHT. A Work Descriptive of the Mysteries and Miseries, the Virtues, the Vices, the Splendors, and the Crimes of the City of Paris. By Jas. D. McCabe, Jr. Philadelphia: National Publishing Co., Publishers, No. 26 South Seventh street.

The title of the above work suggests a sensation—indeed it would not be an easy task to produce a book on the life and customs of the gayest city in the world without introducing sensational chapters. Nevertheless the author has done his work graphically and well, and we have found his descriptions generally very correct and full of lively interest. The illustrations, 130 in number, are truthful, but not well printed as they should be in a work of this character. Sold by subscription only.

EARTH CLOSETS. Price, 50 cents. Published by the Tribune Association, New York.

Mr. George E. Waring has published a pamphlet of one hundred pages, giving drawings of the earth closet system and interesting statistics of the benefits to be derived by the introduction of the disinfecting properties of dry earth as a preventive to disease. The testimony now for the first time collected and put within the reach of the public, is of such a character that it ought to carry conviction to every mind, and lead to a change in the dangerous and wasteful custom hitherto prevalent in this country.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

HYDROGEN GAS AND AIR MIXER.—Daniel Ashworth, Wappinger's Falls, N. Y.—This invention relates to improvements in apparatus for utilizing the pressure of hydrogen gas, due to the generation of it in closed vessels, for mixing with it the requisite quantity of atmospheric air, and for supplying a burner, with the mixture under the requisite pressure, to dispense with the blow pipe in fusing metals; and it consists in a combination with a gas cylinder and an air cylinder of collapsable substance with fixed heads and movable partitions, the movable partitions of each being connected, so that the one belonging to the gas cylinder being propelled will actuate the other, of a four-way cock for supplying and exhausting the gas, and mechanism for shifting the same, whereby the gas cylinder and the said mechanism become a motor for operating the air cylinder as a double-acting pump for forcing air into a receiver into which the gas cylinder exhausts, and from which the flame is supplied, the quantities of each being governed by the capacities of the respective cylinders, which are intended to be in about the proportion of one of gas and two of air.

TRUNK.—W. S. Mayo, Poughkeepsie, N.Y.—This invention relates to improvements in the construction and arrangement of trunks, adapted for supporting the cover, when raised, in a vertical or nearly vertical position on the top of the back part of the bottom, and consists in supporting the cover on trunnions in ears or bearings attached to the bottom, and constructing the rear parts of the tops on curved lines struck from the axis of the trunnions, which are arranged relatively to the back, so that the tops will swing readily thereon in raising or closing, to the required position. The invention also consists in providing a vertical projection to the back of the bottom rising up to, and fitting the curvature of the back of the top to make a finished appearance and close the space above the line of the main part of the top caused by the curvature thereof.

FRUIT DRYER.—Joseph Mongene, Vincennes, Ind.—This invention relates to a novel apparatus for drying fruit, grain, etc., and has for its object to properly utilize the heat of a furnace, so as to obtain rapid and satisfactory action upon the fruit.

BURR FEEDER.—Arthur P. Lawaha, Harper's Ferry, West Va.—This invention consists of a thimble to be introduced within the eye of an upper millstone or runner, said thimble being provided with a pair of half tubes extending downward from its lower edge and reaching nearly to the surface of the nether or bed stone, in order that the motion of the runner may draw currents of air through the half tubes, and thus keep them clear, especially when middlings are running through; the half tubes flaring outward so far as to conduct the material running through them to the furrows in the upper face of the bed stone.

PLOW.—A. F. Epps, Stoney Creek, Va.—This invention relates to a plow stock attached to one side of the plowbeam, and made with an offset which brings it beneath the plowbeam and allows a brace to be extended straight back from the stock to the beam; and having an adjustable grass-root cutter, and removable shares, either with or without wings, and a drill cutter with a vertical coulter.

WRENCH.—Gabriel Utley, Chapel Hill, N. C.—This invention consists of fingers of different widths all jointed on one pivot within the forked end or closed frame of the wrench by means of which such part of the inclosed space as is not occupied by the nut may be filled with one or more of the fingers.

PUMPS.—James A. Sinclair, Woodsfield, Ohio.—This invention consists in the combination of an air chamber placed in the water in a well and communicating therewith by means of pipes, with one pipe extending to the surface for the escape of water, another pipe leading downwards from the surface to the supply of air to the chamber, a stationary piston on the air pipe, and a cylinder sliding over the piston for the collection and compression of air.

RAINBOW SPINNING TOP.—Ottmar Franke, Baltimore, Md.—This invention consists in the combination of a top with wings, so arranged that when the top is in a state of rest, the wings are folded by means of springs against the shaft of the top, and, when the top is set whirling, the wings are expanded by centrifugal force, and, being tinted on their upper surfaces with various brilliant hues, present a pleasing appearance of as many different rings around the top as there are colors on the wings, which rings seem to be successively absorbed in the top owing to the gradual drawing of the rings toward the center by the springs as the centrifugal force decreases.

JET CONDENSER FOR STEAM ENGINES.—Thomas L. Jones, Natchez, Miss.—This invention consists in providing the pipe, through which cold water enters the condenser of a steam engine, with a bell-shaped mouth, and in placing within said mouth a hemispherical separator, so located that it may separate the column of condensing water so that it shall pass into the condensing chamber in an expanded and tubular form, and thereby produce a more enlarged effect upon the exhaust steam.

CAR ROOFING.—Benjamin F. Pickett, Nashville, Tenn.—This invention consists in the combination of a lath or strip forming a ridge attached engthwise of, and directly to the boards of a car or other roof; with metal sheets spread on the wooden roof, and having their edges next the ridge turned over, a metal plate fastened both to the ridge and the reflexed edges of the sheets, and a cap placed over the metal plate and having its edges turned under the reflexed edges of the sheets.

GAS GENERATOR.—A. L. McKay, Bolton, Miss.—This invention relates to a new and useful improvement in a device for generating gas for illuminating purposes, and consists in arranging a generating shell or casing around a tube containing gasoline or other hydro-carbon liquid from which gas is generated.

POCKET INDUCTION APPARATUS.—Curt W. Meyer, New York city.—This invention relates to a new electric apparatus, to be used for medical purposes, and has for its object simplicity of construction, compactness of form, and reliability of operation.

COMBINED SHIRT BOSOM AND CUFFS.—E. H. N. Warner, New York city.—This invention has for its object to furnish an improved shirt bosom, which shall be so constructed that its detached halves may be used with equal facility as cuffs, so that it may be worn as a bosom or as cuffs, as occasion may require.

CAR COUPLING.—S. J. Anderson, Cazenovia, N. Y.—This invention has for its object to furnish an improved car coupling, which shall couple the cars by means of the ordinary coupling pin, which shall be self-coupling, and which will uncouple itself should one or more of the cars be run or thrown from the track, and which shall at the same time be simple in construction and reliable in use.

LADDER.—W. H. McHench, Cobleskill, N. Y.—This invention relates to a new and useful improvement in ladders, and consists in making the ladder self-supporting by connecting two ladders together, forming a double ladder.

AUTOMATIC WATER ELEVATOR.—M. S. McAtee, Chester, Ill.—This invention has for its especial object to furnish an improved apparatus, by means of which the heat necessarily generated in every household may be used for raising water from a well or cistern to a reservoir or tank at any desired elevation, from which the said water may be withdrawn as required.

FRAME FOR RETAINING WINDOW GLASS IN SASHES.—H. L. Myers, Kingston, Ohio.—This invention relates to a new device for facilitating the ready application of glass panes to window sashes, and the secure holding of the same, with the view of enabling any person to readily insert a new pane if the old one is broken. The invention consists in the use of a sectional metallic frame, which is fastened to the sash in such manner that it can be removed and applied from the inside.

CHEMICAL FIRE-EXTINGUISHER ATTACHMENT TO FIRE ENGINES.—Geo Cowing, Seneca Falls, N. Y.—This invention relates to improvements in means for impregnating water, while being thrown upon fire by steam or other fire engines, or hydrants or other means, with fire extinguishing chemical substances such as sulphate of ammonia, bi-carbonate of soda, and other like matters, and it consists of an air tight case, chest, box, or other vessel suitable for containing the chemical substances in a suitable condition, provided with a tubular passage through it preferably near the bottom, adapted for the connection of hose or other pipes at each side so that the water from the engine or other forcing apparatus may be caused to pass through the said tubular passage, which is constructed in sections meeting together within the case, and capable of adjustment for close contact at the place of meeting, or for separation a greater or less distance, to admit the chemical matters to be drawn up with the current of water passing through, for impregnating the water with the necessary percentage of chemicals when required, or for stopping the flow or contact of the water therewith.

STEAM GENERATOR.—J. C. Ludwig, Stockton, Cal.—The object of this invention is to provide a steam generator which shall be cheap, durable, and efficient, and which shall be easier made and stronger than ordinary steam boilers, and more economical of fuel; and it consists in making the generator of crescent form in its cross section, and with a corrugated fire surface.

RAILROAD CAR STOVES.—Samuel Meredith, West Philadelphia, Pa.—This invention has for its object to improve the construction of railroad car stoves so as to protect the car and passengers from any danger from fire should the stove be overturned or thrown out of place by any accident to the car.

HOP PICKER.—Myron Moses, Malone, N. Y.—This invention has for its object to furnish an improved machine for picking hops from the vines, separating them from the vines and leaves, and cleaning them, which shall be simple in construction, and effective in operation, doing its work quickly and well.

GRINDING MACHINE.—Thomas H. Worrall, East Blackstone, Mass.—This invention has for its object to provide an improved machine for running solid emery wheels, which shall be simple in construction, compact and strong.

METHOD OF TREATING TRACING PAPER.—Julius Moos, Karlsruhe, Baden.—This invention has for its object to remove the transparency from tracing paper after a drawing has been transferred upon the same, so that it will be restored to the appearance of ordinary paper. The designs will hereby appear to have been made upon non-transparent drawing paper, which will increase their value.

TRUNKS.—W. S. Mayo, Poughkeepsie, N. Y.—This invention relates to improvements in trunks, and consists in so arranging the top in connection with the bottom, that when raised up to a vertical position, the back of the top will be moved forward about the distance of the hight of the said back part, and rest on the top of the bottom part, in the said vertical position and be held against falling backward

TUBULAR WELLS.—J. Shaw, Bridgeport, Conn.—This invention relates to certain new and useful improvements in tubular wells, such as are formed by driving, or otherwise forcing directly into the earth until water is reached, metallic tubes of small diameter.

BOILER PLATE.—Abraham L. Pennock, Philadelphia, Pa.—This invention relates to a new heating or radiating plate, which is so constructed as to contain almost the largest attainable heating surface, without making it difficult to be cast. The invention is applicable to steam boilers as heating surface, or to heaters for radiating purposes.

HEATERS.—Geo. J. Bently, Michigan city, Ind.—The object of this invention is to provide air-heating attachments to ordinary coal or wood stoves, for heating purposes, and especially upper rooms, in an economical manner, and the invention consists in an arrangement of interior and exterior air-heating chambers, passages, and conductors, together with the stove.

BUCK SAW.—Carl Majer, Williamsburgh, N. Y.—This invention relates to a new bracing mechanism for buck saws, and consists in the application to the saw frame of two V-shaped bracing frames, which are at the junctions of their arms pivoted together, to be thereby made adjustable.

BAG FASTENING.—S. T. Barton and John W. Affron, New Orleans, La.—This invention consists in providing one of the flaps near the mouth with a row of staples securely fastened thereto at suitable intervals, and having holes in their outer ends, and providing the other flap, which is, also, made longer than the first one, with a corresponding row of eyelets, and in providing both flaps with a row of eyelets below the row of staples, the row of of each flap coincident with the others; and in providing a leather, or other suitable cord with a suitable termination, having a slot therein for inserting a seal, for passing through the holes, and fastening the bag.

ADJUSTING SLIDES FOR CHAINS.—Robert J. Pond, Morrisania, N. Y.—This invention relates to improvements in the slides used on the long gold chains worn around the neck, and known as opera leontine chains; also, applicable to guard chains, and consists in providing the said slides with barrels or tubes through which the chains work, made in two parts, hinged together, and provided with spring catches or locking devices, whereby they may be readily opened and closed, for application to and adjustment along the more elaborate chains now in use, which have various styles of links, connected together at regular intervals, some of which are too large to pass through the barrels of the size which it is preferred to use.

OILSTONE HOLDER.—Homer Brown, Hamilton, Ill.—This invention relates to improvements in holders for oilstones, and consists in a pair of cast metal plates, with pointed feet, to rest on the bench so as not to slip, arranged to clamp the ends of the stone at the top, and provided with a clamping rod and screw, between the top and bottom, and a brace below the rod to cause the clamping force on the ends of the stone, when the plates are screwed up to the ends of the stone and the brace by the rod and its nut. The said plates are provided with flanges for the bottom of the stone to rest on, and sockets for confining the ends of the brace.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

H. B., of R. I.—"*Horse latitudes*" is a name given by seamen to the belt or bank of calms situated about 30° north of the equator. These calms are caused by the meeting of air from the equatorial regions moving northward, and by its *vis inertia* going faster than the earth's rotation at that point, or easterly, and the air from the north polar region moving southward, having less than the earth's motion at that point, or with relation to the earth, moving westerly. The two currents counteract or counterbalance each other, and the result is what is technically known as the calms of Cancer. From the necessity of throwing overboard animals, especially horses, from vessels becalmed in these regions, arose the name "*horse latitudes.*"

J. O. L., of Ill.—The powder you send us is precipitated carbonate of lime. We advise you to remove it before using it as feed water for your boilers, as directed in an article published on page 217, Vol. XXI., of the SCIENTIFIC AMERICAN. You can draw water to the hight of 16 feet, through a pipe 800 feet in length, but with a small pipe and rapid flow, the friction will be great. The size of the pipe for a four inch pump will depend upon the rapidity of flow; we should say a fair average size for the pipe would be two inches.

T. R. D., of N. Y.—Your views concerning the rights of inventors are very sound. We imagine that it will be a long time yet before the theories of McFee and Lord Derby can prevail. We have already discussed this subject very fully, and the speech of Mr. Jenckes, printed in this number, confirms your own views.

S. D. T., of Ohio.—You may keep moisture from attacking polished metal surfaces, by inclosing them in a tight compartment containing lumps of quicklime. The lime will draw to it and combine with the moisture in the air, which would otherwise settle upon the metal.

S. P., of Conn.—The air contained in the air chamber of your hydraulic device is exhausted by absorption in the water, the capacity of which for gases is increased by pressure. You will find it necessary to provide for the replacement of the air before you will succeed.

R. M. B., of Pa.—You are right; the resistance of the air against rapidly revolving pulleys is a large absorbent of power, and it is much less when the pulley is boxed in, than when left open to the air. The same may be said of toothed gearing.

J. S., of Mass.—To make pure hydrogen gas, put into a flask pure granulated zinc, and pour on a cold mixture of pure sulphuric acid diluted with three parts distilled water. The evolution of the gas will at once commence.

S. D., of Vt.—Hasheesh is the expissated juice of hemp grown in tropical regions. The hemp does not differ from the same plant grown in colder climates except in the intoxicating property of its juice.

S. M., of Md.—You may discharge from any part of the periphery of a fan blower without affecting the blast, but the length of pipe and its angles will greatly affect its delivery.

M. W., of N. Y.—Iron ores may be smelted in a cupola furnace, but for many reasons which we cannot here enter upon, such furnaces are not best adapted to the purpose.

H. H. T., of N. Y.—The trouble with your canned fruit is undoubtedly that it was too long heated in canning. This would produce dark color and injure the flavor.

F. N. H., of Ga.—We have no chemist connected with our establishment who has any interest in chemical fertilizers. We will refer your letter to another party.

L. B. T., of La.—The elliptical gear movement you send us is an old device for producing irregular motion. It cannot be patented.

R. S. M., of S. C.—Musk is strongly recommended as a remedy for hiccough. The U. S. Dispensatory gives directions for its use.

W. P. P., of Pa.—There is nothing new about the belt shipper of which you send a diagram. It is a device pretty well known.

C. P., of N. Y.—You may give a frosted appearance to sheet tin by a wash of bichloride of tin.

R. D., of Va.—You may make paper water-proof by a varnish of shellac dissolved in alcohol.

☞ You cannot do a better thing for your wife, on a washing day, than provide her a Doty Washer and a Universal Wringer. It will keep aches from her back and arms, wrinkles from her forehead, and roughness from her hands. It will do the work of a hired woman, and save your linen from being scrubbed out, and her temper from being chafed out.—(New York Weekly Tribune, March 22, 1870.

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For Sale by State or County—the improvement in Buckets, etc. as described in this paper of Sept. 11, 1869. Address John H. Tomlinson 150 Madison st., Chicago, Ill.

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To Capitalists and Ship Builders.—Ten thousand square feet of sail spread or rolled in in one minute, by steam. Simple, cheap. E. W. Brown, Cambridge, Ill.

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The Leclanche Battery, illustrated in Scientific American, Jan. 22. For sale by C. Williams, Jr., 199, Court st., Boston.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

Pictures for the Dining Room—Prang's "Cherries," "Strawberries," "Currants," "Raspberries," and other fruit pieces. Sold in all Art Stores throughout the world.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the U. N. Co., 173 Broadway, New York.

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Of Washing Machines, there is nothing to be compared with Doty's.—Weekly Tribune, Dec. 15, 1869.

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Steel Makers' Materials—Wolfram ore, oxide manganese, Speigel iron, borax, titanium, chrome, lubricating black lead, for sale b L. & J. W. Feuchtwanger, 55 Cedar st., New York.

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Bartlett's Street Gas Lighter. Office, 569 Broadway, N. Y.

Important advance on the draft and easement of carriage. See Jackson's Patent Oscillating Wagon, with tests of draft, models, etc., No. 149 High st., Newark, Essex Co., N.J. See Scientific American, Sept. 25, 1869.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

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Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

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FOR

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FOR THE WEEK ENDING April 26, 1870.

Reported Officially for the Scientific American

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102,200.—REVENUE AND POSTAL STAMP.—Lewis Abraham, New York city.

102,201.—CULTIVATOR.—Clark Alvord, Courtland, Wis.

102,202.—COAL SCUTTLE.—Samuel J. Anderson, Cazenovia, N. Y.

102,203.—APPARATUS FOR MIXING HYDROGEN AND AIR.—Daniel Ashworth, Wappinger's Falls, N. Y.

102,204.—LAMP.—J. S. Atterbury and T. B. Atterbury, Pittsburgh, Pa.

102,205.—CONCENTRATING OIL OF VITRIOL.—W. H. Balmain, St. Helens, Great Britain.

102,206.—MODE OF STORING AND TRANSPORTING OIL OF VITRIOL.—W. H. Balmain, St. Helens, Great Britain.

102,207.—PACKING CAUSTIC ALKALI.—William H. Balmain (assignor to the Greenbank Alkali Company), St. Helens, Kingdom of Great Britain.

102,208.—CHIMNEY COWL.—Charles B. Barlow, Portsmouth, N. H.

102,209.—SPRING GUARD.—J. S. Behm (assignor to himself and George Koehler), Elizabeth township (Penn Post Office), Pa.

102,210.—HOT-AIR DRUM FOR COAL STOVE.—G. J. Bentley (assignor to himself and Edward Highfield), Michigan City, Ind.

102,211.—ENVELOPE FASTENER.—M. E. Berolzheimer, New York city.

102,212.—DEVICE FOR MANUFACTURING CHAIR SEATS.—O. A. Bingham, Cavendish, Vt., assignor to G. C. Winchester, Ashburnham, Mass.

102,213.—COUNTERPOISE PLATFORM FOR ORDNANCE.—A. T. Brewer, Brighton, Mass.

102,214.—RAMMER STAFF.—Alanson T. Brewer, Brighton, Mass.

102,215.—LUBRICATOR FOR LOOSE PULLEYS.—J. W. Brockway, New York city.

102,216.—CALCULATOR.—Alexander Brodie, Union, Mich.

102,217.—HOT-AIR REGISTER.—Willis S. Bronson, Hartford, Conn.

102,218.—OIL-STONE HOLDER.—Homer Brown, Hamilton, Ill.

102,219.—PLANING MACHINE.—Timothy L. Carley and Milton Broughton, Homer, N. Y.; said Milton Broughton assigns his right to said Carley.

102,220.—CORE BARREL.—Robert Cartwright, Chicago, Ill.

102,221.—WHIP SOCKET.—Edwin Chamberlin, Lansingburgh, N. Y.

102,222.—CUTTER HEAD.—M. W. Clark (assignor to R. Ball & Co.), Worcester, Mass.

102,223.—CULTIVATOR.—A. P. Clements and John C. Nealey, Monroe, Me.

102,224.—OINTMENT.—Thomas Combs, Yonkers, N. Y.

102,225.—DREDGE BOX, CAKE CUTTER, AND GRATER.—S. Cooke, Bayonne City, N. J., assignor to himself and Frederick E. Bulkley, Brooklyn, N. Y.

102,226.—SEWING MACHINE.—William Cooney, Bridgeport, Conn.

102,227.—SASH LOCK.—Albert Cooper, Harrisburgh, Pa.

102,228.—VENTILATED RUBBER BOOT.—H. C. Cottrell, Norwich, assignor to W. H. Hayward, Colchester, Conn.

102,229.—FIRE EXTINGUISHER.—Geo. Cowing, Seneca, Falls, N. Y. Antedated April 16, 1870.

102,230.—DRYER.—A. W. Cox, Indianapolis, Ind.

102,231.—SPRING BED BOTTOM.—Warren S. Crippen, Grand Rapids, Mich.

102,232.—MACHINE FOR MAKING WOODEN BOXES.—John Cronin, Richmond, Va.

102,233.—FURNACE GRATE BAR AND GRATING.—John Cuthbert, Pittsburgh, Pa.

102,234.—DIRECT-ACTING ENGINE.—C. P. Deane, Springfield, Mass.

102,235.—EXTENSION TABLE.—A. Dietsch, Frankfort Station, Ill.

102,236.—CARD GRINDER.—J. S. Dronsfield, Oldham, Great Britain.

102,237.—PAPER FILE.—G. W. Emerson (assignor to John R. Barrett), Chicago, Ill. Antedated April 23, 1870.

102,238.—HORSE HAY RAKE.—David S. Emrick, Fayette, N. Y.

102,239.—APPARATUS FOR SEPARATING WOOD FIBER FOR PAPER, ETC.—Albert Fickett (assignor to himself, Isaac Butts, and C. T. Moore), Rochester, N. Y.

102,240.—LAMP.—John S. Fish, Cleveland, Ohio.

102,241.—OIL-WELL PUMP.—John S. Fish, Cleveland, Ohio. Antedated April 22, 1870.

102,242.—HINGE FOR SHUTTERS.—C. H. Forbes, and Wm. F. Rutter, Philadelphia, Pa.

102,243.—INK FOR PRINTING AND OTHER PURPOSES.—Lewis Francis, New York city.

102,244.—RAINBOW SPINNING TOP.—L. O. Franke, Baltimore Md.

102,245.—DEVICE FOR BORING WELLS.—Oliver P. Franz, St. Anthony, Minn.

102,246.—COMPOUND FOR CLEANSING SILK.—Karolina Fries, West Zanesville, Ohio.

102,247.—REVOLVING BAR TOY.—H. N. Gallagher, Worcester, Mass.

102,248.—BOOK RACK OR STAND.—George Gardner (assignor to himself, O. L. Gardner, and Wm. Gardner), Clarksville, N. J.

102,249.—FOLDING DESK.—H. E. Gillet (assignor to himself and E. Bickford), Oswego, N. Y.

102,250.—TAMPING PLUGS FOR BLASTING.—Edwin Gomez, New York city.

102,251.—VAPOR BURNER.—Franklin Gould, Paterson, N. J., assignor to himself and W. C. Gould, St. Louis, Mo.

102,252.—SYSTEM OF TELEGRAPHING.—F. J. Grace, Coytesville, N. J.

102,253.—CASTER.—Guy E. Grosse, Masillon, Ohio.

102,254.—COATING METALS.—J. Daniel Gruneberg, Camden, N. J.

102,255.—WASHING MACHINE—John Habermehl, Allegheny, Pa.

102,256.—YARN WASHING MACHINE.—Ed. Haeffely, Lowell, Mass.

102,257.—MACHINE FOR PRINTING ON SPOOLS.—Gardiner Hall, Jr., South Willington, Conn., and George W. Averell, New York city.

102,258.—GAS HEATER.—L. B. Hamilton, Boston, assignor to E. A. Eaton, Winchester, Mass.

102,259.—HOLDER FOR NECKTIES.—William H. Hart, Jr., Philadelphia, Pa.

102,260.—CONVERTING RECIPROCATING INTO ROTARY MOTION.—J. F. Hartmann assignor to himself and William Morningstave), Richmond, Ind.

102,261.—LIFEBOAT.—Philip Heinrich, Allegheny City, Pa.

102,262.—ACUPUNCTURE INSTRUMENT.—G. Herrick, Albion, Mich.

102,263.—SAW MILL.—Enoch Highley, Beechy Mire, Ind.

102,264.—WASHING MACHINE.—Cyrus Hill, Foxcroft, Me.

102,265.—MANUFACTURE OF PAPER.—Isaac Hoffman, Oregon, N. Y., assignor to Mary and Mary C. Hoffmann.

102,266.—STOVEPIPE DAMPER.—George Hollinger and S. H. Fry, Rothsville, Pa.

102,267.—SIGNAL AND OTHER FLAGS.—John Holt, Lowell, Mass.

102,268.—MANUFACTURE OF INDIA-RUBBER BELT.—Albert H. Hook, New York city.

102,269.—SKATE FASTENING.—Horace B. Hooker, Rochester, N. Y.

102,270.—MACHINERY FOR STRIKING OUT LEATHER.—Sam'l Hutchinson, Leeds, England.

102,271.—CAR COUPLING.—G. H. Jones and L. D. Boyce, Rochester, N. Y.

102,272.—STEAM CONDENSER.—T. L. Jones, Natchez, Miss., assignor to himself and Joseph Mitchell. Antedated Oct. 26, 1869.

102,273.—BINDING GUIDE FOR SEWING MACHINES.—Jas. F. Kellogg, North Bridgewater, Mass.

102,274.—HOISTING MACHINE.—R. A. Kendall and William Kendall, Mineral Point, Wis.

102,275.—PNEUMATIC HOIST.—Jos. C. Kent and H. C. Rich, Phillipsburg, N. J. Antedated April 18, 1870.

102,276.—PROPELLER.—Charles Kinzler, New York city.

102,277.—WOODEN PAVEMENT.—Strickland Kneass, Philadelphia, Pa., assignor to John Haldeman, West Point, Va.

102,278.—TOOL ELEVATOR FOR LATHES.—Chas. Knox, Chicopee, Mass.

102,279.—MILL BUR FEEDER.—A. P. Lawsha, Harper's Ferry, West Va.

102,280.—CARRIAGE WHEEL.—Adin H. Leach, Marathon, N. Y.

102,281.—NAVIGATORS' BEARING INDICATOR.—Jos. D. Leach, Penobscot, Me.

102,282.—METALLIC PACKING FOR STATIONARY JOINTS.—Harvey T. Lee, Marysville, Cal.

102,283.—MANUFACTURE OF RAILROAD RAILS.—Hugh Lee, Beloit, Wis.

102,284.—MODE OF LIGHTING STREET LAMPS.—Hiram Lenox, Trenton, N. J.

102,285.—BUNG.—David Leichtnstadt, Brooklyn, and Rafael Pentlarge, New York city.

102,286.—SAW.—C. V. Littlepage, Austin, Texas.

102,287.—STEAM GENERATOR.—John C. Ludwig, Stockton, Cal.

102,288.—ROSSING MACHINE.—John H. Lufberg, Rahway, N. J.

102,289.—NURSING BOTTLE.—E. J. Mallett, Jr., and Wm. S. Ward, New York city.

102,290.—FAUCET LOCK.—V. L. Maxwell, Wilkesbarre, Pa. Antedated April 18, 1870.

102,291.—TRUNK.—William S. Mayo, Poughkeepsie, N. Y.

102,292.—TRUNK.—William S. Mayo, Poughkeepsie, N. Y.

102,293.—GAS GENERATOR.—Archibald L. McKay, Bolton, Miss.

102,294.—ATTACHMENT FOR SEWING MACHINE.—Joshua E. Mellen and Elisha Van Sandt, Adrian, Mich., and M. J. Palmer, Syracuse, N. Y., assignors, by mesne assignment, to William Nixon, Elisha Van Sandt, and Milton J. Palmer.

102,295.—POCKET INDUCTION APPARATUS.—Curt W. Meyer, New York city.

102,296.—FRAME FOR PASSE PARTOUT.—Paul Mignot, New York city.

102,297.—BOOT AND SHOE.—R. A. Miller (assignor to himself and J. C. Skinner), Boston, Mass.

102,298.—FRUIT DRYER.—Joseph Mongene, Vincennes, Ind

102,299.—FOOT BOARD FOR LOCOMOTIVES.—George F. Morse Portland, Me.

102,300.—PNEUMATIC VACUUM ENGINE.—John S. Morton, Philadelphia, Pa.

102,301.—PNEUMATIC VACUUM ENGINE.—John S. Morton and Joseph H. Laning, Philadelphia, Pa., assignors to John S. Morton.

102,302.—APPARATUS FOR COOKING MEAT BY STEAM.—Geo. H. Munroe, New York city.

102,303.—WINDOW SASH.—H. L. Myers, Kingston, assignor to himself, N. Braitegam, and T. Slag, Tarlton, Ohio.

102,304.—MOLD FOR STEREOTYPES.—Mortimer Nelson, New York city. Antedated April 18, 1870.

102,305.—STREET LANTERN.—Joseph Neumann, Philadelphia, Pa.

102,306.—CUTLERY.—Josiah H. Nichols and William Bower, Beaver Falls, Pa.

102,307.—WRENCH.—Johan Fredrik Nordquist, Gottenburg, Sweden.

102,308.—PAINT PAIL.—Charles R. Otis, Chicago, Ill.

102,309.—SWIFT AND REEL.—Caroline Parks, Milan, Ohio.

102,310.—BROOM.—John H. Parsons, Jonesville, Mich.

102,311.—FLOWER POT.—Charles R. Penfield, Lockport, N. Y.

102,312.—RADIATING OR BOILER PLATE.—A. L. Pennock, Philadelphia, Pa.

102,313.—KNITTING MACHINE.—John Pepper, Lake Village, N. H., assignor to Ipswich Mills, Ipswich, Mass.

102,314.—VENTILATED RUBBER BOOT.—R. W. Perkins (assignor to W. H. Hayward), Colchester, Conn.

102,315.—ADJUSTABLE METALLIC DASHER FOR VEHICLES.—George M. Peters, Columbus, Ohio.

102,316.—RAILWAY CAR ROOF.—Benjamin F. Pickett, Nashville, Tenn.

102,317.—SCHOOL DESK.—John F. Piehl, Richmond, Ind.

102,318.—SAW SWAGE.—Levi W. Pond, West Eau Claire, assignor to himself and the Eau Claire Lumber Company, Eau Claire, Wis.

102,319.—SAW SWAGING MACHINE.—L. W. Pond, West Eau Claire, assignor to himself and the Eau Claire Lumber Company, Eau Claire, Wis.

102,320.—PRINTING TELEGRAPH APPARATUS.—F. L. Pope, Elizabeth, N. J., and T. A. Edison, New York city.

102,321.—VELOCIPEDE.—William Quinn, Philadelphia, Pa. Antedated April 19, 1870.

102,322.—VELOCIPEDE.—Joel H. Rhodes and William Reed, Philadelphia, Pa.

102,323.—CRANK MOTION.—Martin A. Rowe, Martinsville, Ill.

102,324.—MANUFACTURE OF ALLOYS OF MANGANESE.—Elliot Savage, West Meriden, assignor to himself and Julius Hotchkiss, Middletown, Conn.

102,325.—APPARATUS FOR THE MANUFACTURE OF AERATED BREAD.—Alfred Scatchard, No. 4 Cambridge Road, Mile End, England.

102,326.—SHADE ROLLER ATTACHMENT.—Peter J. Shirts, Highland Falls, N. Y.

102,327.—SLEIGH.—Hugh Smith, West Gray, Me.

102,328.—COAL STOVE.—James Spear, Philadelphia, Pa.

102,329.—RAILWAY RAIL JOINT.—Charles E. Spooner, Bron-y Garth, Port Madoc, and George A. Huddart, Brynkir, Wales.

102,330.—MACHINE FOR MIXING PAINT, SOAP, AND OTHER MATERIALS.—John Stainthorp and Isaac Cole, New York city, assignors to John Stainthorp.

102,331.—CARPET TACKING MACHINE.—Francis H. Stauffer, Philadelphia, Pa.

102,332.—DIE FOR MAKING THRASHING MACHINE TEETH.—Charles H. Thompson, Alliance, Ohio.

102,333.—TRACE BUCKLE.—James Thornton and Charles F. Demmen, Wellsville, N. Y., said Demmen assignor to said Thornton.

102,334.—PAPER FOLDER.—E. Palmer Tiffany, Hartford Conn.

102,335.—VAPOR BURNER.—Thomas Tully, St. Joseph, Mo.

102,336.—WRENCH.—Gabriel Utley, Chapel Hill, N. C.

102,337.—SPRING BED BOTTOM.—Matthew Van Vleck and Lawrence Van Vleck, Monroe, Wis.

102,338.—HAIR CURLING PIN.—Annie Vogel, New York city, and Fannie Krebs, Georgetown, D. C.

102,339.—VAPOR BURNER.—Thomas Ward, Franklin county, Ohio.

102,340.—SPRING.—James Wayland, New York city.

102,341.—FAUCET.—Darius Wellington, Boston, Mass.

102,342.—LAMP BURNER.—James S. Wetherby, New York city.

102,343.—SHINGLE MACHINE.—E. T. Wheeler (assignor to himself and W. H. Vaughan), Cannelton, Ind.

102,344.—CURTAIN FIXTURE.—James S. Whitney, Lowell Mass.

102,345.—HOISTING MACHINE.—Nelson J. Wilkinson, Kalamazoo, Mich.

102,346.—BARREL.—Henderson Willard, Grand Rapids, Mich.
102,347.—BARREL.—Henderson Willard, Grand Rapids, Mich.
102,348.—BROILER FOR MEAT.—Henderson Willard, Grand Rapids, Mich.
102,349.—BOTTLE STOPPER.—William Wilson and David Wilson, New York city.
102,350.—PRESSURE GAGE.—E. A. Wood, Utica, N. Y.—Antedated March 19, 1870.
102,351.—EAR BRUSH.—George W. Wood, New York city, assignor to Joseph W. Kendall, Philadelphia, Pa.
102,352.—LACING FOR SHOE.—Rufus Wright, Brooklyn, N.Y.
102,353.—BASSO-TENUTO FOR MELODEONS, ETC.—Alfred Zawadski, (assignor to himself and J. C. O. Redington), Syracuse, N. Y.
102,354.—CHURN.—C. T. Anderson, Clarksburg, Md.
102,355.—LAMP BURNER.—Philander Baker, Chicago, Ill.
102,356.—PERFORATED WIRE.—Samuel Beatty, Norwalk, Conn.
102,357.—CAR MOVER.—Samuel Becker and Peter Loucks, York, Pa.
102,358.—WASHING MACHINE.—N. W. Beckwith, McDonough, N. Y.
102,359.—TANK FOR RAISING SUNKEN VESSELS.—F. W. Beers, New York city.
102,360.—FOLDING LOUNGE.—Jacob Beiersdorf, Chicago, Ill.
103,361.—STREET PAVEMENT.—James C. Blake, Elizabeth, N. J.
102,362.—MANUFACTURE OF BOOTS AND SHOES.—L. R. Blake, Boston, Mass.
102,363.—PINION.—V. W. Blanchard, Bridport, Vt.
102,364.—WINDMILL.—A. P. Brown, Syracuse, N. Y., assignor to Continental Windmill Company, New York city.
102,365.—BALANCE-PIVOT GATE.—David Brown, Hampden, Me.
102,366.—SEWING MACHINE.—F. H. Brown, Chicago, Ill.
102,367.—VARIABLE CUT-OFF VALVE GEAR AND VALVE.—William Brown, Hoboken, N. J.
102,368.—SHUTTLE FOR LOOM.—E. F. Burrows, Mystic River, Conn.
102,369.—PUMP.—Aaron Carver, Little Falls, N. Y.
102,370.—STRAP FASTENING FOR PACKAGES.—J. C. Carey, New York city.
102,371.—PIPE TONGS.—Aury Gates Coes, Worcester, Mass.
102,372.—DIE FOR FORGING OX-SHOES.—Horace Colburn, Stafford, assignor to himself and Sylvester Colburn, Ansonia, Conn.
102,373.—WASHING MACHINE.—Hanson Cook, New Bridgeport, Pa.
102,374.—BOILER-TUBE CLEANER.—Patrick H. Coyle, Newark, N. J.
102,375.—CARTRIDGE CASE.—Selden Allan Day, Bowling Green, Ohio.
102,376.—COAL BARROW.—Peter K. Dederick, Albany, N. Y.
102,377.—CONVEYER BLOCK.—Welman De Witt, Talmadge, Mich.
102,378.—COATING AND BRONZING IRON.—Lansing Dockstader (assignor to Bradly and Hubbard), West Meriden, Conn.
102,379.—SASH BALANCE AND LOCK.—W. H. Doe, Oskosh, Wis.
102,380.—NEEDLE.—James W. Donaldson and Daniel Sheets, Suisun, Cal.
102,381.—VENTILATED HORSE COVER.—C. P. Eager, Boston, Mass.
102,382.—REFRIGERATOR AND COOLING APPARATUS.—A. B. Ely, Newton, Mass.
102,383.—MACHINERY FOR DRILLING ROCK.—W. H. Elliot, New York city.
102,384.—PATTERN FOR CASTING.—A. L. Finch, Sing Sing, N. Y.
102,385.—WASHING MACHINE.—Elias Fiscus and Solomon Arney, Albion, Iowa.
102,386.—SPRING SEAT AND BED BOTTOM.—Mark Flanigan, Detroit, Mich.
102,387.—MANUFACTURE OF YEAST.—Henry Fleishmann, New York city.
102,388.—DEVICE FOR MOVING CARS.—John Foreman, Pottstown, Pa.
102,389.—MACHINE FOR ROLLING METAL BARS.—Thaddeus Fowler, Seymour, Conn.
102,390.—PIPE AND BOLT WRENCH.—Louis Frey, Newark, N. J., and George Macardle, Brooklyn, N. Y.
102,391.—LUBRICATOR.—Gregory Gerdom, New York city.
102,392.—TUBULAR ARCH GIRDERS FOR BRIDGES AND OTHER STRUCTURES.—David Hammond and Job Abbott, Canton, Ohio.
102,393.—TUBULAR ARCH GIRDERS.—David Hammond and Job Abbott, Canton, Ohio.
102,394.—TRUSS-GIRDER BRIDGE.—David Hammond and Job Abbott, Canton, Ohio.
102,395.—WASHING MACHINE.—B. R. Hand (assignor to himself, S. J. Eby, and B. S. Trout), Lancaster, Pa.
102,396.—MACHINE FOR SAWING SHINGLE BOLTS.—Matthew Hart, Boston, Mich. Antedated April 23, 1870.
102,397.—HYDRAULIC AIR-COMPRESSING APPARATUS.—Michael Hey, Philadelphia, Pa.
102,398.—STATIONARY FURNITURE.—A. D. Hibbs, Trenton, N. J.
102,399.—SCREW PROPELLER.—Hermann Hirsch, Paris, France. Patented in France, December 16, 1865.
102,400.—DETACHABLE SAW TEETH.—P. J. Hogan, Cincinnati, Ohio.
102,401.—SHANK STIFFENER.—George Houghton, Hudson, and Stephen Moore and Homer Rogers, Sudbury, Mass.
102,402.—CIDER PRESS.—Francis Hovey, New York city.
102,403.—HORSE COLLAR PAD.—J. S. Huston, Mechanicsburg, Pa.
102,404.—ALPHABETICAL INDEX.—Wm. C. Huston, Eaton, Ohio, assignor to himself and N. J. Quinn.
102,405.—SEEDING MACHINE.—Joseph Ingels, Milton, Ind.
102,406.—PLANE STOCK.—Julius Katz, Cincinnati, Ohio.
102,407.—STOVE-PIPE DAMPER.—William J. Keep, Troy, N. Y.
102,408.—CARRIAGE AXLE LUBRICATOR.—John Killefer, West Richfield, Ohio.
102,409.—CURTAIN FIXTURE.—A. Hayden Knapp, Newton Center, and G. W. Bailey, Boston, Mass.; said Bailey assigns his right to said Knapp.
102,410.—SLIDE VALVE.—James Larkin, Detroit, Mich.
102,411.—ANIMAL TRAP.—James H. Lord, San Francisco, Cal.
102,412.—EAVES-TROUGH HANGER.—R. A. Lucas (assignor to himself and Horace S. Weston), Wooster, Ohio.
102,413.—ADJUSTABLE FEET FOR CLOCK CASES.—Ormel R. Luther, Waterbury, Conn.
102,414.—PEAT MACHINE.—J. B. Lyons, New Haven, Conn., assignor to Vulcan Peat Manufacturing Company, New York city.
102,415.—BAKERS' OVEN.—T. P. Mahon, New York city.
102,416.—PUBLIC URINAL.—Samuel Males, Cincinnati, Ohio.
102,417.—NURSING BOTTLE.—John L. Mason, New York city.
102,418.—BOLT AND RIVET MACHINE.—John Morgan, Jr., Wheeling, W. Va.
102,419.—LIFE-PRESERVING GARMENT.—William Morris, Philadelphia, Pa.
102,420.—TOOL REST FOR GRINDSTONES.—W. H. Mossteller, Sharonville, Ohio.
102,421.—HELICAL SPRING.—W. R. Nichols (assignor to Nichols, Pickering & Co.,) Philadelphia, Pa.
102,422.—SPRINGS FOR RAILWAY CARS AND OTHER VEHICLES.—William Rhoda Nichols and Charles Williams Pickering, Philadelphia, Pa.
102,423.—VELOCIPEDE.—Stas Nislosduff, Lowell, Mass.
102,424.—SUSPENDER.—Edwin Oldfield, Norwich, Conn.
102,425.—CHURN.—Geo. N. Palmer, Greene, N. Y.
102,426.—DUMPING WAGON.—Charles F. Parker, Greenfield, Ohio.
102,427.—ELASTIC DOOR GUARD.—Deon E. Peck, Burlington, Conn.
102,428.—DREDGING CAN.—D. W. Pepper (assignor to W. J. Fell and J. E. Taylor), Philadelphia, Pa.
102,429.—BREECH-LOADING PISTOL.—Samuel M. Perry, Plainfield, N. J., and Emerson Goddard, Brooklyn, N. Y., assignors to E. S. Renwick, New York city.
102,430.—PORTABLE SHOE BRUSH AND BOX.—E. A. Pierce, New York city.
102,431.—FIRE EXTINGUISHER.—G. F. Pinkham, Cambridge, Mass. Antedated Nov 2, 1869.
102,432.—BARREL.—H. G. Porter, Grand Rapids, Mich.
102,433.—LOW-WATER INDICATOR.—P. W. Reinshagen (assignor to himself, Daniel Wiehl, Andrew P. Lusk, and John H. Buckman,) Cincinnati, Ohio.
102,434.—BREECH-LOADING FIRE-ARM.—Edward S. Renwick, New York city.
102,435.—STREET CAR.—Jacob Elwood Ridgeway, Philadelphia, Pa.
102,436.—BUTTON-SHANK GAGE.—James F. Russell, Washington, D. C.
102,437.—MANUFACTURE OF SHEARS.—Joseph Ryals, Terryville, Conn.
102,438.—MANUFACTURE OF FERTILIZERS.—W. I. Sapp (assignor to B. M. Rhodes) Baltimore, Md.
102,439.—DROPPING PLATFORM FOR HARVESTERS.—Joseph B. Sawyer, Templeton, Mass.
102,440.—PADLOCK.—Hiram S. Shepardson, Shelburne Falls, Mass.
102,441.—METALLIC ROOFING.—John Siddons, Rochester, N. Y.
102,442.—PUMP.—J. A. Sinclair, Woodsfield, Ohio, assignor to himself, Samuel L. Mooney, same place, and William W. Jordan, Ottawa, Kansas.
102,443.—CONNECTION FOR LEAD PIPE JOINTS.—Isaac Smith, New York city.
102,444.—ROAD SCRAPER.—P. M. Stephens (assignor for one half his right to P. M. Tuttle), Deer Creek, Ill.
102,445.—MECHANISM FOR TRANSMITTING POWER TO LATHES AND OTHER MACHINERY.—James F. Stewart, Fredrich Klinkerman, and James Lamb, Aurora, Ind., assignors to James Lamb and James F. Stewart.
102,446.—SKATE FASTENING.—George W. Street, Brooklyn, N. Y.
102,447.—MACHINE BELTING.—John G. Street, Brooklyn, N. Y.
102,448.—TIRE UPSETTING MACHINE.—Thomas Sullivan, Corning, N. Y.
102,449.—LAMP BURNER.—Alvan Taplin, Somerville, Mass., assignor to Bristol Brass and Clock Co.
102,450.—PREVENTING MILDEW AND DECAY IN SAILS, AWNINGS, TENTS, TARPAULINS, AND OTHER ARTICLES AND FABRICS.—W. A. Torrey, Mount Clair, N. J.
102,451.—METAL ROOF PROTECTOR.—G. B. Volkmar, Baltimore, Md. Antedated April 15, 1870.
102,452.—PUMP.—Henry Wadsworth, Duxbury, Mass.
102,453.—HOLDER FOR FRUIT JARS.—Wm. P. Walter, Philadelphia, Pa.
102,454.—ROTARY MECHANICAL MOVEMENT.—A. G. Waterhouse, San Francisco, Cal.
102,455.—COMBINED FILTER AND COOLER.—J. E. White, New York city.
102,456.—POLE SOCKET.—C. W. Wilcox and J. D. Wilcox, Kingston, R. I.
102,457.—LAMP BURNER.—J. D. Willoughby, Shippensburg, Pa.
102,458.—PUMP.—J. E. Wilson, Bridgeport, Conn.
102,459.—GOUGE.—J. F. Wood, Philadelphia, Pa.
102,460.—BRUSH.—Oscar D. Woodbury, New York city.
102,461.—TAG LABEL.—D. D. Foley, Washington, D. C.
102,462.—COOKING STOVE.—R. M. Hermance (assignor to J. B. Wilkinson), Troy, N. Y.
102,463.—HAY AND COTTON PRESS.—Henry R. Walton, Philadelphia, Pa.
102,464.—ADJUSTMENT OF MERCURIAL PRESSURE GAGE.—M. E. Campfield, Newark, N. J., assignor to American Eagle Steam Gage Company.

REISSUES.

3,932.—CULTIVATOR.—Julius Gerber, Rockford Ill., assignee of Irulus R. Smith.—Patent No. 28,016, dated April 24, 1860.

3,933.—WINDOW BLIND.—Stephen Hebron, Buffalo, N. Y.—Patent No. 94,599, dated Sept. 7, 1869.
3,934.—STOVEPIPE ELBOW.—C. Hoeller (assignor to himself and H. S. Hoeller), Cincinnati, Ohio.—Patent No. 82,497, dated September 22, 1868.
3,935.—SHUTTLE FOR SEWING MACHINE.—J. C. Wade, Boston Mass.—Patent No. 93,945, dated Aug. 17, 1869.
3,936.—VENTILATED HORSE COVER.—Pennel B. Eager, Boston Mass., assignee of Charles P. Eager.—Patent No. 97,896, dated Dec. 14, 1869.
3,937.—HORSE HAY RAKE.—Wm. Emmons, Sandwich, Ill.—Patent No. 88,858, dated April 13, 1869.
3,938.—FLUTING MACHINE.—Susan R. Knox, New York city.—Patent No. 59,913, dated Nov. 20, 1866.
3,939.—URINAL.—Samuel Males, Cincinnati, Ohio.—Patent No. 73,907, dated January 28, 1868.
3,940.—Division A.—TOOL FOR CUTTING SCREW THREADS.—The National Screw Company, Hartford, Conn., assignees of Elijah S. Pierce.—Patent No. 87,198, dated February 23, 1869.
3,941.—Division B.—SCREW.—The National Screw Company, Hartford, Conn., assignees of Elijah S. Pierce.—Patent No. 87,198, dated Feb. 23, 1869.
3,942.—WATER-PROOF SHOE.—T. C. Wales, Dorchester, Mass.—Patent No. 37,413, dated Jan. 13, 1863.
3,943.—BUTTER WORKER.—E. P. Walker, Belchertown, Mass.—Patent No. 77,135, dated April 21, 1868.
3,944.—INSOLE FOR BOOTS AND SHOES.—William Williams, Rochester, N. Y.—Patent No. 89,105, dated April 20, 1869.

DESIGNS.

3,986.—COMB.—E. F. Coffin, Newburyport, Mass.
3,987.—SHAWL MANTLE.—Eberhard Flues, Fort Washington, Pa.
3,988.—SHAWL MANTLE.—Eberhard Flues, Fort Washington, Pa.
3,989.—CAKE DISH.—George Gill (assignor to Reed & Barton), Taunton, Mass.
3,990 and 3,991.—FLOOR OILCLOTH PATTERN.—Jas. Hutchison, Newark, N. J., assignor to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburg, N. Y. Two Patents.
3,992.—BRACKET.—A. D. Judd, New Haven, Conn.
3,993.—TRADE MARK.—Henry Kellogg, Chicago, Ill.
3,994.—SHAPE OF THE SLOTS BETWEEN SAW TEETH.—Edwin Moore, Brooklyn, E. D., N. Y., assignor to the Bissell & Moore Manufacturing Co., New York city.
3,995.—PRUNING SHEARS.—Eli L. Nichols and F. A. Edler, Folsom, Cal.
3,996.—SHAWL MANTLE.—Annie Ellen Taylor (assignor to Harry Taylor), Philadelphia, Pa.
3,997.—SHAWL MANTLE.—Annie Ellen Taylor (assignor to Harry Taylor), Philadelphia, Pa.
3,998.—OILCLOTH PATTERN.—Wisner H. Townsend, New York city.
3,999.—SKEWER CUSHION.—J. C. Wilso (assignor to Richard Campbell), New York city.
4,000.—DRAWER PULL.—A. D. Judd, New Haven, Conn.
4,001.—LAMP-CHIMNEY CLEANER.—Christian Oblinger, Camden, N. J.

APPLICATIONS FOR EXTENSION OF PATENTS.

NETTING MACHINES.—John McMullen, Baltimore, Md., has petitioned for an extension of the above patent. Day of hearing June 15, 1870.

MACHINE FOR HULLING AND SCOURING GRAIN, SEED, ETC.—Oliver P. Stevens, Cleveland, Ohio, has petitioned for an extension of the above patent. Day of hearing June 15, 1870.

BREECH-LOADING FIRE-ARM.—William Mont Storm, New York city, has applied for an extension of the above patent. Day of hearing June 22, 1870.

KNITTING MACHINE.—Jonas B. Aiken and Walter Aiken, Franklin, N. H. have applied for an extension of the above patent. Day of hearing June 22, 1870.

REVOLVING FIRE-ARM.—William Mont Storm, New York city, has applied for an extension of the above patent. Day of hearing June 22, 1870.

MACHINERY FOR CLEANING TOP-FLATS OF CARDING ENGINES.—Horace Woodman, Saco, Me., has petitioned for an extension of the above patent. Day of hearing June 22, 1870.

MEANS OF CONTROLING FEED-WATER APPARATUS OF STEAM BOILERS.—Benjamin F. Bee, of Harwich, Mass., has petitioned for the extension of the above patent. Day of hearing June 29, 1870.

PRINTERS' COMPOSING STICK.—Oliver F. Grover, Middletown, Conn., has petitioned for an extension of the above patent. Day of hearing June 29, 1870.

FOLDING GUIDES FOR SEWING MACHINES.—Sady D. Boyes, Philadelphia, Pa., administratrix of Burritt C. Boyes, deceased, has applied for an extension of the above patent. Day of hearing July 6, 1870.

Inventions Patented in England by Americans.

(Compiled from the "Journal of the Commissioners of Patents.")

PROVISIONAL PROTECTION FOR SIX MONTHS.

701.—THRASHING MACHINES AND DRIVING MECHANISM.—G. B. Hamlin, Willimantic, Conn. March 9, 1870.
744.—FIRE EXTINGUISHER.—C. G. Wheeler, Chicago, Ill. March 10, 1870.
758.—SEWING MACHINES.—J. H. Osborn, Guelph, Canada. March 15, 1870.
770.—GUN CARRIAGE AND SLIDES.—J. W. Wilson, New York city. March 15, 1870.
777.—BLOCKS AND APPARATUS FOR MOVING HEAVY BODIES.—P. Murray Quebec, Canada. March 16, 1870.
780.—MAKING HORSESHOES.—J. T. Walker, Albany, N. Y. March 16, 1870.
781.—DITCHING MACHINE.—H. Carter, Aylmer, Canada. March 16, 1870.
786.—ELASTIC ROLLS FOR CLOTHES WRINGERS, ETC.—J. Moulton, Boston, Mass. March 16, 1870.

RECEIPTS—When money is paid at the office for subscriptions, a receipt for it will be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of their funds.

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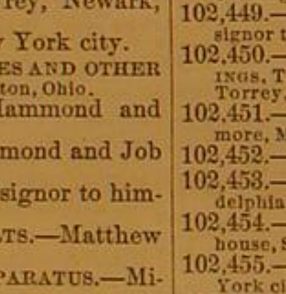
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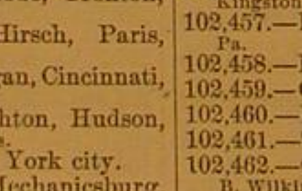
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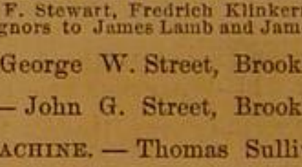
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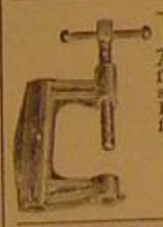
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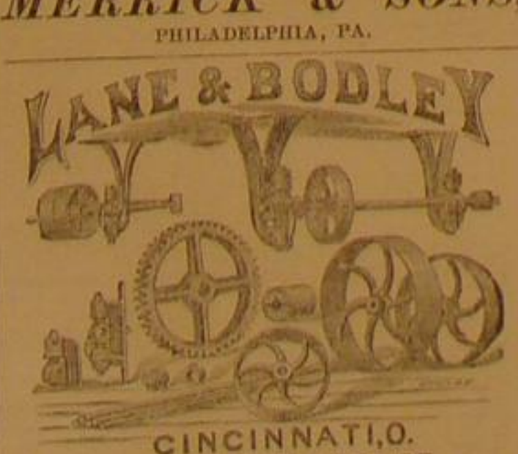
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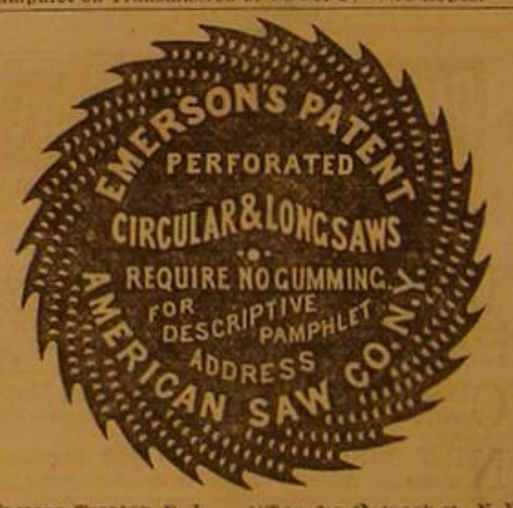


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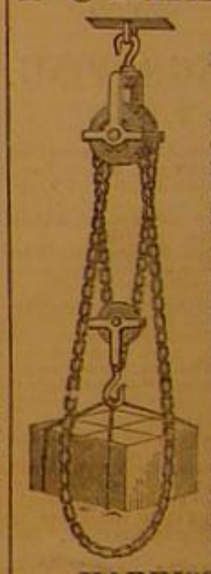
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Dear Sir:—Your account of the report of the American Institute was received to-day.
Your boiler is everything you represent it to be. In a sawmill, perhaps the most unfavorable position for it, a larger boiler than ours would doubtless be more economical, on account of the irregular and heavy drafts made upon the steam, but we frequently saw two thousand feet of lumber with the expenditure of one half a cord of wood (slabs). Yours truly,
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I am pleased to be able to do so now, as I kept a very close and accurate account of the fuel used from Dec. 1867, to Dec. 1868, to compare your boilers with the old ones, which we took out in Sept. 1867.
The amount of raw sugar we refined during that time was larger than ever before. The steam pressure was always kept over fifty pounds, and we were therefore enabled to do more work in a shorter time with the same machinery and apparatus than with our old steam boilers, in which the pressure at times could not be kept up higher than twenty to thirty pounds.
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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXII.—No. 20. [NEW SERIES.] NEW YORK MAY 14, 1870. $3 per Annum [IN ADVANCE.]

Improved Portable Engine for Agricultural Use.

The employment of steam power for agricultural purposes is one of the prominent features of this mechanical age. The latest among the important applications of steam, it bids fair to become one of the most important innovations of modern times. No living man can foretell the extent to which it may be carried, or conceive the immense revolution in modern industry it inaugurates.

We believe it, like all other advances in labor-saving appliances, is destined to greatly benefit mankind at large, and to hasten the period when man, emancipated from all heavy and exhausting toil, shall compel the brute forces of nature to perform all work, which is not in itself so pleasant as to be desirable as healthful exercise and recreation.

The inventive skill of the period has been tasked to produce a steam motor which will answer all the requirements of the plantation and the farm; and while many engines have strong claims to public favor few have succeeded in combining all the requirements for an entirely successful agricultural steam engine.

It may not be amiss to enumerate such of these requirements as occur to us at the moment, although this subject has already received a large share of attention in these columns.

First, and above all other considerations, an agricultural engine should be sufficiently strong in all its parts, and each part should be simple in construction and easily accessible for adjustment and repair. Certain refinements admissible on marine and stationary engines, designed to be always under the supervision of skillful engineers, are wholly to be avoided on an engine designed to be hauled about from place to place, to be used in field or forest under very different circumstances, for sawing, pumping, plowing, thrashing and cleaning grain, grinding and expressing the juices of fruit and sugar cane, cutting fodder, etc. Nothing can compensate for lack of durability and reliability. The danger of break-downs in the midst of a harvesting campaign must be eliminated as far as is possible for human skill to do it, in conformance with the other conditions of the problem.

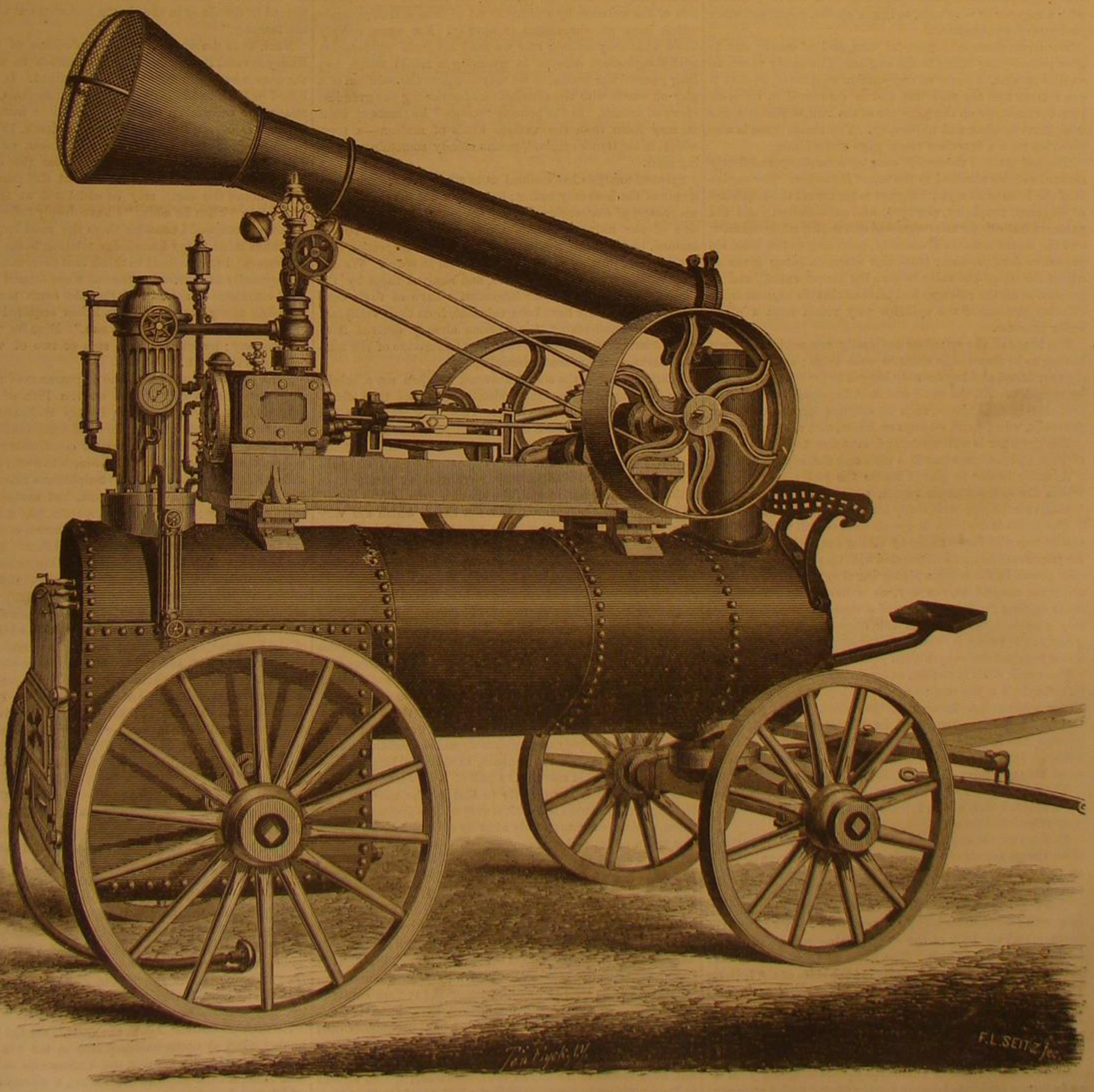
These fundamental requirements being fully secured, the question of economy may next be considered, and such details as are necessary to secure it may be added—always provided they do not too greatly interfere with the attainment of strength and durability.

Then the materials employed in construction must be so formed as to secure minimum weight with maximum strength. Surely here is enough to tax the highest engineering skill of the designer.

We think our readers will agree with us in according to the engine we herewith illustrate, the merit of combining, in a very large degree, all the fundamental requisites we have named, with others that will appear upon careful examination of the engraving.

Every part of the engine is constructed to a standard gage, so that duplicates can at any time be obtained that will fit or replace any part when required, and the work throughout is of the best kind, such as will bear the closest scrutiny from experts.

The boiler is of the locomotive pattern, and is made of such material as to insure safety, durability, and economy of fuel.



AMES' PORTABLE ENGINE FOR AGRICULTURAL USE.

It is constructed of the best Pennsylvania iron of the proper thickness; and the furnace is constructed of the best solid fire-box plate, not ordinarily used in portable engines on account of its high price.

The tubes are the best American lap-welded, and the tube sheets are made of the proper strength and thickness. The bracing at the sides, and at the top and bottom of the furnace, is done after the method adopted by the best locomotive builders.

A special merit is, that the form of the furnace—obtained by extending a water space of ample size and semi-circular form, its under side forming an ash pan—allows the water to circulate freely; thus preventing sediment from accumulating and adhering, as it does in the ordinary form of locomotive boilers, in that part of the furnace below the grate.

This latter style of boiler very soon requires new "water legs," as there being little or no heat below the grates, the water there is in a state of rest, which allows the particles of mineral and earthy matter to adhere to each other and the iron, thereby causing, in a short time, a mass as solid and compact as stone, which soon destroys that part of the boiler.

The circulating water bottom, on the contrary, by the constant movement of the water through it, keeps these particles in a state of suspension, so that they are at once removed from the boiler whenever the blow-off cock is opened. This shaped furnace is much stronger than any other, and obviates the expense and inconvenience of building a separate ash pit.

The smoke-box is a continuation of the shell of the boiler, making it as strong and durable as any other part, which is not the case when it is made of common iron, and merely bolted on to the end of the boiler. The tubes and smoke-box are perfectly accessible for cleaning, through a door, in a in a substantial and ornamental frame which covers this end of the boiler. The furnace front is handsomely designed, and carries the fire and ash-pan doors, and is so made that it can be readily removed, having a large entrance to reach the tubes and furnace for cleaning.

The fire door is made double—its inner part consisting of a heavy iron perforated plate—the outer door being provided with a register to admit air, to ignite smoke, gases, and other products of combustion.

The steam dome is of graceful form, and of ample size to give perfectly dry steam to the engine. The safety valve, as well as its seat, is made of composition well fitted, so that it can neither rust nor stick fast, and is connected to its lever by a device, made on the principle of the link, so that it works with great freedom and uniformity. The steam dome is also provided with a first-class steam gage and whistle.

The bed plate of the engine rests upon carefully and firmly secured saddles attached to the top of the boiler. The engine is of the horizontal style, designed to secure all the requisites of elegance, simplicity, strength, and convenience. All the parts are made in the most approved and workmanlike manner, and the steam is used expansively, according to the most approved modern practice; particular attention being given to adjust the lap of the valve to give the proper cut-off, and to proportion all the passages and ports so that the highest mean effective pressure in the cylinder may result from a given boiler pressure.

The heads of the cylinders are easily accessible, no parts having to be removed in order to reach them; and the cylinders are felted and handsomely lagged to prevent loss of heat by radiation. All the usual and useful appendages found on first class steam engines, such as oil-cups for the cylinders, pet-cocks, water gage, oil cups on slides, etc., are provided.

The governor is well made, and sensitive to any variation of load, and performs its office with ease and certainty.

A water heater is placed inside the bed plate, through which the exhaust steam passes, and is finally discharged into the smoke-pipe powerfully increasing the draft.

The pump is double-acting with composition valves, which can be removed for cleaning by taking out a single set screw. An important feature is connected with these pumps. A stop-cock placed in the suction pipe being always open, the pumps are never allowed to run dry, as is frequently the case in other engines; and by the use of a waste pipe with another stop cock—connecting with the discharge pipe from the pump to the boiler, it is easy to regulate the amount of feed water required for evaporation.

The crank shaft is double, extending a sufficient distance on either side of the engine to allow a band wheel of any size to run without interfering with the boiler. It is forged of the best American iron, and its diameter is considerably greater than is ordinarily seen in portable engines of equal power. It runs in boxes giving ample bearing, to insure steadiness of motion and durability.

The connecting rod is made of hammered iron, supplied with bronze boxes, and is fitted up in the best style, and in a very substantial manner.

In short all the appliances of the best stationary engines, if we except certain refinements above noticed, are to be found on this engine, and so arranged as to avoid undue complication.

The engine and boiler are placed on a very strong truck, as shown; the bolster being under the end remote from the furnace, and the bulk of the weight being placed upon the hind wheels of the truck. The axles of these wheels have been, in other truck engines, bolted to the sides of the boilers; but this plan renders them liable to be broken off or to give great local strain to the part of the boiler to which the axles are bolted. In the engine we are describing a better plan has been adopted, and the difficulty alluded to has been wholly removed.

The axles are made of three-inch square iron, and bent so as to form a complete bearing for the curved under surface of the fire-box. At the angles where they project to receive the wheels, brackets are bolted to the boiler which abut against the shoulders of the axles, bracing them against the effects of sudden twists and shocks. No weight rests upon the brackets, the boiler being sustained entirely by the bent axle. This gives very great strength to them, and removes all strain from the boiler in going over rough ground.

A Salter spring balance is used on the safety valve lever instead of a weight, as in locomotives. The smoke-pipe is hinged and provided with a spark arrester. Each engine is also provided with a flexible suction pipe, with a rose strainer, and has a convenient and comfortable seat for the driver of the team when the engine is being hauled from one position to another. It would seem that nothing has been omitted from consideration, in the construction of this engine, calculated to fit it for every requirement of a first-class agricultural steam motor, and as such it will meet an increasing want in many parts of the country.

These engines, of all sizes, from two to forty-horse power, may be seen at 38 Cortlandt street, New York, at the office of the general agent, Mr. Edward P. Hampson, to whom orders or letters for further information may be addressed.

METEORS.

[From All the Year Round.]

The Universe, of which our solar system is but an infinitely small fraction, is one in material constitution. The spectral analysis of light has shown that the most distant visible heavenly bodies contain substances exactly the same as those which make up the solid crust of the earth. Thus, Aldebaran (the star marked 8 in the Bull), has soda, magnesia, hydrogen, lime, iron, bismuth, tellurium, antimony, and mercury. Sirius, the Dog Star, likewise confesses to soda, magnesia, hydrogen, and probably iron; and not only the stars but many of the nebulæ have been made to avow their possession of similar, if not exactly identical elements.

In the Annuaire of the Bureau des Longitudes, for 1870, M. Delaunay confirms the theory of the unity of the constitution of the universe by a different set of facts and arguments which have all the charm of novelty. For ages, nobody knew what they meant; and we read his lucid explanation with the pleasure enjoyed in guessing a riddle which has long puzzled our brains, if we may compare the solution of a play on words with the satisfaction of obtaining the grandest views of nature. In the present "notice" he treats of what we may learn from the various kinds of meteors—a term which, in its Greek original, means merely something hanging aloft.

Spectral analysis has enabled us to study the material elements of the heavenly bodies; but this is not the only means we possess of discovering directly the secrets of the constitution of the universe. Certain phenomena, now to be examined, put it in our power to make a close inspection of a considerable number of bodies distributed in space. We can even handle some of these bodies, and analyze them by the various processes which our laboratories have at their command. The results have been valuable, from their verifying, directly and undeniably, the notions already derived from other sources respecting the condition and nature of the matter dispersed throughout celestial space.

While gazing at the starry heavens, we often see a bright point dart rapidly across the constellations, and then disappear without leaving any trace. This is what we call a shooting star. Sometimes the brilliant point marks the line of its passage by leaving behind it a luminous train, which lasts a few instants, but vanishes soon afterwards. The path of the shooting star is usually rectilinear or straight, or rather it would coincide with the arc of a great circle traced on the celestial hemisphere. In a few cases, which are very rare, the path presents successive sinuosities, or takes a decided bend, making an angle, sometimes very large, with the direction it followed at the outset. In other words, the shooting star seems to travel in a serpentine course, or rapidly to change its direction, and even, in certain instances, it seems to go back again, returning towards its starting-point. Shooting stars constitute a special class of luminous meteors, which appear at all times and seasons. Not a night passes without several of them being observed. The frequency with which they show themselves, as we shall see by-and-bye, is more or less great, according to circumstances.

From time to time, but much less rarely, there occurs a phenomenon, the same in kind, but much greater in intensity. A luminous body of considerable and appreciable dimensions rapidly traverses the heavens, shedding a bright light in all directions. It resembles a ball of fire, whose apparent magnitude is often comparable to that of the moon. This body generally leaves behind it a very visible luminous train. Often, during, or immediately after its appearance, an explosion takes place, and even occasionally several explosions, which are heard at different and widely distant places on the surface of the earth. Frequently, also, the explosion is accompanied by the bursting of the ball of fire into luminous fragments, which seem projected in different directions. This phenomenon constitutes what is called a meteor proper, or, by French naturalists, a bolide—a word which we might well naturalize, as it is used in that sense by Pliny, and is derived from a Greek verb to throw, to shoot out. The phenomenon occurs by day as well as by night—only in the first case the light it emits is very much diminished by the light of the sun, and, in fact, is only perceptible when developed with considerable intensity.

On the other hand, on the earth's surface we sometimes find solid bodies of a stony or metallic nature, which appear to have nothing in common with the soil on which they live. From time immemorial the vulgar have attributed to these bodies an extra-terrestrial origin. They were believed to be stones fallen from the sky. They have been designated pierres de foudre, pierres de tonnerre, thunderbolts, because they were regarded as matter shot by lightning to the surface of the earth. Many of these pretended thunderbolts have been recognized to derive their origin from the soil itself in which they were found. Such are the ferruginous pyrites, so commonly occurring in chalky strata. But, for a certain number of them, their extra-terrestrial origin has been indisputably ascertained. The name of aërolites (stones of the air) is given to them as a reminder that they fell to the earth from the depths of the atmosphere which envelops our globe. What relationship can possibly exist between shooting stars, bolides, and aërolites? A variety of opinions has been held on this subject. What strikes us most is the vagueness and indecision with which they have been offered, the slight actual knowledge possessed respecting the phenomena under consideration, and at the same time the incredulity with which philosophers have received the accounts furnished to them by the public.

First, as to their incredulity. In Kepler's Ephemerides, we read, "7—17 November, 1623. A fiery meteor, or globe of fire, was seen throughout almost the whole of Germany, flying rapidly from the west to the east. It is affirmed that in Austria something like a clap of thunder was heard. Nevertheless, I do not believe it; for nothing of the kind is to be found in the accounts that we possess."

In the Memoirs of the Académie des Sciences for 1700, Lémery writes: "We cannot reasonably doubt that the matter of lightning and thunder is sulphur, set on fire and shot out with great velocity. As to the lightning-stones with which the vulgar will have it that the thunder is always accompanied, I take their existence to be very doubtful, and am even inclined to believe that there never have been any real ones. None of these stones are to be found on the spots that have been struck by lightning; and even if we had found one, we should sooner believe that it came from some mineral matter melted and formed by the burning sulphur of the thunder in the earth itself, than that the stone had been formed in the air or in the clouds, and shot out together with the thunder."

Next, as to the vagueness and indecision of their views. Halley several times directed his attention to meteors, and the causes by which they may be explained. In a note, published in 1714, in the Philosophical Transactions, No. 341, he relates the occurrence of two remarkable meteors, one of which was seen in Italy on the 21st of March, 1676, the other in England, in the neighborhood of London, on the 31st of July, 1708. He demonstrates that, from the directions in which the latter meteor was seen at different places, its hight above the earth may be estimated at from forty to fifty miles. Then he adds, "I have deeply reflected on these circumstances, and I consider them the most important facts that have come to my knowledge relating to the phenomenon of meteors I am inclined to think that there must exist a certain quantity of matter in ethereal space formed by the fortuitous concourse of atoms, and that the earth meets it while traveling along her orbit, before it has acquired a great rate of speed in the direction of the sun." Here he "burned," as children say; he was within a step or two of what is now held to be the truth.

Some years afterwards, on the appearance of an extraordinary meteor, seen in England on the 19th of March, 1719 (whose hight above the earth Halley reckoned at seventy-three miles), the great astronomer put forth a different explanation, to the effect that the matter constituting the meteor had emanated from the earth, through the effects of the preceding unusually hot summer. Sulphurous vapors, he thinks, have no need of air to sustain them, but mount by a sort of centrifugal force; they then form a train, like a train of gun powder, and, when inflamed by spontaneous combustion, the fire runs along it from one end to the other. And that was the best explanation Halley could give of meteors and bolides.

Mussenbrock, in his "Course of Experimental and Mathematical Physics" (translated into French, 1769), in like manner attributes a terrestrial origin to the materials of which fire-balls consist. "All bodies," he says, "which form part of the universe, emit different emanations, which rise in the air, mingle with it, and are the matter and cause of meteors." And afterwards, "As these globes of fire spread, wherever they pass, an odor like that of burning sulphur, I can scarcely doubt that they are clouds principally composed of brimstone and other combustibles issuing from volcanoes which have opened fresh mouths among the mountains, and have discharged large quantities of sulphurous vapors before they have caught fire."

The opinion of the learned in the second half of the eighteenth century respecting stones fallen from the sky, may be gathered from a report made to the Académie des Sciences, in 1769, by the celebrated chemist Lavoisier, in the name of a commission appointed to give an account of a phenomenon of the kind which had lately happened in France. First, he expresses his skepticism. "In spite of the notions accredited among the ancients, true philosophers have always regarded as very doubtful the existence of these thunderstorms. And if it was considered suspicious at a time when philosophers had scarcely any idea of the nature of thunder, it must appear still more so at the present day, now that it is known that the effects of lightning are the same as those of electricity."

He then proceeds to relate the facts. "On the 13th of September, 1768, at about half-past four in the afternoon, there appeared in the direction of the Château de la Chevallerie, near Lucé, a little town in the Maine, a stormy cloud, inside which was heard a short, sharp thunder-clap, very like the firing of a cannon. Then, throughout the space of two

leagues and a half, without any fire being perceptible, there was heard a considerable noise in the air, which sounded so like the lowing of an ox that many people were deceived by it. Finally, several individuals who were doing harvest work in the parish of Périgué, about three leagues from Lucé, hearing the same noise, looked up, and saw an opaque body which described a curve and then fell on a strip of grass on the high road to Mans, near which they were working. They all ran up to it quickly and found a sort of stone, about the half of which was buried in the earth; but it was so burning hot that they could not handle it. Then they all took fright and ran away; but returning some time afterwards, they saw that it had not stirred, and found that it had cooled sufficiently to admit of a close examination. This stone weighed seven pounds and a half. It was triangular in shape; that is, it presented three rounded protuberances, one of which, at the moment of its fall, had entered the sod. All the part of it which was in the ground was gray or ash-colored, while the rest, exposed to the air, was extremely black.

We have here all the circumstances of a meteor, with explosion, and the fall of a solid body to the earth, but without any luminous appearance, in consequence of its happening in broad daylight. Lavoisier, after mentioning the existence on its surface of a very thin coating of black, swollen matter which appeared to have been fused, came to the conclusion that the stone had not been exposed to a considerable degree of heat, nor for any length of time; in fact, it decomposed before it became red-hot; consequently that it did not owe its origin to thunder, had not fallen from the sky, nor had been formed by mineral matters fused by lightning. The commission gave their opinion that the stone, which perhaps had been slightly covered with earth or turf, had been struck with lightning, and so laid bare; the heat had been sufficient to melt the surface of the portion struck, but had not lasted long enough to penetrate the interior, which was the reason why the stone was not decomposed. It is clear they were determined not to believe the evidence of the persons who saw it fall. The uncertainty respecting the nature and the cause of meteors is further shown in a letter addressed, in 1784, by Charles Blagden to Sir Joseph Banks, and published in the "Transactions of the Royal Society of London." His conclusion is that the sole known natural agent, to which the production of these phenomena can be attributed, is electricity.

Such was the state of opinion respecting meteors and stones fallen from the sky, when Chladni published, in German, in 1794, "Reflexions on the Origin of Divers Masses of Native Iron," and notably of that found by Pallas in Siberia. With wonderful acuteness he maintained the thesis that everything seemed to prove that these masses of iron are no other than the substance of bolides or globes of fire; for all that was known of those meteors proved they were formed of heavy and compact materials which could not be projected in the air in a solid shape by a terrestrial force, nor be composed of diverse substances disseminated in the atmosphere. Moreover, the lumps found where these bolides have fallen, bear so striking a resemblance not only among themselves but to those of Siberia and elsewhere, that it suffices to make us adopt an opinion which is further confirmed by numerous proofs.

His reasoning respecting the origin of bolides reads almost like second sight. It is known, he urges, that our planet is composed of various elements—earthy, metallic, and others—among which iron is one of the most widely distributed. It is also conjectured that the other heavenly bodies are made of analogous materials, or even quite identical, although mingled and probably modified in very various ways. There ought likewise to exist in space much solid matter collected into small masses, without belonging to any of the heavenly bodies properly so called, and which, set in motion by projective or attractive forces, continues to advance until, arriving within the sphere of the earth's (or any other heavenly body's) influence, it falls upon it by the action of gravity. The motion of those masses of matter, extremely rapid in itself, being accelerated by the earth's attraction, causes such friction with the particles of the atmosphere as to heat them to incandescence, and make them throw off vapors and gaseous fluids, ending with the explosion of the mass.

It is a remarkable fact that aerolites are principally composed of iron. But, urges Chladni, if the above theory is correct, we must believe that other substances found in stones fallen from the sky—such as sulphur, silex, magnesia, etc.—are not peculiar to our globe, but are among the elements which enter into the composition of all the heavenly bodies. This opinion coincides, as near as may be, with the discoveries made by the spectral analysis of light. Shooting stars are also referred by Chladni to the same cause as meteoric fireballs or bolides, with which view philosophers of the present day do not exactly agree. What they do hold would occupy too much space to be included in this paper.

A lucky circumstance hastened the adoption of Chladni's ideas. News of the appearance of a magnificent meteor in the neighborhood of L'Aigle (department of the Orne) having reached the Académie des Sciences, and some stones fallen from the sky on that occasion being submitted to it for examination, one of its members, the young Biot, was requested to proceed to the spot and ascertain all particulars respecting the meteor.

It appears that on Tuesday, 6 Floreal, year XI. (26th of April, 1803), about one in the afternoon, weather calm, there was seen from Caen, Pont-Audemer, and the environs of Alençon; Falaise, and Verneuil, a very brilliant ball of fire, which darted through the atmosphere with great rapidity. A few instants afterwards they heard in the town of L'Aigle and around it, throughout an area having a radius of more than thirty leagues, a violent explosion, which lasted five or six minutes. At first there were three or four shots like those of a cannon, followed by what resembled a discharge of musketry, after which there was a frightful rolling like that of drums. The air was calm and the sky serene, with the exception of a few clouds.

The noise proceeded from a small cloud, rectangular in shape, which appeared motionless during the whole duration of the phenomenon, except that the vapors composing it bulged out for a moment at different points, through the effects of the successive explosions. Its elevation in the air was very great; for the inhabitants of La Vassolerie and Boislaville, hamlets situated more than a league apart, beheld it simultaneously over their heads. Throughout the whole canton, above which the cloud was hovering, they heard hissing noises, like those of a stone shot out by a sling, and at the same time they beheld the fall of a multitude of solid lumps, exactly similar to the bodies known by the name of meteoric stones.

If the meteor had burst at one single instant, the stones would have been scattered over a nearly circular area; but, in consequence of the successive explosions, they were strewed over a long strip of ground answering to the meteor's course. The largest found weighed eight kilos. five grammes (about seventeen pounds); the smallest, which M. Biot brought away with him, not more than seven or eight grammes. The total number of stones which fell may be estimated at two or three thousand.

After this inquiry, it was no longer possible to entertain the slightest doubt as to the reality of stones falling from the atmosphere subsequent to the explosion of meteors or bolides. M. Delaunay has collected similar instances, wonderfully agreeing in their details, ranging from the year 1819 to 1868, inclusive; from which he deduces the consequence, that the fact of stones falling from the sky cannot be questioned. They are not darted by lightning, as the vulgar long believed, but they proceed from meteors or bolides, which suddenly appear in the atmosphere, and usually fall after the explosion of the bolides. Those meteors, moreover, are occasioned by the rapid passage through our atmosphere of solid bodies existing in space, and which the earth encounters along her orbit.

Aerolites, touched immediately after their fall, are found to be burning hot. But they cool with very great rapidlty; a proof that their high temperature was merely superficial, and had not penetrated their entire mass. As to their form, it is coarsely polyhedral, with irregular sides and edges. The flat portions of their surfaces often present hollows like those produced by pressing a round body, as a marble or an apple, on a layer of paste or dough. They are also covered with a thin, black crust, usually dull, but sometimes shining like a varnish.

The merely superficial heat of aerolites at the moment of their fall, and the thin, black crust which covers them, clearly demonstrate that they have been subjected, for a very short time, to intense heat, which has melted their outer shell without penetrating to any depth within. On breaking an aerolite and exposing one of its fragments to the flame of a blowpipe, you produce on the surface of the fragment a crust exactly similar to that which covered the entire aerolite. Doubt on the subject is no longer possible. Besides which, the black crust is often wrinkled, owing to the rapid passage of the air over the melted surface.

And now, what is the cause of the intense but short-lived incandescence of bolides? Chladni, we have seen, thought it owing to the *friction* of the air; Benzenberg, in 1811, supposed it rather due to the *compression* of the air. M. Regnault, after experiments on gases flowing with great rapidity, made in 1854, came to the same conclusion, namely, that the temperature of bolides is solely owing to the heat disengaged by the compression of air. When a body moves through the atmosphere with a velocity greater than that of sound, the air's elasticity is neutralized, and compression takes place as if it were inclosed in a vessel. The violent heating of the bolide, during the short lapse of time occupied by its passage through the air, is the necessary consequence.

Showers of iron are much rarer, at least at the present epoch, than showers of stones. Meteoric iron presents itself in masses quite free from stony matter, and sometimes sufficiently pure to be forged immediately. It has even been employed in the fabrication of tools and weapons. Meteorites also contain many other materials of great terrestrial importance, such as oxygen, hydrogen, and carbon. They hence lay claim to a community of origin with the planets which revolve round the sun; which is confirmed by the recent discovery of numerous extremely small planets and the probable existence of others smaller still, which remain invisible in consequence of the trifling quantity of sunlight they reflect.

Of late years, great pains have been taken to form collections of stones fallen from the sky. We may specially cite those in the British Museum, in the Mineralogical Museum at Vienna, and in the Museum d'Histoire Naturelle, at Paris. The last contains specimens of two hundred and thirty-five falls, that is of nearly all; since the number of stone showers represented in collections does not exceed two hundred and fifty.

A Chapter on Chinese Walls.

Bishop Kingsley, in the *Central Advocate*, thus discourses on the city walls of the Chinese:

"All the cities of China are surrounded by high, strong walls, whose massive proportions a stranger has no adequate idea of until he sees them. The walls surrounding the city of Pekin are from twenty-two to twenty-five miles in length, and, on an average, fifty feet high. This wall is sixty-six feet thick, at the bottom, and fifty-four at the top, and once in a few yards there are immense buttresses to give it still greater strength. At every fifth buttress the wall, for the space of one hundred and twenty-six feet in length, is two hundred and fifty-six feet in thickness. In several places the foundation of this wall is of marble, and when the ground is uneven, immense quantities of cement, as durable, nearly, as granite, and about as hard, have been used to level up the ground. The main body of this wall is made of bricks, each twenty inches long, ten inches wide, and five inches thick. These bricks are burned very hard, and have precisely the appearance of stone.

"On the inside of this wall, as well as on others, in other cities, there are esplanades, or stairways, with gates to them for ascending them. And over all the gateways there are immense towers, as large as great churches, and much higher, constructed of these great burnt bricks. On the top of this immense wall there is a railing, both on the outside and inside, coming up to a man's waist, which railing itself is a wall, thus giving a sense of security to a person walking on the top. The outside railing is made into turrets, for the use of cannon, in case of attack. The entire top of the wall is covered with strong burned brick, twenty inches square, resembling the flagging of our sidewalks in large cities,—only, as I have said, these walks are fifty-four feet wide.

There is no way of getting into the city, only to go through this immense wall. And wherever there is a gate for the purpose of getting through, there is another wall built, inclosing a square space, compelling all persons who go into the city to go through two walls, by passages at right angles to each other. The walls are so immensely thick, that these passages through them, arched over with cut stone, remind one exactly of our railroad tunnels in the United States. At each of these great archways there is an enormous gate made of strong timbers, everywhere as much as ten inches thick, and covered on both sides with plates of iron, like the sides of our war ships. These gates are shut early in the evening, generally before sundown, and not allowed to be opened during the night for any purpose. They are fastened on the inside by means of strong beams of timber.

"I have been somewhat particular in describing this wall, because the general construction of all walls in China are similar to this one, although they are not all so high nor so thick. But there are probably a thousand walled cities in China, whose walls will average twenty-five feet high and twenty feet thick, and another thousand whose walls may be somewhat less. Then there is the great Tartar Wall, a little north of Pekin, one thousand five hundred miles long, and older than the Christian era, thicker and higher than any of the rest. There are said to be one thousand five hundred prefectural cities in China. All these are surrounded by walls built by the Government, besides the great number of cities whose walls are made at the expense of the city government alone. And when we have spoken of the walls surrounding the cities, we have by no means done with the subject. For example—in Pekin, inside the inclosing wall, there is another of miles in extent, surrounding what is called the Imperial City. Then, again, inside of this is another immense wall, surrounding what is called the Prohibited City. Within this inner inclosure is the residence of the Emperor, and all the other buildings connected with royalty. And so the Altar and Temple of Heaven are surrounded by two concentric walls, of great extent and magnitude, which must be passed by means of immense gates. Then there is the great wall, covered with dry thorn brush, surrounding what is called the Place of Punishment, where criminals are beheaded, and their heads exposed in cages for a terror to evil doers, and where other criminals are crucified, and yet others starved to death, amid the most piteous moaning and insane ravings for food. Again, the Hall of Literary Examination, where forty thousand men compete for literary degrees, and where the longest purse is more successful than the hardest study, is surrounded by another wall and entered by gates. Then all places of idolatrous worship, and they are legion, in these great cities, are surrounded by high walls. The old city of Nankin, on the south bank of the Yangtze Kiang, is surrounded by a wall eighteen miles long. The city of Tiensing, in the northerly portion of China, has a wall fifteen or sixteen miles in length. The city of Foochow, with one side exposed to the river Min, is surrounded by a high wall. Wherever stone can be had, it is used for these structures. The city of Ranchack, also on the south side of the Yangtze, is surrounded by a wall, running over the top of the mountain a thousand feet high. I also saw, while ascending the Yangtze, a monstrous wall surrounding an area on the top of a mountain, where the Chinese of that region took their wives and children for safety during the terrible rebellion that swept over a great part of China a few years ago.

"Then, in thousands and tens of thousands of instances, in China, a high wall is built right before the door of a private dwelling, to ward off spirits of ancestors, who are supposed to to be blind, and obliged to move in straight lines, and who will, consequently, stumble against the wall when they come to it, and give up the pursuit.

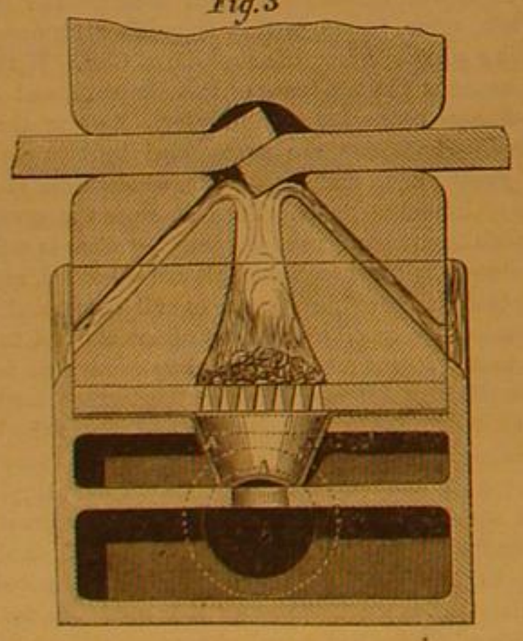
"After giving a good deal of attention to the subject, I am satisfied that the whole amount of wall in China, if put together, would build one twenty feet high and ten feet thick, entirely round the globe, and would require five thousand men to work steadily for two thousand years to accomplish the work."

APPARITION RINGS.—A novelty has reached London under the above appellation which is said to be an invention, the cleverness of which is unquestionable. Without any necromantic tricks, an optical delusion, pure and simple, is produced. To all appearance a link is seen to traverse the whole length of a chain, but it does not fall off, and whence it comes or whither it goes are inexplicable mysteries.

Improvements in Welding Plates.

We illustrate this week from the *Mechanics' Magazine* an invention just patented by Mr. W. S. Sutherland, Liverpool, England. It consists of a means of uniting the ends or edges of plates which are heated in a furnace of peculiar construction, while they are in contact to prevent the formation of scale on the meeting surfaces; also of a furnace for heating such plates, and the arrangements of the apparatus to bring the edges of the plates under the hammer head as speedily as possible while the plates are at a welding heat; the edges being first bent outwards, but in opposite directions, by suitable rolls or other appliance. The invention will be well understood by referring to the annexed engravings, where fig. 1 is an elevation of a furnace so arranged in connection with an overhanging girder as to facilitate a barrel of a boiler or tube to be brought into position for being welded at all the seams by the power hammer instead of being riveted, as clearly seen in the end view, fig. 2. The mechanism consists of a carriage, A, upon wheels for conveying the heated plates of the tube, B, to be welded under the hammer, so that they are united by a succession of rapid blows. The lower portion of the furnace consists of two chambers or passages, one for the fuel and the other for the air or other gas used to support combustion; these materials being led or forced into their respective chambers through the inlet pipe. The fuel and air or other gas pass through a diaphragm of wire gauze or perforated plate, the perforations being proportioned to properly mix the gases for combustion. The mixed fuel and air or other gases then pass through a perforated slab or tile of refractory materials into the combustion chamber and against the parts to be heated, and thence through the escape passages into the open air or into flues placed conveniently to receive them. The fuel is contained in and by the combustion chamber; suitable openings being left for extracting the residue. The air or gas for combustion passes from the chamber through the perforated

Fig. 3



slab or tile of refractory materials amongst the fuel, and the heated products of combustion, after heating the parts to be welded, pass through the escape passages into the open air or into flues placed conveniently to receive them. The carriage, A, carries the tube, B, to be welded, which is adjusted so as to allow the parts to be welded to pass into and opposite to the furnace, C, carried by the arm, D; this arm, D, in some cases also carries the adjustable anvil, E; above this handle is the hammer, F, worked in this arrangement by means of an eccentric on the shaft, G, which eccentric is driven by means of the strap, H, acting upon the fast and loose pulleys, I I; the hammer, F, is carried by the standards and girders, K K. In some cases the furnace is carried by chains, so as to be raised and lowered easily. There is an arrangement for adjusting the hammer to suit various thicknesses of plates. The hammer is in two portions, the lower portion being screwed into the upper portion. This upper portion slides through a worm wheel driven by a worm turned by a hand wheel and spindle. N shows the improved furnace adapted for heating the edges of tubes to be welded together, end to end. The tube resting upon the rollers, o, o, has part of the seam to be welded heated by the improved furnace, and is then easily revolved by hand or otherwise and passed between the hammer and anvil and rapidly welded. Fig. 3 shows an enlarged section of a furnace with two edges of plates in position for being heated. In this form of furnace a fuel-pan, A, is employed which is to be supplied with air to support combustion and also with gases if necessary, the gases being driven into one of the chambers below.

Fig. 1

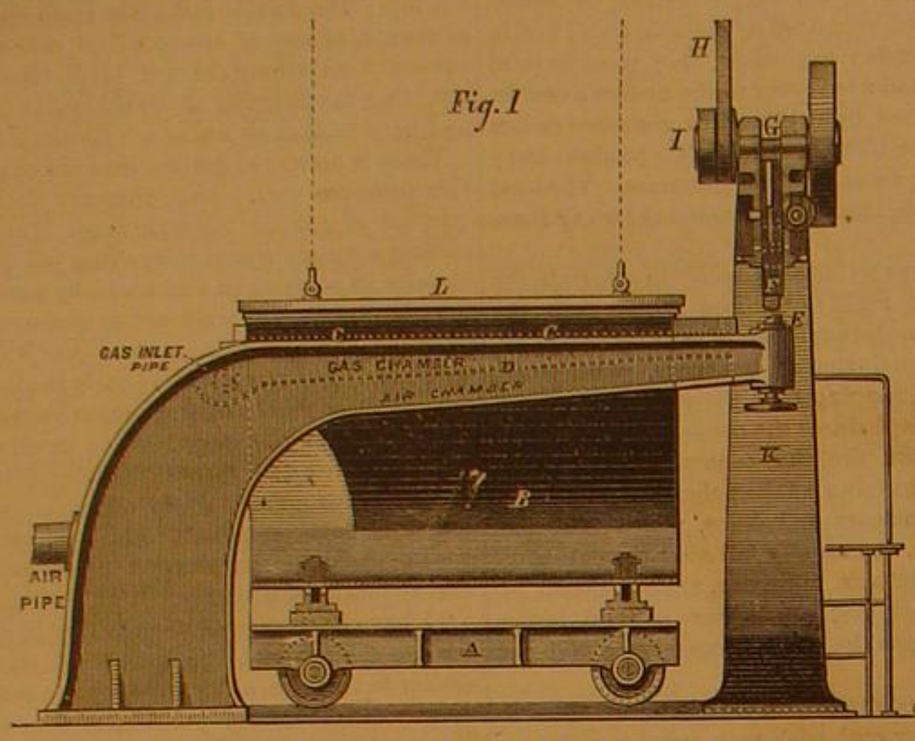
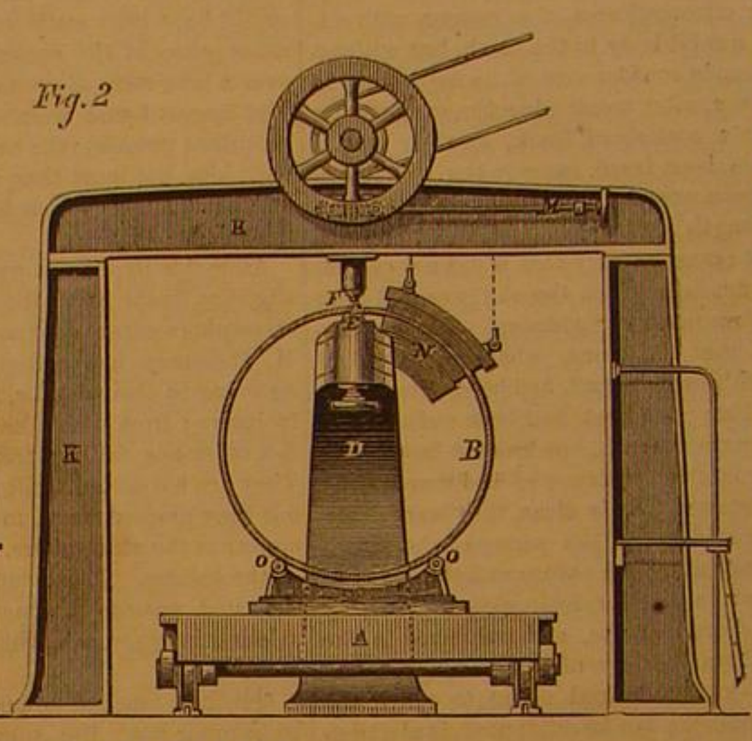


Fig. 2



IMPROVEMENTS IN WELDING METAL PLATES.

American Marbles.

The *Architectural Review* in discussing the subject of black marble and its treatment in architecture, says that at the present time the wealth in marble possessed by this country, instead of decreasing with the great demand made upon it for building and ornamental art purposes, is developing still more its intrinsic value in the recent discoveries of colored marbles of a superb quality which prolific Vermont has contributed to our national resources. In the rooms of the Royal Institute of British Architects, London, there are now to be seen specimens of American colored marbles which have called forth the admiration of all observers. Our present object, however, is to call attention not to the white or to the varicolored, but to the black marble which in its own way confers so much benefit on art by the very force of contrast it creates. It is generally of a fine texture (especially that which is very deep black), but it is rare to find it without calcareous spar in veins through it. The best quality occurs in beds of from three to eight inches thick; but some beds are thicker. It is tough, and contains a good deal of carbon, which imparts the color. It is greatly valued for inlaying, and is extensively used for vases, pedestals, chimney pieces, etc.

It is occasionally ornamented by etching and engraving, in which processes the polished surface is removed, and the brown color of the rough marble exposed. Powdered white lead is sometimes rubbed into the etched surface, to increase the effect. The French have a method of ornamenting marble in this way by etching with acids deeply into the marble various designs upon a properly prepared bituminous ground. When the corrosion has gone sufficiently deep, the cavities are filled up with hard colored wax, so prepared as to take a polish equal to that of the marble when cleared off. Drawings thus made on black marble, and filled in with scarlet wax, after the manner of Etruscan, have a fine effect, and are used for tables, paneling, etc. They have a method in Derby, England, where this art is carried on to a considerable extent, of exposing the brown color without destroying the polish, the effect of which is more durable than ordinary etching.

Rosewood marble, so called from its marking, resembling that of rosewood, is extremely hard and of close texture, being next in these respects to the black variety. The beds are of considerable thickness, but the most beautiful part of the marble is only about six inches thick. The *russet* or *bird-eye* marble takes its name from its color and appearance—the shades varying from light gray to brown. It contains numerous minute embedded or encrinital fossils, and is found in layers of from six to eighteen inches in thickness.

As yet, we believe there has been but one quarry of black marble worked in this country, namely, that of the Mosquito Valley, near Williamsport, Pa., which is a very compact, excellent material, but until very lately every effort to polish its surface proved a failure. We, however, have now on our table a highly creditable specimen of polished black marble from the quarry just named, and we entertain a strong hope that black marble in abundance will be found native to our soil, and worthy of a distinguished place in the art-materials of our country.

Changes in Fishes.

In the *American Naturalist*, Charles C. Abbott, M.D., gives some account of the changes in the fishes of New Jersey within a few years. A slight local disturbance sometimes quite alters the fauna. Thus in 1867 a small, never-failing brook, emptying into the Assumpink, was populated by chubs, dace, and minnows. In July a heavy, sudden fall of rain caused a rise of water, but did not alter the brook enough to attract the attention of those who lived near it. After the subsidence of the water not one of these fish could be found there, while their place was taken by roach, mullets, and red-fins, which are now abundant, while not a chub can be found.

Dr. Abbott mentions several fishes that were not inhabitants of the New Jersey streams twenty-five years ago, which are now quite abundant; and he is greatly at a loss to imagine how they can have reached these streams. He mentions the interesting case of the gizzard shad, which is sometimes carried by freshets into inland streams or ponds. A pond near Trenton was stocked with them in 1857, and is now full of specimens, weighing sometimes five pounds. They have become so different in color from the same fish as found in the Delaware and on the coast that Dr. Abbott at first thought them quite distinct; and he says they have changed considerably, but only in color, during the last ten years.

McNEIL'S IMPROVED TOBACCO PIPE.

Tobacco has come to be such a staple article of luxury that any improvement connected with its use, and having sufficient merit to bring it into popular favor, is sure of an extensive sale.

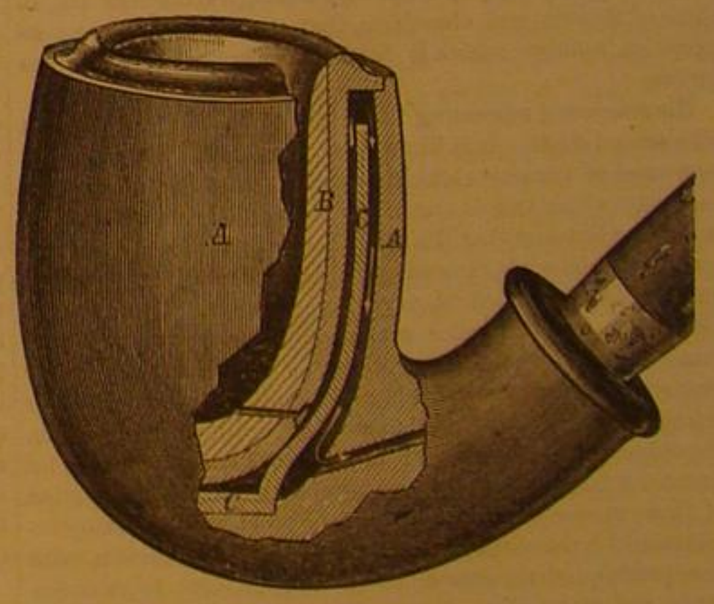
In smoking tobacco in pipes the following things take place. A portion is entirely burned, another portion is destructively distilled, and a portion of the active principle of the plant, nicotine, is distilled over with the water of which all tobacco contains more or less. A part of this moisture with its nicotine condenses in the pipe, and mingles with the tarry matter produced by destructive distillation, and the peculiar excellence of the meerschaum pipe is that it, from its very porous nature, absorbs or soaks up the oily noxious matter, and thus prevents its passage through with the smoke.

But meerschaum pipes are expensive and easily broken, and they have a trick of cracking upon so slight a provocation, that no man who buys a new one to-day can positively rely upon its being a whole one to-morrow.

In the pipe we herewith present to the attention of our readers, a provision has been made for the collection of the foul matters, and for facility in their removal in an ingenious and novel manner. The pipe bowl—in the peculiar construction of which the invention consists—is composed of three parts or shells.

The outer shell, A, is formed after any appropriate design, and a shoulder formed on the inside of the upper edge supports an inner bowl, B, which has a flange or rim upon its upper edge, as shown.

The inner bowl is made of one kind of material, or it may be lined with any suitable material, as shown in the engraving.



It will be seen that when the outer and inner bowls are placed together, they do not touch except at the upper border, leaving an unfilled space in which a third bowl, C, is placed. Suitable openings being made near the bottom of the inner bowl, the smoke passes up and down between the surfaces of the three bowls, as shown by the arrows, depositing its nicotine and moisture within the bowl, C, from whence it is easily removed when necessary, as the parts may be separated and put together again with the utmost facility.

The inventor of this improvement is Wm. S. McNeil, office 104 Wall St., New York, to whom all communications should be addressed.

The First Japanese Railroad.

Letters from Japan state that the arrangements are completed for a line of railway—the first in the country—to connect Yeddo and Osaka, the new and old capitals of the Empire, a distance of 300 miles. There are also to be branches from Yeddo to Yokohama, and from Osaga to Tsuruga. The work will belong to the Japanese Government, but is to be carried out under the advice of English engineers, appointed by Mr. H. N. Lay, who has selected Mr. Edward Morel as principal engineer. Mr. Morel has been summoned from Australia, where he was engaged in works for Mr. Edwin Clarke. An English loan of one million sterling is to be raised to meet the costs, and this will be secured not only by the line itself, but by a mortgage on the Custom duties collected at the ports. From three to five years is to be allowed for completion.

The Planet Mars.

The planet Mars is enveloped, exactly in the same manner as its next door neighbor, the earth, in a dense screen of mists and cloud; and it is only at the favorable moments when these clouds are rent asunder, that the actual surface of the planet can be seen. When the cloud curtains are most close-drawn the hue of the planet is greenish-white; when the curtains are flung open the planet wears a ruddy light. The planet's body is red, like the red sandstone of the earth. The drapery of clouds is of the same tinge as the clouds of the earth when seen hanging in masses under reflected illumination.

Under these circumstances, the only way in which anything like an idea can be formed of what the appearance of the planet would be if the drapery of cloud was entirely removed, is to fit together piecemeal the several passing glimpses that are caught of different parts of its surface at favorable times. The best views are so fleeting and capricious that the observer has to watch continually for hours to catch, it may perhaps be, but a momentary glimpse, which then has to be quickly fixed in the mind in order that it may be accurately transferred into the form of an endering record. And this task can only be worked at, it will be remembered, when the planet is in opposition; that is, when it is on the same side of the sun as the earth, and therefore in its nearest approach to the observer—a circumstance which recurs after intervals of 780 days. The observations of Beer and Madler were made with a fine telescope of Fraunhofer's construction, which enlarged the apparent dimensions of the planet from 23 seconds to 110 minutes of arc, and which made its disk seem nearly four times as broad as the moon. Instruments of this class, until very recently, have been very costly affairs. But through the great ingenuity and skill of Mr. With, instruments of a high order of merit and power can be now supplied at something like one fourth the cost of those of an earlier time. Mr. With's telescopes are reflecting instruments in which the mirror is made of silvered glass, glass being much more easily worked into perfect form than the old speculum metal, and silver afforded a far more brilliant surface than the mixture of copper and tin.

Photography is as yet unable to cope with work such as the delineation of the appearances on Mars, because the actinic power of the largely magnified image of the planet is very low, and because the complex movements of the planet and the earth both render prolonged exposures with any exactness of definition impracticable. Mr. Browning has nevertheless shown that there is something which photography can do in regard to this planet, although it cannot make the planet sit for its portrait. It can enable any pair of human eyes to contemplate the picture of the planet exactly as it would be seen if at some favorable instant it could be caught entirely stripped of its veil of cloud. It can bring all the thousand-and-one results of patient and prolonged study and watching together into one glance. Such are, in fact, the stereograms of Mars which Mr. Browning has prepared.

It now only remains to draw attention to the leading features which are developed in these interesting delineations of Mars. Certain spectroscopic observations made by Mr. Huggins leave no reasonable ground to doubt that the red color of Mars is due to the physical character of the actual substance of those portions of the planet's surface. The ruddy hue is at all times less strongly marked towards the border of the visible disk of the planet, where it is more masked in consequence of the reflected light having to pass through deeper tracks of the planet's atmosphere than in more central regions. It is also very much more intense at some returns of the planet into the favorable position of opposition than it is at others. Thus, for instance, the planet was much more distinctly red in the year 1868 than it was in 1864. This seems to indicate that clouds are more prevalent in the platetary atmosphere at some times than at others. The greenish or bluish-gray patches have just such a character of light as would be reflected from large oceans of water. The red and gray patches of Mars are, therefore, now accepted as indicating a very high degree of probability that these are actually continents and seas, which are contemplated, by chance glimpses, upon the planet's surface.

The actual amount of solar light and heat which Mars receives from the great central luminary is less than one-half the amount which is conferred upon the earth; in more exact numbers the proportion is $\frac{43}{100}$.

From some careful investigations made by the philosopher Zollner, it appears that Mars appropriates for his own intrinsic use something more than seven-tenths (or more exactly ·7328 parts) of the solar energy which it receives, and reflects into space nearly three-tenths (or more exactly ·2672 parts).

With lessened solar force less vapor is raised into the atmosphere, and less rain is precipitated upon the land. There are, therefore, less vigorous traces of the changes that are worked by the wearing away of high land under the action of running water. Something also of the difference of sculpturing and contour are most probably due to the fact that a globe, having only one-seventh part the volume of the earth, would pass from the primeval incandescent and plastic condition into the hardened and rigid form much more rapidly, and therefore would not have the wrinklings and foldings of its contracted crust arranged in exactly the same way as the wrinklings and foldings of the crust of the larger earth.—*Prof. Mann.—British Journal of Photography.*

PALE LACKER FOR TIN PLATE.—Best alcohol, 8 oz.; turmeric, 4 drs.; hay saffron, 2 scr.; dragons'-blood, 4 scr.; red sanders, 1 scr.; shellac, 1 oz.; gum sandarach, 2 drs.; gum mastic, 2 drs.; Canada balsam, 2 drs.; when dissolved, add spirits of turpentine, 80 drops.

OBITUARY--ZERAH COLBURN, ENGINEER, AND LEADING WRITER OF ENGINEERING PAPERS.

We have had specially prepared for this paper a portrait of the late Zerah Colburn, which we publish with the accompanying obituary notice from the pen of his former associate, Mr. A. L. Holley, as published in the New York *Times*, of May 2d.

The name of Zerah Colburn is known to the engineers of all countries where professional literature exists, and his writings are perhaps more various in scope and more vigorous in practical treatment than those of any other member of his profession. In his death engineering sustains an irreparable loss.

Mr. Colburn was born in Saratoga, N. Y., in 1832, and was named after his uncle, the celebrated mathematician. His father died soon after, and his mother, very poor and infirm, removed to New Hampshire, where, during his boyhood, young Colburn earned his living on a farm. His early means and opportunities for acquiring an education were limited to a few months' attendance at a district school, a short clerkship in a factory, and such books as he could find in a remote country village. But his industry and his wonderful memory more than made up to him then, and throughout his life, his want of early advantages. From an odd volume of the old *Penny Magazine* he gained a knowledge of the world and an inspiration to see and figure in it, which all educational appliances fail to give the average boy of the period. At the earliest possible moment, young Colburn left the wilds of New Hampshire and struck out for civilization, and he kept moving till he finally settled down in its midst—in London. His first sight of a city, and, what was a greater thing to him, a locomotive, was at Concord. The strong but hitherto undeveloped mechanical talent in him at that sight asserted its proper place, and the locomotive was ever after his chief study, and the subject of his best conclusions and ablest writings.



He soon after, as he found means for support, removed to Boston. His first literary attempt was in verse for the *Carpet Bag*. His professional career commenced on the Concord Railroad, under the late Charles Minot, then its manager, who was attracted by the brightness and practical ideas of this singular youth. In a few months Colburn had mastered the anatomy and physiology of the locomotive engine, tabulated the dimensions and proportions of those under his observation, and published a small, but excellent and still useful, treatise on the subject. He then got a subordinate position, and soon rose to the superintendence of the locomotive works of Mr. Souther, in Boston. Here he tabulated and committed to memory (an easy task for him) the dimensions of all parts of the then standard locomotive, and the cost of all the materials and labor employed in its construction. With the exception of a few months at the Tredegar Works, at Richmond, where, in connection with Mr. Souther, he started the manufacture of locomotives, Mr. Colburn then made New York his head-quarters until 1858. His more important professional work at this time was his superintendance, for a year or more, of the New Jersey locomotive Works at Paterson, during which engagement he made some improvements, still standard, in the machinery of freight engines.

Although eminently fitted for the management of practical construction, Mr. Colburn early found that the literature of engineering was his true calling. He therefore joined the *Railroad Journal* of this city, in which professional readers, soon recognizing the hand of a master, began to look for a new era in technical journalism. And they were not disappointed. In 1854, Mr. Colburn started, in New York, the *Railroad Advocate*, a weekly, devoted especially to the machinery of railroads, and addressed chiefly to the master mechanics, and the more intelligent operatives. The next year he enlarged the *Advocate*, which soon reached a large circulation and great popularity, not only among railway mechanics, but among the profession at large. It is worthy of mention, as illustrating Mr. Colburn's extraordinary power of memory, that he kept no books for many months, but simply remembered when every subscription and advertisement fell due, and made no mistakes.

In the summer of 1855 Mr. Colburn thought he saw, in his large and favorable acquaintance with railroad men, the way to a fortune in the business of railroad supplies. He therefore sold the *Advocate* to Mr. A. L. Holley, then draftsman of the New York Locomotive Works, bought land warrants with the money, journeyed to Iowa and located his lands, and then returned to New York—but with another scheme. The frontier life had temporarily charmed him, and he got together an engine and machinery to set up a steam saw mill in the far West. But before his plans were completed, literature and civilization had resumed the mastery, and he fell to writing for the *Advocate*, because he could not help writing, and to arranging his supply business. The first thing—and the last—that he undertook in this direction was Ames' tires, and with his knowledge, industry, shrewdness, and his advantages with the professional press, he kept the hammers at Falls Village busy day and night building up an immense business, which, unfortunately, the character of the tires did not maintain.

But Colburn was not made for a merchant. He pined for larger professional observation and knowledge, and for a wider field. As suddenly as he went into trade he left it, and sailed for Europe. During a three months' stay or rather rush among the machine and iron works of England and France, whereof the story is recorded in the *Advocate*, and is of permanent value, he had become again and finally wedded to literature. Returning to New York, he connected himself again with the *Advocate*, which was then enlarged and entitled the *American Engineer*.

In the autumn of 1857, Messrs. Colburn and Holley were commissioned by several leading railroad presidents to visit Europe to report on the railway system and machinery abroad, and in view of the financial troubles of 1857, they were advised to stop, at least temporarily, the publication of their paper.

Permanent-way and coal-burning locomotives were found to be the most important subjects of the period, and in 1858 their report on these subjects, largely illustrated by engravings, was published and generally circulated among American railway managers.

Mr. Colburn's thorough and, to American readers, entirely new and startling analysis of the cost and economy of British railways, was the foundation of many of the reforms that have since, although slowly, become standard here, especially in the matter of improved road-bed and superstructure. The success of this book was such that its authors determined to continue their researches, and in the fall of 1858, Mr. Colburn again visited London. Here he commenced writing for the *Engineer*, then the leading professional journal, and soon became its editor. Under his vigorous management it largely increased in circulation and influence.

Mr. Colburn at this time wrote a supplement on the American Practice for a new edition of Mr. D. K. Clark's work on the "Locomotive Engine." After several years' hard work in London, Mr. Colburn resolved to start another engineering paper in America. He came out in the *Great Eastern*, on her first passage in 1860, and soon selected Philadelphia, the principal seat of mechanical engineering in this country, as the birthplace of his own *Engineer*. It was an excellent paper, and the few numbers published will have permanent value, but the time was not ripe, in America, for a publication of this kind, and Colburn, although he had learned to labor, had never learned to wait. In a moment of despondency he dropped his new enterprise, sailed for England, and again became the editor of the London *Engineer*. At this time he familiarized himself with the French language and professional literature. He also wrote several pamphlets on boiler explosions, heat, etc., the originality of which attracted great attention, and he commenced his great work on the locomotive engine.

In 1866, Mr. Colburn started in London the publication of *Engineering*, which is in all countries accounted the ablest and best serial publication on that subject, and he dissolved his connection with it only a few weeks before his death.

During his residence in London, Mr. Colburn was employed as consulting engineer on many important constructions, and prepared many valuable papers in addition to his editorial labors. The more noted of these were his papers before the Institution of Civil Engineers (of which he was a member) on "Iron Bridges" and on "American Locomotives and Rolling Stock," both of which received medals.

Mr. Colburn wrote vigorously, originally, and with understanding on all the leading subjects embraced under the head of engineering. On the locomotive, the steam engine and boiler at large, steam navigation, bridges, railway works, and mechanical engineering in general, he was a first-rate authority.

The saddest part of Mr. Colburn's story remains to be told. Overwork was at least a powerful agency in his early fall, and this, together with his natural impulsiveness and his habitual irregularity in relaxation, as well as in work, drove him, within a few months, into partial insanity. He came to this country a fortnight since, avoided all his old friends, strayed away to a country town in Massachusetts, and there died by his own hand.

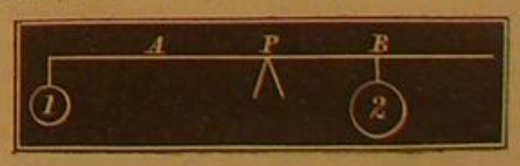
Zerah Colburn was a man whom the profession could ill afford to lose. His thoroughly practical education in the workshop, his extended observation of engineering works, his intimate acquaintance with professional literature, his remarkable quickness of comprehension, his more remarkable memory, and his mechanical talent and inborn engineering ideas, combined to give him a distinction that no engineer in the world will deny him—the best general writer in his profession.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

A Simple Question.

MESSRS. EDITORS:—It is reasonable, *a priori*, to assume that equal downward forces on the arms, A and B, are required to balance the rod on pivot, P; but the rod is balanced by a force of 1 on arm, A, against a force of 2 on arm, B. The downward pressure of 1, on arm A, is not increased by its



greater distance from the pivot, P, than force, 2, on arm, B, for the joint pressures on the pivot is only 1 + 2 = 3.

There is a law in nature, whereby the greater motion of a small force is made equal to the less motion of a greater force. But here there is no motion. How, then, does ar A, with half the force, equal arm, B?

Until a better explanation is given, we may suppose the greater force on arm, B, does, or rather would preponderate if the inseparable and simultaneous creation of motion infinitely small, did not arrest it, as with the parallel case of action and reaction. T. W. B.

Pittsburgh, Pa.

Scraping Slide Valves.

MESSRS. EDITORS:—I notice in a recent number an article on "Scraped Surfaces." From thirteen years' experience, I find that for all kinds of slide valves and such like, a really good scraped-up face is a most decided benefit. But it is a lamentable fact that few workmen know how to scrape properly. I have always found that the scraper works best after

a smooth file; everything should be finished with the smooth file previous to the scraper being used. I have seen many workmen leave too much to be done by the scraper. Now that is a gross mistake; every article ought to be fitted as well as possible before being touched by a scraper; otherwise a bad job is almost certain to be the result. The scraper should always be used obliquely to the file marks, never across at any rate. Nothing makes a better scraper for wrought and cast iron than a taper saw file, and for brass a flat scraper must be used if good work is wanted; say about 1 in. broad and $\frac{3}{32}$ in. thick. A saw file scraper is too keen for brass. In all railway shops in Scotland, scraping is much used and with the best results. We always scraped slide valves, motion bars and blocks, and axle boxes. It is certainly a very unworkmanlike way of turning out a slide valve, and leaving it to work itself tight. It is tantamount to saying it can't be made tight. Most of the first class marine engine builders in Great Britain scrape valves, etc. I know Penn, of Greenwich, tried last year to do away with the scraper on a pair of large valves; on the trial trip the valves got cut up awfully; so scraping is there considered a necessity.

Brooklyn, N. Y. Wm. P. Cowan.

Steam on Common Roads.

Messrs. Editors:—Quite a number of years ago I first saw a steam carriage in Brattleborough, Vt.; it was about the size and build of a common 1-horse wagon; its two cylinders were placed horizontally beneath the seat, and were connected by the usual pistons, cross-heads, and connecting rods, to a crank shaft, with a crank upon each end, and at right angles with each other; power being communicated from this shaft to the driving axle by a "chain belt."

The boiler consisted of a series of tubes bent U form, the lower branches of them serving for the grate and the upper branches for the crown of the fireplace, their ends terminating in two parallel horizontal cylinders, the fuel door being between them, the uppermost of the two cylinders being surmounted by a third of larger size for steam room; the tubes and their two connected cylinders being filled with water and cased with sheet iron.

This carriage worked quite lively on level ground and around a circle of from ten feet to twenty feet radius; but I noticed that the fire and the condition of the water in the boilers were matters of considerable care and solicitude with the operator, the fuel being wood, and the boiler containing but little water, the pressure varied greatly and constantly; now flowing freely from the safety valve and the carriage running vigorously, and then barely steam enough to move. There were both power and speed enough while steam was up. I was deeply interested in the novel exhibition, and expected to see, long ere this, steam vehicles in as common use as any other; and I have often wondered that the people should be so tardy in their appreciation of this mode of locomotion.

To be sure the association of boiler bursting has a terror for the inexperienced, but this will always vanish in proportion to the increase of intelligence upon the subject.

During leisure intervals in mechanical operations—especially while engaged in putting up railway engines—I have often busied myself in considering the best methods of applying the power of steam to common road use, both for heavy and light work.

The steam carriage enterprise was prosecuted quite vigorously in England some years ago, and the minutes of evidence taken in the investigation of the subject in the House of Lords are extremely interesting. It is well known that the result of this investigation amounted to almost a prohibition of the working of steam carriages on any of the populous and paying routes; the tolls imposed being so heavy that the proprietors of steam carriages are forced to abandon the enterprise to the "slow coach," podanger policy. Improvement must necessarily be slow while the paths of progress are thus beset with such adverse legislation.

F. G. Woodward.

Collisions on Railways.

Messrs. Editors:—Within the last few months I have noticed that, on railroads, where each train is designated by a number, and all trains are moved by telegraph, that several wild trains, standing on side tracks, have been mistaken for regular trains, and, as a natural consequence, in each case a collision, more or less serious, has been the consequence.

Could that not be remedied by superintendents of roads having the number of each train painted on a movable board attached to either side of the cape of the engines drawing the train. For engines regular trains a revolving tablet could be used, on which could be painted the numbers of both the trains (North and South or East and West) sufficiently large and prominent to be read by the engineer of any train passing another while it was standing on a side track?

For night trains, lamps, with numbers on them, could be substituted for placards.

On all wild or construction trains, the word "Wild," or "Construction," or "Irregular" could be used.

R. E. Pleasants.

Louisiana, Mo.

Buzzing Up.

Messrs. Editors:—I am glad to see the "buzzing up" process brought to notice in the Scientific American, *vide* page 252 "Explanation Wanted," C. H. Ladomus. Sure enough it is wanted. Fifty years ago the operation was to me a pastime, perfectly bewitching, and unaccountable as now. It is not (?) animal magnetism; I know as much about that as anybody—which is very little. What is it? C. H. L. is, I think, needlessly particular. A lies on his back, on the floor, ground, or an open lounge. B and C (two are as good as four) place their forefingers under the shoulders and hips of A. They breathe in concert by finger signal from A. At the exhalation B and C lift, but they don't lift; the least effort or grunt breaks the spell, and you must begin anew. Thus A is breathed up, the breath lasting, if you are adroit, till you raise him as high as you can reach, when you must catch him to prevent a fall. The head should be the highest and then he will come down on his feet. He will feel that the gravitation is out of him; B and C lift only the clothing. He feels—have you ever dreamed of flying? That is it exactly.

No need of a close or still room, Mr. L. It can be done out of doors, in a gale as well as in a closet. When you get the knack of it—and it has once cost me three hours to teach a class—any two boys of 12 or 15 years can toss up a Daniel Lambert like a feather. I do not know that any science can come out of it, but as an amusement, it is the richest thing I ever knew. Thousands of your readers understand it, but they have need to be touched up a little in order to enjoy it.

Princeton, Wis. W. M. R.

About Making Tea.

[From Good Health, for May.]

Potatoes, no doubt, are an important addition to roast beef, and the man who first planted them ought to have a statue raised to him. Some people may look with awe upon the rock near Salcombe, in Devonshire, where Sir Walter Raleigh smoked his first pipe in England. Indispensable as the potato, sweetly soothing as the tobacco plant, more thirst-quenching than *lachrymæ Christi*, or Bordeaux, invigorating as, but less soporific than beer, tea "cheers, but not inebriates," and seems to unite in itself the virtues of other modern luxuries, without sharing in their demerits. Tea in China, however, is not the same as tea in America. The Chinaman would as soon think of putting milk or sugar into his tea as we should think of flavoring champagne with salt. He is also far more particular about his cups and saucers than we are. He would laugh at many of our thick clumsy cups, called "china" by courtesy. His cup must be of a certain shape, ornamented with colors, which are always beautiful, and harmoniously arranged. He delights, most of all, in the delicate and transparent paper-china, that feels as light as a wafer, and is instantly heated through. The invariably stout and sedentary person, with useless feet, who sits all day, and sometimes all night, making tea for him, puts a few dry leaves into his cup, then pours the boiling water over them, claps a thin little saucer-lid upon the cup, to keep the steam in and draw the tea; and presently the tea is poured into that same little saucer-lid, and drank by John Chinaman, much in the style of our washerwomen. In Russia they make tea in tumblers, and flavor it with lemon and sugar. Some people add rum and drink it cold. In France if you call for tea, you will get a thin boiling fluid, which flows almost colorless from the tea-pot, and tastes something like warm water flavored with dandelions. Of course we mean to imply that our method of making tea is the only sound and proper one. We are not sure that we might not borrow the saucer-lid from the Celestials, but we must insist upon plenty of milk and sugar. At all events, in a free country we may fairly claim the liberty of the subject in this direction; but, alas! how few people know how to make tea! only middle-aged bachelors ever attain supreme excellence in this art, and perhaps a few gifted ladies who have been carefully instructed by them. How many of those unconscious damsels, who carelessly shovel in an indefinite number of spoonfuls, and drench the same with an indefinite quantity of half boiling water, realize the difficulties of the task they have so lightly undertaken! They confidently put their tea-pot on the stove, as they say "to draw," as if, forsooth, tepid water would ever draw the hidden treasure out of leaves that have, perhaps, been placed in a tea-pot only half warmed. Others pour you out three thimblefuls as strong as brandy, and then fill up your cup with pure water, and hand you this flavorless mixture, with the request that you will add milk and sugar according to your taste, as if any possible additions could make the wretched stuff drinkable. Some pour your tea into a cold cup, and deluge it with milk. Others merely tinge the fluid, already pale with weakness, thinking that the tea will look darker without much milk. Some give you a good first cup, and let the drained tea-pot stand till you call for a second; then they have the effrontery to fill it up under your very nose, and offer to pour you out any quantity of hot water, which they expect you to drink gravely, with milk and sugar, and call it tea. Others put in soda, and stir the tea-leaves with a spoon—some boil your tea! in fact, there is no end to the dreadful delusions practiced by women on themselves and their victims under the name of tea-making. Doubtless, there are certain rules which may be laid down, such as—see that the water boils; warm your tea-pot and cups well through; fill the tea-pot at least half or three-quarters full, or your tea will be cold, the water will not be hot enough to draw, or it will draw a little strong essence, which you will presently have to drown, and consequently spoil, with boiling water. Keep the tea as much as possible of an even quality. Let the second and third cups be at least as strong as the first. Dr. Johnson was a great connoisseur in tea, and used not unfrequently to take twelve cups. But such were Mrs. Thrale's experience and skill, that we do not hear of his ever being disappointed. But no rules will insure good tea-making. *Poeta nascitur non fit*, and it may be said similarly, you are born a tea-maker, but you cannot become one.

However, to be a good tea-maker is one thing, and to avoid being a very bad one is another; and we are certain, if ladies could be made to realize the importance of this delightful art, and if they only knew what excellent judges most men are of tea, we should soon have what is sadly wanted through out the country—a great reform in tea-making.

The First Artificial Fire.

Dr. Collas, in *Cosmos*, expresses doubt that the primitive races made fire by simply rubbing together two pieces of wood against each other. He claims that "the friction of two pieces of wood against each other is not sufficient to excite fire, and after what I have seen, I doubt very much if the strength of man is equal to such a task, even if it were possible. It is then not impossible, when we seek from the habits of men still in the uncivilized state, to learn the habits of pre-historic man, assisted by the utensils or relics which time has spared, to arrive at very definite conclusions concerning them.

"The savage, in making his fire is, according to the Sanscrit etymology, a veritable *Prometheus*, for he *hollows by rubbing* in order to *steal away* the fire. Without the groove which he wears he could not make fire. His method is to take two dry pieces of wood unequal in size and hardness. In the larger and softer he plows the groove. The other he bluntly points like a pencil. The larger being firmly supported against a tree or a large rock, the smaller is pushed backward and forward at an angle, in such a way that a groove is formed, making at the same time a mass of fine shavings, or rather a sort of powder which he gathers up at the extremity of the groove opposite to him. The powder soon blackens and smokes, then takes fire, but the *powder only*, and not the piece of wood. Sometimes sailors have attempted the same thing, and have succeeded in blackening the powder and causing it to smoke, but I have never known one to inflame it. Our attempts have been successful in increasing the depth of the groove, but so far as heat was concerned, beyond blackening the powder, we have produced only that which induces prespiration.

"If now we take into consideration the rôle of the powder, the amount of unskilled labor which I have seen lost in *rubbing* pieces of wood with which, without great effort the young Kanack could procure fire, we are led to think that it would be difficult to make a fire with a piece of wood revolving like a drill. With equally good reason we shall conclude that the rocks (*pierres*) found near pre-historic dwellings served another purpose than that of making a fire, and that the piece of granite from Lake Fimon was a household utensil probably analogous to those which the inhabitants of India now possess, and which they use for bruising many substances used as food, whether by pounding them, or by crushing them under a stone roller."

English Steam Plows in Louisiana.

A writer in the *New Orleans Times* gives an account of a visit to a plantation known as the Magnolia Sugar Estate one of the largest in the country. Among other interesting things he witnessed the operation of some English steam plows. We cull a few paragraphs from his description:

"This new implement of agriculture consists of two ten-tun portable engines, resembling the old locomotive that many of our readers probably have noticed at the lake end of the Pontchartrain dept. Beneath each locomotive is a revolving steam drum, on which passes the steel corrugated wire rope that draws to and fro the cultivator, to which are attached some ten steel tipped plow blades. The cultivator is an iron frame, with a seat at each end, and mounted on two iron wheels. On top of the cultivator sits a colored boy, who by means of a simple tiller directs the progress of the plow. The locomotive engines are situated directly opposite to each other, about two acres in distance. By means of the steam drum and the rope the cultivator traverses the field back and forward much faster than a man can walk, and turning up the soil to a depth of eighteen to twenty-two inches in a more effectual manner than could be done by the old system; a harrow some eight feet in length is used over the same field, and is propelled with great ease by the same motive power.

"Mr. Lawrence, the proprietor of the estate, has four of these plows in operation, which easily turn over twenty-four acres a day, at a cost, including fuel and labor, of some three dollars per acre, which is quite a saving over the method heretofore pursued. There is no apparent intricate machinery about the work; the whole seems to work as smoothly as an ordinary standing grist-mill; the locomotive trails over the road quite easily, propelled by steam. Mr. Lawrence, last fall, took off a crop of over six hundred hogsheads of sugar, the entire plowing having been performed by the steam apparatus. The plow, locomotive, etc., were constructed by a firm in Leeds, England, and cost, exclusive of freight, etc., some £1600. The first one imported to this country is now in New Jersey; one subsequently was sent to Illinois, which has lately been sent to this State, and is now in operation at the Concession Plantation, in the parish of Plaquemine, where it is said to give great satisfaction."

Preservation of Stones.

Dr. Robert, in the Paris *Les Mondes*, maintains that the use of the black oxide of copper, and its salts, will effectually prevent change in stone. He shows that the decay of granite, marble, limestones, sandstones, and all natural building stones, is the combined effect of various causes, and that among these is a very minute lichen, the *Lepra antiquitatis*, which is one of the worst enemies of stone, and its action is to such an extent that, for instance, the beautiful marble sculptures of the well-known *Parc de Versailles* will, unless proper measures be taken for staying the process of decay, be unsightly and ugly masses of dirt, and quite irretrievably lost, as works of art, within the next fifty years. The author, taking as instances such buildings at Paris as the Bourbon Palace, the *Palais du Corps Legislatif*, the Mazarin Palace

(*l' Institut*), the Mint, and others, points out that dust, spider's webs, and the action of rain, combined with the minute lichen above alluded to, hasten the decay of stone, especially of those parts where any sculpture or ornamental carving promotes the deposition of dirt and dust. Various places and instances are cited, of the application of oxide of copper and its salts, which places are open to inspection, and the length of time which has elapsed since such application, seems to warrant the conclusion that these compounds act as preservatives of stone. In reference to granite, the author states that this stone is also, according to the experience of Egyptian engineers, far more readily affected by a moist climate than one would be led to believe. The obelisk of Luxor, brought from Upper Egypt to Paris, has become blanched and full of small cracks, during the forty years it has stood on the Place de la Concorde; although forty centuries had not perceptibly affected it, as long as it was in Egypt. Granite, in a moist climate, becomes the seat of a minute cryptogamic plant, which greatly aids its destruction, and it is, moreover, a well-known fact, that the disintegration of this stone, which is composed of three separate minerals (quartz, mica, and feldspar), depends very greatly upon the thorough and intimate mixture, as well as the chemical composition of these three ingredients, each of which, in a separate state, more easily withstands the influence of the weather.

Thames Mud Butter.

A paragraph was recently published in the London journals about the adulteration of butter, in that city, from a product of the Thames mud. At the time of that publication, there was some doubt in our minds as to whether the report had foundation in reality, or whether it was one of those sensational newspaper reports which our British Cousins seem to relish, as well as their Yankee relations. Morgan's *Trade Journal* now reasserts the statement, and gives the following particulars:

"An analytical chemist has extracted from a portion of Thames mud, taken from the river at Battersea, a pure white fat. At this stage it lacks both taste and smell, but properly manipulated, it makes a very popular article of food—whether traceable to the refuse of manufactories and of ships or other sources it is impossible to say. That there is, however, no doubt about the fact is proved by the circumstance that about a week ago a small proprietor on the bank of our noble stream, thunderstruck by the apparent extravagance of an offer for his wharf, learned that it was a very favorable situation for a butter factory. Now, the faster this secret oozes out of its discoverer's brain into the receptive organs of other impostors, the faster, of course, will the mud which it utilizes be made to ooze out of its native bed into pats of London butter, which, if the truth as to its origin were fully told, would be stamped with a likeness, not merely of a cow, but of Father Thames. Unfortunately, knowledge of adulteration is not a step toward its suppression. We must grin and bear it, although we are quite awake to the fact, that our milk is sluiced with water, our stout colored "a fine brown" with liquorice, and our butter likely enough to be enriched with the fertilizing properties of mud. What are we to do, when one proverb warns us that every one eats a peck of dirt before he dies, and another, never to quarrel with our bread and butter, not even when the latter is mud pie with a vengeance—of the earth, earthly indeed?"

The Oxygen Light.

According to the *Opinion Nationale*, Paris, the new *Prefet de la Seine* has definitively authorized the Tessie du Motay Company to lay their underground communications in the city of Paris for illuminating with oxygen gas.

A system of pipes will connect the oxygen works of Pantin with the boulevards, and in a few months all the inhabitants residing between the "new Opera" and the Passage Jouffroy, will thus be enabled to benefit from the immense advantages offered by this new light over the old gas.

Already oxyhidric lanterns have been placed at the entrance of the bazar European, near the Passage Jouffroy, and project a light of the purest white and the most dazzling brilliancy, near which the old gas pales and appears to shine with the most singular yellow color.

The journal referred to congratulates M. le Prefet de la Seine for having ratified a measure in accordance with the general wishes and interests of the people, and which appears to it to be the indispensable corollary of the great improvements undertaken within a few years in Paris.

Medical Properties of Eggs.

The white of an egg has proved of late the most efficacious remedy for burns. Seven or eight successive applications of this substance soothes pain, and effectually excludes the burn from the air. This simple remedy seems preferable to collodion, or even cotton. Extraordinary stories are told of the healing properties of a new oil which is easily made from the yolk of hens' eggs. The eggs are first boiled hard, and the yolks are then removed, crushed, and placed over a fire, where they are carefully stirred until the whole substance is just on the point of catching fire, when the oil separates and may be poured off. One yolk will yield nearly two teaspoonfuls of oil. It is in general use among the colonists of South Russia a means of curing cuts, bruises, and scratches.

TO CLEAN MARBLE.—Take two parts of common soda, one part of pumice-stone, and one part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.

The Osmogene Process.

The inventor of the Osmogene process, for purifying molasses, M. Dubrunfaut, has lately reviewed in the columns of the *Journal des Fabricants*, the progress which his invention has made, and the extent to which it is adopted in the French sugar manufacture. We are not aware that the process has been introduced into this country in a single instance, indeed, it is chiefly valuable for operating on beet-sugar molasses, on account of the soluble salts, which are the chief impurities of this sirup, and which the Osmogene process is so efficient in removing.

M. Dubrunfaut first made public his adaptation of the principle of dialysis in a work presented to the Academy of Sciences, in November, 1855, in which he announced that he had succeeded in applying the power of Osmose to the separation of certain mixtures.

Dutrochet appears to have been the first to study the peculiar behavior (called Osmose) of saline solutions when separated from water, etc., by a diaphragm of a membraneous nature. He was followed with greater accuracy of results by Vierordt, Professor Jolly, and by the closer researches of Graham. The term Osmose, derived from a Greek word signifying impulsion, comprises the two terms endosmose (diffusion through inwards) and exosmose (diffusion through outwards). The first experiment in connection with it was performed by suspending a closed bladder holding a saline solution in a vessel nearly full of water. The salts passed through the bladder into the water at a certain speed, and the water entered into the bladder at a certain speed, but the velocity of diffusion was not alike in each. The more rapid flow from the thinner to the thicker fluid was called endosmose, and the opposite slower current exosmose. It is this principle of dialysis, or diffusion, which M. Dubrunfaut successfully adapted to the purification of beet molasses and the extraction of sugar contained therein. These molasses are a mixture of sugar and different salts, chiefly nitrate of potash and chloride of potassium, which retard and in certain cases prevent the crystallization of the sugars which are present with them. If, then, the proportion of salts in the molasses can be diminished by whatever cause, the molasses will furnish a further quantity of crystallizable sugar.

This result M. Dubrunfaut obtained by placing in the endosmometer of Dutrochet molasses of the usual density in the presence of water, and then causing two currents to flow; a strong one forces the water against the molasses, the other, more feeble, forces the molasses against the water, a diaphragm separating the two. The effect is such that the molasses parts with the greater part of its salts to the water, but with little or none of its sugar, so that the molasses remaining contains much less salts and nearly the same proportion of saccharine, which, by the usual operations of the refinery, may be separated in the form of crystallizable sugar.

Such is the principle of this mode of treatment of molasses and other saccharine liquids, and to the apparatus for carrying it out M. Dubrunfaut has given the name of an "Osmogene."

In an osmogene there are two distinct reservoirs separated by a permeable partition. One of these receptacles contains the molasses or sirup, the other is filled with water; the medium separating the two liquids is of parchment paper.

Each receptacle consists of a casing, the top, bottom, and ends of which are of rather thick wood, while the sides are furnished with parchment paper; each casing is about 3 feet in length, 2 feet in breadth, and ¾ of an inch in thickness. Four bars of wood divide the interior of the casing lengthwise into five compartments, which communicate with each other by an opening in each bar. On each side of the casing is fixed a leaf of parchment paper, kept in place by slender strings. Thus, when the molasses is allowed to enter at the lower part of the casing, it rises in a serpentine manner through the five compartments to the top of the casing whence it may flow out.

A second casing, exactly similar for the water, is joined to the first in such manner that one leaf of parchment paper serves to separate the two cases. This pair constitutes what may be called a set or couple of osmogenes, but as one couple would allow of the treatment of only a small quantity of molasses, a number of these double casings are united, say 25 for water and 25 for molasses, which work simultaneously. The result is, of course, according to the number of cases employed, and it is the union of these cases which is called an osmogene. It is only requisite for success that all the cases of molasses and all the cases of water should fill and empty themselves simultaneously, as if only a single couple were being operated with; to effect this, the molasses enters at the bottom of one end of the series of cases, and a tube communicates with each, the water entering by the top filling simultaneously every water casing and flowing out at the bottom.

There is thus maintained a constant efflux of molasses and water in the osmogene, the two liquids being all the time kept separate during their course by the membrane of parchment paper.

Dr. Charles A. Lee on Water as an Element of Organic Life.

Water is another factor of organic life. Without water no chemical or vital change can take place in the living body. Water enters into the composition of all organic beings. A large number of animals have their existence determined by water. A man weighing 150 lbs. contains 111 lbs. of water in his tissues. The oxygen that vitalizes his tissues is conveyed by water. The starch, the fat, the albumen, so necessary to the existence of animals, are all digested, absorbed, and conveyed to the tissues by water. These substances through whose chemical change life is possible, are decomposed in the presence of water, and the products of this decomposition are carried off by the agency of water. All the higher animals drink water for this very purpose; and the adult human being, on an average, in one form or another, takes from 70 to 80 ounces of water daily. Water is the most potent of chemical agents; its solvent power is equal to that of the mineral acids, and it associates itself in nature with a vast variety of compounds with which it comes in contact in the external world. It dissolves both organic and inorganic matters, hence it may become so contaminated as to be unfitted for the purposes of life. From the inorganic world, it may take up the salts of lime, iron, lead, copper, arsenic, and other compounds in such quantities that, when taken into the human body, it is not only unfit for healthy life, but it may become the source of immediate disease or death. Like the air, it may become the medium of introducing those definite organic poisons, which, kindling similar poisons in the living system, are at once the source of disease to others, and the death of the individual suffering from their action. Hence, among hygenic inquiries, none, perhaps, are more interesting and important than those relating to the quality of the water we drink; and not only this, but as connected with washing, cooking, and manufacturing purposes.

Modifications in the Construction of the Nest of the Swallow.

In the tenth number of the *Comptes Rendus* for the present year, is a paper by M. Pouchet, on the modifications of the nests constructed by the common swallow, in which he remarks that it is evident the mode of life of certain animals, far from being persistent and invariable, undergoes modifications under different terrestrial conditions, and that, in many instances, their habits are different from what they were in former ages. Spallanzani indeed remarks in one of his remarkable memoirs on the swallow, that the shape and structure of the nests of birds are interesting features in their history, and that each species constructs its habitation on a plan peculiar to itself, which never changes, and is continued from one generation to another. And this opinion is shared by many naturalists; observations, however, when sufficiently close and attentively made, show that it is erroneous. We do not indeed see any modifications of those of their habits which are associated with their biology, so that the arboreal species seek to form for themselves a subterranean nest, or rear their young ones in dwellings adherent to the coigns of our houses, but it nevertheless is ascertained that in a succession of years, each learns to improve the construction of his residence. Certain birds work up only the products of our own handiwork, and would necessarily employ natural substances if these were deficient. Thus, as may be seen in the museum of Rouen, the Loriot of Europe sometimes forms its nest with thread ends under the branches of trees, which cannot possibly be the natural method. For several centuries the common swallow has disported itself in our crowded cities, and with its friendly masonry attached itself to our houses. The chimney swallow, still more familiar and audacious, often builds in the smoky shafts of our domiciles, or even in the noisiest factories, undisturbed by the din or the fires or the movement around them. Such habits must form a strong contrast with those of their predecessors in times long gone by. When we ourselves wandered untutored savages in the prehistoric times, or when still later we constructed lacustrine towns, or megalithic monuments, the habits of the birds can scarcely have been identical with those of today, for such human edifices afforded little security or shade. They must then have built amongst rocks. Nearly the same remarks apply to the storks, which have not remained stationary, but have preferred to their less commodious dwellings those offered to them by man. These changes in the industry or the manners of birds are perhaps even more rapid than we might at first sight suppose; and M. Pouchet's observations have demonstrated to him that notable improvements have been adopted by swallows in their modification during the first half of the present century. Having directed a number to be collected for the purpose of having drawings made from them, M. Pouchet was astonished to find that they did not resemble those he had collected some forty years ago, and which were still preserved in the museum of Rouen. The present generation of swallows have notably improved on the architecture of their forefathers, amongst those still building in the arches and against the pillars of the churches. Some, however, still adhere to the old methods, or such nests may possibly have been old ones which have undergone reconstruction. In the streets, on the other hand, all the nests appeared to be constructed on the new method. And now for the differences observed. The old nests show, and all ancient writers as Vieillot, Montbrillard, Rennie, Deglann, etc., describe the nest of the house-swallow as globular, or as forming a segment of spheroid with a very small rounded opening, scarcely permitting the ingress and egress of the couple that inhabit it. The new nests, on the contrary, have the form of the quarter of a hollow semi-oval with very elongated poles, and the three sectional surfaces of which adhere to the walls of edifices throughout their whole extent, with the exception of the upper one, where the orifice of the nest is situated; and this is no longer a round hole, but a very long transverse fissure formed below by an excavation of the border of the section, and above by the wall of the building to which the nest is attached. This opening has a length of nine or ten centimeters and a hight of two centims. M. Pouchet considers this new form affords more room for the inmates and especially for the young which are not so crowded, whilst they can put out their heads for a mouthful of fresh air, and their parents. Lastly, the new form protects the inhabitants of the nest better than the old one, from rain, cold, and foreign enemies.

Improved Cherry Stoner.

On page 289, Vol. XVIII., of the Scientific American, we published an engraving of a neat and ingenious device for removing the pits from cherries, plums, and the like, and also the seeds from raisins, cranberries, etc. Since that time the machine has been greatly improved, and a very different form given to it, although the principle of removing the pits by punching, is retained.

The improved form of the machine, which we illustrate in connection with the present article, was patented by George Geer, of Galesburg, Ill., the inventor of the former machine.

It is screwed to the table by a hand screw, A. An upright, B, supports the body of the machine. The fruit is held in the left hand as shown in the engraving, and rolls down along a gutter, C, and enters the small cups in the periphery of the annular wheel, D.

E is a double crank from which a link, F, imparts vertical, reciprocating motion to the cross bar, G, and also to the recurved punching bar, H. Each time the cross bar, G, rises, a stud, I, engages with one of the cups on the annular wheel, D, turning it along one-eighth of a revolution, and bringing another cup directly under the point of the punching bar, H, carrying with it the fruit which has fallen into it from the gutter, C. Each of the cups has a hole through the bottom large enough to permit the passage of the pit; and when the punching bar descends by the rotation of the crank, it pierces the fruit and forces the pit through the bottom of the cup, into the chute, J, whence it falls into a dish placed to receive it.

The point of the punching bar is branched into four short sharp prongs, so that it cannot slip to one side of the pit; and a plate, K, prevents the fruit from rising with the punching bar.

Thus the pits may be removed almost as fast as a child can turn the crank, and the operation is so rapid that the juice does not escape, and the fruit retains its natural shape and appearance.

This ingenious and useful invention is manufactured by Geer, Stewart & Brother, Galesburg, Ill., to whom all communications should be addressed.



GEER'S IMPROVED CHERRY STONER.

Improved Screw-Driver.

In an article published on page 393, Vol. XVIII., of the Scientific American, discussing the reason why a long screw-driver will put in a screw easier than a short one, we showed that the fact was attributable solely to increased leverage. The device which forms the subject of the present article, and of which an engraving is given, secures increased leverage at the will of the workman without increased length, and will for many kinds of light work also take the place of the bit-stock or brace for drilling, boring, etc.

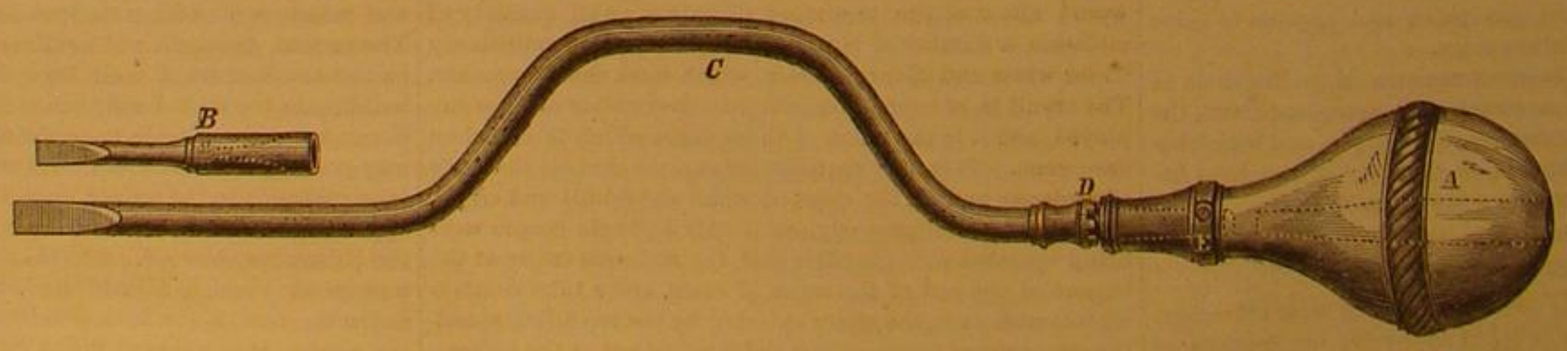
In the engraving, A represents a wood handle, having a recess to receive and retain, when not in use, a second and smaller point, B. This recess is indicated by the dotted line. This supplementary point has a sleeve, indicated by a dotted line, which slips over the point of the larger screw-driver.

The shank, C, of the larger screw-driver is bent in the form shown. At D is a clutch, one portion of which is formed on the shank, and its counterpart on the handle, and underneath the ferrule.

The extremity of the shank, C, in the interior of the handle, has a turned groove, into which the point of the screw, E, enters, and holding the handle so that the two portions of the clutch cannot engage with each other, permits the shank, C, to be revolved like an ordinary bit-stock.

When it is desired to use the tool with one hand, the screw, E, may be turned out a little distance, when its point no longer enters the groove, and the counterparts of the clutch at D, engage with each other. The shank will then turn with the handle, and may be used precisely like the ordinary screw-driver, except that when it is necessary to use the power of both hands in driving home a large screw, an increased leverage is gained by the curvature of the shank.

It will also be obvious that bits properly formed may be placed on the end of the large screw-driver in the same manner as the supplementary point, B, above described, when the instrument will take the place of the ordinary bit-stock.



DRUMMOND'S IMPROVED SCREW-DRIVER.

Various styles of handles may be employed which will suggest themselves to manufacturers. It can be made of wood or metal, and constructed to carry a "kit" of small bits if desired. The inventor would like to communicate with manufacturers in regard to the making or introduction of the device. Address David Drummond, patentee, McGregor, Iowa.

Who Named the Pacific Ocean?

It was Ferdinand de Magelhaens, or "Magellan," as he is usually called, who named the Pacific ocean. Balboa discovered it, from the Isthmus of Darien, several years before, but did not give it the name. Magellan was a native of Portugal, but had been several years in the service of Spain, when he formed the design of going westward from Spain to the East Indies. He started with five ships, in 1519; reached South America in safety, but had to quell a mutiny among his rascally crew before proceeding further. Then, continuing his voyage, he passed through the remarkable strait which bears his name, thus saving hundreds of miles of navigation around Cape Horn, where it is said, "Forever and ever the wildest winds of heaven seem let loose to vex the ocean into madness." Then finding the waters so much more placid than the Atlantic, he named the ocean Pacific. He reached the Ladrone islands, and thence the Philippine islands, where he was killed in a quarrel among the natives. His ship was conducted by Cano, one of his officers, onward to Spain, being the first that had circumnavigated the globe. The voyage occupied three years and one month.

Cellars.

There ought to be no cellars under any dwelling, because they are always more or less damp and musty; and are the receptacle of every variety of substances subject to decay, decomposition, and the promotion of unhealthful gases and odors; not one cellar in a thousand, either in town or country, is clean or dry; and as any housekeeper may verify in ten minutes. Cellars are usually cluttered up with old barrels, boxes, casks, bottles, cast-off boots, shoes, hats; with bones, ashes, and various remnants of wilted and rotting potatoes, turnips, apples, and other varieties of fruits and vegetables; it is the gases, the emanations, arising from these things, which cause the worst forms of typhoid and other malignant fevers. It is a benevolent arrangement of the wise and good Ruler of us all that pestiferous gases are lighter than the common air, and rise with great rapidity in warm weather to the regions of the clouds, where they can injure no one, and are either purified or resolved into their elementary conditions. Thus the disease-engendering atmosphere of the cellar, rises upwards, penetrates the crevices of the flooring, and would escape from the building, but is confined to the parlors and chambers, especially on the highest floors. This is particularly the case in New York City where the only entrance to the cellar is within the building; hence, every time the cellar door is opened, a crowd of foul emanations rush upward to impregnate the air of every apartment in the house. Very many of the ceilings of cellars are not even plastered; when really they ought not only to be plastered, but the eight or ten inches between the floors and the plastering, should be filled with charcoal or ashes. We have seen water closets under the stores in Broadway, which, for conditions of filthiness, are an utter disgrace to civilization. From considerations above named, the cellar should be the cleanest apartment in every dwelling; and in this moving time of the beautiful May, when perhaps half the dwellings change occupants, it is peculiarly convenient, when a cellar has been emptied by the movers out, for those moving in, to have the cellar most completely emptied of every thing not fast attached to the building; let every avenue of grating, door, and window be left open day and night for at least a week; the floor, walls, and ceilings or joists should be swept several times; the walls and ceilings whitewashed with two or three coats; the floor well washed and then rinsed with water, and unslacked lime or powdered charcoal should be liberally scattered wherever there is any appearance of dampness, so as to absorb all odors arising from moist and dark places. In a large district in a city the cholera appeared in only one house, traced to a pile of kitchen offal in a dark corner of the cellar.—*Hall's Health Tracts.*

Bosquillon on the Secrets of Longevity.

"To chew well and to walk well," said Bosquillon, "are the greatest secrets of longevity that I know of." One of the most pernicious habits that can be acquired is that of eating fast. The loss of teeth is not necessarily conducive to a short life, if the imperfection in chewing is remedied by a more careful and slower process. Simplicity in diet is another great point. Two, or at the most, three dishes ought to suffice, but monotony should be avoided. There should be variety in simplicity. It is also of importance to preserve a certain degree of regularity in repasts. The number of repasts may vary with age and constitution; but three repasts, a light breakfast, a good dinner in the middle of the day, and a light supper, are admitted more favorable to health than late dinners, which leave the stomach unoccupied for a long interval, and overloaded at night. It is further of importance that the mind should be at ease during meals. That which is pleasant promotes digestion; everything that is the reverse is obnoxious. Plutarch declared laughter to be the best sauce. Exercise should precede alimentation, not follow it.

Welding Iron to Copper.—It is said that the Pennsylvania Railroad Company have just concluded a series of experiments on a new process recently discovered by Mr. Beazel, a Pennsylvanian, which welds copper and all grades of steel and iron together at one heat so that they cannot be separated, even when upset and beaten down under a steam hammer. After subjecting it to every test at their shops at West Philadelphia for the last two months, the company have purchased the right to use it in their workshops.

To Bronze Gun Barrels.—Dilute nitric acid with water, and rub the gun barrels with it; lay them by for a few days then rub them with oil, and polish them with bees' wax.

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To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums in the country.

THE AMERICAN MUSEUM OF NATURAL HISTORY.

The want of a public museum of natural history and of a zoological garden in the city of New York, has long been felt, and has been frequently discussed in our papers, but all of the efforts at remedying the defect, that have hitherto been tried, have failed for want of means. It is therefore with pleasure that we observe a new movement on the part of some of our enlightened and wealthy citizens to establish a museum in the Central Park, that shall recall many of the best features of similar European institutions, and be secured from political interference, by remaining the property of a private corporation.

The first annual report of "The American Museum of Natural History" has just been published, from which we gather some interesting facts.

It appears that in December, 1868, a number of gentlemen addressed a letter to the Commissioners of the Central Park, expressing their desire that a great museum of natural history should be established in the Park, and inquiring if the Commissioners were disposed to provide for its reception and development. A favorable answer having been received, steps were taken to obtain an act of incorporation, and to solicit subscriptions.

In a few weeks the sum of $44,550 was secured, and the purchase of collections at once begun. A valuable suite of North American birds, containing over three thousand specimens, was procured of Mr. D. G. Elliot, and Mr. Bell, a distinguished taxidermist, was employed to mount them. The committee to whom the matter was referred, having heard that the collection of the late Prince Maximilian of Neuwied were for sale, at once requested Mr. Blodget and Mr. Elliot, who were traveling in Europe, to take measures to secure them. The price paid for the collection was £1,500 sterling, and it is now on its way to America. The collection consists of 4,000 mounted birds, 600 mounted mammals, and about 2,000 fishes and reptiles mounted and in alcohol.

The presence of Mr. Elliot in Europe has been of great importance to the Board of Trustees, as he is familiar with several departments of natural history, and can aid in making proper collections of objects to be purchased. He found a dealer in birds and animals in Paris, who had accumulated a vast collection of curiosities, and of him he secured specimens to supplement the collection of the Prince of Wied. This was much better than to purchase the whole collection, for which the price of $45,000, gold, was asked. Of M. Verreaux, Mr. Blodget and Mr. Elliot secured 2,800 mounted birds, 220 mounted mammals, 400 mounted skeletons of mammals, birds, reptiles, and fishes, at a cost of $16,000 in gold, and of M. Vedray 250 specimens of mounted mammals and Siberian birds have been purchased. In addition to the above, many valuable objects have been presented to the Society by Baron Osten-Sacken, Mr. Robinson, and others, and they have now a collection that when properly exposed, will be a great source of instruction and amusement to our citizens.

The temporary place of deposit assigned by the Commissioners of the Central Park for the collection is the upper story of the Arsenal. The whole of this floor has been fitted up with cases, at the expense of the Commissioners, and the work of unpacking and arranging can now be rapidly carried on.

The trustees of the American Museum employ their own curators and pay them their salaries, but the police force and servants will be furnished by the Park authorities. The trustees of the Museum have the right to exhibit the collections in their own name, and we suppose for an entrance fee, three days of the week; all the rest of the time they will be open to the public free of charge.

Perhaps the most important clause in the agreement made between the Trustees and the Commissioners, is the one relating to the ownership of the collections. The Trustees have the right to remove their property upon giving six months' notice, and the Commissioners can require them to move the collections upon the same terms. In the event of the control of the Park passing into the hands of politicians, as it may easily do by act of Legislature, and of an attempt to make the Museum a source of speculation, the Trustees can withdraw their collections, and save them from falling a prey to these unprincipled men. The chief anxiety of thoughtful citizens has been to keep the educational facilities of the Park out of the hands of the city authorities, and it has been proposed to put the Zoological garden under the control of a private corporation for this purpose.

The recent unceremonious way in which the former Commissioners of the Central Park were legislated out of office is a fair illustration of what may be expected in the future. It is a pity that the Zoological Society was permitted to become extinct, as it could have occupied the grounds set apart for the garden, on the same terms as the Trustees of the Museum of Natural History now hold possession of the Arsenal, and in case of a change in the rules of the Park, the collection of live animals could have been saved from being sold or used as a source of profit to unplaced office seekers. As it is now, there is no guarantee that the Zoological garden may not be looked upon as a tempting field for a class of biped animals who have a keen scent for rich pastures where the work is light and the pay heavy.

The Trustees of the American Museum of Natural History close their report with an appeal to the public for further assistance; they say that the present subscription list of $52,000 should be increased to at least $100,000, and in this appeal they ought to have the sympathy and practical aid of our citizens. We also notice in this connection that the Legislature of the State of New York have changed the name of the State cabinet at Albany, and have put it under the direction of Professor James Hall. The Albany geological specimens are typical ones, and are of the utmost importance to the scientific men of the whole country, as they afford the key to the geological nomenclature of the United States. There is, therefore, great wisdom in carefully preserving them and intrusting them to the geologist who has given names to the groups of rocks in the State, and has done more than any other to illustrate and explain the relative position of American formations. The Legislature also authorized the presentation of duplicates to the American Museum of Natural History in New York.

THE DANGERS OF DRUGS.

The public mind has been much exercised of late by recitals of fatal mistakes of those whose business it is to deal out drugs and medicines; and our countrymen have been rather taught to believe that these mistakes were in a great degree attributable to the looseness of our laws and our want of system in this important regard; and that in other countries where a better system prevailed such mistakes rarely or never occur. There is some truth in this prevailing idea, and much might undoubtedly be done and should be done to prevent the recurrence of such accidents.

Indeed the public can hardly be aware of the disgraceful, and, in view of the possible consequences, alarming ignorance of many of those engaged in the retail drug business. We frequently receive letters (from the country of course), asking information relative to some of the most common substances, which the writers had been unable to obtain at their village drug store, simply because the articles had been inquired for by the technical or chemical name of the substance required. We this week received such a letter asking information as to *chloride of sodium*—common salt—and as to the bi-sulphide of carbon—the latter of course not so common as the former, but still a chemical with which every druggist should be familiar.

Is it to be wondered at that when men, so deplorably ignorant of the very rudiments of knowledge necessary to their business, are intrusted with the dealing out of medicines, many of which, as everybody knows, are active poisons, fatal mistakes are frequent? In fact is it not rather a wonder that we are not more frequently called upon to chronicle such sad results?

That such mistakes, however, are possible in other countries than ours, is evidenced by the following case, reported in the *Chemist and Druggist:*

"An inquest was held at Pemberton, near Wigan, on the body of William Richardson, collier, aged 26, who had died on the previous Sunday immediately after taking a powder which he had obtained at the surgery of Messrs. Johnstone and Beaman, surgeons, Upholland. Mr. Peace, solicitor, appeared on behalf of Mr. Johnstone, who had dispensed the medicines, and stated that by an unfortunate mistake strychnia had been administered to the deceased instead of santonine. Mr. Johnstone had only recently entered upon the practice, and was not aware that any strychnia in a crystal state was in the surgery. The bottle was not labeled, and was in a cupboard in which the santonine was kept.—Mr. George Warwick Johnstone, the surgeon who dispensed the medicine, gave evidence. He said he was not at the time aware that there was any strychnia in a crystal form in the surgery. The bottle was not labeled poison, and in several respects it resembled the one in which santonine was kept.—The verdict of the jury was to the effect that death had resulted from censurable oversight on the part of Mr. Johnstone, and that, in the opinion of the jury, great blame was attached to those who placed the bottle in the closet without a proper poison label."

Here we have an instance of gross carelessness, but in this country we fear carelessness and ignorance are often combined. There ought to be legal enactments that shall secure either carelessness or ignorance from tampering with human life.

Educated and competent chemists are now forced to compete with those who have not the first qualification for dispensing drugs. It was only last week that we sent a very plainly written prescription of an eminent practitioner of this city, copied under his supervision in plain, unmistakable handwriting, to a dyspeptic friend in the country. The prescription was returned with the message that the local druggist (sic) could not make it out; yet every drug was officinal, and to each the correct name, as found in the U. S. Dispensatory, was given.

The competent druggists of this country owe it to themselves, as well as to a too credulous public, that this evil shall be corrected. They should ask and press for the enactment of such a law as will forever exclude ignoramuses from their responsible profession.

STEAM BOILER INSPECTION.

In our issue of April 23d, we published an article upon Steam Boiler Inspection, which has called forth a communication from the steam boiler insurance company therein referred to. This company proves to be the Hartford Steam Boiler Inspection and Insurance Company, whose advertisement has often appeared in our columns.

This letter puts a somewhat different face upon the matter, and corrects a misapprehension derived from the statements of a Chicago paper upon which we based our remarks.

It seems that the company referred to had commenced business in Chicago before the inspection law was passed, and it was simply asked by the boiler owners who had insured and were under guaranteed inspection by the officials of the company, that they should be exempt from the inspection of the city officials. In other words, it is desired by the parties interested that the inspection of the company shall be accepted in lieu of the other, for all such boilers as are under regular inspection by the company. It was not asked that such boilers as are not under the supervision of the company should be inspected by them.

In this point of view we certainly see no injustice in exempting insured and regularly inspected boilers from other inspection. There is certainly the strongest guarantee that such inspection would be faithfully performed, namely, a pecuniary risk attending upon neglect.

We are informed that the company make their inspections quarterly, the inspection being done by salaried experts, whose positions depend upon the faithfulness with which their duties are performed.

Provision was made that if from any reason, for any boiler thus left in charge of the company and exempted from inspection by the city officials, the company should decline to continue a risk, or if the insured should decline to make necessary repairs, the company should at once report the same to the City Inspector so that no boiler might go uninspected.

We are told that although the post of City Inspector has been in several instances proffered to the company, it has been uniformly declined as conflicting with true business policy; and that the company neither ask nor desire any special legislation in their favor.

The plan proposed in Chicago was suggested by the steam users themselves, and in the light of our present information we see nothing objectionable in it.

The company further avow their belief in thorough inspection laws, and indorse our views as expressed in the article alluded to above, in regard to the payment of liberal salaries to competent men, and minute examination for defects.

We are, however, informed that in the experience of the company it has been found that the responsibility of city and State officials rests very lightly upon them, and that where there is no competing element their work is generally very much neglected, a statement which the great number of explosions constantly occurring seem to confirm.

As we said in our former article we believe the system of boiler insurance a good one, and regard it with hearty favor; and we are glad that we can thus, on official authority, make a disavowal of what we felt sure was calculated to greatly injure its usefulness.

MECHANICAL RECREATIONS.

The purpose of this article is to show that mechanical employments furnish the most healthful and delightful recreations for such as are not constantly employed in them.

The purpose of recreation is as the term implies to re-create or renew the exhausted energies of mind and body Perfect rest, such as is secured by good, sound, refreshing sleep, is of all the means by which this is accomplished, the most powerful.

It is true food is the fuel by which the human engine runs and does work, but the analogy between a machine constructed of lifeless material and the animal economy ceases when we consider anything beyond the mechanical power of muscular movement derived from the consumption of food.

The human machine includes within itself a directing

power which wearies and wears, and cannot be continuously employed in a single direction without fatigue. The wise Solomon saw that much study is a weariness to the flesh. And modern physiologists have not failed to see that undue manual labor impoverishes and enfeebles the mind.

The will concentrated long upon compelling the muscles to perform a certain routine of movement, finds itself at length powerless to command. It must then cease exertion entirely as in sleep, or it must exert itself in some new direction. This is what is commonly called recreation, that is, an occupation which affords an agreeable contrast to that which has caused fatigue.

We think it is indisputable that any employment which exacts moderate muscular activity, at the same time interesting the mind by employing its powers upon such topics as do not arouse the animal passions, while they moderately engage the higher mental powers, has in it all the elements of healthy recreation. In our opinion nothing whatever so combines these elements and furnishes so cheaply the needed relief to professional men and hard students as some mechanical occupation, in which originality of design may be united with manual skill in execution.

In such recreation the entire tendency is to gratefully relieve the mind, gently exercise and invigorate the body, and build out and cultivate powers which cannot be developed to the moral hurt of the individual, but greatly increase his intellectual stature.

In such occupations the mind wearied with business cares, or by much study, may revel in refreshing beauties of form, color, and motion, and find the highest of all pleasures in the contemplation of the relation of simple causes to complex effects.

A man who has in this way attained to even moderate skill, may find his lathe a magical instrument by which he can clothe the rudest materials with forms of beauty, and gratify to the utmost that wonderful combination of faculties by which man most asserts his superiority over the brutes.

Imagination here finds, if not so wide a scope as in poetry, or the fine arts, sufficient to give it ample employ, and to banish from the mind all evil thinking and day dreaming, which to the young mind is always hurtful and sometimes fatal.

On this latter account we recommend most earnestly mechanical recreation for the young. Let the boys build windmills and miniature dams. They soil their clothes, but how much better soiled garments than soiled minds. They may cut their fingers with the tools you permit them to employ, but you will find such wounds heal in less time than the foul ulcers of moral corruption.

Every man who can afford it should supply his boys with tools, and a room where they may be used and cared for. A boy takes to tools as naturally as to green apples, or surreptitious and forbidden amusements; and ten to one if he has a chance to develop his mechanical tastes and gratify them to their full extent, his tendencies to vicious courses will remain undeveloped. Such a result is enough to compensate for all the expense and trouble the indulgence we recommend would entail; while the chances that the early development of his constructive faculties may in this mechanical age be the means by which he may ultimately climb to fame and fortune are not small.

CURIOUS ASSOCIATIONS AMONG ANIMALS.

In the palmy days of Barnum's Museum, one of its chief attractions was what was called "The Happy Family," composed of a large number of abjectly miserable animals, generally supposed to have a natural antipathy for each others' society, living together on compulsion, and whose manifestations of stupid tolerance were accepted by the country visitors to that great institution, as indisputable evidence of their blissful state of mind, and the regenerate condition of their hearts.

Once, while on a visit to the collection alluded to, we remarked a good clergyman, evidently hailing from some remote rural location, highly delighted in the contemplation of "The Happy Family," who remarked, somewhat in the style of the venerable Chadband, "Herein we see a type of the fulfillment of the blessed prophecy, that the 'Lion shall lie down with the lamb.'"

Just at the moment, one of the keepers chanced to pass. At the sight of his familiar face, the wretched little dog—whose confinement had not obliterated fond memories of past days, when he might roam and frisk at will, and choose his own society—rushed frantically to the bars of the cage with doleful cries and piteous pleadings, thrusting out his helpless little paws in vain appeal to be released. It was quite affecting to witness the expression of stolid despair in his little brute countenance, when he found no notice was taken of his petition, and the desperate way in which he walked to a partially secluded corner and threw himself prone, as though all hope had fled. The little episode was not without its effect upon the bystanders; and the clergyman referred to, evinced his goodness of heart by loudly denouncing the affair as a cruel exhibition, in which verdict we heartily concurred.

If the reader will follow us for a little while, we will introduce him to some more curious associations than Barnum's Museum ever displayed; associations originating in the common interest of the parties to them, or in the desire to relieve the oppressive sense of solitude which even the lower animals seem to feel.

The well-known associations of parasites with the animals upon whom they prey, are the most unpleasant and disgusting, as they are the most familiar examples of animal companionships. These are only in the interest of one of the parties, and are generally strongly objected to by those who thus find disagreeable company thrust upon them.

We shall find a more pleasant, if not a more instructive field of contemplation in those voluntary associations and attachments which animals of different species form with and for each other.

Foremost among these is the companionship of domestic animals with man. Familiar as household words are the innumerable stories of faithful attachments mutually existing between man and the dumb creatures, which so largely contribute to his sustenance, protection, and pleasure.

Scarcely less familiar are the stories of apparently incongruous attachments between dogs and cats, cats and mice, fowls of different species, etc. Riding once along one of the pleasant drives radiating from Saratoga Springs, we saw the comical spectacle of a pig sweetly sleeping, literally in the arms of a fond calf. These two creatures, cut off from all society by the external limits of a lonely farmyard had become all in all to each other, and shared their "bit and sup," and their quiet couch in the sunny corner, with mutual satisfaction. Very many similar instances of unusual attachments between domestic animals might be enumerated, but we wish, more particularly, to call attention to such associations as are made, apparently through the instinctive consciousness that a common benefit may accrue from a union of diverse gifts and powers.

For this purpose we find a rich collation of facts, ready to hand, in a paper not long since read before the Belgian Academy, by P. J. Von Beneden, on "Animals as Fellow Boarders." We are told, that the *Donzella*, a graceful little fish, found in different seas, takes up its abode in the stomachs of the sea cucumbers, and that these lodgings are shared by prawns and pea crabs, dining together on the abundant stock of food which the sea cucumbers—being excellent fishers—provide.

In the Indian seas, a modest little fish with an extensive scientific appellation, lodges habitually under a star fish, and feeds on the crumbs which fall from the table of his patron. A Siluroid, of Brazil, of the genus *Platystoma*, lodges a species of very small fish in its mouth and shares its daily food with its *protege*.

Other instances of mouth lodgers might be mentioned; even Crustacea taking advantage, in this way, of the superior predatory ability of more active creatures. In the China seas Dr. Collingwood found an anemone, in whose interior little fish resided, whose name he did not know, but which seemed content and happy in their curious abode. The pea crab lives in mussel shells, and picks up a comfortable living without in the least injuring its hospitable entertainers. The ancients, we are told, thought that the mollusks, having no eyes, were glad to avail themselves of these little crabs, but the probabilities are, that the crabs eyes are employed solely for their own benefit. Like other crustaceans, of the same rank, says Von Beneden, "these little creatures carry on each side of the shell, at the end of a movable stalk or support, a charming little globe, furnished with hundreds of eyes, which they can direct, as an astronomer turns his telescope, to any part of the firmament. What cannot be doubted is, that the little intruders live on perfectly good terms with the mussels and if the latter supply a convenient and safe lodging, they, on their side, profit largely by the morsels which fall from the claws of their guests, who are well placed and well provided with with prey-catching apparatus. Snugly seated in their living house at the bottom of the sea, they possess a movable lair which the mussel carries about, and they can choose the best moment for attack, and fall upon the enemy unawares."

But the most remarkable instance of association for mental profit, is that of the hermit crab. These creatures are decapod crustaceans, somewhat resembling miniature lobsters, who make their abode in deserted shells, and change both their skin and their dwelling as they increase in size. The young ones are contented with very small habitations. The shells they inhabit are derelicts they find at the bottom of the sea, and in which they conceal their weakness and personal disadvantages with obstinate persistence.

These singular creatures have too soft an abdomen to confront the dangers they encounter in their incessant wars, and the shells in which they thrust themselves supply at once lodgings and shields. Armed thus from head to foot the soldier crab marches proudly against his enemies, and fears no danger, because he has a secure retreat. But this soldier, or hermit crab, is not alone in his dwelling. He is not an anchorite like those dwelling in air, for by his side a worm is commonly installed as fellow-boarder with him, forming one of the most remarkable associations which is known. The companion worm is elongated like all the Nereids, and its supple, undulating body is armed along its sides with bundles of lances, pikes, and daggers, the wounds from which are very dangerous. The crab, ensconced in his borrowed armor, and flanked by his terrible acolyte, attacks all he finds before him, and knows no reverse. Thus, around his domain, we observe a prosperity not seen elsewhere, and on his shell there usually flourishes a whole colony of Hydractinia, blooming like a flower-bed, and inside we often find Peltogaster, Lyriope, and other Crustaceans, who convert it into a true pandemonium.

Besides many other associations formed with various species of soldier crabs, there are barnacles, which lodge on the skin of the whale, in company with whale lice and other marine creatures, worms which live as companions in the same sheath with their congeners, and even with included mollusks; creatures which live in freedom in their youth, but, when they approach to maturity, throw away their legs and eyes, change their clothes, and attach themselves permanently to some animal upon which they are ever after wholly dependent.

The Remora, an animal found in the waters of the Mediterranean, attaches itself with vigor to other animals by means of an apparatus attached to its head, and the inhabitants of Mozambique make use of this habit to entrap fish and other marine animals. They catch Remoras, put rings in their tails, attach lines to the rings, and cast the Remoras forth into the sea. Presently the Remora will have stuck to something and is drawn in by the tail, holding fast to the creature it has unintentionally brought to grief.

But we cannot dwell longer upon these curious associations. Our readers will agree with us, that they afford food for much profitable reflection, and that they may instruct as well as amuse. They teach how ample is the provision made for the sustenance and protection of the myriad creatures which people our globe, and lead to the belief that these wondrous provisions cannot be alone confined to this little mustard seed of a planet, among the magnificent heavenly bodies that circle together around the great life-giving, life-sustaining sun.

CHEMISTRY OF ZIRCONIUM.

Dr. Ernest Melliss has published "Contributions to the Chemistry of Zirconium" that contain much new matter; and as this element is now employed in the zirconium light, it may be of interest to know something more about it than we can learn from any books on chemistry.

There are scarcely more than a dozen minerals that contain zirconium, the most important of which is the zircon, which is so called because it was used as a false jewel, and received the name jargon, or zircon, from dealers in precious stones. There are fine specimens of this mineral in North Carolina, New York, New Jersey, and Pennsylvania.

The pure zircon contains 66·96 per cent oxide of zirconium and 33·04 per cent silica; its specific gravity is 4·05 to 4·75. From this mineral the metal zirconium and all of its compounds are prepared. It is heated to redness and quenched in water so as to be easily pulverized, and the fine powder is mixed with four times its weight of carbonate of soda, and fused in a platinum crucible. The mass from the crucible is treated with hydrochloric acid, evaporated to dryness to separate the silica, again dissolved, and the oxide of zirconium precipitated by ammonia.

By mixing the powdered zircon with carbon, and passing chlorine gas over it, the chloride of zirconium can be formed along with the chloride of silcon, which latter being very volatile, can be expelled by heat, leaving behind the zirconium salt nearly pure.

The resolution of the mineral by fluoride of potassium has also been recommended, but the best method appears to be to fuse it with bisulphate of potash, and thus on subsequent treatment with sulphuric acid to convert it into pure basic sulphate of zirconia.

The reducing agent employed in the preparation of metallic zirconium is aluminum, and the operation is interesting as being applicable to other metaliurgical processes. The double fluoride of zirconium and potassium is first prepared by dissolving the oxide in hydrofluoric acid and pouring the liquid into a concentrated solution of neutral fluoride of potassium. The precipitate thus formed is well dried and intimately mixed with twice its weight of finely-divided aluminum, and exposed in a gas carbon crucible to a heat sufficient to melt copper.

The zirconium will be found in the form of leaves and scales penetrating the aluminum, which remain after dissolving out the aluminum by hydrochloric acid. The metal is hard, and crystalline, like antimony, with the specific gravity of 4·15. It is said to exist in three states the same as silicium and boron, namely, amorphous, graphitoidal, and crystalline, and is less fusible than silicium, and burns only at the temperature of the oxyhydrogen blow pipe.

No uses have thus far been suggested for zirconium, and, in fact, it has been too little studied to enable us to speak with certainty about it. In consequence of some of its chemical relations it is now classed with tin, titanium, thorium, columbium, and tantalum; while by other writers it is put in the same group with carbon, boron, and silicon, instead of with aluminum as formerly.

The oxide of zirconium is now employed to point the pencils used in the oxyhydrogen light. It is said not to waste away as magnesia and lime do; but the cost of the oxide and the trouble to prepare it must stand in the way of its general adoption.

Dr. Sorby about a year since published an account of the discovery of a new metal associated with zirconium, which he called "jargonium," but recently he announced his mistake. The reactions attributed by him in the first instance to jargonium he now finds are, in fact, owing to the presence of a small quantity of the oxide of uranium in the mineral zircon, and the supposed new metal must therefore be erased from our list. The compounds of zirconium have thus far no interest in the arts.

SCIENTIFIC INTELLIGENCE.

HEATING WITH GAS.

MM. Jacquet and Hauteur, in Paris, have invented a method for heating with gas by reflection, which seems to offer some advantages over previous attempts in this direction. The gas burns with inverted flame, and a double hearth below the burner to absorb all of the products of combustion. The hearth, which is not in sight, throws off all of its heat and light by reflection from a series of mirrors made of red copper, and the effect is said to be remarkable. It is difficult without diagrams to convey a perfect idea of the invention, which is said to be applicable to all kinds of cooking and heating purposes.

TEST FOR SMALL QUANTITIES OF ALCOHOL.

A few drops of the liquid to be tested are poured into a

test tube with a small quantity of iodine and several drops of caustic soda on potash, and gently heated. If there is any alcohol present a characteristic yellow crystalline precipitate of iodide of formyle is produced. According to Lieben, the presence of one part of alcohol in 2,000 parts of water can be recognized in this way.

EMPLOYMENT OF PHOSPHATES AS MORDANTS.

M. Collas proposes to employ phosphates as substitutes for alum. The goods to be dyed are immersed in a bath of acid phosphate of lime or magnesia, afterwards in a bath of coloring matter, and finally into an alkaline solution. The process is said to be particularly applicable to aniline colors, more especially to aniline purple. Lakes can also be prepared by use of phosphates, preferably phosphate of lime. Thus to prepare a lake of cochineal an infusion of the color is first made ready and a gelatinous precipitate of phosphate is added, the mixture is powerfully agitated for some time. The coloring matter will be found to be as completely precipitated as it is with alumina. Insoluble coloring matters can be used for dyeing by employing gelatin in combination with the phosphate of lime.

COBALT AND MANGANESE.

M. Valenciennes recently presented to the Academy of Sciences, Paris, specimens of pure cobalt and manganese—prepared by reduction in magnesia crucibles. The cobalt had the appearance of polished iron, and when turned in the lathe yielded chips similar to those produced from iron of best quality.

The manganese can be easily broken with a hammer, and exhibits on a fresh fracture a perfectly white color. It alters rapidly in the air, changing into an intermediate red oxide. Cobalt combines more readily with copper than with iron; the alloy melts at the temperature of fusion of copper, and is malleable and ductile if properly annealed. Manganese has great affinity for copper, and five samples were made, containing 3, 5, 8, 12, and 15 per cent of manganese—all of them resembled bronze, are hard, sonorous, and easily fused. The alloy containing 15 per cent of manganese was white like steel, and unaltered after long exposure, and was very hard.

The alloys of 3, 5, and 8 per cent are ductile, and can be reduced to as thin leaves as tin. According to M. Valenciennes the alloys of manganese and copper are capable of extensive uses in the arts if they can be prepared in an economical way.

ZINC REFUSE FROM GALVANIZING IRON.

The zinc refuse contains chlorides, oxychlorides, and oxide of zinc, together with some sal ammoniac. Pattinson fuses it with an equivalent proportion of lime by which the ammonia can be saved and the zinc obtained as an oxide.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company make the following report of their inspections for the month of March, 1870:

During the month, 458 visits of inspection have been made; 784 boilers examined, 731 externally and 224 internally; while 69 have been tested by hydraulic pressure. The number of defects in all discovered, 482; of which 60 are regarded as as dangerous. The defects in detail are as follows:

Furnaces out of shape, 7—1 dangerous; fractures in all, 30—7 dangerous; burned plates, 26—5 dangerous; blistered plates, 73—15 dangerous; cases of incrustation and scale, 81—12 dangerous; cases of sediment and deposit, 5; cases of external corrosion, 34—4 dangerous; internal corrosion, 6—5 dangerous; cases of internal grooving, 7—1 dangerous; water gages out of order, 25; blow-out apparatus out of order, 7—1 dangerous; safety valves overloaded 24—1 dangerous; pressure gages out of order, 92—2 dangerous. These varied from—10 to +25. Tubes corroded off near tube sheet, 1—1 dangerous; boilers malconstructed, 1—regarded as dangerous; boilers condemned as unsafe and beyond repair, 4. A large number of leaky boilers were reported, some had become so from blowing down and immediately filling up with cold water—this practice will ruin the best boiler in a short time. Before refilling, the boiler should be allowed to become quite cool. The accumulation of sediment about the tubes, keeping the water therefrom, is a source of evil; tubes become burned and corroded, and leaks will of necessity follow.

Steam gages, it will be noticed, have been found out of order in numerous instances. There is no way of ascertaining these variations except by frequent tests, and although they may be light in many instances, in some they are positively dangerous; for instance, if a boiler is being run by the gage at a pressure of 85 pounds, and the gage is 20 pounds "heavy or slow," the actual pressure used is 105 pounds, which may be far beyond the safe limit, hence it is important that these indicators should be often examined.

We had not room for further comment, but the intelligent engineer will see that the boilers under his care are free from the defects and dangers enumerated above.

Earthquake in Guayaquil.

In Guayaquil, between Point Pasado and Point Venado a peculiar volcanic movement has taken place. In a space of two leagues the surface of the earth undulated slowly, and great chasms and deep circular excavations were opened. A new lagoon was formed, and between the shore and the sea there appeared a large sized hill.

During all this fearful commotion, the hills along the coast were observed to be in a state of unrest, and large land slides took place, carrying with them rocks and trees.

For four days this agitation continued, the undulation being from west to east. These phenomena took place early in the month of March. It would seem from this that the throes of the earth which, a year or two ago, sent desolation and death through some of the most populous districts of South America, are not wholly spent.

Some Hints about Screws.

Where screws are driven into soft wood and subjected to considerable strain, they are very likely to work loose; and it is often difficult to make them hold. In such cases, says the Canadian *Builder*, we have always found the use of glue profitable. Prepare the glue thick; immerse a stick about half the size of the screw and put it into the hole; then immerse the screw, and drive it home as quickly as possible. When there is an article of furniture to be hastily repaired, and no glue is to be had handily, insert the stick, fill the rest of the cavity with pulverized resin, then heat the screw sufficient to melt the resin as it is driven in. Chairs, tables, lounges, etc., are continually getting out of order in every house; and the proper time to prepare them is when first noticed. If neglected the matter grows still worse, and finally results in laying by the article of furniture as worthless. Where screws are driven into wood for temporary purposes they can be removed much easier by dipping them in oil before inserting.

When buying screws notice what you are getting; for there are poor as well as good kinds. See that the heads are sound and well cut; that there are no flaws in the body or thread part, and that they have gimlet points. A screw of good make will drive into oak as easy as others into pine, and will endure having twice the force brought against it.

Safety House Lamp.

The article of a safety kerosene lamp is one of importance to nearly every person. It is a subject of vital interest to every household. From the number of inquiries at this office for information as to lamps possessing safety qualities, we conclude that the public are not satisfied with what the manufacturers generally supply.

A few days ago a circular, advertising Perkins & House's safety lamp, was put into our hands, containing references to a number of distinguished gentlemen whose testimonials were appended. We took occasion to interview one of them—the president of one of our prominent New England colleges—as to the merits of this lamp, and asked if on further use he was satisfied that he had not expressed too much in its praise in his testimonial. His reply was, "No; it has given perfect satisfaction, and I think the lamp superior in respect to safety, perfect combustion, freedom from odor, and amount of light given, to any lamp."

From the high and direct source this testimony comes, we think there is no doubt but that the Perkins & House lamp, advertised in another page by Votaw, Montgomery & Co. possesses all the qualities that the advertisers state.

Iceland Spar.

Joseph D. Price and Benjamin Shunk, of Harrisburgh, Rockingham Co., Va., have discovered in that town large deposits of calcite (carbonate of lime) of the Iceland spar variety. We have received some specimens of the crystals (rhombohedrons), which are clear and excellent. A quarry has been opened and the deposit examined to an extent exceeding eighty acres. The deposit is six feet deep, and promises to be valuable; but the manner of mining and working the mineral is not very well understood in that region.

Steam Omnibuses.

It is said that a company has been organized in Montreal to introduce into that city Thompson's road steamers for passenger traffic. Our readers will recollect one of these vehicles was tried not long since in Edinburgh, Scotland, where its inventor resides, and was stated to have behaved very satisfactorily. The traction wheels are fitted with broad and thick rubber rims, which enable them to conform to the uneven surfaces of common roads, and prevent slipping.

THE EAST RIVER BRIDGE.—The great caisson for the Brooklyn side of the East River Bridge, the successful launching of which we recently announced, has since our last issue been towed out to its final resting place, and will probably be sunk before this paragraph meets the eyes of our readers. The most perfect success has thus far attended every step in this great work, and everything shows that engineering skill of the highest order is guiding its progress.

UNITED STATES DISTRICT COURT—SOUTHERN DISTRICT. BEFORE JUDGE BLATCHFORD. PATENT FOR MAKING VENEERS.

Carmi Hart vs. *Jeryleman Shaw and Salathiel E. Nickerson.*—This was a bill filed by the complainant to restrain the infringement of a patent issued to him on April 4, 1854, and renewed March 16, 1868, for an improved machine for cutting veneers.

The substance of the invention was placing the log upon a table so that it could be brought against the knife to cut off the veneer at different angles, according to the requirements of the material, and suspending it by clamps, so that when it was being carried back to meet the knife again, it would not bear upon the edge of the knife.

The defendants set up a want of novelty in the invention, and denied any infringement on their part.

Held by the Court.—That on the evidence the defense of want of novelty in the invention fails. That in the defendant's machine the same results claimed by the plaintiff are produced by devices which are mechanical equivalents for those of the plaintiff. Decree for plaintiff.

For plaintiff, E. Y. Bell; for defendants, T. M. Wyatt.

APPLICATIONS FOR EXTENSION OF PATENTS.

PEGGING JACKS.—Alfred Bailey, Amesbury, Mass., has petitioned for the extension of the above patent. Day of hearing July 13, 1870.

MACHINE FOR MANUFACTURING SPOOLS.—A. D. Waymoth, Fitchburg, Mass., has petitioned for an extension of the above patent. Day of hearing July 13, 1870.

MACHINERY FOR FORMING HAT BODIES.—Alva B. Taylor, Newark, N. J., has petitioned for an extension of the above patent. Day of hearing July 13, 1870.

WATER CLOSETS.—William S. Carr, New York city, has applied for an extension of the above patent. Day of hearing July 20, 1870.

ROTARY KNITTING MACHINES.—Sidney W. Park, Albany, N. Y., and Edgar S. Ells, Fremont, N. Y., have applied for an extension of the above patent. Day of hearing July 20, 1870.

LIGHTNING ROD.—David Munson, Indianapolis, Ind., has applied for an extension of the above patent. Day of hearing July 20, 1870.

CART SADDLES.—Henry A. Rains, Bloomfield, N. J., has petitioned for an extension of the above patent. Day of hearing August 3, 1870.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

WASHING MACHINE.—Charles Bean and Suel Logee, East Douglass, Mass.—This invention has for its object to furnish an improved washing machine which shall be simple in construction and effective in operation, washing the clothes quickly and thoroughly, and without injuring them.

EARTH CHAMBERS.—William H. Bliss, Newport, R. I.—This invention has for its object to furnish an improved earth chamber or portable earth closet which shall be simple in construction and effective in operation, wholly preventing the escape of any offensive odor into the room.

EXCAVATING APPARATUS.—Philo W. Clark, Oblong, N. Y.—This invention has for its object to furnish an improved excavating apparatus designed for use in transferring the soil from the place of excavation, and loading it upon a cart, or throwing it upon an embankment.

HOISTING APPARATUS.—H. A. Schneekoth, N. Y. city.—This invention has for its object to so construct the hoisting apparatus, which is operated by men, that power may be applied to it by means of the lower extremities and not by the arms, as usually.

LAP BOARDS.—William F. Gammel, Elizabeth, N. J.—This invention has for its object to improve the construction of lap boards, so as to make them more convenient and effective in use.

BOILER FURNACE.—J. A. T. Overend, San Francisco, Ca.—This invention consists in the application to the furnaces of metallic fire-backs and bridge walls, arranged for ready removal for the substitution of others, when worn out, and, in a manner, calculated to resist the heat to the best advantage, and to provide an air chamber behind the bridge wall to facilitate the combustion of the gases.

ORE SEPARATOR.—T. Bates, Pinos Altos, New Mexico.—The object of this invention is to provide a simple and efficient arrangement of means for receiving the tailings of gold, and other ores, from the battery, pulverizing, burnishing, and separating the same. The invention comprises an arrangement of grinding mills and amalgamating apparatus together, and with a battery.

WASHING MACHINE.—Wm. Badger, Hastings-on-the-Hudson, N. Y.—This invention relates to improvements in washing machines, and consists in a simple and inexpensive attachment to ordinary wash tubs, for converting them into washing machines, with oscillating beaters, the same being suspended on a cover arranged for detachable connection to the tub by means of keys wedging into the holes of the handles, and dumping the cover down on the top of the tub.

STUMP PUPPER.—J. M. Eason, Charleston, S. C.—This invention relates to improvements in machinery for pulling stumps, and consists in suspending the chain hook from any suitable portable frame, by two pairs of arms, toggle-jointed to nuts, on a right-and-left-threaded horizontal screw, which is provided with a hand lever ratchet and pawl at the center for applying the power for raising the stumps by screwing the nuts away from each other, and with short levers at one end for turning it rapidly to force the nuts together to let the weight or chain hook down.

NURSING BOTTLE.—Edward Jones Mallett, Jr., and Wm. S. Ward, New York city.—This invention relates to improvements in nursing bottles and other vessels, for containing liquids, and from which they are to be drawn through faucets, cocks, or bungs, and it consists in a novel arrangement of automatic vent valves, in connection with the bungs or plugs, by suspending the valve by a spring secured in the vent passage, or at the top of the plug, and extending through to the lower side, and holding the valve up against a flexible seat of India-rubber, or other like substance.

HUB-BORING AND BOX-SETTING MACHINE.—Abraham Troup, Louisberry, Pa.—This invention consists of a pair of clamps for embracing the sides of a hub provided with feet for resting on the top of the same; and combined with an instrument for boring a recess in the end of the hub suitable to receive a box, in such manner that said instrument may be accurately adjusted to the center of any hub.

TOBACCO ROLLER.—C. A. Jackson, Petersburgh, Va.—This invention consists of a wheel, whose rim is provided with any desired number of circumferential flanges, said wheel working in connection with a belt, whose inner surface is furnished with an equal number of longitudinal grooves into which the tobacco is pressed by the flanges of the wheel; these two devices being combined with scrapers that take the strips of tobacco out of the grooves in the belt, and also with a knife, operated by the wheel, that cuts the strips into plugs.

CORN PLANTER.—James W. Magers, Reinersville, Ohio.—This invention consists of divers improvements in the corn planter, all tending either to simplify its construction or render it more efficient in operation.

ATTACHING POLE OR SHAFTS TO WHEELED VEHICLES.—James McMillin, Ripley, Ohio.—This invention has for its object to enable the occupant of a carriage to detach the pole or thills when the horses become unmanageable, and thus allow the animals to go on their way dragging the pole with them, and leave the carriage in safety.

CAR COUPLER.—John Caleman, Lynchburgh, Va.—This invention consists in the combination, with a bumper open at the sides of a hinged detent arranged within the bumper, so as to allow the head of the coupling bar to pass under it and then to fall by its own weight upon the body of the bar and retain it, and of a coupling link having bevelled heads which pass easily under the detents, against the inner sides of which heads the free ends of the detents bear, which inner sides of the heads are rounded off at the corners so as to allow them to slip out at the open sides of the bumpers and uncouple when one car runs off the track so as not to draw the next car off; the coupling being automatic, and universal in its application.

PAPER WEIGHT.—Max Patzauer, New York city.—This invention relates to a new paper weight, which is so constructed that it can be used as an insect catcher or paper file.

MACHINE FOR COVERING WIRE.—A. Giraudat, New York city.—This invention relates to a novel spool carrier and holder attachment to a machine for covering wire with cotton, silk, or other thread. The object of the invention is to so construct the apparatus that the spool can be readily removed and put on, and that the thread will be applied to the gummed wire and pressed to firmly adhere to the same.

FRUIT BASKET.—Lauren Carpenter, St. Joseph, Mich.—This invention has for its object so to construct fruit baskets, that the same will be strong and simple and that they can be placed one upon another without injuring their contents.

CARVING KNIFE.—Owen W. Taft, New York city.—This invention has for its object to so provide carving knives that they can be used to extract skewers from the meat. The invention consists in forming a hook or aperture on the blade of the knife, whereby a clamp for holding and withdrawing the skewer is obtained. The removal of skewers from meat is at present a process connected with considerable difficulty and annoyance, and although many instruments may be used, it is evident that only the carving knife is appropriate and handy for that purpose.

SHOE LACE.—Rufus Wright, Brooklyn, N. Y.—This invention relates to a new and useful improvement in mode of lacing or fastening and unfastening shoes, whereby that practice is greatly simplified, and much more expeditiously and perfectly performed than it has hitherto been, and the invention consists in an arrangement whereby the shoe is fastened around the instep or ankle by simply drawing upward the lacing, and is loosened by the same movement downwards toward the toe.

HORSESHOE.—George Copeland, Denver, Colorado.—This invention relates to improvements in horseshoes and the nails for fastening them on the hoofs of the animals, and consists in making the nails with large, double, conical, or pyramidal heads, and the shoes with counter-sunk sockets, or other enlargements around the holes for the reception of the parts of the enlargements of the heads with which the smaller parts of the nails are joined, all arranged so that the enlarged heads of the nails shall serve as the calks of the shoe, the said heads being made of either iron or steel, and hardened or not, as preferred.

CRUPPER FASTENER.—Wm. R. Wing, Newark, Ohio.—This invention relates to a new and improved fastening for crupper straps, to be used in substitution of the buckles and straps now used. The invention consists of a pair of cylindrical metal fastenings with one flattened side, one for each end of the strap to be connected, and a correspondingly shaped ring fitted to slide on the said fastenings, one of which has a T-headed projection at the end, and the other is fitted to receive and hold it when turned a quarter of a revolution of the entering, which brings the flattened sides in line, so that the slide may be adjusted to confine them in this position.

COAL SCUTTLE.—S. J. Anderson, Cazenovia, N. Y.—The object of this invention is to provide a coal scuttle or hod for general use which shall be more useful and convenient than they are when constructed in the ordinary manner, and it consists in a loose bottom so arranged that the coal is discharged from the bottom of the scuttle or hod instead of from the top.

VENEER FORMER.—L. A. Johnson, New York city.—This invention relates to a new and useful improvement in the method of bending and forming veneers for fitting legs of billiard tables, pianos, and for other purposes, and consists in the method of heating the veneer, and thereby rendering it pliable, so that it may be made to assume the desired form.

DITCHING PLOW.—I. S. Sheets, Troy, Ohio.—This invention has for its object to improve the construction of the ditching plow, patented by the same inventor February 10, 1869, so as to make it more simple in construction, more effective in operation, and more conveniently adjusted as the ditch increases in depth.

HORSE POWER.—P. W. Clark, Oblong, N. Y.—This invention has for its object to furnish an improved horse power designed more especially for use in cases where it is desired that the direction of the draft may be changed or shifted without stopping or changing the direction of the power.

CORD CATCH.—C. C. Moore, New York city.—This invention has for its object to furnish an improved cord-catch, designed especially for holding the cord of window shades, and which shall be equally applicable for holding other cords, such as picture cords, cords for tying up packages, and various other purposes.

DISTILLING APPARATUS.—J. M. Weyand, St. Louis, Mo.—The object of this invention is to facilitate the generating, dephlegmatizing, aromatizing, and refrigerating of alcoholic vapors, and to thereby simplify and economize the process of distillation. The main feature of the present invention is to so construct the apparatus that steam and mash are made to pass in opposite directions through the same compartments, the steam taking up, and the mash giving off alcohol during such passage. By this method the temperatures can be so completely regulated, that spirits of the requisite grade can be produced with great exactness. The invention consists also in a novel construction and arrangement of the generating compartment, in which the mash is absolutely mingled with steam and brought in contact with heated surfaces, to evaporate all its alcoholic contents.

ELASTIC TIP FOR CHAIRS.—S. Van Patten, Albany, N. Y.—This invention relates to a new elastic attachment to the ends of chair legs, which has for its object to deaden the noise of removing the chair, and to protect the floor or carpet upon which the same may be placed.

GASOLINE BURNER.—Franklin Gould, Paterson, N. J.—This invention relates to a new burner for producing light from gas prepared from gasoline, or other hydro-carbon liquid. The invention has for its object to so construct the burner that it will by its heat produce its own gas from the liquid which it consumes.

PRUNING HOOK.—Andrew Downer, Hammondsville, Ohio.—The object of this invention is to provide an efficient instrument for pruning trees, hedges, vines, or briers, and it consists in a pruning hook, and in a saw combined therewith.

WASHING AND WRINGING MACHINE.—J. B. Wakeman and A. R. Field, Hampden, N. Y.—This invention relates to combined washers and wringers, and consists in certain improvements thereon specified in the claim of the invention.

DUST RING FOR WATCH MOVEMENTS.—J. H. Flint, South Bend, Ind.—This invention relates to improvements in the construction and arrangement of dust rings for watch movements. It consists in the arrangement for fastening the ends at the joint by the movement screw, and the manner of fitting it between the plates, and against the pillars, and to the recess in the upper plate under the barrel bridge.

STUMP EXTRACTOR.—G. L. Howland and Wm. M. Howland, Topsham, Me.—This invention relates to improvements in machines for pulling stumps or lifting heavy weights, and consists in a combination on a portable frame of a vibrating, guiding frame, a hoisting bar, a pair of gripe pawls, operating levers and adjusting springs, the latter for shifting the action of the pawls to cause them to raise or lower the bar.

COMPENSATING LET-OFF FOR LOOMS.—John Day, Paterson, N. J.—This invention relates to improvements in let-off motions for looms, and consists in the application in addition to the ordinary warp-roll of an auxiliary roll, mounted on a vertically sliding and weighted frame, under which the warp is carried from the warp-roll and to another guiding roll, which together with the warp-roll are elevated in a vertical extension of the loom frame, so that the weight of the auxiliary roll frame and weight is suspended in the bight of the warp, which passes over another guide roll in the plane of the first, and down under a third guide roll, and thence through the sley to the work beam. Previous to passing under the final guide roll the warp passes through a sley, or reed, for guiding it evenly on the said roll.

NEEDLE CASE.—Wm. Avery and Albert Fenton, Redditch, England.—This invention relates to improvements in that class of needle cases in which the needle packet is caused to rise up above the top of the needle case, when open, to admit of obtaining a needle therefrom more easily, and it consists in effecting the raising of the packet by the raising of the cap of the case, which is hinged at one side of the top of the case, by providing the said cap with a cranked projection extending downward into the case, and jointed to the side of the packet by a connecting link, or other suitable connection.

BUNG.—David Leichtnstadt, Brooklyn, N. Y., and R. Pentlarge, New York city.—This invention relates to improvements in bungs for barrels, casks, and the like, and consists in a deep bush, screw threaded, and with a collar on the exterior, for screwing down into and upon the side of the cask, and having a smooth, conical interior surface, extending from the bottom upward and a suitable distance, with an annular recess at the top, above which an annular internal groove is formed by a flange at the top of the bush, into which through radial notches a bridge tree which carries a tightening screw with a plug at the lower end, is inserted, and secured by turning the ends away from the notches, under the flange, so as to screw the plug down upon the shoulder above the conical hole of the bush.

TIN TUBING MACHINE.—J. N. Adams, Chillicothe, Mo.—This invention relates to an improved machine for bending sheets of tin into tubing, lapping the edges and the ends of the sections, and holding them for soldering, and it consists of a sectional tubular shell, capable of expanding and contracting, and having a slot along one side for the admission of the tin to the interior, wherein is a mandrel, divided longitudinally, and capable of receiving and pinching the edges of the tin, to hold and draw it in while the said mandrel is turned, and winds the tin around it, after which the lapped edges are held opposite the slot in the shell for soldering, and pressed together by a hinged presser attached to the shell and projecting through the slot. The section thus formed is then shoved along on the mandrel, so that the next sheet bent up will be lapped on the end of it.

TAILORS' SCALE.—W. G. Cummins, Civil District No. 10, Tenn.—This invention relates to improvements in scales for measuring and laying out the several parts of men's clothes for cutting, whereby it is designed to provide a simple arrangement of the same, adapted to all the parts of the different garments under a system that may be easily learned and used by persons little skilled in the art.

TABLES.—Asa Forrest, Moingona, Iowa.—This invention relates to improvements in apparatus for supporting the fall leaves of tables, and consists in the application of jointed braces pivoted at one end to the lower edge of the rail, or other part of the table, and at the other to the under side of the fall, near the outer or lower edge, and so arranged that when the fall is raised to the horizontal position, the joint of the brace may be turned above the right line between the end pivots, and retain the position, by reason of the tendency of the weight of the fall to prevent the braces assuming the right line, which they must do before folding down. The tendency of the weight to force the joint upward, and of the two parts to fold down the other way, is counteracted by the arrangement of the arms, so that the joint will strike the under side of the table.

TIN GUTTER MACHINE.—J. N. Adams, Chillicothe, Mo.—This invention relates to improvements in machines for making tin gutters, and consists of a sheet metal cylinder, of the same radius as the gutter to be formed, provided with guides by which the previously bent up sheets of tin are confined to it while holes are bored along from end to end for soldering, and also provided with a socket for supporting it while in use on a "candle mold stake," a tool in common use in tinners' shops.

STRAW CUTTER.—Julius Ambrun, Leavenworth, Kansas.—This invention has for its object to simplify the connection between the two reciprocating frames which hold the cutters, and to provide an effective automatic feed apparatus, which will not operate while the straw is being cut, but only when the cutters are moved apart.

PLANING CHUCK.—Augustus Newell and William Pim, Chicago, Ill.—This invention relates to a new "chuck," or "vise," to be used on a lathe, or planer, its chief object being to hold the work perfectly true. The invention consists in the arrangement and combination of the leading screw and swivel bed, with a T-bolt, a movable jaw, all parts operating so that the article to be planed cannot be upset, but will be held perfectly true.

MACHINE FOR PRINTING SPOOLS.—G. Hall, Jr., South Wilmington, Conn., and G. W. Averell, New York city.—This invention relates to a new and useful improvement in a machine for printing or labeling spools for holding thread, or other material of like nature, and consists in the use of a series of dies, and in connection therewith the several mechanisms for producing the movements necessary to accomplish the object in view; the main object being to print both ends of the spool directly upon the wood while the spool is passing through the machine.

ROPE CLAMP FOR SETTING RIGGING.—Slaight and Androvatt, Prince's Bay, N. Y.—This invention has for its object to provide an instrument for clamping and holding ropes for hoisting different kinds of articles, or for stretching or applying such ropes to the sides of ships, or other places, without requiring knots to be tied or eyes formed in such ropes.

HEMP BRAKE.—George Rymel, Paris, Ky.—The object of this invention is to provide a simple, durable, and effective machine for braking and cleaning hemp.

STREET MOISTENING COMPOUND.—Moritz Marcus, New York city.—This invention has for its object the production of a substance by which the paved streets in cities and towns can be kept clean, and whereby the air in such streets will be purified, and greater health insured.

SAWSET.—Erastus Y. Clark, New York city.—This invention relates to new and useful improvements in sawsets, whereby they are made more perfect, and consequently more useful than they have hitherto been.

GANG PLOW.—J. W. Sursa, San Leandro, Cal.—This invention relates to new and useful improvements in gang plows, whereby they are made more effective and convenient than such plows have hitherto been.

SHAFT AND POLE COUPLING FOR CARRIAGES, ETC.—Charles G. Dudley and Jacob Gulden, Key Port, N. J.—This invention relates to a new device for facilitating the ready removal and application of wagon and carriage poles, with an object of leaving the clip undisturbed.

ADJUSTABLE AWNING FRAME.—Louis Yenne, New York city.—This invention relates to a new awning frame, so constructed that it can readily be expanded or folded together, with a view of preserving the awning and all the material connected therewith.

BORING APPARATUS.—Thomas St. John, Dunbar, Pa.—This invention relates to a new and useful improvement in an apparatus for boring soapstone or ores, or similar material in the process of mining, whereby the operation of getting out the softer kinds of stone and ores is greatly facilitated.

PLOW GRINDER AND POLISHER.—Michael Devault, Charleston, Ill.—This invention has for its object to furnish a simple and convenient machine for grinding and polishing plows, which shall be so constructed and arranged as to support and hold the plow securely, and in such a way that it may be moved about and adjusted to the stone or wheel quickly and accurately.

RUDDER.—Capt. W. C. Law, New York city, now residing at Ningpoi China.—This invention has for its object to improve the construction and manner of hanging rudders for ships, boats, and other vessels, so as to make them more easily shipped, less liable to be accidentally unshipped, and so that they will serve as a center board for sail boats.

OFFICE REGISTER, OR DAILY, HOURLY, AND MONTHLY DIRECTORY.—Henry Rentchler, Belleville, Ill.—This invention has for its object to furnish an improved device, simple in construction and convenient in use, for enabling business men and others to keep their memoranda of matters and things to be attended to, in such a shape that they can see at a glance what they have to attend to, what engagements to keep, etc., for each day of the month, and for any hour of the day.

VENTILATORS FOR WINDOWS, ETC.—William C. Betts, Brooklyn, N. Y.—This invention has for its object to furnish a simple, convenient, and detachable ventilator for attachment to openings in the windows, doors, or walls of a room, to remove the impure air, and introduce fresh air in such a way that no injurious currents will be established, and which may be adjusted to adapt it to different conditions of the atmosphere.

STRENGTHENING JOINTS OF RAILS OF RAILWAYS.—C. E. Spooner Bron-y-Garth, Port Madoc, and George A. Huddart, Brynkir, Wales, Great Britain.—This invention relates to improvements in the mode of strengthening the joints of the rails of railways. The abutting ends of the rails, whether they be double-headed or formed with a flat base, it is proposed to clip between two plates suitably shaped to embrace the web and the foot or lower head of the rail, and of such depth that when applied they will extend vertically a sufficient distance below the rail to form a girder or stiff rib, and admit of being secured by spring clamps.

FELLY BENDING MACHINE.—W. D. Williams, Raleigh, N. C.—This invention relates to improvements in machines for bending fellies, and consists in a fixed curved block with a curved extension hinged at each end, and provided with holding devices, a confining strap of steel or iron and operating levers, arranged for attaching the timber and bending it up into a semicircle.

FEED MOTION FOR SEWING MACHINES.—Wm. Cooney, Bridgeport, Conn.—The object of this invention is to arrange the feed arms in those machines used for sewing tubular articles, and also in other machines, so as to feed, not only longitudinally or transversely of the said cylinders, but at any angle between the two directions, or it may be in any direction whatever within a circle; also to arrange them to move vertically in the rising and falling movements through the slotted feed plates when moving up to and away from the work.

Caveats are desirable if an inventor is not fully prepared to apply for a patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Patent Office fee on filing a Caveat, $15. Agency charge for preparing and filing the documents from $10 to $12. Address MUNN & CO., 37 Park Row, New York.

Facts for the Ladies.

It gives me pleasure to add my testimony to that of many others as to the superiority of my Wheeler & Wilson Machine over all others with which I am acquainted. During the twelve years I have had it, it has traveled many thousands of miles, accomplished a great deal of sewing, from the finest linen cambric to heavy broadcloth, and has never once been out of order.

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Business and Personal.

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Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 61 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Spools of all kinds, and spiral shade tassel molds made by H. H. Frary, Jonesville, Vt.

For Sale—An old established Malleable and Gray Iron Foundery, doing a large trade in hardware. Cause of selling, failure of health of the proprietor. Address "Malleable Iron," Newark, N. J.

If Mr. Edward Trenholm, who resided in Washington, D. C., in the spring or summer of 1863, will send his address to or call on S. B. Strong, at No. 22 Pine st., New York city, he will learn something to his advantage.

Wanted—Descriptive circulars and price lists for wood-working machinery, new or second-hand. Address Baldwin Brothers, Washington city, D. C.

Wanted—A partner with capital in the manufacture of a patented article for ladies' use, is a good, salable invention. Address T. Sullivan, southwest cor. 118th st. and 3d ave., New York.

The Lacing made by J. Sweetman, Utica, N. Y., is of superior quality.

Pictures for the Household—Prang's "Four Seasons," after Jas. M. Hart. Sold in all Art Stores throughout the world.

For Sale by State or County—the improvement in Buckets, etc. as described in this paper of Sept. 11, 1869. Address John H. Tomlinson, 150 Madison st., Chicago, Ill.

We find our Rawhide Sash Cord is not only best for weights, but makes the best round belting of any material in use. Darrow Mf'g Co., Bristol, Conn.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the U. N. Co., 173 Broadway, New York.

Of Washing Machines, there is nothing to be compared with Doty's.—Weekly Tribune, Dec. 15, 1869.

Steel Makers' Materials—Wolfram ore, oxide manganese, Speigel iron, borax, titanium, chrome, lubricating black lead, for sale by L. & J. W. Feuchtwanger, 55 Cedar st., New York.

An experienced mechanical and railway engineer wishes a position as Master of Machinery, or Manager. Address "Engineer," Station "G," Philadelphia, Pa., Postoffice.

Bartlett's Street Gas Lighter. Office, 569 Broadway, N. Y.

Important advance on the draft and easement of carriage. See Jackson's Patent Oscillating Wagon, with tests of draft, models, etc., No. 149 High st., Newark, Essex Co., N. J. See Scientific American, Sept. 25, 1869.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

Needles for all sewing machines at Bartlett's, 569 Broadway, N Y.

Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Hackle, Gill Pins, etc., at Bartlett's, 569 Broadway, New York.

Portable Pumping or Hoisting Machinery to Hire for Coffer Dams, Wells, Sewers, etc. Wm. D. Andrews & Bro., 414 Water st., N. Y

Keuffel & Esser, 71 Nassau st., N. Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Two 60-Horse Locomotive Boilers, used 5 mos., $1,300 each. The machinery of two 500-ton iron propellers, in good order, for sale by Wm. D. Andrews & Bro., 414 Water st., New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

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For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Inventions Examined at the Patent Office.—Inventors can have a careful search made at the Patent Office into the novelty of their inventions, and receive a report in writing as to the probable success of the application. Send sketch and description by mail, inclosing fee of $5. Address MUNN & CO., 37 Park Row, New York.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

L. L., of Ohio.—The notation given in Silliman's Physics with reference to pitch of sounds is rather puzzling. You will understand it, however, by the explanation that C_1 is identical with C, and C_2 with C_1, etc., also bearing in mind that the vibrations spoken of are simple vibrations, that is, from center line out and back again to central line. The number of vibrations constituting the fundamental C, or C_1, varies in different countries. The accepted meaning of the term vibration also varies in different countries. In France the term is accepted as the excursion of the vibrating body in one direction only. In England and Germany it means an excursion in both directions. The French vibrations are therefore only halves of the English and German, and twice as many are required to produce the same pitch. See "Tyndall on Sound," page 69.

O. L. L., of Me.—Having lately discussed the question of saw filing at length in our columns, we prefer not to re open the subject at present.

C. T., of Mass.—From your description we do not think the blister on the boiler you describe renders it dangerous at the present time. It is, however, a subject upon which we do not like to give advice at this distance. The advice of experts who can see the boiler is the best guide for you.

G. V. P., of ——.—Directions for obtaining the true sidereal time and computing the solar time, cannot be given in the space we can allot to your query. You will find the subject simply and concisely treated in "Norton's Astronomy," published by John Wiley & Son, New York.

T. C., of Ky.—The edges of spectacle glasses may be smoothed and polished after grinding by using a wooden wheel fed with pumice stone and water for smoothing, and putty and water for polishing.

C. D., of ——.—Gum shellac is a good cement for broken queensware. It should be melted, and applied thinly to the heated broken edges, which should then be pressed together and allowed to cool.

J. O. B., of ——.—A shallow stratum of fluid will evaporate under a given heat applied at the bottom, faster than a deep one.

C. H. C., of Mass.—Paint over the interior of your water tank with asphaltum. It will not injure your boiler.

O. S. M., of Va.—In so much as the oxide of zinc enters the human system it is hurtful. Of course care and cleanliness reduces the liability of poisoning in the manufacture and use of any kind of paint. Zinc is not as directly injurious as lead paint. The device you name would be effective as a protection, but we doubt if you could get workmen to wear it.

S. T. S., of Ohio.—We published in our last issue the specification of Dr. Adams' patent for electro-plating with nickel. *Ormolu* articles are made of brass, and being gilt, are colored by first rubbing the articles with a scratch brush—but not so hard as when it is intended to burnish them—exposing them to a moderate heat, and when partially cooled, brushing them over with a mixture of pulverized hematite, alum, and common salt, leaving the burnished parts untouched. The pieces are then heated upon burning charcoal till they are hissing hot, and the color begins to change to brown. They are then plunged into cold water, washed and rubbed with a brush wet with vinegar, or if the work is chased, with dilute nitric acid. They are then thoroughly washed with pure water, and dried by a moderate fire.

J. C. K., of Pa.—The distance to which sound will travel depends upon the original intensity and the density of the medium which conveys it. Two voices pitched upon the same key and each producing a sound of given intensity, will unite to produce a sound of double the intensity of that produced by either voice alone, provided they are so placed with reference to each other that the sound waves do not interfere with each other. Silliman's Physics contains some observations upon this subject, which are not noticed in Tyndall's Lectures on Sound.

H. H. T., of Pa.—We think superheating your steam after carrying it five or six hundred feet in pipe, must prove beneficial. Unless such a pipe was felted, or covered by some other non-conducting material, considerable condensation must inevitably ensue. We think by proper clothing you might remove the necessity for superheating, and if so, it would be the most economical plan.

J. T. S.—There is no work specially on silvering glass in the English language that we know of. You will find articles on the subject in Dr. Ure's "Dictionary of Arts and Manufactures," Muspratt's Chemistry, and other technical works. You will find the subject of gilding well treated in the "Painter, Gilder, and Varnisher's Companion," published by Henry Carey Baird, 406 Walnut street, Philadelphia.

M. H. K.—The positions taken in the pamphlet you send us on the subject of steam boiler explosions, are as you say, queer, so queer that we do not think it worth while to burden our colums with further criticism upon them.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING May 3, 1870.

Reported Officially for the Scientific American

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102,465.—TIN GUTTER MACHINE.—Jas. N. Adams, Chillicothe, Mo.

102,466.—TIN TUBING MACHINE.—Jas. N. Adams, Chillicothe, Mo.

102,467.—STAVE DRESSING MACHINE.—M. Pascal Adams, Pittsburgh, Pa.

102,468.—DIE FOR DRAWING WIRE.—J. D. Alvord, Bridgeport, Conn.

102,469.—GUIDE FOR SEWING MACHINE.—J. S. Alter, Leavenworth, Kansas.

102,470.—STRAW CUTTER.—Julius Ambrun, Leavenworth, Kansas. Antedated April 28, 1870.

102,471.—NEEDLE CASE.—Wm. Avery and Albert Fenton, Redditch, England, assignors to William Avery.

102,472.—WASHING MACHINE.—William Badger, Hastings-on-Hudson, N. Y.

102,473.—FASTENER FOR BEDSTEADS, TABLES, ETC.—Jas. M. Baird, Wheeling, West Va., assignor to himself, John McLure, Jas. W. Ward, and John B. McLure. Antedated April 20, 1870.

102,474.—SANDPAPER HOLDER.—Joseph Barker, Chicago, Ill.

102,475.—DEVICE FOR ATTACHING PICKER TO PICKER STAFF.—John D. Barrie, Lawrence, Mass.

102,476.—ORE SEPARATOR.—Thomas Bates, Pinos Altos, New Mexico Territory.

102,477.—WASHING MACHINE.—Charles Bean and Suel Logee, East Douglass, Mass.

102,478.—VENTILATOR FOR WINDOWS.—William C. Betts, Brooklyn, N. Y.

102,479.—POTATO DIGGER.—Joseph H. Billmeyer, Raisin, Mich.

102,480.—EARTH CHAMBER VESSEL.—Wm. H. Bliss, Newport, R. I.

102,481.—CHURN.—Charles A. Boone, Shickshinny, Pa.

102,482.—RACK FOR CARS.—Albert Bridges, New York city.

102,483.—WORKING AND LOCKING RAILWAY SWITCH AND SIGNAL.—John Brunton, Kensington, England.

102,484.—PREPARING THE PITH OF CORNSTALKS FOR USE IN THE ARTS.—William M. Bryant, Alexandria, Va.

102,485.—FEED CUTTER.—Cornelius H. Cain, Dayton, Ohio.

102,486.—DIRECT ACTING ENGINE.—Adam Scott Cameron, New York city.

102,487.—CLAMP.—Charles B. Canfield, Oriskany, N. Y.

102,488.—FRUIT BASKET.—Lauren Carpenter, St. Joseph, Mich.

102,489.—DRAWER SLIDE.—John L. Chapman, West Roxbury, Mass.

102,490.—DEVICE FOR SECURING THE FEATURES OF A CORPSE IN PLACE.—Amos S. Chesebrough, Hartford, Conn.

102,491.—HORSE POWER.—Philo W. Clark, Oblong, N. Y.

102,492.—EXCAVATING APPARATUS.—Philo W. Clark, Oblong, N. Y.

102,493.—LIFTING JACK.—William Clark, Decatur, Ill.

102,494.—EARTH CLOSET.—Wm. R. C. Clark, New Orleans, La.

102,495.—EARTH CLOSET.—Wm. R. C. Clark, New Orleans, La.

102,496.—LIME KILN.—James Clarkson and Geo. W. Decker, Washington, D. C.

102,497.—CATTLE POKE.—Samuel P. Clemons, Dansville, N.Y. Antedated April 22, 1870.

102,498.—REVERSIBLE SEAT FOR RAILWAY CARS.—Thos. J. Close, Philadelphia, Pa.

102,499.—MATCH CASE.—Frank B. Coleman, Southampton, Mass.

102,500.—CAR COUPLING.—John Coleman, Lynchburg, Va.

102,501.—MANUFACTURE OF MALLEABLE IRON.—John J. G. Collins, Philadelphia, Pa.

102,502.—POT FOR SMELTING GLASS.—Roy Combs and Henry J. Leasure, Wheeling, West Va.

102,503.—APPARATUS FOR BLASTING LOGS.—Matthew Cooke, Sacramento City, Cal. Antedated April 27, 1870.

102,504.—HORSESHOE.—George Copeland, Denyer, Colorado Territory.

102,505.—TAILORS' SCALE.—Wm. G. Cummins, Civil District No. 10, Tenn.

102,506.—LET-OFF MECHANISM FOR LOOM.—John Day, Paterson, N. J.

102,507.—COVER FOR KETTLES AND OTHER VESSELS.—E. K. Dean, Bangor, Me., assignor to Wm. C. Lovering, Taunton, Mass.

102,508.—PLOW GRINDER AND POLISHER.—Michael Devault, Charleston, Ill.

102,509.—CHURN.—J. L. Devol, Parkersburg, West Va. Antedated April 29, 1870.

102,510.—PUNCHING APPARATUS.—Thomas De Witt, Detroit, Mich., assignor to John T. Maxson, De Witt, Iowa.

102,511.—PUMP.—Thomas De Witt, Detroit, Mich., assignor to John T. Maxson, De Witt, Iowa.

102,512.—WASHING MACHINE.—Thomas De Witt, Detroit, Mich., assignor to John T. Maxson, De Witt, Iowa.

102,513.—PRUNING HOOK.—Andrew Downer, Hammondsville, Ohio.

102,514.—SPINDLE STEP CAP.—William F. Draper and Jos. B. Bancroft, Hopedale, Mass.

102,515.—SHAFT OR POLE COUPLING FOR CARRIAGES.—C. G. Dudley and Jacob Gulden, Key Port, N. J.

102,516.—STUMP EXTRACTOR.—James M. Eason, Charleston, S. C.

102,517.—MAINSPRING BARREL ATTACHMENT FOR WATCHES.—Ola L. Ellason, Salt Lake city, Utah Territory.

102,518.—CHURN.—Arthur H. Elliott, Albion, Mich.

102,519.—COFFEE CLEANING MACHINE.—William H. Elton, Baltimore, Md.

102,520.—SAW.—James E. Emerson, Trenton, N. J.

102,521.—STEAM BOILER FOR COOKING FOOD FOR STOCK.—William J. Estes, Penn township, Ill.

102,522.—SECTIONAL STEAM GENERATOR.—H. W. Evans, Philadelphia, Pa.

102,523.—CHURN.—Francis T. Fairchild, Sheboygan, Wis.

102,524.—COMBINED HAY AND PRUNING KNIFE.—John Fasig, West Salem, Ohio.

102,525.—HARVESTER RAKE.—V. H. Felt, Kendall, N. Y.

102,526.—BEEHIVE.—Charles Finn, Des Moines, Iowa.

102,527.—DUST RING FOR WATCH FRAME.—Jas. H. Flint, South Bend, Ind.

102,528.—TABLE LEAF SUPPORT.—Asa Forrest (assignor to himself and O. L. French), Moingona, Iowa.

102,529.—SETTING UP DEVICE FOR CIRCULAR KNITTING MACHINES.—William Franz and William Pope, Crestline, Ohio.

102,530.—LAP BOARD.—W. F. Gammel (assignor to himself and Jacob A. Weible), Elizabeth, N. J.

102,531.—FASTENING TUBE IN GRAIN DRILLS.—Franklin Gardner, Carlisle, Pa. Antedated April 18, 1870.

102,532.—CORN HARVESTER.—M. A. Getzendaner, Polo, Ill.

102,533.—COOKING STOVE.—Henry G. Giles, Troy, N. Y.

102,534.—WORK HOLDER.—Jane E. Gilman, Hartford, Conn.

102,535.—SEEDING MACHINE.—M. L. Gorham, Rockford, Ill. Antedated April 29, 1870.

102,536.—EMBROIDERY HOLDER.—Henry Gundaker, Lancaster, Pa.

102,537.—SELF-ACTING MULE FOR SPINNING.—Wm. Hackley (assignor to himself and Charles T. Almy), Moosup, Conn. Antedated April 25, 1870.

102,538.—REVERSIBLE BUTT HINGE.—D. F. Hale, Chicopee, Mass.

102,539.—STOVE PIPE DAMPER.—Rich. M. Hermance, Haly Moon, assignor to Joseph B. Wilkinson, Troy, N. Y.

102,540.—SHOE BRUSH.—F. D. Holland (assignor to Henry J. Holland), Lewiston, Me.

103,541.—COTTON CHOPPER.—Wilson Holt, Dawson, Ga.

102,542.—SCAFFOLD.—E. R. Holzer, Philadelphia, Pa. Antedated April 29, 1880.

102,543.—CULTIVATOR PLOW.—Louis Homrighouse, Baltimore, Ohio.

102,544.—STUMP EXTRACTOR.—George L. Howland and Wm. M. Howland, Topsham, Me.

102,545.—WASHBOARD.—Saunders Hubbell, Jr., West Salem, Ohio.

102,546.—MANUFACTURE OF SOAP.—Charles Wager Hull, New York city.

102,547.—WEATHER STRIP.—J. H. Hull, Irasburg, Vt.

102,548.—CLOTHES-LINE HOLDER.—A. L. Hurtt, Monticello, Ind.

102,549.—TOBACCO ROLLER.—Chas. A. Jackson, Petersburg, Va.

102,550.—PROCESS FOR TEMPERING STEEL.—Jabez Jenkins, Philadelphia, Pa.

102,551.—LANTERN.—J. M. Jenness (assignor to himself, J. D. Jenness, and S. D. Jenness), Boston, Mass.

102,552.—LAMP BURNER.—J. H. Johnson, Newark, N. J., assignor to Holmes, Booth & Haydens, Waterbury, Conn.

102,553.—CAUL FOR LAYING VENEERS.—L. A. Johnson, New York city.

102,554.—DRY DOCK.—William Jones, New York city.

102,555.—SOLDERING FIRE-POT.—Elias W. Kimball, Hudson, N. Y.

102,556.—SUBMARINE TORPEDO.—W. R. King, Washington, D. C.

102,557.—SHOE FASTENING.—A. E. Kroger, Norwalk, Conn.

102,558.—COAL STOVE.—Joel Laforge and Jonathan T. Crane, Rahway, N. J. Antedated April 18, 1870.

102,559.—BOAT RUDDER.—Wm. C. Law, New York city.

102,560.—MACHINE FOR GRANULATING TOBACCO.—C. H. Lilienthal, Yonkers, N. Y.

102,561.—PRINTING-TELEGRAPH INSTRUMENT.—L. T. Lindsey, Jackson, Tenn.

102,562.—ELECTRO-MAGNETIC MOTOR.—L. T. Lindsey, Jackson, Tenn.

102,563.—POLICEMEN'S NIPPERS.—George Lutz, D. H. Rice, Michael Trenor, and Robert Chadwick, Columbus, Ohio.

102,564.—CORN PLANTER.—James W. Magers, Reinersville, Ohio.

102,565.—COMPOSITION FOR FINISHING WAX-LEATHER.—Patrick Maguire, New Boston, Mass.

102,566.—MANUFACTURE OF BOLTS.—Alexander Mailer (assignor to G. C. Bell and R. H. Plumb), Buffalo, N. Y.

102,567.—STREET MOISTENING COMPOUND.—Moritz Marcus New York city.

102,568.—MACHINE FOR FOLDING POWDERS.—J. W. Maxwell, Louisville, Ky.

102,569.—FARM GATE.—John Mayben, Milroy, Pa. Antedated April 23, 1870.

102,570.—COMPOUND FOR DRESSING TEXTILE FABRICS.—John McGill, Boston, assignor to Benjamin S. Goodwin, Boston, and Hiram Whitney, Watertown, Mass.

102,571.—WATER MOTOR.—William McGinniss, Auburn township, Ohio.

102,572.—TUBE WELL.—James McMillan, Fairport, N. Y. Antedated February 15, 1870.

102,573.—BIRD HOUSE.—Henry Miller, Johnston, R. I.

102,574.—DOOR CLAMP.—Benjamin Moore, Hart, Mich.

102,575.—CORD-CATCH.—C. C. Moore, New York city.

102,576.—FENCE AND GATE.—Enoch Muirheid, Greenfield, Ohio.

102,577.—PLANING CHUCK—Augustus Newell and Wm. Pim, Chicago, Ill.

102,578.—HORSE HAY RAKE.—George Notman, Deerfield Ohio.

102,579.—ROSETTE FOR BRIDLES.—J. O. Brien, Geneseo, Ill.

102,580.—CARRIAGE HUB.—James O'Connor, Jackson, Mo.

102,581.—BOILER FURNACE.—J. A. T. Overend, San Francisco, Cal. Antedated April 23, 1870.

102,582.—FIRE EXTINGUISHER.—W. M. Parker, Boston, Mass. Antedated April 19, 1870.

102,583.—ANCHOR.—Gurney C. Pattison, Baltimore, Md.

102,584.—ANCHOR.—G. C. Pattison, Baltimore, Md.

102,585.—FLY TRAP.—Max Patzauer, New York city.

102,586.—SEWING MACHINE.—Rufus H. Peabody, Chelsea, Mass.

102,587.—BOBBIN FOR SPINNING, ETC.—Oliver Pearl, Lawrence, Mass.

102,588.—GRINDING MILL.—Walter Peck, Rockford, Ill.

102,589.—AUTOMATIC WAGON BRAKE.—Frank M. Pickerill, Indianapolis, Ind.

102,590.—HEATING AND VENTILATING ATTACHMENT FOR STOVES AND FIREPLACES.—Emily S. Potter and B. R. Potter, Boston Mass.

102,591.—APPARATUS FOR POLISHING COFFEE, ETC.—J. T Randall (assignor to F. W. Elder & Co.), Baltimore, Md.

102,592.—OFFICE-REGISTER AND DIRECTORY.—Henry Rentchler, Belville, Ill.

102,593.—CORN SHELLER.—J. W. Ricker, Chelsea, Mass.

102,594.—BALL TOY GUN.—Charles Robinson, Boston, Mass.

102,595.—WATER COOLER.—John Rutter, West Chester, Pa.

102,596.—HEMP BRAKE.—George Rymel, Paris, Ky.

102,597.—HOISTING APPARATUS.—Hans A. Schneekloth, New York city.

102,598.—BARLEY OR GAVEL FORK.—D. P. Sharp, Ithaca, N. Y.

102,599.—DITCHING PLOW.—I. S. Sheets, Troy, Ohio.

102,600.—LOCK NUT.—E. R. Shepard, Scranton, Pa.

102,601.—RAILWAY RAIL.—E. R. Shepard, Scranton, Pa.

102,602.—COMPOUND RAILWAY RAIL.—E. R. Shepard, Scranton, Pa.

102,603.—BOB-SLED.—S. C. Shepard, Richfield, Ohio.

102,604.—SASH HOLDER.—R. L. Sibbet, New Kingston, Pa. Antedated April 29, 1870.

102,605.—CLAMP FOR SETTING RIGGING.—J. W. Slaight and J. W. Androvatt, Prince's Bay, N. Y.

102,606.—SAWING MACHINE.—Addison Smith, Perrysburg, Ohio. Antedated April 23, 1870.

102,607.—COMBINED CORN SHELLER AND VEGETABLE-SLICER.—J. P. Smith, Hummelstown, Pa.

102,608.—CULINARY VESSEL.—J. C. Smith (assignor to himself and J. H. Poppy), Rochester, N. Y.

102,609.—ROLL FOR MAKING RAILS FOR STREET RAILWAYS.—G. A. Springer, Chicago, Ill.

102,610.—ROCK-BORING APPARATUS.—Thomas St. John, Dunbar, Pa.

102,611.—HAND CORN PLANTER.—Wm. D. Stroud, Oskosh, Wis.

102,612.—SHIRT.—S. H. Strouse and Joseph Strouse, New York city.

102,613.—HAT-BLOCKING MACHINE.—Jacob Surerus and W. H. Behrens (assignor to A. T. Finn), Newark, N. J.

102,614.—OVEN.—Charles Swain, Laconia, N. H.

102,615.—MOLD FOR ARTIFICIAL TEETH.—Eli Sweet, Whitney's Point, N. Y.

102,616.—BAG-HOLDER.—Geo. D. Sweigert (assignor to himself and Samuel Eshleman), Martic township, Pa.

102,617.—CARVING KNIFE.—O. W. Taft, New York, assignor to himself and Ernest Mitchell, Flushing, N. Y.

102,618.—CORN PLANTER.—L. B. Tarbox, Colliersville, N. Y

102,619.—APPARATUS FOR THE COMBUSTION OF PETROLEUM AND OTHER HYDROCARBON LIQUIDS.—Homer Taylor, Montreal Canada.

102,620.—COMBINATION PADLOCK.—George Thompson (assignor to himself and J. H. Cogill), Trenton, N. J.

102,621.—WASHING MACHINE.—H. N. Thompson, Auburn N. Y.

102,622.—SASH FASTENER.—Theodore R. Timby, Saratoga, N. Y.

102,623.—DRAIN AND WATER PIPE.—G. H. Titcomb and J. P. Culver, Jersey city, N. J.

102,624.—FAUCET.—W. H. Triscler, Cleveland, Ohio.

102,625.—MACHINE FOR BORING HUBS.—Abraham Troup (assignor to himself and Herman Kirk), Lewisberry, Pa.

102,626.—BLOWER FOR BLACKSMITHS' FORGE.—J. G. Tscheulin, Baltimore, Md.

102,627.—ELASTIC TIP FOR LEGS OF CHAIRS, ETC.—Silas Van Patten, Albany, N. Y.

102,628.—WASHING AND WRINGING MACHINE.—J. B. Wakeman and A. R. Field, Hamden, N. Y.

102,629.—STONE PAVEMENT.—Chas. G. Waterbury, New York city.

102,630.—ATTACHING HANDLE TO JOINERS' PLOW.—C. H. Weigle, York, Pa.

102,631.—CULTIVATOR.—Nicholas Werts, Magnolia, Ill.

102,632.—APPARATUS FOR DISTILLING.—J. M. Weyand, St Louis, Mo.

102,633.—EVAPORATING AND DISTILLING BY SOLAR HEAT.—Norman W. Wheeler, Brooklyn, and Walton W. Evans, New Rochelle N. Y.

102,634.—PUMP.—J. T. Whipple, Chicago, Ill.

102,635.—SAFETY SOCKET FOR WHIPS, UMBRELLAS, BILLIARD CUES, ETC.—J. W. Whiteman, Christiana, Del.

102,636.—WATER-COCK FILTER.—Nahum C. Wilder, Hartford, Conn.

102,637.—MACHINE FOR BENDING WOOD.—W. D. Williams, Raleigh, N. C.

102,638.—FORMER FOR HOOP SKIRTS.—C. C. Wilson, Baltimore, Md. Antedated April 18, 1870.

102,639.—COAL HOD.—William Wilson, Boston, Mass. Antedated April 18, 1870.

102,640.—STRAP FASTENER.—William R. Wing, Newark, Ohio.
102,641.—BENDING MACHINE.—Henry Winter, Honesdale, Pa., assignor to himself and T. W. Ball, New York city.
102,642.—ADJUSTABLE AWNING FRAME.—Louis Yenne, New York city.
102,643.—EVAPORATING APPARATUS.—Alanson Youngs, Berlin Mich.
102,644.—SUBSTITUTE FOR JAM NUT.—Theodore B. Young, Louisville, Ky.
102,645.—SCREW PROPELLER.—Chas. Arlan and Chas. Gautschi, New York city.
102,646.—STOVE-BLACKING BOX.—William W. Armington (assignor to himself, Stephen L. Usher, and Fred A. Welton), New Haven, Conn.
102,647.—WELL TUBE.—Isaac Ayres, Elkhart, Ind., and D. C. Payne, Delavan, Wis. Antedated April 25, 1870.
102,648.—DRYING GUANO.—Edwin P. Baugh, Philadelphia, Pa.
102,649.—CLAPBOARD GAGE.—Joab S. Biddlecom, Macedon, N. Y.
102,650.—LIQUID METER.—N. L. Blanchard, Spuyten Duyvil, N. Y. Antedated April 25, 1870.
102,651.—HAY CARRIER.—C. S. Boothby, Saco, Me.
102,652.—PLOW CLEVIS.—Thomas E. C. Brinly, Louisville, Ky.
102,653.—SAW.—Henry Broomell and A. W. Wilson, Christiana, Pa.
102,654.—PYROMETER.—Edward Brown, Philadelphia, Pa.
102,655.—WATER ELEVATOR.—Geo. C. Canfield, Mechanicsburg, Ohio.
102,656.—SLATE-FRAME CLAMP.—J. H. Coffin, Danielsville, Pa. Antedated March 17, 1870.
102,657.—CARRIAGE WHEEL HUB.—A. F. Cooper, San Francisco, Cal.
102,658.—SASH BALANCE.—William Damerel, Brooklyn, N. Y.
102,659.—STAPLE MACHINE.—J. T. Darnell, Florence, N. J. Antedated April 22, 1870.
102,660.—COMPOSITION FOR AND MODE OF ORNAMENTING WOOD.—T. H. Davis (assignor to Cheney Kilburn and J. H. Gates), Philadelphia, Pa.
102,661.—PADLOCK.—J. M. A. Dew, Chicago, Ill.
102,662.—PROCESS AND APPARATUS FOR USING LIQUID FUEL FOR PRODUCING HEAT AND LIGHT.—T. S. Dickerson and R. M. Whipple, Chicago, Ill.
102,663.—SAFETY DERRICK LAMP.—Jonathan Dillen, Petroleum Center, Pa.
102,664.—PUMP VALVE.—J. W. Douglas (assignor to W. & B. Douglas), Middletown, Conn.
102,665.—SEASONING WOOD.—Richard A. Douglas, Philadelphia, Pa.
102,666.—MACHINE FOR CUTTING VEGETABLES.—W. R. Dunn, Alton, Ind.
102,667.—SASH HOLDER.—W. A. Eisenhower, Friedensburg, Pa. Antedated April 29, 1870.
102,668.—PIANOFORTE.—Geo. Ely, New York city.
102,669.—BOTTLE STOPPER.—William Ely, New York city.
102,670.—ROUGHING ROLL.—David Eynon (assignor to Tredegar Co.), Richmond, Va.
102,671.—AGRICULTURAL BOILER.—Francis Farquhar, Richmond, Ind.
102,672.—WASHING MACHINE.—Benjamin F. Fellman, Sellersville, Pa.
102,673.—SPRING SEAT FOR WAGONS.—H. E. Foster (assignor to himself, D. J. Block, and J. T. Gates), Decatur, Ill.
102,674.—LAMP BURNER.—S. W. Fowler, Brooklyn, N. Y., assignor to A. C. Hodgman.
102,675.—METALLIC CARTRIDGE.—Richard J. Gatling, Hartford, Conn.
102,676.—MATCH SAFE.—Geo. Geer (assignor to Chas. Parker), Meriden, Conn.
102,677.—COMBINATION TOOL.—Geo. W. Gregory, New York city.
102,678.—SPRING SEAT.—D. F. Haasz (assignor to himself and E. N. Scherr, Jr.,) Philadelphia, Pa.
102,679.—COAL SCUTTLE AND SIFTER.—Wm. Hazlet and W. H. Flanigan, Philadelphia, Pa.
102,680.—REFRIGERATOR.—W. G. Holden, Jr., Covington, Ky. Antedated Feb. 2, 1870.
102,681.—VENTILATOR FOR MINES.—Jenkin B. Jones, Laure Run, Pa.
102,682.—BASE-BURNING STOVE.—Wm. J. Keep, Troy, N. Y.
102,683.—COOKING STOVE.—Edward Kirk, Sharon, Pa.
102,684.—SEEDING MACHINE.—Hermann Koeller, Adams County, Ill.
102,685.—BOTTLE STOPPER.—G. W. Ladd and F. W. Copcutt, New York city.
102,686.—COMPOUND FOR TREATING RHEUMATISM.—Wm. Landert and John Deggeller, Chicago, Ill.
102,687.—PLOW.—W. M. Lanham, Noblesville, Ind.
102,688.—BARBER AND DENTAL CHAIR.—Michael Leidecker, Rochester, N. Y.
102,689.—MANUFACTURE OF FERTILIZER AND OIL FROM FISH.—Orazio Lugo, Baltimore, Md.
102,690.—PIPE TONGS.—Stephen Lynch, New York city.
102,691.—SHADE HOLDER FOR LAMPS.—J. W. Lyon (assignor to himself and John Fellows), Brooklyn, N. Y.
102,692.—LANTERN GLOBE.—I. C. Mayo (assignor to himself and J. J. Currier), Gloucester, Mass.
102,693.—MACHINE FOR SPLITTING GRINDSTONES.—Jas. McDermott, Cleveland, Ohio.
102,694.—SHOE FASTENER.—A. McKenney, Portland, Me.
102,695.—ATTACHMENT OF POLE OR SHAFTS TO WHEELED VEHICLES.—James McMillin, Ripley, Ohio.
102,696.—SEAL LOCK.—D. A. McNair, Washington, D. C.
102,697.—TRANSMITTING POWER.—A. W. Morton, Morrisania, N. Y.
102,698.—HYDRANT.—John Myers, Cincinnati, Ohio.
102,699.—WELL TUBE.—Simon Neff, Clymouth, Ind.
102,700.—SASH MARKER.—Governeur M. Nickason, Ellenville, N. Y.
102,701.—ROCKING AND RECLINING CHAIR.—T. J. Palmer, New York city.
102,702.—SOFA BED.—F. C. Payne, New York city.
102,703.—PISTON CONNECTION.—Hart F. Pease, Brooklyn, N. Y.
102,714.—SMITHS' BELLOWS.—Geo. H. Peck, East Hamburg, N. Y.
102,705.—WASHING MACHINE.—S. B. Peugh, Salem, Ind.
102,706.—GRADING MACHINE.—James Preston, Atchison, Kansas.
102,707.—DIE FOR FORMING KING BOLTS.—F. B. Prindle, Southington, Conn.
102,708.—DIE FOR TRIMMING KING BOLTS.—F. B. Prindle, Southington, Conn.
102,709.—HUBS OF ROAD CARRIAGES.—John Raddin, Lynn, Mass.
102,710.—SEWING MACHINE.—George Rehfuss, Philadelphia, Pa., assignor to American Button-hole Over-seaming and Sewing Machine Co., Pa.
102,711.—MACHINE FOR MAKING CHAIN LINKS.—Henry Reynolds, Aurora, N. Y.
102,712.—WASH BOILER APPARATUS.—Jacob Ringle, Jersey City, N. J.
102,713.—SCHOOL DESK.—Charles Hamilton Roberts, Geneva, Ohio.
102,714.—WASHING MACHINE.—W. T. C. Runnalls, Searsport, Me.
102,715.—COMPOUND FOR REFINING CIDER, WINE, ETC.—Oliver Schaffer, Dayton, Ohio.
102,716.—CASK FOR LAGER BEER.—John J. Schillinger, New York city.
102,717.—CLOTHES DRYER.—Henry Schryver (assignor to himself and J. D. Chipp), Kingston, N. Y.
102,718.—TEA AND COFFEE STRAINER.—A. B. Searles, Providence, R. I.
102,719.—HOISTING GEAR.—Henry F. Shaw, West Roxbury, Mass.
102,720.—HEEL STIFFENER FOR BOOTS AND SHOES.—G. V. Sheffield, Northbridge, Mass.
102,721.—SHANK-PIECE FOR BOOTS AND SHOES.—George V. Sheffield, Northbridge, Mass.
102,722.—MACHINE FOR COVERING REEDS FOR HAT TRIMMING.—G. A. Shepard, Bethel, Conn.
102,723.—REVERSIBLE LATCH.—Wm. E. Sparks (assignor to Sargent & Co.), New Haven, Conn.
102,724.—RAILWAY SWITCH.—William H. Staats, Crescent, N. Y.
102,725.—APPARATUS FOR PRESERVING WOOD.—Francis A. Stevens, Chicago, Ill.
102,726.—HEATING STOVE.—David L. Stiles, Rochester, N. Y.
102,727.—KNIFE SHARPENER.—Septimus C. Stokes, Manchester, N. H.
102,728.—LAMP BURNER.—Alvin Taplin, Forestville, assignor to Bristol Brass and Clock Co., Bristol, Conn.
102,729.—HAY AND LIME ELEVATOR.—Abraham Thomas and G. D. Thomas, St. Thomas, Pa.
102,730.—COMBINED THREAD AND NEEDLE CASE.—Theodore R. Timby, Saratoga, N. Y.
102,731.—MACHINE FOR MAKING PLOWS.—J. Uric, Evansville, Ind.
102,732.—COPY BOOKS.—Philip F. Van Everen, Brooklyn, N. Y.
102,733.—BOOK COVER PROTECTOR.—Philip F. Van Everen, Brooklyn, N. Y.
102,734.—HAND STAMP CANCELER.—L. B. Van Kleeck, New York city. Antedated March 16, 1870.
102,735.—REFRIGERATOR.—G. W. Walker, Malden, Mass.
102,736.—STRAW CUTTER.—Columbus M. Weathers, Rochoport, Mo.
102,737.—LAVATORY APPARATUS.—Darius Wellington, Boston, Mass.
102,738.—WATER-CLOSET BOWL.—Darius Wellington, Boston, Mass.
102,739.—LUBRICATOR FOR LOOSE PULLEYS.—I. P. Wendell and S. P. M. Tasker, Philadelphia, Pa.
102,740.—MANUFACTURE OF WROUGHT IRON FROM ORE, CINDER, OR SLAG.—James D. Whelpley and Jacob J. Storer, Boston, Mass.
102,741.—AUTOMATIC GATE.—Samuel Whitaker, Bel Air, Md.
102,742.—DRYER.—G. W. White, Malden, and L. E. Wentworth, Melrose, Mass.
102,743.—PUMP.—F. C. Wilson, Watkins, N. Y.
102,744.—HAY RAKE AND LOADER.—Geo. A. Wing, Albany, N. Y.
102,745.—APPARATUS FOR DISTILLING SPIRITS.—Francis M. Young, Nashville, Tenn.
102,746.—UMBRELLA.—S. W. Young, Providence, R. I.
102,747.—PROPELLING WHEEL.—A. C. Loud, San Francisco, Cal.

REISSUES.

3,945.—CULTIVATOR.—A. R. Blood, Alexander Hathaway, and V. R. Beach, Independense, Iowa.—Patent No. 19,304, dated June 30, 1868.
3,946.—BREECH LOADING FIREARMS.—W. N. Ely, Stratford, Conn., trustee and assignee of J. C. Symmes.—Patent No. 22,094, dated November 16, 1858.
3,947.—MOWING MACHINE.—John P. Greely, Boston, and Levi W. Buxton, Lynn, for themselves and Thomas H. Dodge (assignee of one third interest), Worcester, Mass.—Patent No. 39,288, dated July 21, 1863.
3,948.—ORE CRUSHER.—John Hamilton, George W. Hamilton, and Joseph Hamilton, for themselves and Joseph Hamilton, assignee of L. E. Hanson, Wheeling, West Va.—Patent No. 90,532, dated May 25, 1869.
3,949.—EXTENSION TABLE.—C. P. Lenz, Poughkeepsie, N. Y.—Patent No. 91,617, dated September, 7, 1869.
3,950.—STEAM GAS GENERATOR.—H. S. Maxim, New York city.—Patent No. 71,400, dated Nov. 26, 1867.
3,951.—BREECH-LOADING FIREARM.—B. S. Roberts, U. S. Army.—Patent No. 36,531, dated Sept. 23, 1862; reissue 2,067, dated Sept. 5, 1865.
3,952.—Division 2.—BREECH-LOADING FIREARM.—B. S. Roberts, U. S. A.—Patent No. 36,531, dated Sept. 23, 1862; reissue 2,067, dated Sept. 5, 1865.
3,953.—BREECH-LOADING FIREARM.—B. S. Roberts, U. S. A.—Patent No. 36,531, dated September 23, 1862; reissue 2,067, dated Sept. 5, 1865.
3,954.—RAILWAY CAR WHEEL.—J. K. Sax and G. W. Kear, Kingston, Pa.—Patent No. 88,743, dated April 6, 1869.
3,955.—Division A.—HARVESTER.—John F. Seiberling, Akron, Ohio, assignee of George Esterly.—Patent No. 23,666, dated April 19, 1859.
3,956.—Division B.—HARVESTER.—J. F. Seiberling, Akron, Ohio, assignee of George Esterly.—Patent No. 23,666, dated April 19, 1859.
3,957.—Division C.—HARVESTER.—J. F. Seiberling, Akron, Ohio, assignee of George Esterly.—Patent No. 23,666, dated April 19, 1859.
3,958.—HARVESTER.—Richard M. Williams, Rockville, Md.—Patent No. 95,861, dated Oct. 12, 1869.
3,959.—MANUFACTURE OF YEAST FOR DISTILLERS.—Joseph Wolff, Cincinnati, Ohio.—Patent No. 99,615, dated Feb. 8, 1870.
3,960.—HORSE HAY RAKE.—Alzirus Brown, Worcester, Mass., assignee, by mesne, assignments, of Mathias Raezer.—Patent No. 16,294, dated Nov. 29, 1859.
3,961.—CONSTRUCTION OF SEWING MACHINE COVER.—John Johnson, Hartford, Conn.—Patent No. 72,739, dated December 31, 1867.
3,962.—BRONZING AND GILDING.—John L. Duffee, Washington, D. C., for himself and John H. Johnston, assignee of one third interest.—Patent No. 102,198, dated April 19, 1870.

DESIGNS.

4,002.—GLASS COLUMN FOR COACH LAMPS.—Thos. Boudren, Bridgeport, Conn.
4,003.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa.
4,004.—BRAND.—Max Hoffheimer, Cincinnati, Ohio.
4,005.—TRADE MARK.—Otto Kornemann and Julius Jungbluth, New York city.
4,006.—BURIAL CASKET.—Philipp J. Marchal, Hartford, Conn.
4,007.—FLOOR CLOTH PATTERN.—James Patterson, Elizabeth, assignor to R. H. and B. C. Reeve, Camden, N. J.
4,008.—TYPE.—Richard Smith (assignor to Mackellar, Smiths and Jordan), Philadelphia, Pa.
4,009.—CROSS-CUT SAW.—W. G. Tuttle, Chelsea, Mich.
4,010.—TRUNK LOCK.—Cornelius Walsh, Newark, N. J.

EXTENSION.

SEAMLESS METAL TUBES.—W. F. Brooks, New York city.—Letters Patent No. 14,551, dated April 1, 1856.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

806.—CRIMPING MACHINE.—S. W. Jamison, New York city. March 18, 1870.
816.—MACHINES FOR SEWING STRAW.—S. S. Turner, Westborough, Mass. March 22, 1870.
796.—PRINTING PRESSES.—Charles Parker, Meriden, Conn. March 17, 1870.
834.—MANUFACTURING BARRELS, AND OTHER ROUND VESSELS OF WOOD.—D. H. Howard, Grand Rapids, Mich. March 21, 1870.
837.—WHEELS.—J. A. Woodbury, Boston, Mass. March 21, 1870.
872.—AMMONIATED SULPHURIC ACID.—C. U. Shepard, Jr., Charleston, S.C. March 24, 1870.
856.—IRON AND STEEL WORKING.—John Absterdam, New York city. March 18, 1870.
870.—TURBINE WATER WHEELS.—H. A. Chadwick, Burnet, Texas. March 24, 1870.
885.—STEAM ENGINE VALVES.—G. E. Noyes, Washington, D. C. March 25, 1870.
882.—VALVES.—G. Sickels and J. H. Thorndike, Boston, Mass. March 25, 1870.
896.—MACHINERY FOR COMPRESSING PEAT, ETC.—T. Ellis and W. A. Ellis, Philadelphia, Pa. March 24, 1870.
904.—WRENCH.—G. C. Taft, Worcester, Mass. March 28, 1870.
905.—ANCHOR.—G. C. Pattison, Baltimore, Md. March 28, 1870.
923.—ARTIFICIAL FUEL AND APPARATUS EMPLOYED IN ITS MANUFACTURE.—Anthracite Fuel Manufacturing Company, Philadelphia, Pa. March 30, 1870.
932.—MACHINES FOR REAPING AND MOWING.—C. H. McCormick, Chicago, Ill. March 30, 1870.

U. S. Patent Office.

How to Obtain Letters Patent FOR NEW INVENTIONS.

Information about Caveats, Extensions, Interferences, Designs, Trade Marks; also, Foreign Patents.

For a period of nearly twenty-five years, MUNN & CO. have occupied the position of leading Solicitors of American and European Patents, and during this extended experience of nearly a quarter of a century, they have examined not less than fifty thousand alleged new inventions, and have prosecuted upward of thirty thousand applications for patents, and, in addition to this, they have made, at the Patent Office, over twenty thousand preliminary examinations into the novelty of inventions, with a careful report on the same.

The important advantages of MUNN & CO.'S Agency are, that their practice has been ten-fold greater than that of any other Agency in existence, with the additional advantage of having the assistance of the best professional skill in every department, and a Branch Office at Washington, which watches and supervises, when necessary, cases as they pass through official examination.

CONSULTATIONS AND OPINIONS FREE.

Those who have made inventions and desire a consultation are cordially invited to advise with MUNN & CO. who will be happy to see them in person at the office, or to advise them by letter. In all cases, they may expect an HONEST OPINION. For such consultations, opinion, and advice, NO CHARGE is made. A pen-and-ink sketch and a description of the invention should be sent.

TO APPLY FOR A PATENT,

A model must be furnished, not over a foot in any dimension. Send model to MUNN & CO., 37 Park Row, New York, by express, charges paid, also, a description of the improvement, and remit $16 to cover first Government fee, and revenue and postage stamps.

The model should be neatly made, of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show with clearness the nature and operation of the improvement.

PRELIMINARY EXAMINATION

Is made into the patentability of an invention by persons search at the Patent Office, among the models of the patents pertaining to the class to which the improvement relates. For this special search and a report in writing, a fee of $5 is charged. This search is made by a corps of examiner of long experience.

Inventors who employ us are not required to incur the cost of a preliminary examination. But it is advised in doubtful cases.

COST OF APPLICATIONS.

When the model is received, and first Government fee paid, the drawings and specification are carefully prepared and forwarded to the applicant for his signature and oath, at which time the agency fee is called for. This fee is generally not over $25. The cases are exceptionally complex if a higher fee than $25 is called for, and, upon the return of the papers, they are filed at the Patent Office to await Official examination. If the case should be rejected for any cause, or objections made to a claim, the reasons are inquired into and communicated to the applicant, with sketches and explanations of the references; and should it appear that the reasons given are insufficient, the claims are prosecuted immediately, and the rejection set aside, and usually

Without Extra Charge to the Applicant.

MUNN & CO. are determined to place within the reach of those who confide to them their business, the best facilities and the highest professional skill and experience.

The only cases of this character, in which MUNN & CO. expect an extra fee, are those wherein appeals are taken from the decision of the Examiner after a second rejection; and MUNN & CO. wish to state very distinctly, that they have but few cases which can not be settled without the necessity of an appeal; and before an appeal is taken, in any case, the applicant is fully advised of all facts and charges, and no proceedings are had without his sanction; so that all inventors who employ MUNN & CO. know in advance what their applications and patents are to cost.

MUNN & CO. make no charge for prosecuting the rejected claims of their own clients before the Examiners and when their patents are granted, the invention is noticed editorially in the SCIENTIFIC AMERICAN.

REJECTED CASES.

MUNN & CO. give very special attention to the examination and prosecution of rejected cases filed by inventors and other attorneys. In such cases a fee of $5 is required for special examination and report, and in case of probable success by further prosecution, and the papers are found tolerably well prepared, MUNN & CO. will take up the case and endeavor to get it through for a reasonable fee, to be agreed upon in advance of prosecution

CAVEATS

Are desirable if an inventor is not fully prepared to apply for a Patent. Caveat affords protection, for one year, against the issue of a patent to another for the same invention. Caveat papers should be carefully prepared.

The Government fee on filing a Caveat is $10, and MUNN & CO.'S charges for preparing the necessary papers are usually from $10 to $12.

REISSUES.

A patent when discovered to be defective, may be reissued by the surrender of the original patent, and the filing of amended papers. This proceeding should be taken with great care.

DESIGNS, TRADE MARKS, AND COMPOSITIONS

Can be patented for a term of years, also, new medicines or medical compounds, and useful mixtures of all kinds. When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

PATENTS CAN BE EXTENDED.

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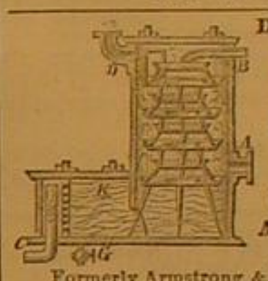
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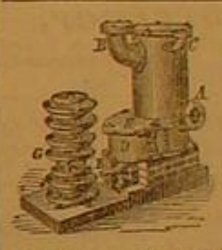
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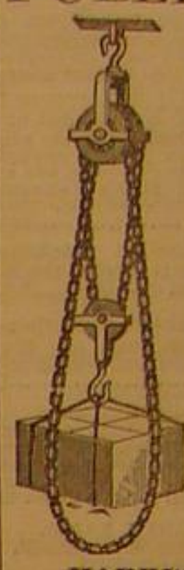
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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXII.—No. 21. [NEW SERIES.] NEW YORK MAY 21, 1870. $3 per Annum [IN ADVANCE.]

Improvement in Marine Staterooms and Furniture.

A life on the ocean wave is a fine thing in poetry, but in practice to those whose stomachs are sensitive to the motion of vessels, it is often a very sorry experience. Many and various remedies, and as many prophylactics as remedies, have been proposed, among which the most efficacious is to stay at home, but the latter, unfortunately, cannot always be done. The inventor of the device illustrated in the engravings has, however, undertaken the task of providing a remedy for the sufferings of sea sickness. If successful in operation, as would seem probable from the principles involved, the discomforts of a sea voyage to many will be overcome.

Fig. 1 is a perspective view of the invention, and Fig. 2 a plan view. It consists in providing the staterooms, cabins, saloons, etc., of vessels with couches, sofas, and the like, suspended in such a way as always to maintain a horizontal position, no matter how much the vessel may pitch or roll.

The couches, A, Fig. 1, are preferably made in a circular form, as shown in Fig. 1, and suspended on oscillating hangers, C, the hangers being adjusted on the principle in which the mariner's compass is suspended to keep it constantly level.

Doors B, to which steps placed in the corner of the apartment lead, admit the occupants, and the hanging couch may contain a center table, and other small articles of furniture.

Leaves D, Fig. 2, serve to enlarge the surface when it is desired to recline, and they may be turned down out of the way, when only a seat is required.

The corners of the room may be utilized as closets, presses, etc., a wash stand occupying one corner, E, Fig. 2.

Patented April 5, 1870, through the Scientific American Patent Agency, by Lorenzo D. Newell, 514 Broadway, New York.



NEWELL'S OSCILLATING SOFA, TABLE AND COUCH FOR VESSELS.

Presence of Mind.

The following introduction to some stories of great presence of mind, in the last number of *Chambers' Journal*, contains a fine analysis of an obscure mental faculty.

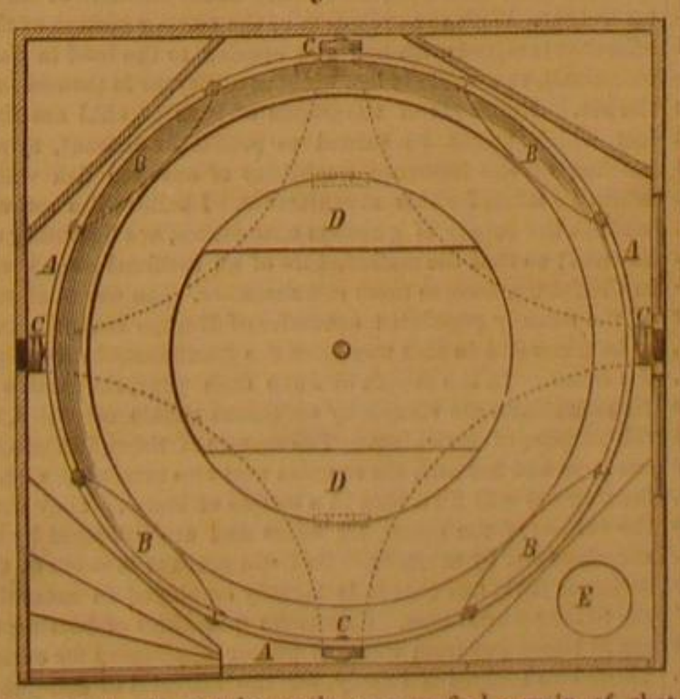
Now, then, throw yourself over; you'll be dashed to atoms; but what matter? Away you go. You feel that unless you speedily retreat, you must obey the dread command; and you turn your head away from gazing down the horrid abyss. You ask yourself: What if I were so placed that I could not withdraw, should I obey the whispering demon? Perhaps you reason with yourself: Nonsense! it is only a feeling, a sensation; impossible! Try again. Yes, there it is again; you dare not remain. What can it be? you ask. Is it the demon of suicide? Can it be anything in my brain? There, you have hit it! It is no demon of suicide that urges you on—it is only something in your brain. Let us try and find out what it is.

From a pair of scissors to the imperial parliament, and upwards still to the System of the Universe, every agency, moral or physical, seems to be compounded of two antagonistic forces, controllable and performing correctly the duties assigned to them as long as they work in unison; but uncontrollable, and prone to run into excess of their functions, if separated from each other.

Take away the force of gravity, and centrifugal force uncontrolled would scatter us in fine dust through space. Abolish one of the constituent parts of any well-organized government, and the result, in a moral sense, would probably be pretty much the same. Even the blade of a pair of scissors won't work without its fellow. Nor is the brain an exception to this rule. An eminent philosopher (Dr. Richardson), still living, in experimenting recently, on animals, with the object of testing the comparative value of various anæsthetics, discovered that at least two antagonistic forces reside in the brain: one having its abode in the anterior and upper portion (the cerebrum), the other in the lower and posterior part (the cerebellum). In his experiments, he observed that if the cerebrum of an animal be rendered insensible, and its powers thus temporarily destroyed, the animal is immediately impelled to rush forward; on the other hand, the cerebellum being paralyzed, retrograde movement is the result. Thus he accounts for that impulse which many people feel to precipitate themselves from a hight; the cerebrum, which contains the thinking and directing faculties, under such circumstances becoming paralyzed—dizzy—and so the control which it normally exercises over the cerebellum being partially removed, the influence of the later declares itself.

The learned professor having opened the gate for us, we may walk in and observe for ourselves. Many things come to our recollection which we can now account for by this double brain force. We can comprehend why that partridge dashed madly forward after the fatal charge struck him; and why the other, although flying at the same speed, fell back in the air like a tumbler-pigeon, fluttering still backward to

Fig. 2



the ground. If we take up the one, we find a grain of shot has pierced the skull a little above the eyes; and we see the death wound of the other at the back of the head. We can now understand why those overcome with fright so frequently rush into the danger they wish to avoid. Nor need we confine ourselves to examples of a purely physical nature. We may place in the same category the bashful man who talks nonsense when he should hold his tongue; the awkward man, who only is awkward because he is nervous—the directing power of his brain is in abeyance—and the passionate man, whose words and actions are uncontrolled by his reasoning powers. In a word, we can trace half our foolish words and actions to a want of equilibrium between these two forces that inhabit our brains, and it is only when the balance is correct that we are fit to govern ourselves.

Presence of mind is the popular term to express this mental equilibrium.

The question has been frequently discussed in social circles, whether men or women are most prone to lose their presence of mind. Lucy, just seventeen, says: "Oh, men, to be sure. Why, self-possession is an attribute almost peculiar to women; a young girl entering society is quite at her ease, while a young man is sure to be awkward and nervous. See how we get out of a scrape; never at a loss for an answer. A man would stutter and mutter, and get deeper into the mire." "Yes, but," says Tom, who is just home from school, and not much troubled with nerves—"just look at you girls, how you scream: if your life depended on silence, you'd betray yourselves by a scream." Then the ladies reply "Oh, we don't pretend to be as brave as men." And so the question remains unsettled.

Lucy no doubt is correct, nor is Tom less so. Perhaps the fairest arrangement would be to grant the weaker sex pre-eminence in the absence of physical danger; and yet, on the other hand, instances of calm thought and deliberate action of women under trying circumstances are so numerous, that they can scarcely be held as merely exceptions to the rule. Among the tales of shipwrecks are recorded noble instances of presence of mind amongst women in the most appalling danger. What could be more heroic, for instance than the conduct of the women on board the illfated *London?* Indeed, it is generally in circumstances of comparatively trifling peril that the balance of the female mind is disturbed—when, as Tom says, they shriek.

New Resources of the Pacific States.

That which we legitimately expected, says the San Francisco *Bulletin*, from the completion of our railroads—that which President Grant in his inaugural denominated "unlocking the strong box of our treasures," seems rapidly coming to pass. New mines are discovered in all directions. Our veteran army of prospecters, experienced in the search, and starting from a hundred new centers of operations and improved bases of supplies, are waging a war upon nature, the results of which are likely to be as productive as our recent civil war was destructive. Not only on the line of the railroad, but in distant Arizona, and in Oregon and Washington, we hear, every day, the old cry, "Eureka!" We have become quite callous to the appeals of gold and silver, or any one of these new discoveries would excite a pursuit like that to which California owed its transformation.

Not less important, perhaps more so, is the reported finding of cannel coal within half a mile of the Union Pacific Railroad in Wyoming, which we chronicle this morning. About three miles from Percy Station, it is said, the first discovery has been made of this species of diamonds—"black diamonds" we may still call them with no disrespect to the fifteenth amendment. Such a discovery is invaluable to the railroad, and through it to all the industries which are to be vivified by it. Cheap fuel is the great desideratum in the barren interior, throughout the treeless West, and for the rapid and cheap development of the lead, iron, copper, silver, and gold mines everywhere. In view of the liberal gifts of nature which are coming to us as treasure trove, the date of our national bankruptcy may as well be postponed. Even specie payments cannot be far off, with another cotton crop worth $300,000,000 and $100,000,000 a year of gold and silver production with which to kick the "balance of trade."

CODFISH AS FOOD FOR MAN, BEAST, AND VEGETABLE.

[From Stewart's Quarterly].

The Cod fishery is the staple industry of Newfoundland. This splendid fish, which graces the table of the noble, and in its dried and salted condition supplies a wholesome food for the poor man, is found in perfection around the shores of Newfoundland. Its chosen home is on the Great Banks, six hundred miles in length and two hundred in breadth. Here the aristocracy of the great race are found, the quality and size of Bank fish being superior to that caught near the shore, averaging thirty to the quintal when dried. The enormous colonies of fish on these Banks may be judged of from the fact that more than three hundred and sixty years of fishing, on an immense scale, have apparently made no impression on them in the way of reducing their numbers. It is questionable whether the smaller banks near the shores, where the dimensions of the fish colonies are but limited, are not suffering from over fishing. It is certain that there are localities where the fish are not nearly so plentiful as formerly, and some have been abandoned altogether. Since the day when the Red Indian lay over the rocks and transfixed the codfish with his spear, till now, when 70,000 men with the most ingenious instruments of capture, are constantly at work, what myriads of codfish have been drawn from those seas, and as yet there is no sensible diminution in the supply! Cuvier tells us that "almost all parts of the cod are adapted for the nourishment of man and animals, or for some other purpose of domestic economy. The tongue, for instance, whether fresh or salted, is a great delicacy; the gills are carefully preserved to be employed as baits in fishing; the liver, which is large and good for eating, also furnishes an enormous quantity of oil, which is an excellent substitute for that of the whale, and applicable to all the same purposes; the swimming bladder furnishes an isinglass not inferior to that yielded by the sturgeon; the head, in places where the cod is taken, supplies the fishermen and their families with food. The Norwegians give it with marine plants to their cows, for the purpose of producing a greater proportion of milk. The vertebræ, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtschatkadales to their dogs." These same parts, properly dried, are also employed as fuel, in the desolate steppes of the shores of the Icy Sea. Even their intestines and their eggs contribute to the luxury of the table. Since Cuvier's day, cod-liver oil has become world-renowned for its medicinal properties. The best is made without boiling, by applying to the livers a slight degree of heat, and straining through thin flannel or similar texture. When carefully prepared it is quite pure, nearly inodorous and of a crystalline transparency. The article however is largely adulterated in England and France. The common cod oil, made by the putrifying process, which deprives it of its iodine and consequently of its medicinal virtues, is refined by charcoal, filtered, and sold as the genuine article, by dishonest dealers. It is much to be regretted that means are not adopted in Newfoundland, such as a seal or label, to be affixed by a responsible officer on each bottle or vessel, so as to attest the genuine article. To invalids, who wish to get cod-liver oil pure, this would be an inestimable boon. It has now become a valuable remedy in that widespread, formidable disease, consumption. The result of an extended trial of this medicine, in the hospital, at London, for the treatment of consumptive patients, shows that about seventy per cent gain strength and weight and improve in health, while taking the cod-liver oil; and the good effect, with a great many, is permanent. Skate liver oil is also coming into use for medicinal purposes. The quantity of common cod oil extracted from the fish caught on the banks and shores of Newfoundland is estimated at 12,500 tuns, the value of which, at £30 a tun, is £375,000.

It is well known that the cod is most prolific in the perpetuation of its race. A cod-roe has more than once been found to be half the gross weight of the fish; and specimens of the female have been caught with upward of eight millions of eggs. Were all these to come to maturity a pair of cod would, in a few years, fill the ocean; but of course, in the great waste of waters, only a portion of the eggs are fertilized, and only a small per centage of the fish ever arrives at maturity. The cod spawns in the mid winter, but its habits have not been observed with sufficient accuracy to determine when it becomes reproductive. The best authorities hold that the cod is an animal of slow growth, and that it is at least three years old before it is able to repeat the story of its birth. A question of great interest to Newfoundland is, whether it is possible, by over fishing, to exhaust her cod fisheries, either partially or entirely? As yet no serious impression appears to have been made on the Bank fishery, after three and a half centuries of ceaseless fishing. The same, however, cannot be asserted in regard to the shore fishery, at least at certain points; and the frequent complaints of late years of the scarcity of fish in certain bays, as compared with former times, and the numerous failures in the summer fishery awaken the suspicion that the perpetual drafts, year after year, without any interval for recruiting, have seriously reduced the number of codfish, in certain localities. The scarcity of cod in Conception and Trinity bays, and other places, of late years, as compared with "the good old times," is generally allowed; and the bulk of the population of these bays now proceed to the Labrador for their summer fishing. The theory of the migration of fish, once a general notion, is now known to be a popular delusion, and has been abandoned by all scientific naturalists. The migratory instinct in fish is ascertained to be very limited, merely leading them to move about a little from their feeding ground to their spawning ground—from deep to shallow water. In fact there are, in the world of waters, great fish colonies, as there are great seats of population on land; and these colonies are stationary, having, comparatively speaking, but a limited range of water in which to live and die. All around the shores of Newfoundland are numerous banks, or submarine elevations, of greater or less extent, which constitute the feeding and breeding grounds of the cod; and each of these has its own fish colony that live and die within a limited range from their own *habitat*. They do not intermingle with other colonies or invade their domains. This is proved by the well known fact that the cod of different localities are marked by distinctive features and qualities—the cod, for example, of Placentia bay being quite distinguishable from that taken in Bonavista bay. So, too, the vast fish colonies of the Great Banks, at a considerable distance from the shores, differ from shore fish, being larger and finer, and, except a few adventurous individuals that roam from home, are not found at any distance from the place of their birth. It is a favorite theory with Newfoundland fishermen that, were it not for the Frenchmen fishing on the Great Banks, and covering miles of the ocean with their *bultows*, the fine bank fish would come in on the shores, and swarm in every bay and creek. This is merely a popular fallacy. The bank and shore fish keep to their respective homes. If heavy drafts are made on the smaller colonies around the shores and in the bays, in the course of years, these will become seriously diminished in numbers. Facts seem to indicate that this is the case in many localities at present. The average catch of codfish now is not greater than it was fifty years ago, though many thousands more hands are now engaged in fishing.

There is one other economic purpose for which the codfish are available, but which is yet undreamed of in Newfoundland. I refer to the manufacture of fish-guano from fish offal. The French have invented a process by which the offal of all fish, and the coarse fish that are useless for food, can be converted into a fish-powder nearly as rich as the best Peruvian guano, equally [transportable and possessed of the same fecundatory properties when employed in agriculture. The process is simple—the offal or fish are boiled—then subjected to pressure, in screw-presses, to extract as much as possible of the water and oil; then dried and reduced to powder, which is found on analysis to contain 12 per cent of nitrogen and 14 per cent of bone earth. In fertilizing qualities, when applied to land, it competes advantageously with Peruvian guano. There are several large factories, for the manufacture of this fish-guano in France—the most extensive being at Concarneau, between Lorient and Brest, in the department of Finisterre, a fishing village, where the catching and preparation of Sardine are carried on. The success of this branch of industry has been great and decisive, and is now placed beyond the possibility of doubt. In the locality in which it is manufactured in France this fish-guano fetches eight shillings per cwt., and is eagerly sought by the farmers; while the oil, which constitutes about 2½ per cent of the raw fish, is worth three shillings and four pence per gallon. These figures show that the manufacture must be highly profitable. The establishment at Concarneau, where only six men and ten boys are employed, produces 2,000 tuns of manure annually, which, at the rate of three cwt. per statute acre, would suffice to manure 13,000 acres of land, and would represent, at 22 per cent of dried manure, a fishing of 9,000 or 10,000 tuns. The quantity of coal used in the manufacture is about two cwt. to one tun of manure. The French have had one of these factories in operation for some years, at Quirpon, near the strait of Belle-Isle, on the northeast coast of Newfoundland; but its existence is all but unknown to Newfoundlanders, few if any of whom are aware of the invention, and the immense field of industry which it opens up. This establishment at Quirpon furnishes from 8,000 to 10,000 tuns of manure annually; and possibly there may be other factories at work along the "French Shore" of which we have no information.

A new and vast field of enterprise in Newfoundland might be opened up, in this manufacture, were persons possessed of skill and capital to enter on it. The cod, previous to being salted and dried, is deprived of its head, its intestines, and the backbone, which together make about one-half of its total weight. With the exception of the trifling portion of this offal that is mixed with bog and applied to the land in Newfoundland, the whole is lost without utility, or is thrown into the sea. Hundreds of thousands of tuns of offal are thus lost which might be turned to profitable account, to say nothing of the immense quantities of common fish which might be taken for this manufacture. I believe the sources, whence the supply of guano is now drawn, are becoming exhausted; so that the manufacture of an artificial guano will, in the future, become more remunerative. The worn-out soils of the densely populated countries of Europe seem destined to be renovated in this way from the inexhaustible wealth of the ocean. In the month of June each year, the shores of Newfoundland are visited by enormous shoals of caplin, for the purpose of spawning. The masses of them, in the various bays and harbors, are so great that two men with a small landing net will fill a boat in a couple of hours. They cover the surface of the ocean for miles and are devoured by the voracious cod by myriads. So little account is made of this delicious little fish that it is largely employed in manuring the fields and gardens. Enormous quantities of herring too are at times lost from want of proper appliances for curing. These two sources of supply, for the material of fish-guano, might be added to those already named, so that the stock could never fall short. He would be a benefactor to Newfoundland, who would introduce this important branch of industry.

EXTRACTS of medicinal plants are now made with the bi sulphide of carbon by M. Lefort.

Nathan Read, the Inventor of the Multi-Tubular Boiler.

Nathan Read was a native of Warren (formerly Western), Worcester County, Mass., born July 2, 1759. His ancestors originally came from Newcastle-upon-Tyne; they then settled in the County of Kent, where they lived for several generations. From thence they emigrated to America at an early day, about 1632, and settled in the vicinity of Boston, where they resided for many years. His grandfather—when the country was new, and but few settlements in that section of the State—purchased a large tract of land in Warren, upon which he settled, and where he spent the remainder of his life in the improvement of his lands. His father, Major Reuben Read, was an officer in the Revolutionary service; and his mother, whose maiden name was Tamison Eastman, was first cousin to Major-General Nathaniel Greene, of Rhode Island. His father was an only son, and resided upon the homestead during his life. At the age of fifteen years, Nathan commenced his preparatory studies for College, and at the close of the summer vacation of 1777, entered Harvard University. His parents were desirous that he should qualify himself for the ministry, and he attended Professor Sewall's Lectures on the Hebrew Language. He acquired a good knowledge of the language, and by appointment, gave a Hebrew Oration at a public exhibition of the University; and during the interval between the death of Professor Sewall and the appointment of his successor, Mr. Parsons, he was engaged to instruct the class in Hebrew. He graduated in 1781, on which occasion he was selected to deliver the valedictory address. He was distinguished as a scholar, and left College with the respect of officers and students. After graduating he was engaged in teaching in Beverly and Salem, until 1783, at which time he was elected a tutor in Harvard University, where he continued his labors as such until the commencement of 1787. He then resigned his place as tutor, and entered upon the study of medicine with Dr. Edward A. Holyoke of Salem, until October, 1788, when he gave up the idea of following medicine as a profession, relinquished its study, and opened an apothecary store in Salem.

While engaged in the study of medicine with Dr. Holyoke, and also while in his store, he devoted himself, more or less, to study and experiment in the mechanic arts, which indeed held a higher place in his mind than his medical studies or merchandise. It was during this period of time that he invented and constructed his models of a steamboat and locomotive carriage.

In October, 1790, he was married to Miss Elizabeth Jeffrey, daughter of William Jeffrey, Esq., Clerk of the County of Essex, and granddaughter of Joseph Bowdish—August 24th, 1791, he was elected a member of the American Academy of Arts and Sciences—April 4th, 1795, he removed to his farm in Danvers, and built a permanent structure across Water's River, which served the double purpose of a dam and bridge. In 1796, he and his associates erected and put in operation the Salem Iron Factory, for the manufacture of chain-cables, anchors, and other materials of iron, for ship-building, he having the chief superintendence of the work. While thus engaged, he invented and put in operation in the factory, designed for its own special use and benefit, with a view to the saving of labor and other economical purposes, a nail machine, since extensively used for cutting and heading nails at one operation, for which he received a patent, as the original inventor, from the United States Government, on the 8th of January, A. D. 1798. This highly important invention obviated the very great labor and expense of the manufacture of these articles by hand.

In October, 1800, he was appointed a member of Congress for Essex South District, to fill the vacancy occasioned by the death of Judge Sewall, then late member from that district; and in November, 1800, he was elected by the people of the district, a member of the succeeding Congress, for two years from and after March 4th, 1801; and was a member during the severe contest in the House of Representatives for the Presidency, between Jefferson and Burr.

In February 1802, while a resident of Danvers, he was appointed by Governor Strong a special Justice of the Court of Common Pleas for the County of Essex; and after his removal from Danvers to Belfast in Maine, which was in 1807, he presided as Chief Justice of the Court in Hancock County for many successive years. In 1815, he was elected an honorary member of the Linnæan Society of New England.

After removing to Belfast, Judge Read gave most of his time to agricultural pursuits; but he often indulged himself in new inventions in the mechanic arts and trying experiments therein; and during his whole life these and the natural sciences were his favorite study. He invented several useful agricultural implements, for some of which he took a patent; but constructed them mainly because he had use for them on his farm. His farm consisted of some four hundred acres of land, finely situated near the head of Belfast Bay, lying upon the shore just south of the city of Belfast. His residence overlooked the bay, with its attractive scenery; and here he spent the remainder of his life, ever taking a lively interest in all matters of a public character, especially such as were designed to improve the moral condition, and advance the intellectual and social improvement of the people among whom he lived. He regarded the cause of education as involving one of his highest duties; and at an early day, when the town was comparatively new, he was instrumental in establishing a high school in Belfast, that the youth of the place might be educated at home—the beneficial effects of which have long been appreciated.

He died at his residence in Belfast, January 20th, 1849, in the ninetieth year of his age, and in the full possession of his intellectual powers, except a few days at the close of his last sickness. He possessed a strong constitution, and a strong

and highly cultivated mind; his aims were high, and he soared above the sordid interests of the world. He never sought to make himself conspicuous, or to give publicity to his attainments or labors, but chose rather unobtrusive retirement. His deportment was always gentlemanly; his form fine, and his countenance highly intellectual. His conversation was ever interesting and instructive; and he lived and died with the respect and esteem of all who knew him. He was the last surviving member of his college class; and with two exceptions—Judge Farrar and James Lovell—the oldest living graduate of Harvard University.

As early as 1788, as already noticed, while a resident of Salem, he became especially interested in the purpose of applying steam-power to the practical end of propelling boats and land carriages. He foresaw the importance of attaining such a purpose, and set himself to work to contrive the necessary machinery to effect it, which at that time was felt by all intelligent men who had given their attention to the subject, to be a *desideratum*—a work yet to be accomplished. The idea as applied to boats was not new; various experiments had been tried, but were mainly directed to the mode of propulsion, without so much attention to the motive power; and all the experiments hitherto tried had proved a failure.

THE WIRE ROPE TRAMWAY AT BRIGHTON, ENGLAND.

[Condensed from Scientific Opinion.]

The wire-rope transport system may be described as consisting of an endless wire rope running over a series of pulleys carried by substantial posts which are ordinarily about 200 feet apart. This rope passes at one end of the line round a drum, driven by either steam, water, or even horse power, in small farming operations, at a speed of from four to eight miles per hour. The boxes in which the load is carried are hung on the rope at the loading end by a wooden A-shaped saddle, about 14 inches long, lined with leather, and having four small wheels, with a curved pendant, which maintains the box in perfect equilibrium while traveling, and most ingeniously, but simply, enables it to pass the supporting posts and pulleys. By a sliding-ring arrangement the boxes or buckets are easily emptied by tilting, without unshipping the saddle from the rope. The boxes can be made to carry from 1 cwt. to 10 cwt., and the proportions of the line and the loading and discharging arrangements can be varied to suit any particular requirement, ranging from 10 tuns to 1,000 tuns per diem. At each end of the line are rails placed to catch the small wheels attached to the saddles of the boxes, by which means the weight, having acquired momentum, is lifted from the rope, and, thus suspended from a fixed rail or platform, can be run to any point for loading or emptying, and again run on to the rope for transport, the succession being continuous and the rope never requiring to be stopped for loading and unloading.

Curves of sharp radius are easily passed, as well as steep inclines, and its applicability to cross rivers, streams, and mountains, or hilly districts, will be apparent at a glance, as the cost of construction increases but little under such circumstances, whilst that of a road or railroad is, perhaps, increased tenfold, and the daily working cost doubled or trebled. The rope being continuous, no power is lost on undulating ground, as the descending loads help those ascending.

In the case of lines for heavy traffic, where a series of loads, necessarily not less than 5 cwt. to 10 cwt. each, must be carried, a pair of stationary supporting ropes, with an endless running rope for the motive power, will be employed, but the method of supporting, and the peculiar advantage of crossing almost any nature of country with a goods line without much more engineering work or space than is necessary for fixing an electric telegraph, without bridges, without embankments, and without masonry, exists equally in both branches of the system.

In the minor applications, such as short transport from mines to railways, the landing or shipping of goods in harbors and roadsteads, and the carriage of agricultural produce on farms, some peculiar features of the system render it specially advantageous. Amongst these are the facility with which power can be transmitted by the rope and taken off at any required point for mining or other purposes. In lines terminating on the seaboard, or on great rivers, a manifest advantage is secured in the facility for taking goods direct to or from ships in harbor or roadstead without transhipment into lighters.

Seen from a distance, the posts which carry the tramway wires at Brighton, might be mistaken for telegraph poles, but a nearer inspection reveals a second line of wires on the same level, and upon these two wire-rope lines, supported on standards at intervals varying from 300 feet to 1,000 feet apart—according to the requirements of the ground—are suspended iron boxes for the carriage of the goods, which boxes pass on noiselessly and steadily, carried forward by the rope at the uniform rate of five miles an hour—the time required for performing the entire circuit of the line.

In laying out these five miles at Brighton the opportunity has been taken of exemplifying the working of the system under every variety of difficulty that could possibly present itself; thus we have at one part an incline of 1 in 6, up and down which the rope and boxes work with perfect facility, the descending weights assisting those which are ascending; then there are, besides several bends less acute, two instances of absolutely right-angles which are passed with the greatest ease; in some instances the standards are carried to the hight of 70 feet, to meet inequalities of the ground, undulating and hilly country being more trying to this system than craggy and mountainous—such as that for which this plant is designed, and where, from the long reaches taken, fewer posts will be required.

The line is rather over five miles long; there are 112 posts, or standards, in the whole length; these standards can either be made of light angle and band iron neatly put together, as in the present case, or of wood. The rope is made of charcoal iron, is two inches in circumference, each strand as well as the center of the rope having a hempen core, to secure ductility. The power employed to drive the rope is a portable 16-horse power engine.

Some of the spans are 600 feet and 900 feet in length, and ingenuity has been shown in devising every possible mode of testing the merits of this system of transport; and we are bound to record that all difficulties have been overcome with complete success. The line is capable of delivering 240 tuns per day of ten hours, *i. e.*, 120 tuns in each direction.

This tramway has been erected by Mr. Hodgson the inventor, at the request of some gentlemen with whom he was in negotiation, for the supply of materials for a line sixty miles in length in Ceylon.

It is intended to divide the proposed Ceylon line of 60 miles into 5-mile sections such as the one described—one engine working every two sections, and the boxes passing each section by shunting arrangements, similar to those used at the termini, from one section to anothor. The line in work will be open daily to public inspection during the month of April, and is well worth a visit. It is hardly likely that so efficient and economical a means of transport will be for long exclusively confined, as at present, to the conveyance of goods. For ourselves, we venture to confidently predict an early adaptation of the principle of this ingenious system to passenger traffic.

FURROWING AND PITTING IN LOCOMOTIVE BOILERS.

BY JOHN G. WINTON.

Some theorists attribute furrowing to the expansion and contraction of the boiler, inducing a bending and unbending of the plates; if so, then the outside of the plates would show an abrasion similar to the end plates of the smoke-box, as with inside cylinders, or simply to a straight strip of iron bent and unbent by the hand. These furrows are observed with lap joints, with butt joints having inside strips, but when the strips are outside no furrowing takes place. Now, with this statement, I hold this theory of bending and unbending of a circular boiler to be perfectly erroneous, and look to natural laws for an explanation of the furrowing and pitting of steam boilers.

Mountain torrents very rapidly wear the bed of a river of the most compact material, and it is well known that the bilge-water in a ship rapidly wears off the rivet heads, by the mere friction of the water rolling forwards and backwards. Were water allowed to drop on an iron plate, drop by drop, pitting would follow, corrosion taking place, and the impact of the falling water washing away the rust as it formed—thus eating into the iron very quickly, more especially on soft spots of the surface.

Now, what is the mechanical action of the water in a locomotive boiler? I take it to be a racing of the particles from the fire-box to the smoke-box end, and as the steam is generated from the tubes, a partial explosion takes place in all directions, carrying the particles of water along with it. I am not so certain that the impact of the water propelled by the steam generated by the tubes acting on the surface of the boiler does not, in a great measure, account for pitting. When corrosion takes place, the incessant impact of the water on the soft spots of the iron must wash off the rust as it forms, leaving the surface always raw, as it were (assisted in some cases by galvanic action). The boilers generally show the center of the furrow about one inch from the lap joint. I will endeavor to give an explanation of this. Noticing pieces of wood floating on the surface of our silent Thames when the river had attained its greatest downward velocity, I was quite struck by observing at the piers of the bridges that the pieces of wood never came in contact with the pier, but invariably took a rapid current about one foot from the pier, and were carried away more rapidly than in the center water-way. How is this to be explained? I take it that the water flowing against the pier is repelled, the same as the sea dashing against a breakwater is thrown back again, and being met with a downward current, and the meeting of the waters, I will say, induces a rapid current one foot from the pier. Those interested can make this observation for themselves by simply looking over, say, Westminster Bridge, and observing materials floating on the surface. I am just going to state that this phenomenon is the cause of the furrowing of locomotive boilers. Where a boiler is made perfectly cylindrical, with butt joints and the strips outside, no furrowing is observed; with the strips inside, or with lap joints, furrowing takes place. Now, in my opinion, the strips and lap joints are the obstructions, as in the piers of a bridge, causing these furrows; the steam generated from the tubes, shooting the water against the edges of the plates, is repelled, and the racing of the water from the fire-box end causes a rapid current to flow parallel with the joints, this upward and repelling and onward action of the confined water inducing more friction, and, consequently, keeping this part of the boiler in a raw state, making it more subject to corrosion and galvanic influence. With these opinions I consider, when the edges of the plates are placed downwards, they are more liable to form furrows. Some bevel the edges of the plates, which I consider will tend to lessen this evil, but cannot imagine it would be easily calked, as it is very difficult to calk a knife-edge. The best cure is by making outside strips strong enough with butt joints and a proper form of rivet, which I maintain is a double counterlap; thus we shall have as strong a boiler with no furrowing, which must tend, in a great measure, to reduce the number of boiler explosions. The following shows the rivet I would adopt for lap and butt joints. A curved countersink is, I consider, the strongest form, as the iron is less distorted. Part of the head of the rivet is retained to resist the force of impact from the riveting hammers; and it is evident that if the head is reduced by corrosion the countersink will hold good. This is not a bending and unbending theory, neither is it a bulging one, as in some cases these theories may hold good; but at the same time the mechanical action of the water in either case I consider rapidly deteriorates the boiler.

Girdling Fruit Trees to Make them Bear.

A correspondent of the *Boston Journal of Chemistry* states that there is no doubt that the girdling of fruit trees is a cause of abundant fruitage, but it by no means follows from this fact that a general principle can be deduced, that trees would be improved, or the crop increased for a series of years, by such treatment. It is well known that gardeners frequently girdle a branch, by removing a narrow ring of bark around it, when they wish to increase the size and beauty of the fruit; but it is done at the expense of its vitality, and, unless the operation is skillfully performed, will invariably destroy it before the season of bearing the next year.

The crude sap, taken up from the soil by the roots of the tree, ascends principally through the vascular tissue of the alburnum or sap-wood to the leaves of the branches, and there both this and the carbon of the carbonic acid, absorbed from the air by the leaves, are organized into the proper substance for the growth of the wood and fruit. It then descends on the outside, principally through the sieve tissue of the cambium layer, forming a new layer of wood and bark; while a part also goes to the nourishment of the fruit. If there is no obstruction of the elaborated sap in its downward course, it is equally distributed to the branches, fruit, stem, and roots; but, if the bark and cambium layer are removed by girdling, it is stopped in its descent, and consequently received into the branches and fruit in excess, and they are thus increased at the expense of the part below. In this way we account for the increase of the fruit by girdling.

Professor John Lindley, when speaking of this subject in his late treatise on horticulture, quotes Mr. T. A. Knight approvingly, as follows: "When the course of the descending current is intercepted, that naturally stagnates, and accumulates above the decorticated space, whence it is repulsed and carried upward, to be expended in an increased production of blossoms and fruit." This theory is adopted by the best physiologists of the present time, and can be demonstrated with almost mathematical certainty. Therefore, this unnatural development of fruit, instead of indicating an improvement of the trees, must be looked upon as a premonitory symptom of disordered physical action, and of premature death.

If the bark and the cambium layer have been removed by girdling, as seems to be the case with the trees, the downward circulatory connection on the outside between the upper and the lower part is destroyed, and the upper part at least must die. If, however, the cambium layer has not been destroyed, and has been so covered by wax and bandages as to prevent evaporation and drying of the surface of the decorticated part, there is a chance for some of them to live. It is true that some few cases are recorded of trees which have lived several years after the bark and cambium layer have been removed, but they are of very doubtful authority.

M. Ernest Faivre, a French physiologist, gives a statement of his recent investigations on this subject, published in the *Gardener's Chronicle*, about two months ago, in which he says: "In mulberry trees, as in all trees deprived of latex, annular incisions generally produce the following manifestations: 1. Formation of a swelling, or tissue restorer, at the upper lip of the wound. 2. Diametrical growth of the parts above the zone of bark taken off. 3. Hardening of the wood in that region. 4. Stationary condition of the parts below, if they are deprived of leaves and buds; or, if not, vigorous shoots from below the lower lip of the wound. 5. More easy, more early, and more abundant flowering and fructification. 6. Destruction, after a variable time, of all the parts above the annulation."

From the foregoing observations it appears that girdling trees in any form is ruinous, and almost always fatal; therefore I heartily concur in the advice given in the *Journal* that orchardists should not experiment on their trees too freely before they see what the final result will be with those already girdled.

Speed of Electric Signals.

Professor Gould has found that the velocity of the electric waves through the Atlantic cables is from 7,000 to 8,000 miles per second, and depends somewhat upon whether the circuit is formed by the two cables or by one cable and the earth.

Telegraph wires upon poles in the air conduct the electric waves with a velocity a little more than double this, and it is remarked, as a curious fact, that the rapidity of the transmission increases with the distance between the wire and the earth, or the hight of the support. Wires buried in the earth likewise transmit slowly, like submarine cables. Wires placed upon poles, but slightly elevated, transmit signals with a velocity of 12,000 miles per second, while those at a considerable hight give a velocity of 16,000 or 20,000 miles.—*Journal des Telegraphes.*

THE Boston *Journal of Chemistry* recommends a mixture of equal parts of dry white lead and red lead mixed into a paste with mastic varnish, and used as soon as made, as a cement for aquariums.

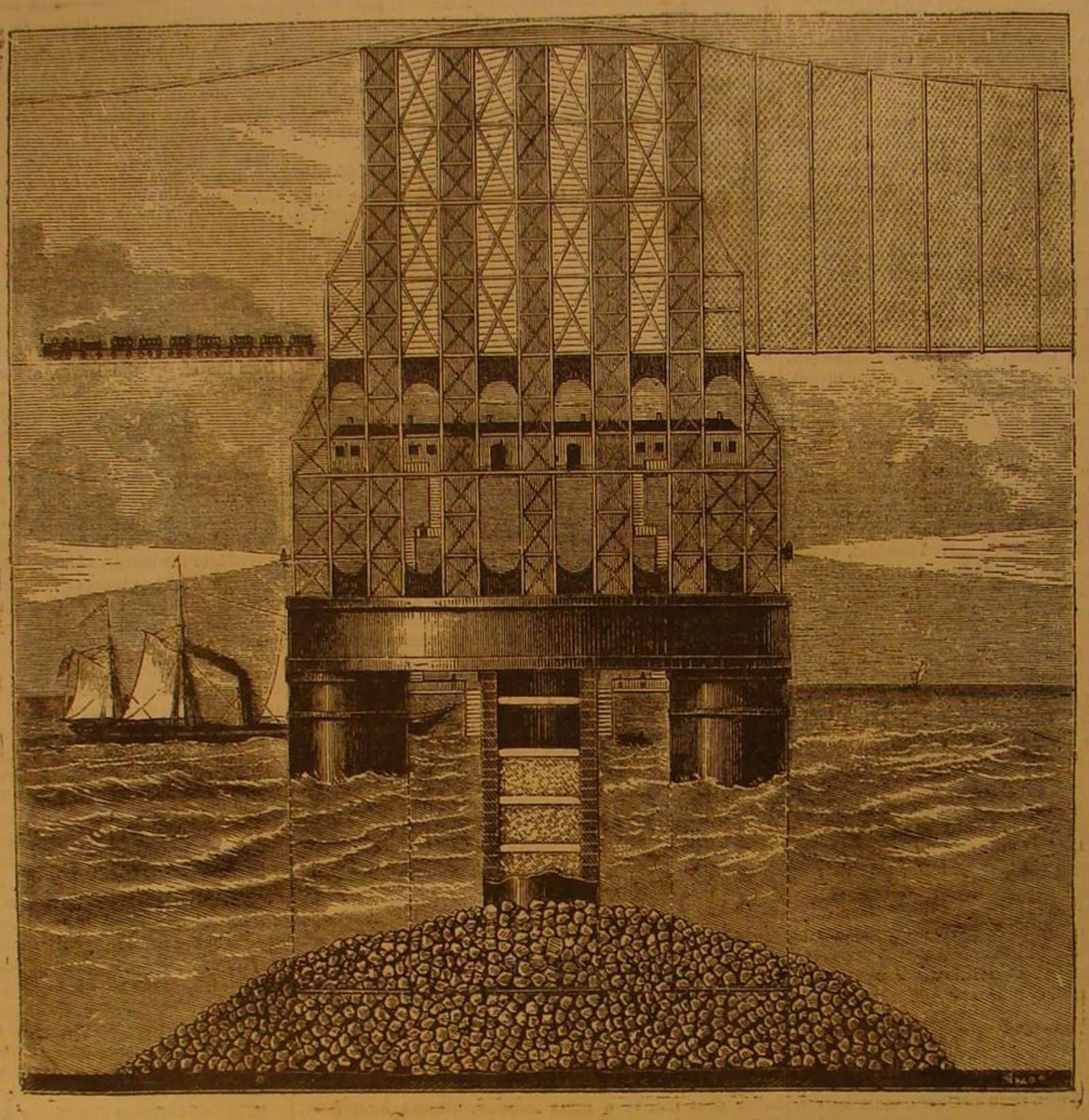
Deep-Sea Railroad Bridges Crossing the English Channel.

If all the plans and projects for crossing the English Channel, which have been published, were engrossed upon suitable paper, rolled up, and cast into that famous passage, they would nearly bridge the space between Dover and Calais, and would form as practicable a structure as many that have been seriously mooted.

We illustrate this week from the English *Mechanic* a plan proposed by John S. Winton, an English engineer, which is, to say the least, as feasible as many others put forth by men of wider celebrity.

Mr. Winton writes to the above-named journal as follows:

"The great difficulty in laying down deep sea bridges is, undoubtedly, the piers; for in the Channel the depth of water varies from 75 feet to 175 feet. The bed, we will presume, is gravel. Some prefer piling, screwing long piles into the sand or gravel, as the case may be. I would lay before you a very different mode of sinking deep sea piers—the accompaning sketch almost explains the plan I would adopt. Three hollow piers are constructed of metal, filled in with concrete, securely joined together at the bottom, as well as having distance pieces uniting them, a little below the surface of the sea, as shown. The length of each would be 390 feet, the breadth of each 60 feet, and the total breadth 260 feet. The piers would have an inner and outer skin, strongly trussed together, the space between the skins being filled up with concrete, as well as the bottom part that rests on the bed of the Channel. Such I consider is the size that would be required for the piers at mid-channel, as the total hight of the structure at that part would be little less than 550 feet, the track being 200 feet above the level of the sea. To those who have had similar works to execute, it is an easy matter to construct in shoal water those huge piers, tow them to their destination, and sink them by simply admitting water into the piers, and afterward displacing it by precipitating puddle and small stone from above; thus we would have piers of great weight, strength, and stability, to resist the troubled waters of the Channel. The total holding-down weight, making due allowance for the displacement of the structure, would be about 453,963 tuns, principally composed of concrete and ballast—this is only for one pier proper, sunk in a depth of 175 feet of water; should it be considered necessary, hydraulic, or pile piers, could be sunk into the bed of the Channel to secure a better foundation. These piles being contained within the piers, could easily be working from the platform, with suitable pipes, valves, etc. Thus, having laid down all the piers, the superstructure could be proceeded with. I consider the suspension principle far before the horizontal wire-rope bridge of M. Bratch, and would certainly recommend a suspension bridge, embodying the ideas of the French engineer, by the system of interlacing all the wire ropes. I consider, when the main suspension ropes were laid on to the depth of the bridge or lattice-work at the center of the spans, a platform could then be laid for finishing the structure, requiring no scaffolding, as in the Boutet Viaduct. I will not trespass on your valuable space much further; suffice it to say, that when both countries agree to a bridge, that bridge can be easily constructed, and although my tunnel project does not interfere with the navigation, I think all must allow, and more especially the fair sex, that railway communication per bridge would be a delightful way of visiting our Continental friends. The inclosed sketch is drawn accurately to scale; the railway train seems a mere toy, and it is this fact that renders the whole structure not only safe, but practical. Of course the electric light would guide navigation at night."



DEEP-SEA PIERS FOR A PROPOSED BRIDGE TO CROSS THE BRITISH CHANNEL.

ALL exact knowledge depends upon exact measurement.

Heat from Nebular Condensation.

Professor Tyndall, in his "Heat as a Mode of Motion," affirms that the chances that iron is in the sun are 1,000,000,000,000,000,000,000 to 1, on account of the coincidence of certain dark lines in its spectrum with certain bright lines yielded when incandescent vapor of iron is employed as the source of light. This is put forth as an *actual* calculation. It may be *actual* in the sense that Professor Tyndall actually made it, but purely imaginary at the same time. The elements for a *real* calculation of the probabilities are not known. Very likely the professor is right if he thinks only of coincidence arising from *chance*, but we have no information whatever concerning the probability that coincidences may result from *law*. The quantity of experiments yet made is insufficient to justify such extravagant assertions, and no one has yet arrived at a law explaining why the spectra of different so-called simple bodies vary exactly as is found to be the case. No philosopher really imagines that there are scores of substances which are really simple, and if, as is probable, the chemist may find means of decomposing metals, and certain gases, or carbon, who can venture to predict what fresh spectra may appear.

Helmholtz, cited by Tyndall, estimates the heat occasioned by nebular condensation as prodigious in intensity. Tyndall, describing his opinions, says, that supposing the nebulous matter to be in the first instance of extreme tenuity, and the specific heat of the condensing mass the same as that of water, then the heat of condensation would be sufficient to raise the temperature 28,000,000° Centigrade, or about 13,000 times the heat of the Drummond light. A question arises whether condensation would take place under such circumstances, or at such a temperature, which we should be inclined to suppose would dissociate all chemical compounds. Nebular condensation, producing suns and planets, must give rise to chemical unions, and if heat were not the cause of the dispersion of the molecules of the nebula into the highly-attenuated form of those bodies, their condensation may not evolve heat as Helmholtz supposed.

The Relations of Labor---Letter from General Butler.

General Butler has written a letter in which he describes the changes that have taken place in the management of the great manufacturing establishments of New England, and in the character of the operatives, and expresses his views of the proper policy to be pursued hereafter in the following terms:

"It seems to me that the time has come for the interference of the Legislature in the investigation at least of the limit of the hours of labor, and the limit of the employment of youth, to determine how far it is best for the State that its children shall be deprived of an opportunity for education and training, by the employment of its young life in accumulating the gains of selfish parents, or adding to the profits of equally selfish capitalists; also, what safeguards ought to be placed around the lives and limbs of the operatives engaged in managing huge and powerful machines, where a false step or a false motion may cost the life or limb. On this very necessary and important subject our statute books are wholly silent, while the laws of England are dotted all over with penal enactments to preserve the persons of the laborers from accident.

"Also, to inquire as to what may be done to insure a fair division of the rewards of labor as against the profits of capital. In a word, that the law may intelligently do in this most important relation of life and business what it ought to do, and does do, in almost every other, step in and restrain the strong from crushing the weak, and protect the needy against the promptings of avarice or the cruelty of selfishness.

"Of course, to do this effectively and justly to both parties requires accurate and careful observation of the conditions and relations of the operative to the employer, and of labor to capital, a full examination and report upon the abuses which require remedy, a full understanding and comprehension of all the facts on the one side and on the other which should guide legislation, to the end that injustice may not be done to the employer, or the citizen when employed shall not be without adequate protection by the laws.

"I was more than gratified at the establishment of the Bureau of Statistics and inquiry into the connection of labor with capital, and I have examined the report of that bureau with the utmost interest and attention I most earnestly desire that this work may go on, and that the Legislature, with a liberal hand, will afford all necessary and proper assistance, and that the objects of its investigation may take a more extended range.

"In my judgment there are no statistics so vital to the future well-being of the Commonwealth as those which would be gathered by the bureau. A struggle is just commencing here between capital and labor. If the contest is pursued with harshness, intensity, and bitterness of feeling, it will be because of want of knowledge by both parties of the duties of each to the other, and the rights of either relative to the other. Let the capitalist remember that, unlike England, here the vote of the laborer controls capital in legislation, and that if capital desires to preserve itself from unjust legislation, it must be because labor wields the ballot with intelligence. Let capital also remember that abuses, if any exist, in its relations with labor, cannot be hidden, and may grow all the more magnificent in their proportions from being partially unknown. A wrong understood only to be felt as a fear, is always the most terrible. The voter uninstructed will act upon exaggerations and erroneous impressions. The capitalist will refuse the amelioration of evils of which he neither knows the extent, nor, perhaps, the existence; and therefore collision with the operative because of them is inevitable. When that collision comes, the history of all governments shows capital goes to the wall."

FRAMING WOODEN BUILDINGS.—A writer in the *Architectural Review* says that in constructing wooden buildings, there is one thing to which particular attention should be paid; namely, the binding the top of the walls well together, and that is accomplished by framing the wall plate all around the house, and spiking the ceiling joists down on the same; then herring-bone, bridging these joists in as many rows as are necessary to make a thoroughly stiff brace for the whole. The roof (no matter whether Gothic or Mansard) cannot exercise any bad influence in pushing out the walls when this system is adopted.

A BEETLE ON THE WAR PATH.

[By Edward C. H. Day, of the School of Mines, Columbia College.]

Beetles constitute the order of the Coleoptera or sheath-winged insects, so called because their anterior pair of wings are modified into a, more or less, hard case, within which the thin, membranous, and delicate hinder pair, when not in use, are folded. The wing cases, or "elytra," do not subserve the purpose of flight, and as such heavy-bodied insects, as beetles usually are, require a large expanse of wing to support them, we accordingly find the hind wings in this order in general, largely developed. If we watch a lady-bird as it alights, we see that at first the wings extend far behind the elytra, but soon our welcome little friend furls the outer portions quickly and neatly beneath their cases. We could not, therefore, have a more expressive term for this group than the word coleopter; and there are are but few forms belonging to the order that the beginner in insect studies will fail to recognize at once as "sheath-winged."

The wing cases, in some exceptional instances, are much reduced in size; more frequently the true wings are more or less aborted, and the beetles then, of course, do not possess the power of flight. The inner edges of the elytra always fit together along the middle of the back; that is, they do not overlap and partly cross one another, as do the wings of the true bugs, which belong to another order, the Hemiptera.

The transformation of the beetle is a complete one. It begins life as grub, generally with legs (three pairs), and furnished like the adult insect with powerful gnawing jaws. When it passes into its pupa stage it becomes inactive, the legs and wing cases of the futur einsect are, however, free, and the perfect form is already clearly foreshadowed. This enables us at once to distinguish the coleopterous pupa from those of the flies or the butterflies, in which the wings and limbs are soldered into the pupa case, thus effectually disguising the outlines of the form that is about to appear from it.

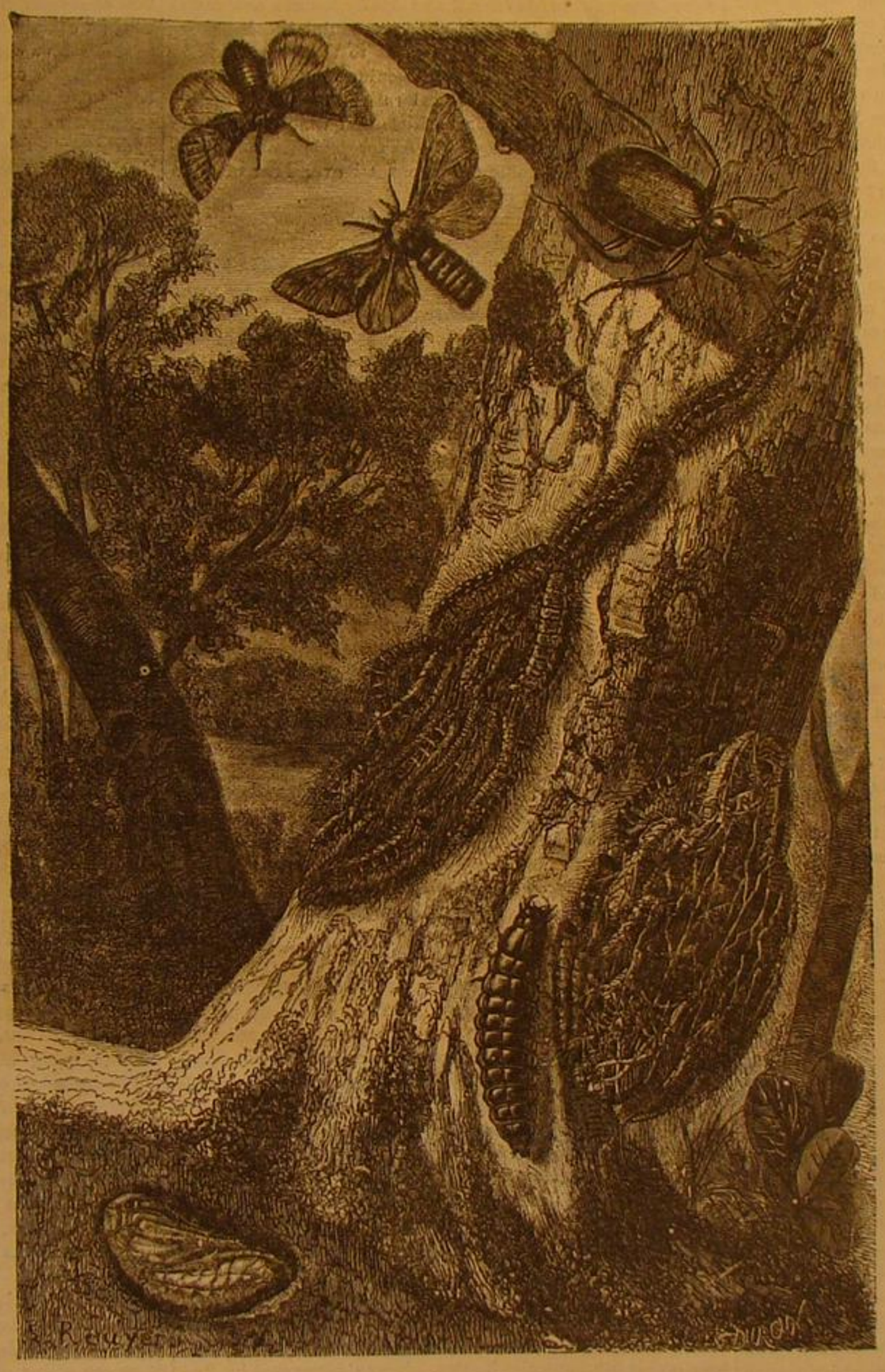
Beetles, from their vast numbers and from their varied habits, are of great economical importance. Of the weevils alone, a family to which the notorious pea weevil and plum curculio, and a host of other pests belong, from 8,000 to 10,000 species, according to Packard, are known; and the total number of species of beetles, of all families and from all countries, preserved in collections, is variously estimated at from eighty to one hundred thousand. Of these, some, as the Scolytus, figured in a late number, bore into timber; others feed upon leaves, flowers, or fruit; great numbers are carnivorous, preying upon their fellow insects; while many, again, are scavengers, living upon carrion or decaying substances. There are species that live in the nests of ants, and an entire group that inhabit fungi. Some kinds are altogether arboreal, while whole families are confined to the waters. The grubs, too, are equally variable in their habits, their food generally corresponding in its essential character to that of the perfect insect. The habits of beetles are thus of the most varied interest to the observer, though we do not find among them such high instincts as we do among the Hymenopters (the bees, wasps, and ants), which we have heard well termed "the thinking insects." On the other hand, the remarkable forms and the brilliant colors of many beetles and the comparative ease with which they are preserved in cabinets, render this order a great favorite with the mere collector.

The beetle shown, in the annexed illustration, descending the tree towards the procession of caterpillars, is the Calosoma (beautiful body), a terrestrial and, as we can almost determine by a superficial glance, a carnivorous insect. Its neat, light form, its evidently active legs, its trenchant jaws, all indicate a predatory being. It is clothed, too, in a close-fitting coat of mail—an armor brilliantly burnished, its dark green color flashing gorgeous metallic tints in the sun light. This is evidently one of the free-lances of the insect world. Its larva, taking the caterpillars on the other flank is likewise on the war path. Our picture, in fact, represents one of the innumerable scenes in nature, in which the maxim is enforced that "might is right;" and that train of slow leaf-eating caterpillars is as certain to lose some of its members, as they swarm up the tree trunk, as the richly-laden caravan in the desert is to be harried and black-mailed by the marauding Arab. The Calosoma, however, and its grub, unlike the human plunderers, are to be regarded as the friends of civilization and agriculture.

In this connection we may remark, that it is quite worth the gardener's while to learn something of the nature and habits of the grubs, which he turns up with the spade, for in his ignorance on this subject he too generally smites his best friends as well as his worst foes. On the lower left-hand corner of the cut, the pupa of the Calosoma is represented buried in its temporary tomb. How strange that death-like, transforming trance, interposed between two periods of such active existence!

Among a host of other carnivorous genera there are about thirteen species of the genus Calosoma recorded as occurring in the United States; of these, one, the Calosoma scrutator, is a common, large, and beautiful example. It is known to be the determined enemy of the canker-worm, and, according to Harris, it may be found, in the month of May, searching beneath and upon the trunks of the trees infested by those caterpillars.

The caterpillars represented in our engraving are of a European species, worthy, however, of illustration for several reasons. They are of a genus most destructive to the forest vegetation of Europe, and they have on occasions caused incalculable damage to the oaks, elms, and pines which they infest. Like many allied caterpillars, they live in a common web or tent, which they weave on the trunk of the tree on



THE CALOSOMA AND ITS PREY

which they have been hatched, but in this tent each caterpillar makes its own chamber. When the feeding hour comes they sally forth from their tent by the common doorway, in regular order, one always leading, then two, then three following, until, finally, the whole community marches on in a gradually swelling column. From this habit they obtain their common name of "processionary" caterpillars. Finally, the hairs which clothe them possess a remarkable property, expressed in the scientific appellation of the moth from which they come—*Cnethocampa* (*knetho*, to irritate, and *kampe*, a caterpillar). The penetration of these hairs into the skin, caterpillar is about to change to a chrysalis, it lines its chamber with its hairs, and he who incautiously places his hand on such a nest will not be likely soon to forget his experience. Noel Humphreys quotes the case of a boy who, while birds-nesting, was so severely stung on the neck and breast by these hairs, that the irritation caused his death. A very common caterpillar in this country, belonging to a different genus of the silk-spinning moths, possesses this same disagreeable power of nettling at once your skin and your temper. Curiously it has likewise the habit of marching in strictly follow-my-leader processions of progressive development; but, happily for us, it is behind its European fellow in the matter of a domicile—it has not arrived at the idea of tent building, and of lining its sleeping apartment with its own cast-off hairs, but the entire community rest together beneath the primitive shelter of a leaf. The moth from which this particular American stinging caterpillar comes, is the large and handsome Io moth (*Saturnia Io*), and differs considerably from the moths represented in the engraving as the parents of the European processionary caterpillars.

White of Egg an Antidote for Corrosive Sublimate.

It is asserted by Peschier, that the white of one egg will render four grains of corrosive sublimate innocuous. Orfila administered to a small dog twelve grains of this poison; after it had acted for about eight minutes, the whites of eight eggs were given; it vomited several times, the pain ceased, and in five days it quite recovered. The white of egg should be beat up in a little water, and it should be given freely, at intervals. A woman, named Rose Maney, poisoned herself with corrosive sublimate; various remedies were tried, but with little benefit. The morning after the poison was taken, the whites of two eggs, beaten up with a little cinnamon water, were given; this dose was repeated every half hour, until she had taken the whites of twelve eggs, when she began to feel easier; and, during the time she had been under this treatment, she had only vomited twice, and other unfavorable symptoms began to disappear. The white of egg treatment was continued until she had taken the whites of thirty-two eggs. She went on progressing favorably, and was eventually cured. Here the albumen was not given till many hours after the poison was first taken. There is another substance which is considered to act as an antidote, namely, gluten. Its properties were discovered by Taddei, an Italian chemist. In administering it, it is usual to mix the gluten with soap, so as to hold it in suspension. If eggs are not at hand, gluten may be thus used. It is easily prepared by kneading dough, made of flour and water, under a tap from which the water is pouring in a small continuous stream; the starch is washed away from the flour, the gluten remaining behind; and this should be rubbed up with soap and rinsed with water.

Thenard, the great French chemist, during a lecture, by mistake drank a strong solution of corrosive sublimate. He immediately discovered what he had done, and made the fact known to his class. The excitement produced was intense. He told them to bring him eggs. Eggs were sought for in every direction; in a few minutes large quantities were obtained by his anxious pupils, and thus the life of this eminent professor was saved. This happened shortly after the discovery of the effects of albumen on corrosive sublimate were discovered by Orfila. A case is also recorded of a gentleman who, by mistake, drank a portion of an alcoholic solution of this substance. He was so alarmed by the taste that he did not finish it. He was, however, seized with a sense of tightness in the throat, burning at the stomach, and purging. Orfila saw him when the symptoms had acquired great severity, having lasted two hours. The administration of white of egg caused a mitigation of his sufferings, and he ultimately recovered.

Potatoes.

In Gerarde's "Herbal," 1597, page 926, will be found the following interesting account of the uses of the potato: "The potato roots are among the Spaniards, Italians, Indians, and many other nations, ordinary food and common meat; which no doubt are of mighty and nourishing parts, and do strengthen and comfort nature; whose nourishment is, as it were, a mean between flesh and fruit, but somewhat windie; yet being roasted in the embers, they lose much of their windinesse, especially being eaten sopped in wine. Of these roots may be made conserves no lesse toothsome, wholesome, and dainty, than of the flesh of quinces, and likewise those comfortable and delicate meats called in shops Morselli, Placentulæ, and divers other such like. Their roots serve as a ground or foundation whereon the cunning confectioner or sugar-baker may work and frame many comfortable delicate conserves and restorative sweetmeats. They are used to be eaten roasted in the ashes. Some when they be so roasted infuse and sop them in wine; others, to give them the greater grace in eating, do boil them with prunes, and so eat them; likewise others eat them (first being roasted) with oil, vinegar, and salt, every man according to his owne taste and liking. Notwithstanding, howsoever they be dressed, they comfort, nourish, and strengthen the body, vehemently procuring bodily lust."

To take Ink-stains out of Mahogany.—Put a few drops of spirits of niter in a teaspoonful of water, touch the spot with a feather dipped in the mixture, and on the ink disappearing, rub it over immediately with a rag wetted in cold water, or there will be a white mark, which will not be easily effaced.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Curious and Incongruous Attachment.

Messrs. Editors:—I am reminded by your article of last week, entitled "Curious Associations among Animals," of an incident in my boyhood's experience more remarkable and more inexplicable than anything I have ever heard or read, which, if you think it worth the while, you may give to your readers.

My boy brothers and myself were one day roaming over the fields with a little dog—our inseparable companion in such rambles—and amusing ourselves by turning over logs, flat stones, etc., to give the dog a chance at the field-mice or meadow moles, as we called them, so frequently to be found in moist meadows and pastures.

Boys and dog were having rare sport "bagging" lots of game, when on turning over a log, we found one of those round, soft, skillfully constructed nests, with which every country boy is familiar, and, upon tearing it open, discovered five little bare, helpless mice, not yet able to crawl. We concluded to take nest and mice to the house, the nest as a curiosity, and the mice as a feast for our favorite cat. Upon placing the little creatures on the floor before her, expecting to see them consecutively gobbled with all that gusto which cats from time immemorial have manifested for that species of delicacy—imagine our astonishment at the result. Instead of devouring them, pussy, with that peculiar caressing purring usually heard only from the feline mother when calling their young, commenced licking and petting the little things, lay down on her side, and pushed them up to her body with her paws exactly after the manner of cats with their very young kittens. The whole family were called to witness the strange performance.

We had read in our juvenile treatises on natural history of the curious freaks of cats which had lost their kittens, and should not have been so much surprised if our cat had been subjected to any such bereavement, but our cat *had never had any kittens*, and became a mother for the first time ten days or a fortnight after the occurrence in question. After watching them for a time, we were told to take them away, and carried them to the barn a short distance from the house, the cat following, and calling as to kittens. The infantile mice being deposited in the barn, the cat continued to caress, and as far as she could to care for them. After a little time we left them, and returned to the house to dinner. Pussy availed herself of the opportunities thus offered to bring *every one* of her newly adopted proteges into the house again and to place them on a bed to which she had access, where they were found about an hour afterward.

The performance was becoming something of a nuisance, to get rid of which, as well as to save the little creatures from a lingering death, we destroyed them. I do not recollect that the cat manifested any particular regret, or that her subsequent conduct was at all peculiar, and as I have said, a few days after she had a family of her own.

Let those who attribute all the acts of animals to "unerring instinct," account for these facts. I give them as they occurred, and give you my word that they are exactly as stated.

Albany, N. Y. C. A.

The Currant Worm.

Messrs. Editors:—On page 297, of the Scientific American, copied from an exchange, is a description of the currant worm and its habits, which contains three errors: "The miller that deposits the eggs" is not a miller at all, but a small yellow fly with brown wings, about as large as the common house fly, but slimmer and more active. The flies deposit their eggs the last of April or first part of May, the worms appearing usually by the middle of May. This year they were first seen May 7th. When the worms attain to their full size they go under ground and turn to flies again and lay their eggs sometime in June. Last year a *third* brood of worms appeared about the 1st of September, which continued upon the bushes till every leaf was destroyed. The last brood of worms after reaching maturity, go under ground where they remain till the following April.

The "miller" of which your correspondent speaks is the parent of the loop or measuring worm, its body being about an inch in length, yellow, and covered with black dots. This worm also preys upon the currant leaf, but is *comparatively* harmless.

My method of fighting these plagues is as follows: I hold a tin pan underneath the bushes, and gently rap the branches with a paddle, the worms fall into the pan and are then easily destroyed. This I do once a week, or oftener if they be numerous. In this way I save my bushes, keep the worms in check, and have all the currants I want. J. H. P.

Wear of Driving Wheels on Locomotives.

Messrs. Editors:—A correspondent asks "Why the forward wheels of locomotives wear more than the hind ones?" In answer I would say that it is lateral slip, produced mostly in passing curves. The forward wheels only, partake of lateral slip, and having this extra motion must, as a natural consequence have more wear.

St. Louis, Mo. Geo. Shone.

The Australian preserved meat imported into England has it is asserted, hitherto proved an unsuccessful experiment, as people will not touch the strange food, preferring to go without meat altogether rather than to taste an untried dish. The importation of live cattle from Brazil has, therefore, been attempted, and the River Platte Company has recently sent 500 oxen, which arrived in good order at Falmouth.

[For the Scientific American.]

ON RUTHENIUM.

BY PROFESSOR CHARLES A. JOY.

Gottfried William Osann, born at Weimar, in 1797, Professor of Chemistry at the University of Dorpat from 1823 to 1828, and afterwards, until the time of his death a few years since, Professor at Wurtzburg, while examining some platinum ores from Siberia, found in them what he considered traces of three new metals. One of them because it was discovered in platinum from Urai, he named from the first letters of those words—pluranium; the second, from its gray color, was called after the Greek, polinium; and the third, as it was the first metal discovered in ores from Russia, was called after the ancient name of that empire, *Ruthenia*, ruthenium.

Professor Osann never succeeded in fairly isolating and describing these metals, and all these names would have been dropped and forgotten if it had not been for the labors, in 1845, of a native Russian chemist, Professor Claus, who was more successful in his efforts, and really found a new metal in the platinum ores, differing from anything described by Osann, but which, out of compliment to that *savant*, and in honor of his country, he called ruthenium.

According to Claus, the original ruthenium was composed of zirconia, with oxide of iron, silicic and titanic acids, and was consequently nothing new. As for polinium and pluranium, it is not probable that we shall ever hear of them again.

Professor Claus found ruthenium in the residues after treating ores of platinum with acids. It occurs in the fine black scales called "iridosmine," now so extensively used for pointing gold pens, and is so rare that if it were ever to be required in considerable quantity in the arts it would be difficult to supply the demand.

The platium ores of Russia, America, and Borneo, contain it, and recently an interesting mineral has been found at the latter locality, which Woehler shows to be a sulphur compound of osmium and ruthenium, and to which, out of compliment to an old friend, he has given the name of *laurite*. Previous to the discovery of this mineral it was not supposed that sulphur would ever be found associated with the metals of the platinum group.

It is not necessary to recapitulate all of the steps taken by Claus to isolate ruthenium, as that would lead us into a scientific labyrinth of no practical value, but it is quite worth while to give an account of the method pursued by Deville for obtaining it, as it has qualities that adapt it to interesting uses, and many persons may desire to make it. The material to be employed is iridosmine; which is a refuse article from the gold-pen manufactory, and also from the assay office. At one time it was to be had in considerable quantity, but of late years, partly owing to a different way of working gold ores and partly to the absence of the scales in gold and platinum from new localities, we have less of it than formerly. Since the discovery of a method for the employment of iridium in alloys with platinum, the iridosmine has become more valuable, and more efforts are made to discover and save it.

The iridosmine is fused with four or five times its weight of zinc in a carbon crucible, and the heat is then raised sufficiently to volatilize all of the zinc.

This leaves a porous, easily pulverized mass, which is again fused with 3 parts of peroxide of barium, and 1 part of saltpeter, and the resulting powder must be treated with hydrochloric acid, and afterwards with nitric and sulphuric acids, we then convert the ruthenium into oxide and fuse it by means of the oxyhydrogen blow pipe in a lime crucible.

We have omitted certain details of the operation, but have given enough to show that it is no easy matter to obtain the metal. Ruthenium is, after osmium, the most difficult to fuse of all the metals; it is only possible to melt small quantities in the hottest point of the oxyhydrogen flame at a temperature that would convert gold and platinum into vapor.

The specific gravity of the metal thus prepared is 11·4. It can be alloyed with other metals, such as zinc and tin, but does not, as an alloy, present any peculiar features or uses. There is a property of spongy ruthenium that is worthy of note, and is not generally known. It was discovered by Professor Schoenbein, and used to be exhibited by him as a capital class experiment. He found that when cholorine gas was conducted into water and spongy ruthenium added, the metal acted in a manner analogous to sunlight, and decomposed the water into free oxygen and hydrochloric acid.

The metal was not itself in the least changed, so that the same piece would decompose an indefinite amount of chlorine water. Schoenbein was of the opinion that by passing chlorine gas continuously through water in which ruthenium was placed, a stream of oxygen gas would continue to come off as long as any water was left to be decomposed.

This curious reaction suggests other possible uses of the metal as a substitute for platinum in the manufacture of vinegars, and also to bring about many chemical changes where simple contact is sufficient. It is a subject that needs investigation and may lead to the discovery of important uses for ruthenium.

Since 1845, Claus has continued his investigations into the properties of ruthenium, and has published several papers on the subject; also Fremy, Deville, Bunsen, and Gibbs have increased our knowledge of the element, but their papers are of a purely scientific character, unsuited to a popular journal, and we refrain from attempting an abstract of them.

Ruthenium belongs to the platinum group of metals, and is closely allied to osmium in many of its chemical relations. The metals of the platinum family never occur separately, with the exception of palladium. They all possess the curious properties of determining a large number of chemical reactions by simple contact.

The order of fusibility of the group is as follows: Palladium, platinum, rhodium, iridium, ruthenium, osmium.

The specific gravities as given by Deville are: Ruthenium, 11·4; palladium, 11·8; rhodium, 12·1; platinum, 21·15; iridium, 21·15; osmium, 21·4.

It will thus appear that osmium is at once the heaviest and the most infusible of all the metals; ruthenium stands next to it in point of fusibility, but is much lighter.

The sesqui-chloride of ruthenium has been recommended by Gibbs as a delicate reagent in testing for salts of the nitrates—with nitrates of the alkalies it forms double salts which are difficultly soluble.

Many salts of ruthenium have been made by chemists, but they possess a purely scientific interest, and we refrain from giving them here.

Manufacture of Benzine, or More Properly, Benzol.

In the year 1825 Faraday was occupied with the investigation of certain liquids which were deposited in the cases used for containing compressed oil-gas, a material which was at that time a cheap source of illumination. He was able to detect, in the complex mixture on which he had to work, a body to which, in accordance with the current nomenclature and notation of his time, he gave the name "bicarburet of hydrogen." Several years afterwards, Mitscherlich found that on distilling benzoic acid with lime, a volatile oil came over, and that this was in every respect identical with Faraday's compound. Hence the name "benzol." It was not, however, until 1845 that Hofmann proved the presence of benzol in coal tar; nor until three years later that Mansfield (unhappily a martyr to these researches) showed how it might be obtained from that source on an industrial scale. A small specimen of Faraday's original preparation is still in existence, sealed up as a recondite curiosity by its discoverer; now, benzol is manufactured by the tun. The direct proportion of power to knowledge could scarcely be illustrated by a more instructive contrast.

Benzol constitutes sometimes as much as one tenth of the weight of crude tar. In order to prepare it, the light oil is used as a starting point. This material is placed in large stills, and submitted to what is termed "fractional distillation," that is, to a distillation in which the contents of the retort are separated into certain portions, which are distilled over and received separately. The apparatus employed is very simple in principle, and, however varied in form, is generally merely the embodiment of a method first delineated by Mansfield. The retort invariably contains a mixture of hydrocarbons, having a gradually increasing boiling point, and a gradually increasing chemical complexity. On applying heat so as to cause ebullition, the first "distillate," or substance that arrives at the receiver, will be that which possesses the lowest boiling point; the next will have the next higher boiling point, and so on. This law, however, is not more than approximately true, it being always found in practice that a complete separation of the constituents in the retort cannot be effected, each body of lower boiling point dragging with it, so to speak, some of each body of higher boiling point. The impurities which would thus be introduced into the distillate necessarily exist in the vapor; but it is found that, by passing the vapor through an upright tube surrounded by baths of various suitable temperatures, they can be cooled out, and compelled to run back into the retort, without rising high enough to pass over into the receiver.

The benzol of commerce, however, is never pure, its boiling point being frequently 100° in fact, a steam bath is employed in its preparation. Absolutely pure benzol can be obtained by re-distilling commercial benzole at about 80°, and submitting the distillate to the prolonged action of a freezing mixture. It then crystallizes in beautiful white plates, having a high luster, which melt at about 3°, and from which the impurities can be removed by draining and pressure in a cold apartment. When these crystals are re-melted, they constitute a colorless, highly refractive liquid, of somewhat agreeable odor, boiling at 82°, and considerably lighter than water. The crude or pure product may be used as a solvent of grease stains, of caoutchouc, gutta-percha, and resins, as an ingredient in varnishes, as a chemical discriminant in analysis, as a means of rendering tracing paper temporarily transparent, etc.; but its most important application is to the manufacture of nitro-benzol.

What the Telescope is Doing.

One of the largest telescopes in the world, it is well known is owned by the Chicago University. The destined work of this wonderful instrument is to make, in connection with nine chief observatories of Europe and America, an entirely new catalogue of 250,000 stars, determining the right ascension and declination of each particular star; so that by observing its position, astronomers may, in far-off ages, be able to announce authoritatively on its motion, and to declare in what direction it has proceeded through the illimitable voids. At this moment it is slowly and surely performing its sublime work, and furnishing those far-off astronomers the data upon which to base their calculations respecting that mighty problem, the direct motion of the sun through space.

When this is solved, data will also be abundant for locating the position of the great central sun, around which millions upon millions of other suns popularly denominated stars, do, in all probability, revolve. The labor being divided among the ten principal observatories in the world, will make the share of it falling to the Chicago Observatory, 25,000 stars—upon each one of which the most careful observations will be made and recorded. It will require about ten years to accomplish this stupendous work, and when it is done we may expect some most important astronomical discoveries.

The Draft of Mowing Machines.

Mr. H. H. Ingalsbe communicates his views upon this subject to the *Country Gentleman*, which we think of sufficient interest to quote at length.

"The power required to drive a mowing machine at work may be resolved into direct draft and side draft. A good mowing machine should be so balanced between the driving wheels and the cutter bar, by placing the line of draft nearer, or further from, the heel of the bar, that ordinarily, there will be little or no side draft. If so placed, the end of the tongue will sometimes, when at work, be drawn toward the standing grass, and sometimes thrown away from it by the side draft. Practically, the side draft is of small account in a good machine.

"The direct draft depends upon three causes, and may be resolved into three parts:

"1. The draft of the machine itself, on its own wheels on the ground.

"2. The power required to give motion to the gearing and the knife.

"3. The resistance offered by the grass or other substance cut.

"These three several parts, added together, make up the sum total of the resistance, are called the draft of the machine, and for convenience are spoken of as pounds power, which for comparison are sufficiently accurate.

"Each of these separate causes varies much in different machines at the same time, and in the same machine at different times. The power required to draw the machine on its own wheels depends upon the size of the wheels, the perfection of the axles and the smoothness of the ground, and,other things being equal, upon the weight of the machine, and in a machine weighing 600 lbs. should not, on a smooth, firm turf and a level field, be more than 75 to 100 pounds. Adding to the weight of the machine would add to the draft just in proportion, whether that added weight be in the machine or in a driver on it. Suppose the machine to weigh 600 pounds and the draft to be 80 pounds; put a driver of 150 pounds on the seat, and you have increased the draft 25 per cent or to 100 pounds, while the power required to drive the knife and to cut the grass, remains unchanged, and you have only increased the draft 20 pounds.

"The power required to drive the knife and gearing, depends upon the perfection of the gearing,and the weight and velocity of the knife. It should,while differing in different machines, remain nearly the same in the same machine at different times, and would do so if they were built upon correct mechanical principles, and kept in proper order. A machine that in proper order may not require more than 10 or 20 pounds of power, may require ten or twenty times that amount from deficiency of oil, collection of dirt in the gearing, gum on the knife, or loosening of the connections of the pitman by wearing or otherwise.

"The resistance of the grass to be cut will vary with every change of condition, kind, and thickness of grass, and every variation in the condition of the knife and rapidity of stroke. The greater the velocity of a cutting edge, after the velocity is once obtained, the less power is required to do a given amount of work. In the great trial of the New York State Agricultural Society,the first and second causes were measured together under the name of 'trial out of grass,' and the third by itself, called 'absolute draft,' got by deducting the sum of the first and second from the total amount of power required. In one or two cases machines were used which had an absolute heavier draft out of the grass than when in the grass and at work, a fact which was wondered at by the committee, and unaccounted for by them, but which we will consider by and by.

"The direct draft of a good machine, working under the most favorable circumstances, as shown by the trial of the State Agricultural Society, is less than 300 lbs., but those favorable conditions are not always to be obtained, so that the draft must, many times, be much heavier. The machine having the lightest draft at a trial may not be the best machine for practical use; it may not have sufficient power to work under less favorable circumstances. The power of a machine to cut, other things being equal, depends upon the hold the wheels have upon the ground. When the second and third causes,combined,are sufficient to overcome the hold the wheels have, they slide, the knife stops, the machine is clogged. The heavier the machine, the less likely this is to occur; putting a heavy driver on the seat will sometimes carry a machine through, when with a lighter one it would clog.

"As to the trial of the machine which drew lighter when at work than when running free,at which the judges expressed surprise, while it probably cannot now be told with certainty what the reason was, still it would not be difficult to give a reason which is good in some cases, and may have been so in this one. When the knife reaches the end of the stroke, its momentum is considerable, and it requires nearly as much power to stop it as it did to start it to make the stroke—it would require quite as much if it were not for the loss of some power by the friction of the knife in the guards; now, if the joints of the pitman and connections are all perfect, this stopping occurs when the crank passes the center of the shaft driving it, and the remainder of the momentum of the knife is expended upon the crank in the direction of its length and at right angles to the driving power, so that none of that is used up in stopping the knife. But if these joints of the pitman are, from any cause, loose,so that there is a little play, and the crank can pass the center before the knife reaches the end of the stroke, this momentum will be expended in opposition to the driving power, and will of course increase the power necessary to work the machine by so much as is necessary to overcome the momentum of the knife; again, the crank beginning to act upon the knife after it has passed the center to make the return stroke, the knife must start with a greater velocity, causing another loss. Now put the same machine into the grass, and the grass operates to stop the knife as soon as the crank allows it to stop, thus saving the momentum that was expended upon the crank in opposition to the driving power, and also shortening the stroke and saving power in that way.

"To illustrate: if from the imperfection of all the joints, by wear or otherwise, there is a play of half an inch (and as there are never less than four of them, a play of one eighth of an inch to each one will amount to half an inch in the aggregate), the knife running out of the grass will be thrown to the extreme length each way, and will add one inch to the length of the stroke, increasing the power necessarily required to make it. If it requires a certain number of pounds power to make a stroke of three inches in length, it will require 33 1-3 per cent more power to make a stroke of four inches in length in the same time. Whenever these amounts of power lost in this way equal the power required to cut the grass, then the machine will draw just as heavily out of the grass as in it. From these premises, many deductions might be drawn as to the care of and practical use of mowing machines."

Roast Beef by Wholesale---A New Industry.

A Houston, Texas, paper describes an establishment for packing and shipping roast beef, situated near that city, the details of which novel branch of business are interesting. It says:

"The location of the packery is a very desirable one. The bayou is straight for a considerable distance above and below, and at the wharf the bayou is wide enough for two boats of largest size to pass without difficulty. Water is deep to each bank. The wharf, a very substantial one, is just at high water mark. Two large cypress trees were growing in the bank at the exact spot where they were wanted. They were cut down, and the stumps are the foundation upon which the wharf is built.

"A large amount of excavation was required for a location for the buildings, so as to have space all around them, and ventilation underneath; no part of any of the buildings coming against a bank of earth, which would cause the timber to decay, and be objectionable otherwise. At the same time, the slaughter house is so arranged that cattle come into it almost on a level with the ground, and on to a floor level with the second floor of the packery or main building. All the framing and flooring of the building is of the best Florida pine. The dirt, mostly sand, that was moved, filled up the low ground between the buildings and wharf,and quite a distance on either side of that, so that there is a gradual slope from the main buildings to the wharf.

"The first building from the wharf is a framed shed, very substantial, 30 feet square, upon brick pillars. Ten feet from that is the main building, two stories, 30 by 50 feet, and ten feet from that is the slaughter house, 30 by 25 feet, 14 feet to the plates; it is on a level with the second floor of the main building, with a ten-feet passage between the two, connecting the floor of the slaughter house with the second floor of the packery. Between these two buildings is the rendering tank under the passage. In the floor of the passage is a door, through which all the offal, to be rendered, is put into the tank. There is,also,a cistern between these buildings holding 3,000 gallons of water, above the floor of slaughter house, and above the second floor of the packery. From the slaughter house is a sewer, running past the main building to the bayou. This conveys the blood from the slaughter house,and the water used in slaughtering and cleansing it to the bayou under ground. The water from the rendering tank and from the boiler, and the escape steam, is also conveyed into the same sewer. There is a cistern under the shed, also, holding 3,000 gallons, designed to catch the water from the roofs of buildings for drinking purposes. There are pipes from this and the other cistern to the same sewer, to carry off the surplus water, or to prevent the cisterns overflowing.

"At the side of the two-story building is the oven and boiler house, 14 by 26 feet, built of brick, with an iron roof. The oven part of it is two stories high. There is not a piece of wood about this building, where the fires are, not even a lintel, the openings being arched with brick. As the openings are of different widths and hight, the building presents quite a unique appearance. A large amount of air is required to roast meat by this process, and quite a large opening, the whole width of the building, is left under the roof of the oven part of it, with brick pillars to support the roof.

"Next the oven, and on the same side of the packery, is a room 14 by 24 feet. In this room there will be a steam chest, of galvanized iron, with two railways,where the cans of meat, after being sealed up, will be heated with the escape steam from the engine. The air will be let out of the cans while hot, and then they are ready for boxing. All these buildings have been put up in three weeks and a half, and all have gutters conveying the water from the roofs to the cisterns. It is intended that there shall be as little manual labor in the handling of meat in this establishment as possible. The work is nearly all done by machinery.

"The beeves go into the slaughter house nearly on a level with the ground. After they are killed, they are suspended for dressing with a windlass, and, when dressed, are let down on a car platform, which runs into the packery on the second floor, through the passage before spoken of. The platform of the car is level with the cutting benches, and the carcass is slid from the one to the other, and the meat cut from the bone while still retaining the animal heat. From the cutting bench to the receiver on the same level,where the air is pumped from it to a very high vacuum through a condenser, reducing the temperature to about 38 degrees, and the weight of the meat about five per cent by the loss of ammonia and other gases pumped out of it by the air pump. From the receiver it goes to the top of the oven three feet above the same floor; as it is roasted it is let down by machinery to the bottom of the oven, a couple of feet above the first floor, where it goes through the cutter to the press, and the filled cans from the press to the railway in the steam chest,and thence to the shed, where it remains for the steamer at the wharf, a few yards only from the shed. The cans are made in the same room where the meat is run through the cutter and packed.

"As the meat goes through the air-pump process while warm, but one animal is killed at a time. The slaughter house is washed after each animal is dressed. The offal is immediately removed. The blood and washings are carried to the bayou underground, and there will be nothing more offensive about the establishment than in any clean and well-kept kitchen.

"The oven will hold eight or ten steers at a time, and will roast twenty a day. The buildings are calculated for one hundred beeves a day, and space has been left for four more ovens like the one now constructed. It is intended to increase the business as fast as a market can be created for the meat. On the premises purchased there are sites, just as convenient as this one, for nine more establishments of the same size, and the business will be increased as fast as a market can be foundfor the roast beef, up to one thousand beeves a day, or any number that can be sold, up to that amount.

"The twenty-two acres of ground will be enriched by the offal of the animals slaughtered, and an arrangement has been made with a very intelligent and enterprising German, who understands the business, to plant an extensive vineyard on the ground, with a view to the manufacture of wine.

"There is a small stream of never-failing water running through the place from a spring on the adjoining property. The water being very soft and free from mud, is superior to the bayou water for a steam boiler, the water of the bayou being generally muddy and sometimes brackish. A dam has been built across the stream, making a small pond, from which water is taken for the packery, and in which it is proposed to test the cultivation of fish in Texas. The grove of three or four acres, near the packery, heavily timbered, is to be thinned out till there is sunshine enough for grass to grow, the fuel furnished by it more than paying all the expenses of making it quite ornamental."

Will Pills Explode?

It is really terrible to find out every day some new danger to which we are exposed. If there is one thing which people have hitherto confided in, it is a pill box; it is allowed to lie about anywhere, it is shut up in a drawer or a cupboard, or is carried in the pocket. A general panic will therefore be caused in many a household by the account given in the *Pharmaceutical Journal* of what recently befell a lady for whom a doctor had prescribed twenty-four pills, each containing two grains of the oxide of silver, a twenty-fourth of a grain of muriate of morphia, and a sufficiency of extract of gentian, the pills being coated with silver in the usual manner. The pills, it is stated, were delivered to the patient in an ordinary pill box; but the lady, being in her nursery, and having no pocket in her dress, placed the box in her bosom, probably next the skin. Little did this unfortunate lady know the deadly peril which awaited her. In three quarters of an hour a severe explosion occurred; her underclothes were reduced to a tinder, she was seriously burned, and, but that she had the presence of mind to extinguish the flame with her hands, she would have been destroyed. Oxide of silver, being reduced by contact with vegetable extracts, is, it seems, in the habit of exploding. It is really as well people should be made aware of the danger they run, in order that they may have magazines for pill boxes attached to their dwellings. We should also be glad to know if pills of this nature are liable to explode after being swallowed. No information is given on this point, which is of some little importance; but the *Lancet*, for our consolation, under the head of "Things not Generally Known," says that a similar occurrence has been known in compounding the extract of colocynth with the oxide of silver, and that with creosote of oil of cloves this salt is reduced to the metallic state with the production of heat, amounting often to an explosion. In fact, there are some pills which are nothing more or less than infernal machines, and people with volcanic temperaments and undermined constitutions, for whom they are prescribed, should be careful to take them in secluded spots, where no one but themselves can be injured in the event of the explosion.

STUCCO.—This substance, now much in use for walls, pillars, etc., is at present prepared by mixing plaster of Paris with a solution of gelatin or glue, instead of with water. This, while stiffening more slowly, becomes much harder than with water alone. For white stucco, the proper quality of gelatin must be employed; for colored, less care need be exercised. When the mass has been suitably applied, and sufficiently hardened, the surface is to be moistened and rubbed down with pumice stone until smooth. It is finally to be coated by means of a brush with a concentrated solution of gelatin, and, when perfectly dried, it may be polished with tripoli on a buffer, with the addition of a little olive oil. It is often desirable, in using plaster of Paris in the ordinary way, to prevent its hardening too rapidly. This may be easily done by adding a saturated solution of borax to the water in suitable proportion. One volume of the solution to twelve of water will prevent hardening for fifteen minutes; while with equal parts this will not take place for ten or twelve hours.

Machine for Punching and Inserting Eyelets in Leather.

We illustrate herewith a very ingenious and important improvement in machines for punching leather and inserting eyelets therein, which surpasses in cheapness and efficiency anything of the kind with which we are acquainted, while it has all the elements of durability, freedom from complications, and ease of operation, which characterize a practical and useful invention.

It may be operated successfully by young girls, and punches a hole and inserts an eyelet at each stroke of a foot lever, with perfect uniformity, both in the width of space from the edge of the piece and in the distances between the eyelets.

The machine is one of those ingenious affairs which are only produced occasionally, and is worthy the attention of all who delight in curious mechanical contrivances, as well as those for whose use it is specially designed.

The eyelets are placed in a magazine, A, which moves with every motion of the foot lever. This magazine is divided into two compartments by a perforated partition, the perforations being of such shape that the eyelets pass from the first chamber to the second, with the turned or flanged end downward. The hight of this second chamber is such that the eyelets cannot turn over while passing through it, and it tapers so that the eyelets are forced finally to move in single file down a curved way, C, which reverses their position as they pass over the curve at the end next the magazine. The way, C, down which the eyelets slide, consists of two rails sufficiently separated to allow the body of the eyelets to pass between them, while the rim or flange slides along their upper surfaces. At I, two springs act as fingers to hold the eyelets from dropping till they are wanted.

A spring latch, B, serves to secure the cover to the magazine, A, so that the eyelets cannot be accidentally thrown out.

Having thus traced the course of the eyelets to the point of insertion, we will next describe the movement of the machine.

A rod, M, connects the principal actuating lever, F, of the machine with a foot lever or treadle. The lever, F, is weighted, as shown, so that when it is not moved by the foot lever through the rod, M, it falls into the position shown in the engraving.

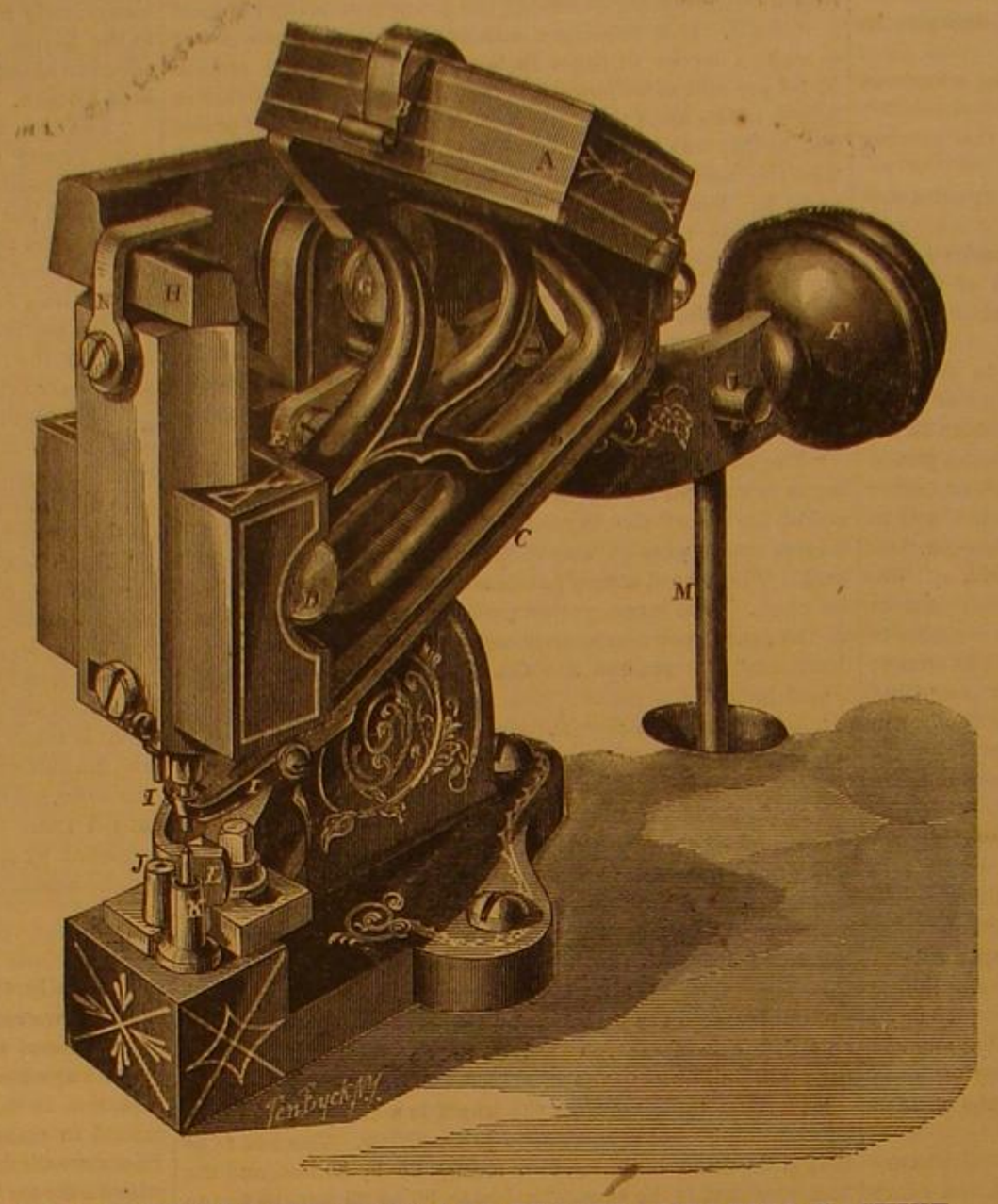
By the action of the foot lever the back end of the lever, F, is raised, and being pivoted at S a right-angled lateral projection, H, forces down the sliding punch stock, which carries a punch corresponding to the female die, J, and an eyelet-riveting punch corresponding to the die, K.

A link, E, connects the principal lever, F, with the frame which carries the magazine, A, and the sliding way, C. This frame is pivoted at D, so that every movement of F raises it, and by means of a slot and a pawl arrangement, not distinctly shown in the engraving, allows it to fall with a sudden jar, by which the eyelets in the magazine are shaken up and a sufficient number passed through into the second chamber and down the way, C, to keep the punch supplied.

The die corresponding to the die, K, is a hollow cylinder, and has a spindle in its interior, which, when it meets the upper point of K is thrust up into the hollow, and as the die rises is thrust out again by a spring. The eyelet having arrived at the spring fingers, I, the sliding punch stock descends and thrusts the spindle just described through the eyelet. As the punch stock descends vertically, and the spring fingers are drawn back radially, they are forced to release the eyelet, which then slides down the spindle on to the die, K, where it is riveted by the force of the blow. At the same time a new hole is punched in the leather by the punch corresponding to the female die, J; a guide bar, L, serving to keep the distance from the edge uniform.

The punch stock is raised by a hook, N, which engages with the lateral projection, H, on the lever, F.

The facility and accuracy, with which this machine does its work, are surprising, and its merits will undoubtedly attract the attention of all interested in the shoe manufacture, where it will find its most useful application.



KOMP'S COMBINED PUNCHING AND EYELET-INSERTING MACHINE.

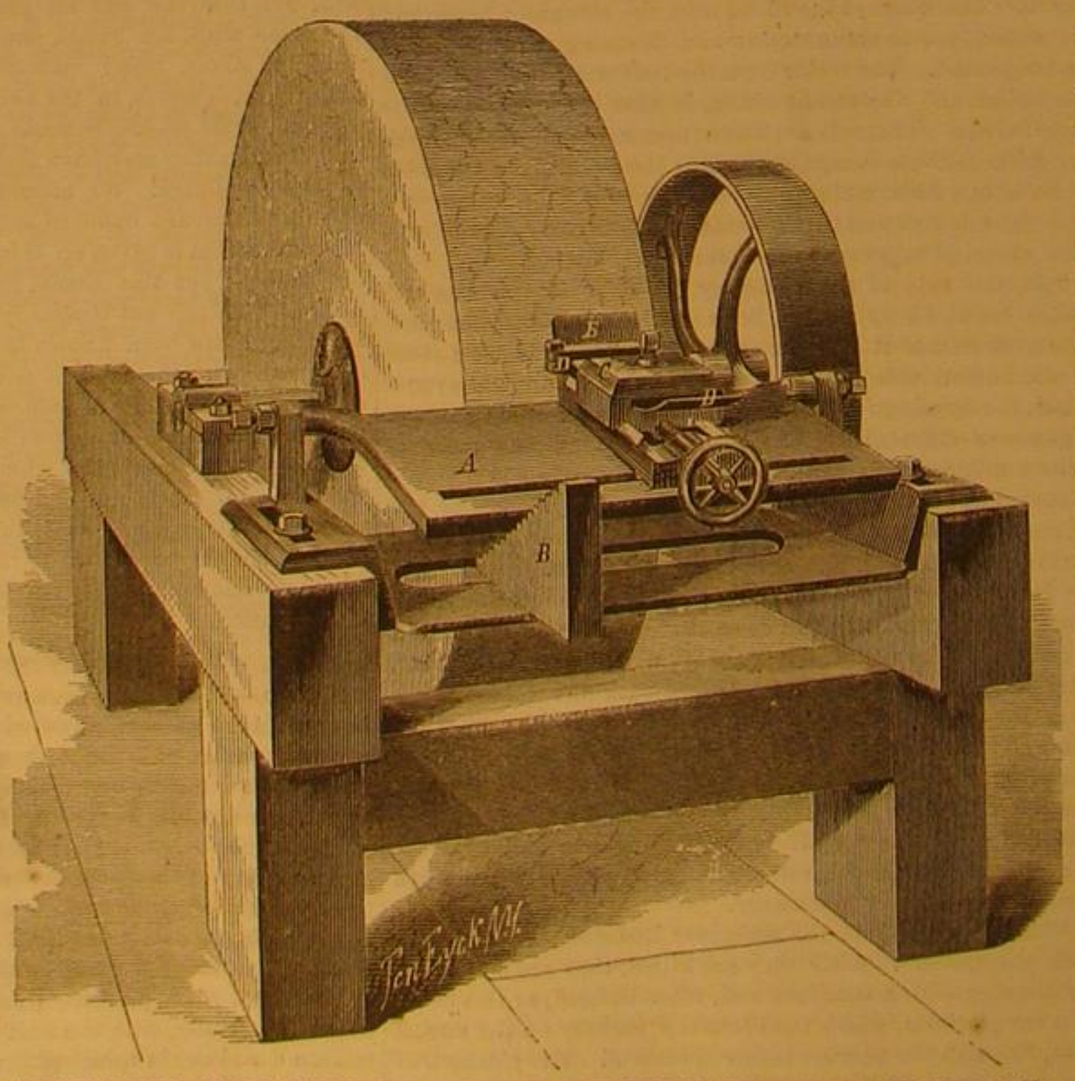
It was patented, June 30, 1868, and a patent for recent improvements is also now pending through the Scientific American Patent Agency.

For further information, address Albert Komp, 215 Center street, New York city.

Improved Tool Holder and Machine for Turning and Scraping Grindstones.

Every mechanic is aware that the accurate grinding of a tool can be accomplished only on a stone properly faced and free from glazed streaks, and that with many kinds of tools it is important that they should be held uniformly at a given angle. This is in many cases a difficult thing to do, especially in grinding long knives for wood planers, tobacco cutting machines, and the like.

The invention we herewith illustrate, is designed to provide for both the convenient and accurate facing of the stone, and the uniform holding of tools in grinding, and is, we believe, not only a cheap but a valuable adjunct to a grindstone in most shops and manufactories.



LEONARD'S TOOL HOLDER AND GRINDSTONE DRESSING MACHINE.

The parts are so clearly delineated by the excellent engraving, that any mechanic will comprehend at once the operation of the device.

A pivoted plate, A, is adjusted to any required angle by means of a wedged-shaped stop-block, B. This plate carries a tool holder, C, by which the adjustment of the scraper, D, is effected, and by which the latter is firmly held when dressing the stone.

Parallel motion is given to the tool-holder by means of a slot in the plate, A, in which a guide slides.

The tool-holder is also used for holding any other tool which it is desired to grind perfectly true, acting as a clamp firmly sustaining the tool to be ground in the required position. A fender plate, E, prevents the scattering of dust while facing the stone.

The form shown in the engraving is a cheap style for general use; it will, however, be understood that the principle may be carried to any extent, and to any degree of refinement, for any tool of whatever size or length required for various kinds of work.

This device has been made the subject of four patents, bearing date, respectively, July 14, 1868, June 29, 1869, December 7, 1869, and February 22, 1870, all taken through the Scientific American Patent Agency by Philip Leonard, Sharon, Pa., who may be addressed for rights, etc.

The Wild Beast Trade.

An English magazine says, "The trade in wild beasts is a system as regular as the trade in tea, coffee, or cotton, or any other merchandise. Some creatures, of which parrots are the most numerous, are brought over by sailors, who intend them, perhaps, as presents for their sweethearts, but they sell them for grog or tobacco as soon as they land. A dealer has agents in every country; and these agents communicate with the natives of the various countries. The system is now carried to such perfection, that if any gentlemen or lady would like an elephant for private riding, a tiger as an ornament to the garden, a crocodile or hippopotamus for the lake, or an ostrich or emeu for the lawn, the wish can be gratified by merely addressing a letter to the London dealer. He will calculate distance, the time occupied in catching and transporting the desired animal, give a close estimate of the cost, and deliver it at the door on the appointed day."

RUBBER TIP FOR FURNITURE LEGS.

In some forms of rubber tips for furniture legs, now in use, the method of attachment is such that when the rubber wears away from long usage, the attachment by which it is held fast to the leg, becomes a nuisance, marring floors, and cutting carpets. There is also danger of their coming off, especially when submitted to the test of the Yankee practice of tipping back in chairs. These things have been serious drawbacks to the use of such tips for libraries, sitting rooms for hotels, etc., when otherwise they would be found very useful, in preventing the wear of polished floors, and reducing the noise consequent upon moving chairs from place to place, sliding them about, etc.

The object of the present invention is to remove both the annoyances specified.

The screw by which the rubber tip is held to the leg is formed as shown at A, Fig. 1, with a broad head, to abut against the leg, as shown in Fig. 2; and it also has a button, B, formed upon the head, upon which the rubber tip is cast, as shown.

The portion of the head which abuts against the end of the leg, is made octagonal in form, with a circular flange, which gives it a finished appearance, the angular part enabling it to be driven into the wood by a wrench, or other suitable implement.

The whole forms a neat, cheap, and durable attachment,

Fig. 1

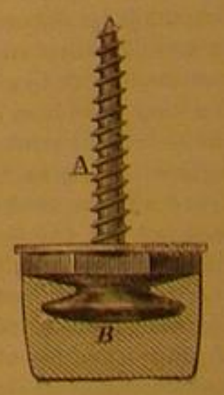


Fig. 2



and we regard it as a decided improvement upon other methods hitherto employed.

Patented, through the Scientific American Patent Agency Dec. 22, 1868, by O. B. Collins, whom address for further information, Box 249, Charleston, S. C.

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To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums n the country.

THE VALUE OF SCIENCE.

Many persons have been deterred from pursuing scientific studies on account of the cry of utilitarianism and the reproach that attends upon anything practical. There is something quite unworthy of the age in which we live, in any such notion, as the progress of society and the advance of civilization in modern times depend chiefly upon the application of the discoveries of scientific men. We never know what use may ultimately be made of a discovery. What appears to us at the time as a trivial and insignificant fact, may become one of the links in a great chain of practical application.

When Oersted observed the deflection of the needle produced by the galvanic current, he could not have anticipated that a telegraph would grow out of so slight a circumstance. Faraday's discovery of induction gave us the present form of the telegraph, and also electro-plating and electro-chemistry. The black powder in the alkali manufacturers' vats in Paris, to which the name of iodine was given, was of no consequence when first discovered, but now we know that the grand application of photography depends upon it.

A few years ago a German chemist announced the discovery of sugar in the beet. The account was received, like a vast number of other announcements, as a useless fact, and rather disgraceful to the man who wasted his time in such insignificant labors. Now we know that the beet sugar industry is one of the most important on the continent of Europe, involving millions of capital, and giving occupation to thousands of men.

The illustrious philosopher, Faraday, succeeded in condensing a number of gases. It was an interesting experiment, but certainly no one could have predicted that some day the question of furnishing cheap food to large cities would depend upon the application of this discovery, but such appears likely to be the fact. The best refrigerating machines, and the most practical methods of producing artificial cold, are founded upon the condensation of gases, especially of ammonia, by means of which we shall be enabled to transport frozen meat any distance.

But not only in the production of cold is Faraday's discovery available; we have in it the germ of a valuable motive power, that is capable of extensive application. Faraday also discovered benzol, and for many years no use could be devised for it; we now know that the whole aniline industry, with its magnificent array of colors, rests upon what appeared to be a useless discovery; and yet Faraday, who gave us our present form of telegraph, who enabled us to produce the richest colors, who put cheap food within our reach, and gave us a motive power available at all times, himself worked in poverty, and died a poor man.

Professor Tyndall has just aroused the attention of the world to the great question of haze and dust, and out of the agitation of this subject will eventually grow true methods of ventilation, the suppression of cholera and fevers, the proper care of the poor in tenement houses, and many improvements in the sanitary condition of mankind.

De la Rive, of Geneva, while experimenting in electricity, found that a bit of zinc would prevent the oxidation of iron, and he at once suggested its employment for this purpose. Out of this simple fact has grown the immense industry of galvanizing iron; but that is not all, for in the same battery De la Rive observed that the minute scratchings on one of the cups was accurately copied on the copper deposited upon it. He mentioned the circumstance; Jacobi took it up, and we now have electro-plating and galvano-plasty carried to complete success.

Pasteur has been devoting years to the study of fermentation, and as a result of his experiments, we are taught to know the true causes of disease and decay, and to invent the proper remedy.

The workers in copper were found to be exempt from cholera, and on investigation it was found that they breathed considerable sulphurous acid, and it was at once seen that this gas, which prevents fermentation and destroys the cholera germs, was what had afforded protection to the coppersmiths, and the same remedy was applied with success in cholera districts and in hospitals.

Sir Isaac Newton discovered the solar spectrum. It was an insignificant thing to throw a beam of light on to a screen through a hole in the shutter, and his neighbors thought he ought to have been better employed; but what a wealth of invention has grown out of this one fact. We now dissect our light, and apply each part as we want it. We can shut out the light and admit the heat. We can concentrate the chemical rays and take a picture. We can examine the spectrum and determine the composition of the sun, moon, and stars, and we shall, before long, separate the light and chemical rays from the heat, and shall store up the heat of the sun as our great motive power, after our coal and fuel have been exhausted. We cannot tell to what vast uses this discovery is destined to be applied.

Professor Schrotter, of Vienna, found that he could convert phosphorus into a red powder, which had many peculiar properties: It was not so poisonous to the workmen in the match factory; it did not ignite on friction, and could be easily transported from one place to another; it was not soluble in the same re-agents as the ordinary phosphorus; and it had powerful reducing properties. It was a trifling matter at first, but has since saved the lives of many a poor person in match factories, and served an important use in the extermination of vermin.

The catalogue of trifling discoveries is almost endless, and we have mentioned enough to show the importance of appreciating the labors of those whose whole life is devoted to the good of their fellow men.

In ancient times it was said, "The proper study of mankind is man," and acting upon that, the world stood still for centuries. The study of mankind led to metaphysical mysteries and superstitions, and it is only since science has dispelled these clouds and let in the light of observation, perception, and judgment, that man has begun to enjoy freedom from such thralldom as our early philosophers imposed upon him. One superstition after another passes away before the clear light of scientific inquiry, and it is not the man of science, but the metaphysician and inductive philosopher, who throw doubt and distrust and unbelief into our ranks. The value of scientific study is therefore two-fold; it gives us the comforts of civilized life, and overturns all doubt and superstition; "it proves all things and holds fast that which is good."

IS HYDROGEN A METAL?

About a year since, we published an account of the late Mr. Graham's researches on the occlusion of hydrogen by the metal palladium, from which he arrived at the conclusion that hydrogen was a metal in a gaseous form. In a recent issue we also gave an account of an interesting experiment performed by Mr. Loew before the Lyceum of Natural History in this city, from which it appeared that he succeeded in making a hydrogenium amalgam with mercury.

It is well known to chemists that when mercury containing a little sodium is treated with a solution of chloride of ammonium, the mercury apparently swells to a bulk very much greater than it originally possessed, and the radical ammonium, generated by the reaction of the chloride of ammonium with the sodium, appears to enter into combination with the mercury to form an amalgam, called the ammonium amalgam.

From this deportment of ammonium with mercury it has been maintained by eminent chemists that hydrogen, one of the elements of the radical ammonium, is probably a metal, which theory the investigations of Graham were pretty generally accepted as confirming.

In the discussion upon Mr. Loew's experiment above alluded to, Professor Seely took occasion to remark that he, together with others, entertained the opinion that there yet existed no proof calculated to substantiate the belief that hydrogen was metallic in its nature, and that the term "hydrogenium" which Mr. Graham applied to that element, was therefore inappropriate.

In a recent conversation, Professor Seely expressed the same opinion to us, adding that the so-called ammonia amalgam is nothing more than a *froth* of mercury, and that the hydrogenium amalgam of Mr. Loew is a similar *froth*.

To enforce his views he performed in our presence an interesting experiment. The mercury amalgam was made by him in a glass tube, to which a small air-tight piston had been previously fitted. After the reaction had taken place he subjected the same to a pressure of probably ten atmospheres by forcing the plunger into the tube. The amalgam deported itself exactly in accordance with Mariotte's law of the compression of gases, which certainly could not have been the case if the amalgam was other than a froth as claimed by Mr. Seely.

We deem this experiment as wholly conclusive that this apparent compound is really nothing but a mechanical mixture and not a true chemical compound as hitherto maintained.

We may add that Professor Wurtz, of this city, who had his attention called to the experiment of Professor Seely, has since been able to produce a froth of mercury by simple agitation of aqua ammonia with the metal first amalgamated with a little zinc.

HOW PEOPLE LIVE TOO FAST.

The word "fast" has latterly obtained a peculiar significance as indicating a tendency to general high living and indulgence in sensual pleasures. A man of reckless expenditure, who indulges himself in all that can gratify his sensual tastes, is a "fast man" in the common sense of the term. This expressive adjective has also been applied to those who habitually risk money in games of chance, and has in some instances been coupled with the names of others, who speculate in doubtful stocks.

We have come to the conclusion that sensual indulgence, exciting games of chance, or speculation in fancy stocks, are not the only ways in which men may live too fast.

Many a godly and devout divine is a fast man. Many an editor, lawyer, merchant, or scientific man, against whom no thought of suspicion exists as to the soundness of his moral character, is fast in as just, though not in so reprehensible a sense, as the man who wastes his substance in riotous living.

Fast living in the sense of such living as shortens life, is a much more common evil than it is generally regarded. We have been an observer of faces and character for a long time, as we have had opportunity in cars, stage-coaches, and our daily intercourse with men, and we believe that in the vast majority of cases it would be found that the rapidity of the pulse in Americans is above the normal standard. Every man's life may be measured by pulse-beats. He will live, accident excepted, to make a definite number of these, and his life will be shortened in proportion to the excess of work performed by his vital organs, in a given time.

Excitement, physical or mental, is the cause of the rapid rate at which most American people are living. The love for excitement is a vice, as positively evil in its effects as the love for strong drink, licentiousness, or gambling. It matters not what kind of excitement; all excitement is fast living, and begets a feeling of exhaustion in intervals of indulgence, which clamors for relief from some other form of stimulant.

Thus it is that the universal demand for artificial stimulants has increased, until there is perhaps not one in a thousand who does not resort to something of this kind. Alcohol, absinthe, opium, hashish, tobacco, coffee, tea, or whatever else it may be, is taken to support the system under the effect of nervous prostration, and to supply in another form the excitement which it craves.

Now all this is just the reverse of what should be the case. Instead of seeking excitement, health and long life demand that we should shun it. The natural, healthy condition of the mind and body is that of unruffled calmness. If excitements occur, they should be exceptional, not the rule of life. As soon as they become a necessity there is a diseased state of mind and body, and the candle begins to burn at both ends.

THE STEAM MAN.

Have we not heard somewhere in song of a wonderful steam arm, which hammered away all obstacles, and of a steam leg that walked the owner to death, and then walked away with his ghost? If our memory serves us, we have. We never expected to meet those wonderful members in the flesh, but no man knows to-day what is reserved for him to-morrow. We have lived to see steam legs, steam arms, steam body and breeches, steam coat, hat and choker, all combined to eclipse all that poets have sung or dreamed.

Passing up Broadway we saw large posters announcing the greatest wonder of any age, past, present, or future, which wonder was explained, in smaller letters, to be an imitation of the human form divine, impelled by steam, and approximating in agility the renowned Hanlon Brothers.

We paused, considered, entered the place of exhibition, and found the steam man in a perfectly nude state, with the exception of his hat. His other articles of dress were hung upon a line, as if to dry from them the prespiration they had absorbed in his severe exercise. We were at fault, however, in this supposition, as we were told by the steam gentleman's valet, who was giving his master a drink of benzine through a hole in his shoulder. This attendant told us that the grace of the steam man's movement, and the comeliness of his features had begotten a general desire in the minds of his admirers to see his manly proportions, and his modesty offering no protest he was accordingly disrobed for the benefit of the public.

We proceeded to take observations of his anatomy from divers points of view. The gluteal region, kindly protected from rude assaults of hostile boots in ordinary mortals, by thicker muscles than are found on other parts of the frame, was replaced on the steam man by a Behrens rotary engine, the contour of which would give, we may imagine, an outline—when covered by clothing—not unlike that demanded to sustain the resemblance to a man so far as this important portion of the human system is concerned.

This engine impels a screw, which actuates worm gears; the gears actuating eccentrics, which actuate the legs and feet, which actuate the entire man at a velocity of, we should say, about forty feet per minute, when doing his level best.

His legs are merely straight bars, with large blocks of iron

for feet, fastened rigidly to the legs. The legs are joined to the feet at the middle, so that the heels are as long as the front part of the foot; and to keep the figure from toppling over side-wise, a flat bar extends laterally from each foot.

To give the appearance of bending at the knee a toggle joint is attached to the front part of each leg, but this has nothing to do with the propulsion of the automaton.

There is nothing in the movement analogous to that of the human leg. One foot is raised and then advanced, the whole leg moving forward, not swinging, with the foot, each foot being alternately the pedestal or base upon which the body rests.

The fuel employed is some fluid hydrocarbon, and the boiler is concealed in the body. The smoke escapes through a hole in the crown of the hat. When the steam man is about to take a walk, his valet takes a pair of pinchers and after opening the throttle valve, seizes with the pinchers the end of a shaft which protrudes just below the abdomen, and giving it a partial turn, a most remarkable sound resembling the rumbling of wind in the bowels commences, and the steam man sets out upon his travels with a rather unsteady gait, and with extremely short steps. When he reaches the end of his limit the steam is shut off, and he is turned about face by his faithful attendant, and retraces his steps in the same manner as we have described.

On the whole, the steam man is a curious automaton, and very much more satisfactory than his predecessor exhibited two or three years since in this city, who could only stand upon fixed crutches, and kick like a spunky child suffering for a spanking.

WASHINGTON CONSIDERED AS A PLACE FOR AN EXHIBITION.

Hallet Kilbourn, Esq., has sent to us a copy of the interesting speech delivered by him at Lincoln Hall, Washington, in support of the somewhat melancholy project of holding an "International Industrial Exhibition" in that city.

Our readers are probably aware that Washington is situated on the Potomac river, about twenty-five miles above Mount Vernon. It is principally celebrated for being the capital of the United States, and was selected for that purpose by the "Father of his Country," in view of its retired and almost inaccessible situation. A railroad communication has, however, been opened since the death of Gen. Washington, and it is now much easier than formerly to reach the Federal Capitol, though it is still somewhat off the line of public travel.

In speaking of the characteristics of Washington city, Mr. Kilbourn refers thus to the "Market House:"

"Probably no one prominent object in the city commands so many opprobrious epithets, and is so universally conceded a nuisance, alike by citizens and sojourners, as the group of old sheds fronting five hundred feet along Pennsylvania avenue, and styled the Center Market. Mark Twain, in one of his lectures, said that, in all his travels around the world, visiting objects of interest in Christian and heathen lands, his national feeling was constantly buoyed up by the recollection that, at the national capital of his own proud Republic, there existed a structure whose equal was not to be found on the face of the habitable globe—the Center Market-house, on Pennsylvania avenue."

It seems, however, that four years ago the city authorities proposed to erect an elegant structure on the premises, and present a building, which would be a credit to Pennsylvania avenue, clean and commodious, for market purposes. Plans were adopted which would require the expenditure of several hundred thousand dollars, and the money was appropriated by the city. After the erection of the foundation, at an expense of several thousand dollars, Congress suddenly realized the fact that the old white-washed land-mark (and guide-post for meandering representatives) was about to disappear and a permanent structure to be erected in its place; whereupon the House stopped this outrage on civilization by unanimously passing a resolution putting a stop to the job.

It seems to us, therefore, in view of the facts that the idea of Mr. Kilbourn, or any other man, that Washington should have an "International Industrial Exhibition," borders a trifle upon the absurd.

ARTIFICIAL STONE.

We have heretofore expressed the opinion that nothing whatever can take the place of good stone for building purposes. Nothing else is so durable and nothing else is capable of producing such architectural effects. The only drawback to its more general use is the expense attending cutting it into the required forms.

As the constituents of building stones are easily ascertained and well known to chemists, it is somewhat remarkable that long before this the art of making artificial stone has not been brought to perfection. Yet if we may judge from the great and increasing variety of processes, patented and otherwise, which now press their claims upon public notice, the time is ripe for the introduction of any process which can demonstrate practically its capacity to fulfill the requirements of the case.

These requirements are not numerous, yet they have been hard to attain, as the history of the failures which have marked the course of invention in this field, sufficiently shows. The Ransome process, successful in England, has not proved so in America yet, though it cannot be said to have had a fair trial here.

We doubt, however, that it will ever compete with cheaper American processes, by which some excellent and cheap building stones are produced.

We have for the last two years availed ourselves of every opportunity afforded us to examine and test specimens of artificial stone, and have met with many kinds which have very little merit. Some however are really good stones, and as such must in our opinion come largely into use.

We notice in the *Art Review Advertiser*, a new journal published in Chicago, that a stone has been introduced there called the Frear Artificial Stone, which is described as fully equaling brown stone both in appearance and endurance. A very handsome residence has been erected on one of the fashionable avenues of that city of this stone, the sidewalk and fence being also of the same material.

The nature of the process is not detailed, in fact it is generally thought advisable by manufacturers of artificial stone to give as little publicity to their processes as possible, in order to prevent infringements.

We have latterly had our attention called to a kind of artificial stone—an advertisement of which will be found in another column—manufactured by Mr. Herman A. Gunther, of Eighty-sixth street, between Third and Fourth avenues, in this city, which we find to be a very excellent stone. In fact we have not met with anything which in our opinion is superior to it in solidity or beauty of surface. It chips with the chisel almost as hard as blue lime stone, and is almost as dense.

We have been shown specimens of this stone which have been laid into sidewalks, and made into a continuous surface of great strength and beauty. Our experiments with it lead us to believe that it will sustain a crushing weight of 150 tuns to the square foot, and the action of water hardens rather than softens it.

It has the great advantage that it may be laid up in continuous walls, leaving no cracks or crevices; a property which has given it considerable request for breweries, malt houses, linings for water tanks, and cellars into which water flows. It may also be molded while in the plastic state into any desired ornamental form, thus saving the expense of cutting. Any desirable shade of color may also be given it except, we believe, pure white.

The material sets very quickly and the stone can be made very cheaply. We believe the Frear stone and other kinds of artificial stone will find it somewhat difficult to give better results than those secured by Mr. Gunther, who is the assignee of the patent which covers the process. We have said thus much as a matter of simple justice to what we deem a meritorious invention, and would advise those interested to examine the stone in question, at the works above mentioned.

THE YACHT RACES.

Last year the American yacht *Sappho* was badly beaten in England by the British yacht *Cambria*. The owners then came to an agreement for additional races this year, the *Sappho* people being very confident that their boat was the fastest sailor, and attributing their defeat to breakage of spars. Three races have been arranged for the present year between the above yachts, the first of which took place on the 10th May, when the *Sappho* came off victorious, greatly to the delight of the Americans. The race was from Cowes, for a distance of 60 miles to windward, up the English Channel. The *Sappho* soon beat the *Cambria* out of sight, so the latter gave up the contest, admitted defeat, and returned to port without having sailed to the stake boat. Two races yet remain to be sailed—one "sixty miles dead to windward and back," and the other a triangular course of sixty miles, twenty miles on each bounding side of the equilateral triangle. The *N. Y. Herald* thus describes the rival vessels:

THE CAMBRIA.

The *Cambria*, schooner, 248 tuns, New York Yacht Club measurement, and probably the fleetest of the British yachts, was launched in May, 1868. She is a fine type of the deep and narrow English model, and in external appearance bears a resemblance to the stiffness and stability of a Cunard steamer. It can hardly be said that the *Cambria* is as graceful and charming in her *pose* upon the water as the majority of American schooners, and this is simply because the English are willing to sacrifice anything to secure the full embodiment of their ideas as to speed. Her dimensions are—

	Feet.
Length (from stempost to sternpost)	108
Beam	21
Depth of hold	11
Draft of water	12
Mainmast (hounds to deck)	61
Foremast	56·6
Main boom	61
Main gaff	33·9
Fore gaff	25
Bowsprit (outboard stem)	35
Maintopsail	35·6
Foretopsail	32·3
Maintopsail yard	32
Foretopsail yard	29

She is a keel schooner, substantially built of oak, with teak topsides. Her interior fittings are remarkably beautiful, rich, and in good taste, and the wainscoting is finished in polished oak. On the principle upon which she was built the *Cambria* is a most perfect triumph, and no one need doubt that she is the finest schooner in Great Britain. All of the delicate niceties employed by English yachtsmen in ballasting, sparring, and canvasing, have been tested by Mr. Ashbury, who, with a spirit which does credit to the most fascinating of all pastimes, has done much to develop yachting among his own countrymen to its present high status.

The *Cambria* has twenty-one tuns of ballast smelted and run into her timbers, and she has also four tuns of lead bolted to her keel. Under sail she spreads a vast area of canvas, and works in the wind with the ease and facility of a weather vane. It is by her qualities of being sharp and quick in stays, of being close to the wind, of making good time in light airs that yachtmen claim that she is one of the fastest schooners in the world. By the wind—that is, close-hauled—she has gaff-topsails bent to the ordinary spars; but in sailing free she has much longer and lighter and more flexible yards aloft, and the sail of lighter canvas, of course, clubs out a considerable distance. Her bowsprit is a very peculiar spar, and with the jibboom and flying jibboom is all in one stick and rigs in and out at the option of the sailing master. Of course it is ugly in appearance, but the nautical advantages claimed for it are many and doubtless well founded.

The *Cambria* has had a brilliant and eventful history. She has been the victor in many contests, and her bold and gallant owner and commander has sailed her in most all the seas that wash European shores, and has but recently returned from his cruise up the Mediterranean. She first won fame upon June 2, 1868, when she came in first, with the *Egeria* and *Fleur de Lis* as competitors; but in this contest she failed to win the prize because she had to give time allowance. She also figured with evidences of the finest qualities on the 17th of June, 1868; on the 30th of June, 1868; on the 6th of August, 1868; and on the 11th of August, 1868.

On the 26th of August, 1869, she beat the *Sappho*, her competitor yesterday, and in the same race, three fast English yachts—the *Aline*, *Oimara*, and *Condor*.

After these victories alterations were made in the *Cambria* to make her more sea-worthy. She was padded forward, her masts were bored, and the weight of her keel was diminished. Besides, on the occasions named, the *Cambria* has won golden laurels, especially upon beating to windward, in a trial of this quality with an English cutter (corresponding to our American sloop), in which she was again the victor. This is her *forte*. During the present season the *Cambria* has been given more ballast, her bulwarks have been raised forward and her scuppers have been much enlarged. She is now, according to the dispatches in her best trim, and she will have every American and English eye bearing upon her during the season of 1870.

THE SAPPHO.

All will remember the keel schooner *Sappho*, 274 tuns New York Yacht Club measurement, owned by that thorough yachtman Mr. William Douglas. She is one of the finest, ablest, and fastest of all American or English yachts. Her dimensions are:

	Feet.
Length of keel	113
Length on water line	123·3
Length on deck	125
Length over all	154·8
Beam	27
Depth of hold	11
Foremast	91·20
Mainmast	89·6
Maintopmast	54
Foretopmast	50
Main boom	76
Main gaff	40
Fore gaff	36
Head booms (outward)	30

The *Sappho* draws twelve feet of water aft and seven forward, carries a squaresail, a staysail, two gaff-topsails, and five lower sails, and has great buoyancy and stability by form, both of which comes from a good model and sixty-five tuns of ballast, stowed with fine judgment.

In her model, as can be seen from her comparative beam and hold, respectively 27 and 11 feet, she carries out the American idea of construction. Her bows are very long and fine and her lines forward are nearly straight. She has very little concavity. One peculiarity forward is her bowsprit, which is built in her, thus securing one-third more strength than by the usual plan, with one-third less weight. A very severe test of this improvement has shown it to be of great value, and as an experiment it is very successful.

Coming aft an examination of her lines reveals the excessive swell in her bilge lately increased by Mr. Douglas by "hipping"—that is, by planking on the original framework and augmenting her width below the water line. These alterations took place between the fore and main mast and certainly give the *Sappho* more buoyancy under the large cloud of canvas which she spreads in all weathers; but it is doubtful if she has gained in speed—at least this is the impression of her former owners. Perhaps it might be well to say she has little to gain in this particular.

From the fattest part of the bilge the schooner's sides hollow with considerable concavity, and terminate in a rocker keel, 36 inches deep. She has a very fine and light stern, peculiar to herself, and is quite hollow aft. Her stern is all dead wood and drags no water, leaving a narrow wake. She stands up well, is remarkably quick in stays, is well sparred, and nearly as strong as crystallized rock: built of oak, locust, and hackmatack; finished on the interior with a hard wood cabin, and in everp respect a graceful and elegant craft. She has few superiors or equals.

The amount of sail she spreads is incredible, and in light airs there is not a square inch of area within the limits of the stays through which the sky is visible.

Death of Franklin Peale.

Franklin Peale, Esq., whose decease occurred May 5th, in Philadelphia, was a highly esteemed citizen, and extensively known through the public positions he formerly held, and his connection with various scientific, musical, literary, and charitable societies. For a number of years past he has been President of the Pennsylvania Institution for the Blind. Mr. Peale was the son of Charles Wilson Peale, himself an eminent Philadelphian, and the founder of the widely known "Peale's Museum." He was an associate of his father in the organization, and subsequently was engaged in the mainten

ance and supervision of that extensive collection. In 1836 he was appointed Melter and Refiner in the United States Mint, and in 1839 was promoted to be Chief Coiner of that institution, succeeding the venerable Adam Eckfeldt. Mr. Peale served until 1855, and during his sixteen years of service exerted his skill in introducing the steam coining apparatus and the model steam engines which have always been so much admired by visitors to the Mint. He was also instrumental in bringing into use the French medal lathe, which, by subsequent improvements, has become of great use in executing the original dies for our national coinage. He traveled extensively in Europe, visiting the various government mints and private medal establishments, and made effective use of his information in the reorganization of the Mint, rendered necessary by the removal of the establishment from the dilapidated and confined quarters in Seventh, below Arch, to the handsome building in Chestnut street. His taste in the fine arts was also of great assistance in the change of the designs on the coin, which took place in the early part of his duties as Chief Coiner. Mr. Peale was also some time President of the Hazelton Coal Company. He was a prominent member and officer of the American Philosophical Society, the Horticultural Society, the Musical Fund, and various other scientific and social societies which have exercised beneficial influences in favor of the public. He died in his 75th year, greatly regretted.

Filing a Flat Surface.

The following practical and valuable remarks from the *Irish Builder*, will be of use to many of our amateur subscribers: "Filing consists in the paring off of very small shavings of metal by means of the numerous teeth of the file. It need scarcely be observed that the coarser the teeth the larger will be the shavings removed, and that with sufficient force the quicker will the work be accomplished; hence it is customary to use coarse files for the greater part of the work; but as coarse files make deep scratches, the work is finished with smooth files. The file is considered one of the most difficult tools to use with accuracy; this, perhaps, is owing to the want of a sufficient guide by which to regulate the direction of the file, the direction of the file depending altogether on the hand for a guidance. In filing a flat surface on a piece of iron, unless there is some skill or care used in the operation, the two exterior edges are apt to be greatly pared away, so that that part of the service about midway between them will be least worn down. It will be clear that the two edges are supported with the metal at only one side, whereas any other point on the surface between these two is supported with metal on both sides; then as the file is drawn backwards and forwards nearly its own length, it is apt to hang over these corners and to file them off. The work is held in a bench vice, in such a position that the file will run in a horizontal direction nearly level with the workman's elbow, but should the work be of a very light nature, it may be held in a more elevated position; or, if it be very heavy, it may be held a little lower. In filing flat surfaces, a 'surface-plate' is used to enable the operator to finish the work with accuracy. The surface plate is merely a cast-iron plate planed and carefully reduced to a true surface. Some red lead is rubbed on this plate before being used; then this piece of work is rubbed on the plate, and wherever the work is reddened it shows that that part of the work is above the level, and has to be filed down; and this process of testing and filing is carried on until the work is reduced to a perfectly true surface. It saves the file to draw it back at each stroke as lightly as possible. There is also economy in using the files first on brass or cast iron, and afterwards on wrought iron."

Machine for Treating Borings.

In all well-managed engineering workshops care is taken to keep the brass borings, filings, etc., as distinct as possible from those of iron or steel; but notwithstanding the precautions which can be practically taken, there are produced in all such establishments a large quantity of mixed borings, etc., which it is desirable should be subjected to some separating process. The ordinary mode of effecting this separation is to rake the mixed borings by hand with large magnets; these magnets of course attracting the iron and steel particles, and leaving the brass behind. This, however, is at best but a slow process, and where large quantities of boring, shavings, filings, etc., have to be operated upon it is not only expensive but also unhealthy for those employed in it. It was to obviate these inconveniences that M. Vavin, a French engineer, some months ago designed an ingeniously arranged machine, which has been in regular use at the works of MM. Cail and Co., of Paris, since June last, being constructed so as to effect the desired separation of the brass and iron borings, etc., without the aid of manual labor.

The machine is provided with a hopper, which receives the mixed borings, these latter falling from the hopper on to an oscillating spout, which has a vibrating movement given to it. By the aid of the spout the particles are delivered on to a drum, the circumference of which is formed of bands of soft iron, alternated with bands of copper. Each band of iron is in contact with a series of horseshoe magnets, these magnets being so arranged that each has one pole in contact with one of the iron bands and the other in contact with the next band.

The particles of iron falling on the drum, are attracted by the soft iron bands, and are carried round by the drum until they are removed by a revolving brush; this brush sweeping them off, and causing them to fall on an inclined plane, which conducts them to a proper receptacle. The brass particles, on the other hand, together with any iron particles which may have escaped the attraction of the bands of the first drum, fall off this latter on to a second drum, which is constructed in the same manner as the first, and which, like it, is furnished with a revolving brush. This drum completes the separation of the iron from the brass particles, the two kinds of borings, etc., being finally delivered into separate receptacles.

Preservation of Cast-Iron Water-Pipes.

In 1858 the cast-iron pipes carrying the Cochituate Water from Boston to South Boston were treated with a preparation from coal tar, known as Dr. Smith's process, and the result has been so favorable that it has been permanently adopted by the Cochituate Water Board, and by the managers of other water works throughout the country, where the material used for pipe is cast iron. The pipes laid in 1858 were taken up and examined after ten years' use and were found nearly free from rust or ocherous accretions. This coal pitch varnish is applied substantially according to Dr. Smith's process, which is described as follows in the specifications:

Every pipe and casting must be entirely free from dust, sand, or rust, when the varnish is applied.

The varnish or pitch is to be made from coal tar, distilled until all the naphtha is removed, the material deodorized, and the pitch reduced to about the consistency of wax or very thick molasses; pitch which becomes hard and brittle when cold will not answer for this use.

Pitch of the proper quality having been obtained, it must be heated in a suitable vessel, to a temperature of three hundred degrees Fahrenheit, and must be maintained at not less than that temperature during the dipping. As the material will deteriorate after a number of pipes have been dipped, fresh pitch must be frequently added, and at least eight per cent of heavy linseed oil must be added daily with the fresh pitch, and the vessel must be entirely emptied of the pitch and refilled with fresh material as often as may be necessary to insure the perfection of the process.

Each casting shall be kept immersed from thirty to forty-five minutes, or until it attains the temperature of three hundred degrees Fahrenheit, and, if required by the engineer, shall be heated to such temperature as he may designate before it is dipped.

After the bath is completed, the castings will be removed and placed in such a position to drip that the thickness of the varnish shall be uniform.

The coating on the pipes and castings must be tenacious when cold, and not brittle, nor disposed to scale off, and when it shall appear to the inspector that the coating has not been satisfactorily applied, the pipe or casting shall be thoroughly scraped, cleaned, and re-coated.

Meteorological.

Professor H. H. Hildebrandson, of the University of Upsal, in Sweden, has prepared four synoptical meteorological maps, which contain several features of scientific interest. It is generally known that a fall of the barometer is usually followed by an increase of heat, and *vice versa*. But in Sweden, from observations taken from Lapland to Upsal, the barometer and thermometer frequently show results quite contrary to the general experience of more southern latitudes; the barometer often falls considerably, while during the long winter nights of this region the thermometer generally remains stationary, and when storms are prevalent invariably falls along with the barometer.

Experience shows that in those regions an intimate relation exists, not only between the variations of the pressure of the atmosphere and those of the direction of the wind, but also between the movements of the barometer and thermometer during serious atmospheric perturbations. The dampness of the atmosphere being much greater in the southeast part of the territory visited by a violent storm than at the opposite extremity, it is easy to conceive that the atmospheres at those two points possess entirely different qualities, analogous, in some degree, to those of the equatorial and polar currents.

The Cow Tree.

"Among the many curious phenomena which presented themselves to me in the course of my travels," says Humboldt, "I confess there were few by which my imagination was so powerfully affected as by the cow-tree. On the parched side of a rock on the mountains of Venezuela grows a tree with dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower; its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts, provided with large bowls to receive the milk, which grows yellow and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock."

Tungstate of Soda.

Buckmaster's "Elements of Chemistry" says: "Every year considerable loss of life occurs from the inflammable nature of materials used for dress. Solutions of several salts have been proposed with a view of rendering fabrics non-inflammable. From numerous experiments, it appears that a solution of the tungstate of soda is greatly to preferred. A concentrated neutral solution of the salt is diluted with about one third of water, and then mixed with three per cent of phosphate of soda. This solution is found to keep well, and is used in the Royal laundries. The lightest muslin washed in this solution and dried, becomes non-inflammable."

Gutta-percha Vessels for Chemical Uses.

A contributor to the *Chemical News* says, "Erroneous views have been held and circulated concerning the durability of gutta-percha under the action of various reagents. We are ordinarily told that it is absolutely unacted upon by cold mineral acids, with the single exception of the sulphuric at 1·6 sp. gr. and upwards. This is far from being the case. There is, indeed, no immediate corrosion, or other rapid and striking change; but, in course of time, the surface becomes overspread with a thin buff-colored layer, which may be easily rubbed off. This change extends gradually deeper and deeper, till the whole mass loses its coherence and splits in various directions. I have before me a number of jugs which have been used for nitric, chlorhydric, and dilute sulphuric acids, as, also, for solutions of stannous, stannic, and ferric salts, and which, in less than three years' service, have become quite worthless; on being sent for repairs to a dealer in such articles, they were returned with the remark that they 'could not be mended, as they had been used for acids.' I find that the disintegration in question can be very much retarded, if the vessels are always rinsed in cold water immediately after being used."

Use of Borax in Glass Manufacture.

M. M. Maës & Clemendot, glass manufacturers at Clichy, produce a crystal as fine as the best Baccarat and St. Louis crystal by using boracic acid.

The presence of this flux allows a modification in the composition of the crystal, as the oxide of zinc can then be substituted for the oxide of lead; and soda, lime, or barytes can thus replace potassa.

The barosilicates of zinc and potassa, of potassa and barytes, of soda and zinc, manufactured by Maës & Clemendot, are remarkable for their limpidity and whiteness. The following are the proportions:

Silicious sand (white)	261	225
Minium	261	225
Potassa (1st quality)	60	52
Borax	18	4
Niter	18	3
Manganese	18	1
Arsenious acid	18	1
Refuse of former operations	18	89

USE OF CALCIUM LIGHTS AT THE ST. LOUIS BRIDGE.—Mr. W. Milnor Roberts, who is in charge of the work, says: "We have used calcium lights only for our open-air work in laying masonry on the top of our caissons—one light on one side, and one at the other, on diagonal corners: we found that they distributed the best light when thus placed. We had the oxygen gas forced into copper gas-holders with a pressure of about 200 lbs. to the square inch. These were carried over from the city to the piers on a little steamer, and the gas was conveyed to the burner through small lead pipe. At first our reflectors were of glass, but so many were broken that they were replaced by metal. A man remained with the two burners through the night, to regulate them occasionally, and to mend the pipes when a burst occurred. They usually burn from eleven to twelve hours; and, with the aid of some movable large reflector lamps, the masons worked as well at night as in the day. The cost of the calcium lights to our company was 3·75 dollars per hour each."

A COMING EXHIBITION.—During the past few months we have noticed in the daily papers vague allusions to an association organized for the purpose of establishing in this city, on a monstrous scale of dimensions, a permanent Exhibition of Industry and Art. It is said that the concern has not only been chartered by the Legislature, but that its capital, amounting to $7,000,000 or more, has all been paid in. At last accounts this huge affair was prospecting about for some land whereon to build its Tower of Babel. Can any one enlighten us about this mysterious affair? Who are the incorporators? and what are they intending to do? If an exhibition of that character is to be located in this city or vicinity, we should like to get at the facts.

MARINE COUCH.—We would call the attention of steamship companies to an illustrated description of Newell's marine couch, published in another column. Mr. Newell has patented his invention in Europe as well as in the United States, and is desirous of interesting capitalists in its introduction.

Inventions Patented in England by Americans.

(Compiled from the "Journal of the Commissioners of Patents.")

PROVISIONAL PROTECTION FOR SIX MONTHS.

988.—PREPARING ICELAND AND IRISH MOSS AS A FOOD.—W. J. Hand, Brooklyn, N. Y. March 31, 1870.

33.—WATCH CASES AND MACHINERY FOR MANUFACTURING THEM.—C. L. Thiery, Boston, Mass. January 4, 1870.

533.—MACHINERY FOR MAKING HORSESHOE NAILS.—Daniel Dodge, Keeseville, N. Y. February 23, 1870.

887.—MACHINERY FOR HEATING AND DELIVERING METAL BARS.—S. A. Darrach, Newburgh, N. Y. March 26, 1870.

889.—MACHINERY FOR GRINDING AND POLISHING SAWS, ETC.—W. J. Lippincott, Cincinnati, Ohio. March 26, 1870.

897.—ROTARY PRINTING MACHINES.—Jesse B. Brown, Nashville, Tenn. March 26, 1870.

907.—PUMPS FOR RAISING WATER AND SAND, MUD, OR OTHER DISINTEGRATED SUBSTANCES.—B. H. Jenks, Philadelphia, Pa. March 28, 1870.

960.—SEWING MACHINES.—Nathan Wheeler, New York city. April 1, 1870.

967.—CRUSHING AND GRINDING MILLS.—H. Jackson, Leeds, England, and Charles and John Ross, New York city. April 2, 1860.

973.—MACHINERY FOR MAKING HORSESHOE AND OTHER NAILS.—S. Schleisinger, Boston, Mass. April 2, 1870.

1,015.—INKSTAND.—C. H. Wight, Baltimore, Md. April 6, 1870.

1,016.—FRAME FOR STATIONARY, WITH THERMOMETER, ETC.—C. H. Wight, Baltimore, Md. April 6, 1870.

1,048.—LOOM.—G. Crompton, Worcester, Mass. April 9, 1870.

1,051.—WROUGHT IRON AND STEEL.—J. Henderson, New York city. April 9, 1870.

1,073.—RAILWAY BRAKE AND STARTER.—E. P. Jones, Shell Mound, Miss. April 12, 1870.

1,074.—WHIFFLETREES.—E. P. Jones, Shell Mound, Miss. April 12, 1870.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

J. B., Jr., of Ohio.—To test the purity of white lead ground in oil, take a small portion and wash it with spirits of turpentine, to remove the oil, and rinse thoroughly with alcohol. Pour on the sample thus prepared, dilute nitric acid. If a residue remains it is sufficient indication of sulphate of baryta. The weight of this substance when separated from the solution by filtering and drying, will, when compared with the weight of the sample, give the proportion of this very common adulteration, provided sulphate of lead be not present. The clear solution which has been filtered off, may next be tested for carbonate of lime (chalk or whiting), by evaporating to dryness, and treating with alcohol. This will dissolve the nitrate of lime into which the carbonate of lime has been changed by the first treatment with nitric acid. The loss of weight in the residue after treatment with the alcohol, filtering, and drying, will indicate the proportion of carbonate of lime present in lead, provided there is no oxide of zinc present, and the amount of carbonate of lime may be determined by multiplying this loss by 56, and dividing the product by 82; the quotient will be the weight of carbonate of lime present in the sample before treatment. A mixture of lead, carbonate and oxide of zinc, prepared cheaply from an ore found in North Carolina, has been latterly used to adulterate white lead; therefore, oxide of zinc may be present. To test for this salt, add to the alcoholic solution obtained in the first washing, sulphide of ammonium, which will throw down all the zinc as a sulphide, five sixths of which will be the amount of oxide of zinc present in the sample, which must be deducted in estimating the carbonate of lime. Sulphate of lead may be present; if so, it will remain undisturbed with the sulphate of baryta, upon the first treatment with nitric acid. It may be washed entirely out of the sulphate of baryta with pure water; the loss in weight ascertained after drying the sulphate of baryta, will then indicate the quantity of sulphate of lead present. In this case the whole of the residue at first left when the nitric acid is added, is not the sulphate of baryta, and the latter must be weighed after washing out the lead salt. Whiting is not, in our opinion, as good as lead for a priming coat. Zinc white has not the body of white lead, but it does not change in color on exposure. We recommend for outside work two coats of lead and a finishing coat of zinc.

C. E. W., of N. Y.—To find the supporting power of an air chamber immersed in water, divide the weight of the inclosed air by the number indicating its specific gravity, when water is taken as the standard unit. The quotient minus the weight of the air will be the amount it will support over and above its own weight. Divide also the weight of the chamber by the number expressing the specific gravity of the material of which it is made. If the quotient be less than the weight of the chamber, subtract the difference between the quotient and the weight from the supporting power of the air, over and above its own weight, as found above; but if the quotient be greater than the weight of the material, add the difference instead of subtracting it. Perform a similar operation for each of the chains, cords, or other appurtenances to which the weights are to be suspended, successively adding the results to or subtracting from the last sum or difference found, as above directed. The final result will be the supporting power of the entire apparatus, over and above its own weight. To find what weight of any submerged material heavier than water it will support, divide the supporting power of the apparatus above determined, by the number denoting the specific gravity of the material to be supported; subtract this quotient from the supporting power, and divide the latter by the difference thus obtained. Add the quotient to the supporting power of the apparatus This result will be the weight of the given material the apparatus will support. To find the same result when the fluid is other than pure water, make the fluid itself the unit of specific gravity, or what is the same thing, divide, before making the calculation, each specific gravity number, or coefficient in the ordinary water standard table, by the specific gravity coefficient of the fluid required, taken from the same table.

N. N., of Pa.—The use of the magnet to reduce the friction of journals was proposed many years ago by James Way, of England. He fixed the permanent magnet over the vertical axle in such a manner that the weight of the wheel was nearly balanced by the magnetic attraction. Experiment showed an economy of 50 per cent. A given weight would drive the wheel 30 seconds with the magnet applied, but only 20 seconds without the magnet. We once succeeded in revolving a wheel armature suspended from a magnet, a full hour and one half in vacuo, with no increment of force after the initial force, given to it by the fingers before the bell glass was placed over it on the plate of the air pump. The weight of the armature was adjusted so as to nearly overcome the force of the magnet, and reduce the pressure between the bearing points as nearly as possible to a minimum.

W. C. & Co., and others.—We do not know the exact address of Mr. Charles Hodgson, the inventor of the English Wire Rope Tramway, or "Sky Railway" System; but by addressing him to the care of the editor of *The Engineer*, 163 Strand, London, England, you will probably receive immediate attention.

C. R. T., of Ga.—The centrifugal force of the moon and other planets results from the original force with which they were projected into space. Whatever that may have been, science has not determined it. You may spend a good deal of leisure time in trying out the problem.

T. H., of Pa.—We know of no book which specially treats of the manufacture of small fire-arms. The chambers of revolvers are generally of steel, and the parts are fitted by very ingenious and accurate machinery, of which we cannot give you a good idea without diagrams.

A. J. Wood, of Pa.—We do not believe there is any tidal action which can affect the flow of water into your mine, nor do we believe that there is any difference in the flow during the night. If this is so, however, you can easily test it by experiment.

H. H. H., of Ind.—What is meant by working steam expansively is the cutting off the influx of steam to the cylinder before the end of the stroke, and allowing the force of expansion in the steam to complete the stroke.

S. & S., of Ohio.—A cupola may be used for large brass castings, but for small work a suitable furnace is preferable, and most ordinarily employed, the brass being melted in a black lead crucible.

A. D., of Iowa.—You will find the subject of the link motion fully discussed in Auchincloss' Link and Valve Motion, published by D. Van Nostrand, 23 Murray street, New York.

A. L. P., of Pa.—Your letter about the Vertical Multiplier, with many others of a similar character, has been handed over to Mr. Fithian. Specimen papers sent as directed.

P. C. H., of Ohio.—The Painter, Gilder, and Varnisher's Companion, published by Henry Carey Baird, 406 Walnut street, Philadelphia, contains the information you desire.

W. L., of N. Y.—Stove polishes are various forms of plumbago or black lead, either in a pulverulent state, or cemented into cakes by a weak size.

D. D., of Md.—The rouge, or colcothar, used for polishing purposes, is an oxide of iron.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Broughton's Oil Cups and Lubricators for shafting and machinery are the most reliable. Address H. Moore, 41 Center st., for circulars.

Wm. Harper Blays, Hancock, Md., wants Broom Machinery.

Wanted—A good second-hand milling machine. Index Miller preferred. Address P. & F. Corbin, New Britain, Conn.

Manufacturers of Wool-card Clothing please address, with prices, etc. F. E. Harrison Andersonville, S. C.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

A Valuable Patent for cutting files, and a machine in operation, for sale on reasonable terms, at C. F. Rost's, 22d st. and 2d avenue, New York.

John Dane, Jr., 61 and 63 Hamilton st., Newark, N. J., builds drop, power, screw, and foot presses, lathes, improved jewelers' rolls, watch & jewelers' machinery, new inventions perfected, and any work to order.

Sturtevant Pressure Blower, No. 6, for sale, nearly new. Fulton Foundery, 41 Morgan, near Greene st., Jersey City.

Rights for sale of a very valuable invention for curing smoky chimneys and bad drafts. Henry English, 109 West st., Wilmington, Del.

Galvanized iron ventilating skylights, straight and curved extension lights, conservatories, etc., under patents dated 1869-70, are approved by every architect. For Rights address Geo. Hayes, 75 8th ave., New York.

Crampton's Imperial Laundry Soap, washes in hard or salt water, removes paint, tar, and grease spots, and, containing a large per centage of vegetable oil, is agreeable as Castile soap for washing hands. "Grocers keep it." Office 84 Front st., New York.

To Manufacturers—A mowing and reaping Machine, with front and rear cut gearing, only one wheel matching into a spiral screw, a third less draft than any other machine. A new Rake and Reel. Also, shop rights or States for sale. Address N. A. Wood, New York.

Steel Makers' Materials—Wolfram ore, oxide manganese, Spiegel iron, borax, titanium, chrome, lubricating black lead, for sale be L. & J. W. Feuchtwanger, 55 Cedar st., New York.

Revolving Head-screw Machines, Gang Drills, Lathes, Tapping, milling, profiling, and other machines for sewing machine works, with latest improvements and excellent workmanship, constantly on hand or finishing, by the Pratt & Whitney Co., Hartford, Conn.

Pictures for the Household—Prang's "Four Seasons," after Jas. M. Hart. Sold in all Art Stores throughout the world.

For Sale by State or County—the improvement in Buckets, etc. as described in this paper of Sept. 11, 1869. Address John H. Tomlinson, 150 Madison st., Chicago, Ill.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the U. N. Co., 173 Broadway, New York.

Of Washing Machines, there is nothing to be compared with Doty's.—Weekly Tribune, Dec. 15, 1869.

An experienced mechanical and railway engineer wishes a position as Master of Machinery, or Manager. Address "Engineer," Station "G," Philadelphia, Pa., Postoffice.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Portable Pumping or Hoisting Machinery to Hire for Coffer Dams, Wells, Sewers, etc. Wm. D. Andrews & Bro., 414 Water st., N. Y

Keuffel & Esser, 71 Nassau st., N. Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Two 60-Horse Locomotive Boilers, used 5 mos., $1,300 each. The machinery of two 500-ton iron propellers, in good order, for sale by Wm. D. Andrews & Bro., 414 Water st., New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MOP WRINGER.—Charles Bradway, Maquoketa, Iowa.—This invention has for its object to furnish a simple and convenient mop wringer, which shall be so constructed that the mop may be easily and thoroughly wrung without its being necessary for the operator to put her hands into the dirty water to wring out the mop, and which at the same time may be made and sold for a trifling sum.

SELF-ADJUSTING WATCH KEYS.—J. S. Birch, New York city.—This invention has for its object to furnish a simple and convenient self-adjusting watch key which will adapt itself to the arbors of different watches, however much said arbors may vary in size, and which shall be so constructed that it may be manufactured and sold for less money than the self-adjusting watch keys heretofore made.

HAND CORN PLANTER.—Henry Hickman, Omaha, Neb.—This invention has for its object to furnish an improvd hand corn planter, which shall be simple in construction, and effective in operation, and which shall be adapted for planting in sod or in plowed land, as may be desired.

CULINARY BOILER.—J. S. Bunnell, Carbondale, Pa.—The object of this invention is to construct a culinary boiler in which one, two or more separate dishes may be cooked at the same time without mixing the flavor of the several articles. The invention consists in arranging within each one of a series of vessels which are set one upon the other, a perforated false bottom, and in connecting the pipe, which conducts the steam to the said vessels, with the lower part under the false bottom of each.

RAZOR STROPS.—W. D. Evans, Philadelphia, Pa.—This invention relates to a new and useful improvement in strops for sharpening razors, whereby the operation of giving a razor a good edge is much more speedily and perfectly performed than it has hitherto been, and it consists in the use of cork beneath the outer or leather coating of the strop.

ACID AND WATERPROOF COMPOSITION.—Henry W. Johns, New York city.—This invention has for its object to furnish an improved composition for coating and saturating canvas and other woven or felted fabrics for roofing and sheathing purposes, for lining boxes and barrels, etc., and for other uses, such as bags for guano, phosphates, and other fertilizers, and forming tarpaulins, sails, cordage, seines, etc., for coating the interior of boxes, barrels, and other articles liable to injury from acids, mold, or decomposition of vegetable and animal matter, and as a body for roof coatings, cements and preservative and marine paints, etc.

PADLOCK.—H. F. Haack, New York city.—This invention relates to a new manner of arranging and combining the bolt, tumbler, and bolt arrester in a padlock of that class which can be opened by pushing in a flat key.

CAR BRAKE.—Almerin H. Lighthall, Albany, N. Y.—This invention relates to improvements in car brakes, and consists in an improved arrangement of spring-actuated car brakes and means for tripping the springs by the act of pulling the bell-rope to signal for the stopping of the train.

BIRD TRAP.—S. M. Brooks, Memphis, Tenn.—This invention relates to improvements in traps for birds and small animals, and consists in the application to a small rectangular or other frame adapted for attachment to the ground readily, of a woven netting of any kind, and a swinging frame actuated by springs, and a setting and tripping device, so arranged that when set access is afforded to the birds or animals within the first-named frame, where they trip the swinging frame, which instantly carries the netting over them and becomes secured by a spring catch.

VEGETABLE CUTTER.—H. P. Lauer and H. G. Reichard, Pottsville, Pa.—This invention relates to improvements in vegetable cutters, and consists in an arrangement in a case resembling in form an inverted, truncated, hollow cone, of a vertical, hollow, cylindrical cutter carrier as large as the interior of the shell at the bottom, and having two or more wide vertical slots, in which are hinged vertical gages to regulate the thickness of the slices to be cut, by cutters attached to the walls of the slots opposite where the gages are hinged. The top of this cylinder is geared with a hand-crank for revolving it, and the vegetables are placed on the space between the shell and the cylinder; the cut pieces are forced to the interior of the cylinder and drop out below. The hinged gages are provided with adjusting apparatus for varying the openings, for cutting thicker or thinner slices, the said apparatus is manipulated by a thick screw at the top of the cylinder.

CUTTER RACK.—W. C. Gifford, Jamestown, N. Y.—This invention relates to improvements in means for opening and closing the stanchions of cutter-feeding racks for securing and releasing the cattle, and consists in connecting the movable stanchions with the adjacent fixed stanchions by one or more bars pivoted to each, so that in opening, the stanchion is also raised, the object of which is to utilize their weight to make them self-closing. The invention also consists in the combination with the connecting bars of arms arranged to hold the stanchions open by hooking on to pins or studs in such a manner that when the cattle reach between the stanchion and down to the food they will disconnect the hooked arms and let the stanchions close by the action of gravity; and it also consists in forming the said hooked arms with spring catches to lock the stanchions in the closed position.

BENCH PIN.—H. Gabelmann, Fort Scott, Kansas.—This invention relates to improvements in bench pins for joiners and cabinet makers' use to support the boards at the side of the bench for pointing the edges, and consists of blocks of wood or metal with diagonal grooves in the sides or edges adapted for engaging in slots in the side of the bench so as to project obliquely therefrom and hold the rear end of the board in the diagonal slot by the corners of the walls of the slots cramping against the side of the board, one end of which is held in the vise, or both ends may be held by these pins, the said pins are more especially intended for side boards which are too high to joint conveniently when supported on a pin in the common way at the lower edge.

SELF-PACKING BUSH.—Carl Miller, Sandoval, Ill.—This invention relates to a new and useful improvement in a self-packing bush for mill spindles.

FORMING EXTENSION TABLE SLIDES.—S. J. Moore and G. A. Buckman Ogdensburgh, N. Y.—This invention has for its object to improve the manner of forming extension tables slides so as to make them stronger and more durable than when constructed in the ordinary manner.

GRAIN BINDER.—W. D. Harrah, Ira M. Gifford, and Edward T. Johnston, Davenport, Iowa.—This invention has for its object to furnish an improved machine for forming grain into bundles, and binding it as it passes from the reaper, which shall be simple in construction, effective in operation, and convenient in use.

POKE.—A. E. Cruttenden, Canaseraga, N. Y.—This invention has for its object to furnish an improved poke for horses and cattle, which shall be so constructed as to more effectually prevent the animal from throwing down or getting over a fence, than the pokes constructed in the ordinary manner.

EARTH CLOSET.—George G. Baldwin, New Haven, Conn.—This invention relates to a new earth closet, which is so arranged that the person occupying it may readily apply the necessary quantity of earth, and that the pan, or receptacle, can be removed and replaced when desired.

FIRE-ARMS.—Charles Felix de Dartein and Jules Edouard de Dartein, Strasbourg, France.—This invention relates to an improvement in revolving fire-arms, and consists chiefly in a novel mode of actuating and stopping the revolving cylinder.

LANTERN.—Samuel Peters, Crescent, N. Y.—This invention has for its object to improve the construction of lanterns, so as to make them simple in construction, and at the same time convenient, and safe in use, enabling the upper, or globe part of the lantern to be detached from the lower, or lamp part, with one hand.

STOVES, RANGES, ETC.—Frederick G. Cochran, St. Louis, Mo.—This invention has for its object to improve the construction of stoves, furnaces heaters, ranges, etc., for burning coal, peat, or other gaseous or fuliginous fuel, in such a way that the gases and other combustible products of said fuel may all be consumed, instead of being carried off into the smoke flue, or chimney, as is the case with ordinary stoves.

WOODEN PAVEMENT.—Alexandre Trenaunay, Neuilly-Sur-Seine, near Paris, France.—This invention relates to the manufacture and application of mineralized wood blocks or slabs for paving purposes.

CARDING ENGINE.—Ferdinand Morf, Wetzikon, Switzerland.—The object of this invention is to enable the top flats or top cards to be stripped in any required succession, instead of stripping them in regular alternate succession

MANUFACTURE OF ARTIFICIAL FLOWERS AND FOLIAGE.—Octave Eugene Fillion, Paris, France.—This invention consists in making artificial flowers of a composition consisting of collodion, castor oil, and glycerin.

BALING PRESS.—Bryant F. Stroud, Marshall, Texas.—This invention has for its object to improve the construction of baling presses so as to make them simpler in construction and more convenient and effective in operation.

HEALING SALVE.—William Kramer, New York city.—This invention has for its object to furnish an improved healing salve for sores, wounds, cuts, and the various purposes for which a healing salve is applicable.

APPARATUS FOR CLEANSING AND PREPARING RAGS FOR THE MANUFACTURE OF PAPER.—William Edward Newton, London, England.—This invention has for its object to cleanse rags from the dirt and impurities which naturally adhere to them, before being operated upon and prepared for conversion into pulp for the manufacture of paper.

HARVESTER.—C. Lidren, La Fayette, Ind.—This invention relates to a new platform attachment to harvesters, which can be extended in the rear of the finger bar, to receive the cut grain, or constructed under the bar when not used, or to drop the grain. The grain is therefore deposited upon the platform, and can be raked off by hand, or may, by quickly contracting the platform, when a gavel is completed, be allowed to drop behind the finger bar.

U. S. Patent Office.

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Issued by the United States Patent Office.

FOR THE WEEK ENDING May 10, 1870.

Reported Officially for the Scientific American

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Patent Solicitors, No. 37 Park Row, New York

102,748.—ELECTRO DEPOSITION OF NICKEL.—Isaac Adams, Jr., Boston, Mass.

102,749.—VAPOR BURNER.—John W. Baker, Columbus, Ohio.

102,750.—EARTH-CHAMBER VESSELS.—G. G. Baldwin, Milford, Conn.

102,751.—STOVEPIPE ATTACHMENT.—O. B. Bartlett and G. E. Bartlett, Lewiston, Me.

102,752.—PRUNING AND HEDGE SHEARS.—E. K. Bigelow (assignor to himself and Peter Comstock), Litchfield Mich.

102,753.—ADJUSTABLE WATCH KEY.—J. S. Birch, New York city.

102,754.—CRIMPING ATTACHMENT TO PAPER MACHINE.—W. H. Bleasdale, Chagrin Falls, Ohio.

102,755.—BANDAGING AND BOXING CHEESE.—Joel Blood, Watertown, N. Y.

102,756.—COLLAR FOR ATTACHING COW BELLS.—T. H. Body, Kilbourn City, Wis.

102,757.—STEAM HEATING APPARATUS.—E. M. Bosley, Baltimore, Md.

102,758.—CHURN DASHER.—Francis Bosom (assignor to himself and W. A. Wright), Jonesville, Mich.

102,759.—MOP WRINGER.—Charles Bradway, Maquoketa, Iowa.

102,760.—BLEACHING, TANNING, AND COLORING SPONGES.—Frederick Braun and A. T. Schmidt, Pittsburgh, Pa.

102,761.—BIRD TRAP.—Silas M. Brooks, Memphis, Tenn.

102,762.—BUCK-BOARD SPRING.—Thomas H. Brown, Chicago, Ill.

102,763.—HOISTING APPARATUS.—William H. Brown, New York city.

102,764.—HULLING MACHINE.—G. A. Buchholz, Regent's Park, London, England.

102,765.—CULINARY BOILER.—Isaac S. Bunnell, Carbondale, Pa.

102,766.—PENCIL SHARPENER.—Hubert Burgess, Oakland, Cal.

102,767.—HEATING STOVE.—Micajah Currier Burleigh, Somersworth, N. H.

102,768.—ROTARY PUMP.—Richard Bush, Brooklyn, N. Y.

102,769.—SOFA BEDSTEAD.—James C. Butler, Albany, N. Y.

102,770.—WRENCH.—Benjamin F. Buxton, West Randolph, Vt.

102,771.—FALL LEAF TABLE.—Walter Caldwell, Bryan, Ohio.

102,772.—SPOOL OR BOBBIN.—Alexander Carmichel (assignor to himself, J. P. Stillman, Ames Stillman, Albert Stillman, and Thomas V. Stillman), Westerly, R. I.

102,773.—FAUCET.—Isaac Carey, Morristown, N. J.

102,774.—DISTILLING TURPENTINE.—David Cashwell, Wilmington, N. C.

102,775.—BAR FOR HORSESHOE BLANK.—Ebenezer Cate, Watertown, Mass.

102,776.—HARVESTER.—Charles Clapp (assignor to Erastus C. Gregg and Chauncey P. Gregg), Trumansburg, N. Y. Antedated Nov. 10, 1869.

102,777.—HEATING STOVE.—F. G. Cochran, St. Louis, Mo.

102,778.—POKE.—Alvan E. Cruttenden, Canaseraga, N. Y.

102,779.—FRICTION-ROLLER BEARING.—C. M. Daboll, New London, Conn.

102,780.—BOLT FOR SAFES, ETC.—G. L. Damon, Portland, Me.

102,781.—CHILL FOR CASTING TOOTHED GEAR.—R. T. Davis, Canton, Ohio.

102,782.—REVOLVING FIRE-ARM.—C. F. De Dartein and J. E. De Dartein, Strasbourg, France.

102,783.—GATE.—Benjamin F. Dickey, Marshall township, Mich.

102,784.—GAS GENERATOR.—Ellis Doty, Janesville, Wis., assignor for one half his right to Thor Judd.

102,785.—FIRE TONGS.—Samuel Douglass, Kalamazoo, Mich.

102,786.—METHOD OF MAKING TURNED SEWED SHOES.—William Duchemin, Boston, Mass, assignor to G. B. Bigelow, trustee.

102,787.—TENSION DEVICE FOR THREAD IN SEWING MACHINE.—G. L. Du Laney, Mechanicsburg, Pa.

102,788.—MEDICAL COMPOUND.—C. J. Eames, New York city.

102,789.—PLOW.—A. F. Eppes, Stony Creek, Va.

102,790.—RAZOR STROP.—William D. Evans, Philadelphia, Pa.

102,791.—WEIGHING-SCALE.—Thaddeus Fairbanks, St. Johnsbury, Vt.

102,792.—WASHING MACHINE.—John Farmer, Rockport, Ohio.

102,793.—BOLT FOR SAFES.—John Farrel, New York city.

102,794.—BRICK MACHINE.—Charles W. Ferguson, Jackson, Tenn.

102,795.—NEEDLE-SETTERS FOR SEWING MACHINES.—J. W. Field, Marysville, Ohio.

102,796.—MANUFACTURE OF STEEL.—William Fields, Wilmington, Del.

102,797.—MANUFACTURE OF IRON.—Wm. Fields, Wilmington, Del.

102,798.—MANUFACTURE OF ARTIFICIAL FLOWERS.—O. E. Fillion, Paris, France.

102,799.—DUCK-CALL.—Elam Fisher, Detroit, Mich.

102,800.—TAG FASTENER.—Henry Fisher (assignor to himself and W. B. Williams), Canton, Ohio.

102,801.—GANG PLOW.—P. H. Flansburgh, Haywards, Cal.

102,802.—BENCH PIN.—Henry Gabelmann, Fort Scott, Kansas.

102,803.—COMB CLEANER.—Charles Edward Gibbs, Boston, Mass.

102,804.—STANCHION FOR CATTLE.—W. C. Gifford, Jamestown, N. Y.

102,805.—DEVICE FOR HANGING PICTURE FRAMES, ETC.—J. N. Gillispie, Waltham, Mass.

102,806.—REFINING AND AGEING LIQUORS.—S. H. Gilman, Galveston, Texas.

102,807.—MATCH BOX.—John H. Goodfellow and Martin Russell, Jr., Troy, N. Y.

102,808.—FEEDING MECHANISM FOR SEWING MACHINES.—James E. Gowen, Stoneham, assignor to himself and C. H. Wetherell, Boston, Mass.

102,809.—BUREAU.—G. S. Graf, Pittsburgh, Pa.

102,810.—PADLOCK.—H. F. Haack, New York city.

102,811.—POTATO DIGGER.—John Hall, Jr., and Owen Flanigan, Temperanceville, Pa. Antedated December 20, 1869.

102,812.—POTATO DIGGER.—John Hall, Jr., Temperanceville, Pa

102,813.—AGITATOR WHEEL FOR POTATO DIGGER.—John Hall, Jr., Temperanceville, Pa.

101,814.—POTATO DIGGER.—John Hall, Jr., Temperanceville Pa.

102,815.—GRAIN BINDER.—W. D. Harrah, Ira M. Gifford, and E. T. Johnston, Davenport, Iowa.

102,816.—ROLLING MACHINE.—J. B. Hastings, Ironton, Ohio, and G. Hastings, Jr., Wheeling, W. Va.

102,817.—ADJUSTABLE SHUTTER HOLDER.—C. N. Herr, Lampeter Pa.

102,818.—HAND CORN PLANTER.—Henry Hickman, Omaha Nebraska.

102,819.—APPARATUS FOR DISTILLING HYDROCARBON OILS.—S. A. Hill and C. F. Thumm, Oil City, assignors to themselves and O. P Scaife, Pittsburgh, Pa.

102,820.—COMBINED LATCH AND LOCK.—Friedrich Hoppe, Stuttgart, Germany, assignor to Theodor Hahn. Antedated April 28, 1870.

102,821.—CUE-CUTTING MACHINE.—Joseph Huber (assignor to himself and Solomon Brunswick, St. Louis, Mo.

102,822.—CHURCH ORGAN.—Wm. Jackson (assignor to himself and H. C. Wilkins), Albany, N. Y.

102,823.—LIFE PRESERVER.—Lyman Jacobs, Albion, Mich.

102,824.—ACID AND WATER-PROOF COMPOSITION FOR COATING CLOTH, ETC.—H. W. Johns, New York city.

102,825.—SUBSOIL ATTACHMENT FOR PLOWS.—Ross Johnson, Lawrence, Kansas.

102,826.—DRAWER FOR FURNITURE.—G. F. Joyce, Boston, Mass.

102,827.—SASH SUPPORTER.—G. F. Joyce, Boston, Mass.

102,828.—MATCH SAFE.—A. D. Judd, New Haven, Conn.

102,829.—BORING BIT.—Daniel Kelley, Muskegon, Mich.

102,830.—MOSQUITO BAR.—Simon Kemper, Berger, Mo.

102,831.—CLOTHES DRYER.—Hiland H. Kendrick, Fulton N. Y.

102,832.—APPARATUS FOR OBTAINING TANNING EXTRACTS.—Simon H. Kennedy (assignor to himself and F. G. Macomber), New York city.

102,833.—MANUFACTURE OF MEDICATED MALT LIQUORS.—H. H. Kessler, Detroit, Mich.

102,834.—FENCE.—Edward Kirk, Sharon, Pa.

102,835.—HARVESTER.—Jacob Kline, Mechanicsburg, assignor to himself and George Winters, Harrisburg, Pa.

102,836.—HEALING PLASTER.—William Kramer, New York city.

102,837.—VEGETABLE CUTTER.—H. P. Lauer and H. C. Reichard, Pottsville, Pa.

102,838.—BRIDLE BIT.—William P. Letchworth, Buffalo, N. Y.

102,839.—PLATFORM FOR HARVESTERS.—Christopher Lidren (assignor to himself and R. Jackson), La Fayette, Ind.

102,840.—RAILWAY CAR BRAKE.—Almerin H. Lighthall, Albany, N. Y.

102,841.—CULTIVATOR.—Truman Mabbett, Sr., Vineland, N.J.

102,842.—PLANING MACHINE.—George H. Mansfield, Concord, N. H.

102,843.—TRACE BUCKLE.—T. C. Martin and J. Offineer (assignors to T. C. Martin, John Taylor, and Daniel Geiselman), Perrysville Ohio.

102,844.—TWEER OF BLAST FURNACE.—T. W. McCune, Pittsburgh, Pa.

102,845.—LADDER.—W. H. McHench, Cobleskill, N. Y.

102,846.—PAVEMENT.—Abram B. McKeon, Rutherford Park, N. J.

102,847.—HEAD BLOCK FOR SAW MILLS.—Cornelius Meiners Indianapolis, Ind.

102,848.—SELF-PACKING BUSH FOR SPINDLES.—Carl Miller Sandoval, Ill.

102,849.—APPARATUS FOR CORRUGATING METAL.—Jas. Montgomery, New York city.

102,850.—TOOL FOR MAKING SLIDES FOR EXTENSION TABLES.—S. J. Moore and G. A. Buckman, Ogdensburg, N. Y.

102,851.—MECHANISM FOR STRIPPING THE TOP FLATS OF CARDING MACHINES.—Ferdinand Morf, Wetzikon, Switzerland.

102,852.—TRUSS.—Peter Mueller, Middle Lancaster, Pa.

102,853.—WHEEL FOR VEHICLE.—Ira F. Munson, Washington, D. C.

102,854.—APPARATUS FOR CLEANING AND PREPARING RAGS FOR MANUFACTURE OF PAPER.—W. E. Newton, London, England.

102,855.—FUNNEL.—P. H. Niles, Boston, Mass.

102,856.—ELECTRO MAGNET.—H. M. Paine, Newark, N. J., assignor to himself and M. S. Frost, New York city.

102,857.—SELF-DISCHARGING PULVERIZING BARREL.—A. B. Paul, San Francisco, Cal.

102,858.—LANTERN.—Samuel Peters, Crescent, N. Y.

102,859.—FARM GATE.—Howard Piper, Haskins, Ohio.

102,860.—PLOW.—S. W. Pope, Louisville, Ky.

102,861.—SPOKE FOR WAGON WHEELS.—Robert Potts and Nathaniel Ogden, Chatham, N. Y.

102,862.—BRICK MOLD AND BOTTOM BOARD.—A. T. Putnam, Detroit, Mich.

102,863.—WHIP.—A. C. Rand, Westfield, Mass.

102,864.—ALARM TILL.—Eden Reed (assignor to himself and L. L. Warren), St. Louis, Mo.

102,865.—SCRUBBING BRUSH AND MOP WRINGER.—Edwin Rees (assignor to himself and Lewis Stull), Stoddartsville, Pa.

102,866.—HEATING DRUM.—Jesse Reynolds, Philadelphia, Pa.

102,867.—CONNECTION OF SPRINGS FOR BED BOTTOMS, SEATS, ETC.—Chas. Rich, Poughkeepsie, N. Y.

102,868.—BLEACHING STRAW GOODS.—A. M. Rosbrugh, Panora, Iowa.

102,869.—PRESERVING AND HARDENING STONE, BRICK, ETC.—E. J. Salisbury (assignor to himself and George A. Brush), San Francisco, Cal.

102,870.—APPARATUS FOR SAVING GOLD.—Chas. Schofield Kernville, Cal.

102,871.—RIVETING HAMMER.—H. A. Seymour and W. H. Nettleton, Bristol, Conn.

102,872.—WINDOW SCREEN.—George Shatswell, Waukegan, Ill.

102,873.—FASTENING FOR RAILROAD RAILS.—George Shatswell (assignor to himself and E. M. Haines), Waukegan, Ill.

102,874.—STALL FOR FEEDING ANIMALS.—S. H. Shaw, Attica, N. Y.

102,875.—FLAX PULLER.—Jas. Smith, Troy, N. Y.

102,876.—AXLE NUT.—E. A. Stanley (assignor to himself and O. A. Palmer), Brewer, Me.

102,877.—COVER FOR CHAMBER VESSEL.—Wm. Stockton, New York city.

102,878.—BATHING APPARATUS.—William Tell Street, Frankfort, Pa.

102,879.—BAILING PRESS.—B. F. Stroud, Marshall, Texas.

102,880.—STOVE GRATE.—Levi Stuck, Bryan, Ohio.

102,881.—FILTER.—Taylor P. Thompson (assignor to himself and L. R. Bradbury), Charlestown, Mass.

102,882.—LEVELING AND GRADING INSTRUMENT.—H. E. Towle, New York city.

102,883.—LIQUOR METER.—S. C. Treat, Tabor, Iowa, assignor to himself and C. P. Treat, Oberlin, Ohio.

102,884.—WOODEN-BLOCK PAVEMENT.—Alexandre Trenaunay, Neuilly-sur-Seine, near Paris, France.

102,885.—IMPLEMENT FOR MEASURING BOARDS.—Melzer Tuells, Penn Yann, N. Y.

102,886.—APPARATUS FOR ASSORTING POTATOES, ETC.—J. F Unglish, Webster, N. Y.

102,887.—METALLIC CHURN DASHER.—Orrin Updike, Grass Lake, Mich.

102,888.—PEGGING JACK.—Charles Varney, East Brookfield Mass.

102,889.—HAMES BUCKLE.—David Vogt, Trenton, Mich.

102,890.—HARVESTER DROPPER.—Aaron Ward (assignor to himself and Jesse Hiatt), Dublin, Ind.

102,891.—HOE.—Edward Warren, Ceresco, Mich.

102,892.—LAMP CHIMNEY.—S. W. Warren, Boston, Mass., assignor to himself and G. B. Parrott.

102,893.—MACHINE FOR VARNISHING PENCILS, ETC.—Albin Warth, Stapleton, and Philipp Hufeland, and Geo. Braun, New York city assignors to Eberhard Faber, New York city.

102,894.—MOLD FOR MAKING RUBBER PENCIL TIPS.—Wm Welcker, Blackstone, Mass.

102,895.—LANTERN.—Wm. Westlake, Chicago, Ill.

102,896.—LANTERN.—Wm. Westlake, Chicago, Ill.

102,897.—LAMP BURNER.—H. J. White, Boston, Mass.

102,898.—MACHINE BAND.—Samuel J. Whitton, Coleraine, Mass.
102,899.—SPRING CLAMP FOR GLASS BLOWERS.—T. Wightman, Pittsburgh, Pa.
102,900.—BLIND, SCREEN, AND SHUTTER.—B. J. Williams, Philadelphia, Pa.
102,901.—CRUTCH.—P. R. Wimer, Trenton, N. J.
102,902.—WIRE AND STONE FENCE COMBINED.—H. C. Wire, Wilmington, Ohio.
102,903.—BRICK MACHINE.—Robert Wolff, New York city, assignor to himself and Bernard Silverman, Brooklyn, N. Y.
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102,905.—BUGGY GEARING.—John B. Augur, Poughkeepsie, N. Y. Antedated Jan. 13, 1870.
102,906.—MANUFACTURE OF SOAP.—H. M. Baker, Washington, D. C.
102,907.—MACHINE FOR CUTTING, STAMPING, AND PACKING SOAP.—Lurandus Beach and Lurandus L. Beach, Jr., Lawrence, Mass.
102,908.—RAILWAY CAR WHEEL.—C. K. Bradford, Lynnfield, Mass. Antedated April 29, 1870.
102,909.—WATER WHEEL.—Truman Bristol Cheshire, assignor to himself and Charles Monson, New Haven, Conn.
102,910.—FERTILIZER DISTRIBUTER, CORN AND COTTON-SEED PLANTER.—R. M. Brooks, Woodbury, Ga.
102,911.—COMPOSITION FOR VARNISH, ETC.—Henry Browning, No. 77 Salmon Lane, Limehouse, England. Patented in England, June 1, 1869.
102,912.—MANUFACTURE OF IRON AND STEEL.—J. P. Budd, Ystalyfera, near Swansea, Wales. Patented in England, March 8, 1869.
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REISSUES.

3,963.—RAILWAY AXLE BOX.—J. B. Fletcher, St. Albans, Vt., assignee of C. B. Boynton).—Patent No. 70,793 dated November 12, 1867.
3,964.—MANUFACTURE OF INKSTAND.—T. S. Hudson, East Cambridge, Mass.—Patent No. 94,113, dated August 24, 1869.
3,965.—BASE BURNING STOVE.—Geo. G. Hunt, Quincy, Ill.—Patent No. 38,828, dated June 9, 1863.
3,966.—DEVICE FOR FLANGING FLUE-HOLE OF BOILER HEADS.—Edward Regan, Indianapolis, Ind.—Patent No. 99,707, dated February 8, 1870.
3,967.—GRATE FOR FURNACES.—E. S. Renwick, Millburn, N. J.—Patent No. 81,109, dated August 18, 1868.
3,968.—STOVE FOR BURNING STUMPS.—Henderson Willard, Grand Rapids, Mich.—Patent No. 98,801, dated February 15, 1870; antecated January 29, 1870.

DESIGNS.

4,011.—TRADE MARK.—Robert W. Bell, Buffalo, N. Y.
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4,013.—FIRE TONGS.—Sylvester S. Green, Henrietta, N. Y.
4,014.—CALENDAR.—Hans C. Heistad, Brooklyn, N. Y.
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4,016.—DRAWER PULL.—Albert D. Judd, New Haven, Conn.
4,017.—HAND STAMP.—Albert L. Munson, New Haven, Conn.
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4,021.—LAMP FOUNT.—Henry Whitney, East Cambridge, Mass.
4,022.—CANDLESTICK.—Henry Whitney, East Cambridge, Mass.

EXTENSIONS.

PRINTING TELEGRAPH.—H. N. Baker, Binghamton, N. Y.—Letters Patent No. 14,759, dated April 29, 1856; reissue No. 3,812, dated January 25, 1870.
CONSTRUCTION OF ARTIFICIAL LEGS.—William Selpho, New York city.—Letters Patent No. 14,836, dated May 6, 1856.

NEW BOOKS AND PUBLICATIONS.

HAND-BOOK OF THE STEAM ENGINE.—Containg all the Rules Required for the Right Construction of Engines of every Class. With the Easy Arithmetical Solution of those Rules, constituting a Key to the Catechism of the Steam Engine. Illustrated by Sixty-seven Wood-cuts and Numerous Tables and Examples. By John Bourne, C.E., author of "A Treatise on the Steam Engine," "A Treatise on the Screw Propeller," "A Catechism of the Steam Engine." New Edition. Philadelphia: J. B. Lippincott & Co. London: Longman & Co.

This edition of a well-known popular and standard work contains little that is new, yet it is none the less valuable on that account. The reasons why there could not be many additions are so well set forth in the author's instructive preface that we copy a portion as the best notice we can give of the book. Mr. Bourne says: "In this third edition of the present work, I have merely corrected some typographical and arithmetical errors, which had escaped detection in the earlier issues, and the existence of some of which has been brought to my knowledge by correspondents. Since the appearance of the first edition, there have been no improvements in the steam engine of any importance; and in the Paris Exhibition of 1867, the machinery department of which I carefully inspected, I found that although much strained and fantastic ingenuity was displayed in many of the engines exhibited, there was in point of fact nothing to be seen that could be accounted a solid and permanent improvement. For many years past, indeed, I have ceased to expect the realization of substantial improvement in the steam engine; and what I now looked forward to is its early supersession by less cumbrous and costly motors. With this conviction I have undertaken a new quarto work on 'Steam, Air, and Gas Engines,' which treats of all kinds of motive power engines, and which, reviewing all the reasonable expedients which have been proposed for obtaining motive power, discusses their comparative merits, specifies what expedients have been again and again published or long ago patented, so that they are now public property open to the adoption of any one, and points out in what direction improvement must advance to attain results superior to any that have yet been realized. To carry improvement forward, two things are necessary; 1st. That there shall be a clear conception of what it is desirable to effect; and 2d. That there shall be an accurate knowledge of what expedients are available for carrying such improvement out without being hindered at every step by the wide and ambiguous claims of pretended patentees, who in most cases have in reality invented nothing that was not notorious and obsolete long before they appeared upon the field."

COSMOLOGY. By George M'Ilvaine Ramsay, M.D. Published by William White & Co., Boston.

We do not like to be unjust, nor to censure without cause. We cannot, however, commend this work. The author has altogether too much poetry in his composition for a philosopher. That he has taken a rather large contract upon his hands the reader can judge from the following extract from on page 15: "Oh, man, buckle on thy whole mental armor, and strive to get thee back upon the *chimes* of time, to a period anterior to the sun's existence, to the sun's formation; to a period when there was no light, and there in deep, deep darkness and solitude, let thy non-created mind contemplate the yet uncreated, visible universe. Perchance thou mayst feel the first tiny glow of heat; or see the first flicker of light by the powers of which two primordial atoms of matter were ousted from their eternity of rest and were made to unite in one, *and thus creation was begun*." These last italics are our own. It will be seen that when the author "gets his whole mental armor buckled on," he hopes to know, and presumably that his readers having read his book, will know all about it—*it* meaning creation, not the book. This journey "back upon the chimes of time to behold the first two primordial atoms of matter OUSTED" would, doubtless, be a very pleasant trip, and perhaps profitable, but the author will excuse us for a little timidity as to the undertaking. If he could only manage to get his readers fairly mounted "upon the chimes of time" before they were fully aware of what he was going to do with them, the excursion might not be in reality so formidable as this very poetic programme makes it appear. In short, to be serious, the author's style is too grandiloquent for the gravity and character of the subject with which he deals. The book may have merit, but we fear that others will share the prejudices which such passages as the one quoted inevitably awaken.

NATHAN READ: His Invention of the Multi-Tubular Boiler, and Portable High-Pressure Engine, and Discovery of the True Mode of Applying Steam Power to Navigation and Railways. A Contribution to the Early History of the Steamboat and Locomotive Engine. By his Friend and Nephew, David Read. New York: Hurd & Houghton. Cambridge: Riverside Press.

There is little doubt that many entitled to a large share of the credit due to those who have been instrumental in the development of the application of steam to the propulsion of machinery, culminating in the steam railway, and the majestic ocean steamer of modern times, have not received their dues in this respect, and that others have been overpaid by a grateful posterity. The simple love of justice will therefore impel the candid reader to examine the present work with attention. The author has, in our opinion, made a rather strong case in favor of his uncle's claims to a share of grateful remembrance, and has, moreover, given many interesting and important particulars relating to the inventions of others. The book is a small octavo, printed and bound in a very neat and tasty style. It will be found decidedly interesting, both in the matters of fact it contains and the style in which they are presented. We publish, in another column, a biographical sketch of Mr. Nathan Read, extracted from the work.

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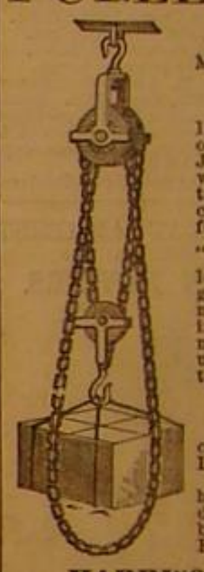
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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXII.—No. 22. [NEW SERIES.]

NEW YORK MAY 28, 1870.

$3 per Annum [IN ADVANCE.]

Improved Tobacco Press.

Our engraving illustrates a new and improved tobacco press for packing tobacco in casks, which is extremely simple and powerful, and has in it, we believe, all the elements of a successful invention.

It is easily taken to pieces and can be packed in a very small space. It has nothing complicated about it, and requires no mechanical skill to work it and keep it in order.

The simplicity of the invention and the skill of our artist leave little for us to do in the way of description, and the device can hardly fail to be comprehended at once by the most unmechanical reader.

A triangular frame, shown in Fig. 2, is placed under the bottom of the cask as indicated. The inventor does not, however, limit himself to this form of frame, any other suitable form being covered by his patent. From the angles of this arise links, A, which connect the bottom frame with a spider, B, at the top, the links being held in place when in use by screws, as shown.

The large screw works in a nut held in its place by a set screw, C, so that it will not drop when the screw is run up. The nut abuts against an internal shoulder formed in the hub of the spider, so no strain is exerted upon the set screw.

The operation of pressing tobacco in hogsheads is delineated in Fig. 1, which explains itself. When it is desired to transport the press from place to place, or to apply it to another cask, it may be taken down in a very short time, and put up again when wanted, without any trouble.

It is certainly the most simple and the cheapest form of press for this purpose we have met with, and we think it will become a popular implement on tobacco estates.

For further information address W. S. Ford, Evansville, Ind. Patent pending through the office of the Scientific American Patent Agency.

Fig. 1



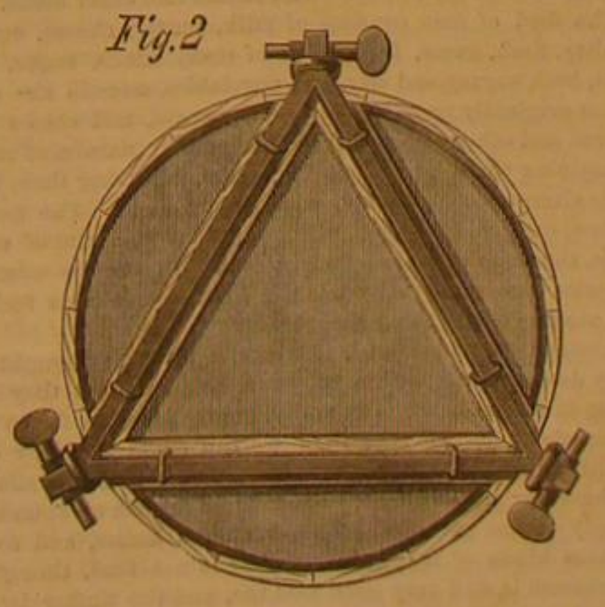
FORD'S IMPROVED PLANTATION TOBACCO PRESS.

White Brass.

According to *Engineering* this metal is the invention of Mr. P. M. Parsons, and is manufactured by him at the Thames Foundery, East Greenwich. Although somewhat similar in appearance to some of the alloys known as white metal, it nevertheless differs from them most materially in other respects, inasmuch as it is harder, stronger, and sonorous. It is in fact, as its name indicates, a species of brass, and behaves in a similar manner to that metal under the tool when bored or turned. It does not clog the file and is susceptible of a very high polish, at the same time its fusing point is lower than that of ordinary brass, and it can be melted in an iron ladle over an ordinary fire. These special features render the metal valuable for fitting up machinery where first cost has to be kept down, as it can be run in place for bearings, or bushes, thus avoiding the expense of fitting or boring. It can also be cast in metal molds, or even in sand and loam like ordinary gun-metal. Although this new metal is not very generally known, we find it to have been in use for some years past in various engine works and on several of our leading railways, where it has proved itself particularly suitable for the bearings of engines and carriages and the wearing parts of machinery generally. Having indicated some points of resemblance existing between white brass and ordinary brass, let us now turn to the points of difference which are very marked. Compared with gun-metal or ordinary brass, white brass is the cheapest, whilst at the same time its durability is greatly in excess of either of those metals. This latter point has been established by a series of carefully conducted experiments on the Great Northern Railway made with carriages running in the express train between London and Edinburgh, the axles being fitted with ordinary brass bearings at one end, and white brass bearings at the other. These experiments were instituted by Mr. Sturrock, and they form the subject of a report from that gentleman, and which is now before us.

According to this report, which is dated the 20th May, 1862, it appears that two white brass bearings, fitted under a brake van, lost only two ounces in weight in running 19,400 miles. Two ordinary brass bearings fitted under the other end of the same van, and which traveled the same distance, lost 2 lb. 4 oz. In another case a third-class carriage was fitted up in a similar manner, and ran 20,000 miles. Here the white metal bearings lost only 2½ oz., whilst the ordinary brass bearings lost 1 lb. 6 oz. In another third-class carriage similarly fitted, the diminution in the white metal bearings was 2½ oz., whilst in the ordinary brass bearings it was 1 lb. 12 oz. in running 20,000 miles. The bearings ran perfectly cool, and were lubricated with oil. In July, 1864, four white brass bearings were taken from a brake van which had run 64,712 miles. Mr. Sturrock reports that the bearings were still in very good order, and but little worn. After this important testimony to the value of this metal, little more, we think, can be added than that it has proved itself equally successful in bearings for general purposes. We cannot find that such a thing as a hot axle has ever been heard of where it has been used as a bearing; in fact, it seems to possess the peculiar property of lubricating itself to a certain extent when the oil or grease fails. This much is certain, that when it was adopted on the Great Northern Railway, the stoppage of the long express train from London to Edinburgh from hot axles entirely ceased, although stoppages from this cause had previously been of constant occurrence. It would seem to us that the knowledge of such facts as we have here before us, is all that is required to render the use of white brass general.

Fig. 2



The "Fluidity" of Solids.

In an editorial upon this subject *Engineering* says:

"There have been probably no investigations carried out during the past few years which possess a higher scientific interest than the admirable series of experiments which have been conducted by M. Tresca, on what he has aptly termed the 'flow of solids.' The subject is one which has been frequently noticed in our pages, and in our number for June 7, 1867, we published the valuable paper by M. Tresca, read before the Institution of Mechanical Engineers, during their meeting at Paris that year. This paper, with which many of our readers are no doubt familiar, contained a full account of the results which M. Tresca had obtained up to that date, and of the deductions which were to be drawn from them; but since then M. Tresca has devoted further attention to the subject, and it is of the results of his more recent investigations that we now desire to speak.

"M. Tresca's earlier experiments had shown that when a solid body, such as a metal, was subjected to the action of a compressing force more than sufficient to overcome its elasticity it behaved more or less like a fluid, an actual 'flow' of the particles taking place. The pressure necessary to produce this flow has been named by M. Tresca the 'pressure of fluidity,' and one of the objects of his later researches has been to determine this pressure in certain cases. Moreover, it is clear that when a solid is subjected to pressure, the action of that pressure is most intense at the point where it is directly applied, and becomes less and less intense as that point is receded from; and hence it may be assumed that there is, in fact, a limit beyond which, practically, no action whatever takes place. The area comprised within the limit just mentioned has been named by M. Tresca the 'zone of activity,' and another object of his more recent investigations has been to ascertain the limit of this zone in certain instances.

"It necessarily follows from the assumption that the 'zone of activity' has, practically, definite limits, that the resistance which any given punch will experience in being forced through a given metal is also limited, and that there is, in fact, a certain maximum beyond which the resistance cannot rise, however great the thickness of the metal to be traversed may be. Let us suppose, for instance, a punch to rest upon a plate having a thickness which is very considerable in proportion to the area of the punch, and let us suppose the pressure on the latter to be gradually and steadily increased.

Under these circumstances a 'zone of activity' of gradually increasing size will be formed beneath the punch, this increase going on until the intensity of pressure on the latter is equal to the 'pressure of fluidity' of the particular solid which is being experimented upon. As soon as this point is reached the resistance to the motion of the punch will, according to the theory we are now enunciating, cease to increase, and the latter will descend steadily, the metal flowing laterally from beneath it. This, of course, will only continue to be the case so long as the 'zone of activity' is contained wholly within the thickness of the plate. As soon as the punch has descended so far that the 'zone of activity' touches the under surface of the plate, the latter commences to bulge, and, there being a free outlet below, the lateral flow of the metal ceases, and the shearing action commences.

"That the action above described does really take place under the circumstances we have supposed, has been proved by M. Tresca's later experiments, and we cannot but regard the fact as one of very high scientific interest. We hope in a future number to give a detailed account of M. Tresca's more recent researches, and of the deductions he has drawn from them; for the present, however, we must merely remark that the values of the 'pressure of fluidity' of any material furnished by various experiments, have been found to remain sensibly constant, and that they approximate closely to the number representing the resistance to shearing."

CLEANING MARBLE.—It is said that marble may be cleaned by mixing up a quantity of the strongest soap lye with quicklime, to the consistence of milk, and laying it on the marble for twenty-four hours. Clean it afterwards with soap and water. Or else use the following: Take two parts of common soda, one part of pumice-stone, and one part of powdered chalk; sift through a very fine sieve, and mix with water. Then rub it well all over the marble, and the stains will be removed. Then wash with soap and water as before, and it will be as clean as it was at first.

THE NATURE AND FOOD OF MAN.

BY W. BRIDGES ADAMS.

All the objects, animate or inanimate, in this world of ours, whatever the processes they have gone through, or may go through, would seem to culminate in their utility to man for his various purposes, physical and mental. We are accustomed to call these processes art, as distinguished from nature; but, in truth, the work in the alembic of man's brain, whereby the forms of matter are changed and altered, is as much a process of nature as a volcano or an earthquake, a boiling spring, or a rock, or metal deposit, or the growth of a tree. Man can originate nothing; he can only exercise volition over existing processes coeval with creation. He may choose one or more seeds out of a heap, and plant or destroy one or all of them, but he cannot create a single seed. Modify them he may, by various processes, but they must all be processes of nature, whether coming through his brain or not. He is not even an imitator; he is simply the user, as he may be the abuser. He is one of the agents employed by nature, with freedom of choice to select his own work, but, nevertheless, working according to fixed laws only, yet with so enormous a space and variety that his brain, unable to take in the whole scope of the objects he works on, frequently becomes confused, and he imagines that he has created when he has only uncovered something. We do not know the laws whereby minerals are compelled to aggregate, or crystals to form. We can hardly imagine volition or a sense of enjoyment in the process; and as little do we know of the principle of life in plants or animals. All we know is, that they aggregate and gather matter together in various modes, and that with decay the matter disperses again to assume new forms, productive, and destructive, and re-productive following each other in a constant, if not unvarying round. To man only is it given to control and vary these processes according to the perceptions of his brain, the promptings of the nature within. The wants of a man in a savage state, the one necessity of his existence in a warm climate, is simply food, and this nature provided for him in the spontaneous growth of vegetables and fruits of many kinds. The next want as he traveled northward or southward from the equator was warmth, and this had to be provided for by fire first, next by clothing, and next by shelter. Nature gave him trees for his firing, so soon as he discovered how to obtain fire wherewith to burn them. The skins of beasts formed "robes of durance," and rock caverns gave roofs for shelter, needing little repair. Oil and sugar-bearing plants and fruits were not native to the cold regions, but nature provided animals, fish, flesh, and fowl, and man grew to be a hunter, and a neat-herd, and a shepherd, and built dwellings of timber and of stone, and took the wool of the sheep, instead of the skin of the wild beast, wherewith to spin and weave his garments.

And thus food, fuel, clothing, and shelter, marked the dawn of his growing civilization, appropriating nature's gifts to his especial uses, as a property securing him against want. And then he grew to be luxurious, saving his own physical labor in locomotion by appropriating the labor of the lower animals, bringing the higher nature of his brain to dominate their lower natures, taming the ass and the horse, and subjugating the bull and the elephant; the strongest brains also subjugating their fellow-men—fellows, but not equals, creatures of gradation. And out of his brain sprang the wheel and axle—a germ of planetary movement—and he came to ride in carriages drawn by many kinds of beasts, and clothed in purple and fine linen, and faring sumptuously every day. And he made boats and ships, and went down to the sea and over the sea, and all out of the timber which nature had prepared for him before his birth. And he imagined in that seething natural brain of his how to use the running streams and moving winds of nature, to harness them to his water and wind mills, and grind his corn, and do his other drudgery for him. And he grew ambitious, and tyrannous, like lions, and tigers, and bulls, and stags; and he made his fellow-men into fighters like wolves in a pack, and planned new varieties of weapons very different from that wherewith Cain slew Abel, to slay other men, by wholesale and more rapid processes. But other men profited by and imitated his doings, and learned to resist tyranny, and at length it was discovered that wealth, the object of all men, as insuring abundance and safety against want could be better, and more easily, and more abundantly procured by the processes of commerce than of war. Direct slavery was abandoned as fast as it was found to be unprofitable, but indirect slavery—the pressure of poverty forcing men into repugnant drudgery—continued, and still exists in many places.

Civilization cannot exist in its highest condition without a population thick upon the ground, with its stimulus of competition and rivalry, and many wants; but if this population be merely used to supply physical power, it will be no better than the slaves of old. Nature is the great power-source in the supply of heat, and whether the heat be elicited by the consumption of food in the human body, or by the sun producing wind or evaporating water, or by the burning of fuel, it is the same power. But using the human body as a mere drudge degrades man to a condition analogous to that of the lower animals, and it is impossible in such a condition to attain the highest degree of general civilization. Man must, therefore, resort to fuel, but if that fuel were to be the same as it was in the beginning—timber—it would all rapidly disappear, and the earth be denuded and deteriorated. For this, too, nature has provided. In her coal cellars underground, stocked before man's birth, physical power is provided in enormous masses, and the *manu*factory disappears in the machine processes worked by coal power. Man may fill the earth with useful things without drudgery or degradation, and the fruits remain as things of use and of beauty, gratifying his higher and constantly awakening tastes. Through all the centuries of growth man has been constantly seeking to assimilate more and more the productions of nature to his special uses. He made the crab into an apple, the sloe into a plum, and almost every variety of vegetable is changed in its form, sometimes till it becomes diseased and all but disappears, and the wild stock is resorted to, to restore the race. The grape, and the potato, and the hop alike suffer, as well as the apple orchard. All this is simply disease engendered by empiricism analogous to the diseases that attack man himself. Time was that a Smithfield Cattle Club gave prizes for and bred up food animals to an unhealthy degree of inedible fat till they were past walking or healthy exercise, and it is only of late years that the object sought has been the best quality of food. Turnips get over-guanoed in the desire for rapidity of production, and get a flavor of their origin, as do dunghill fowls and pigs that feed upon carrion, as in the pampas of Buenos Ayres, where they taste as of train oil, and the fowls fed on beef have the flavor of beef, and not of fowls.

In thickly peopled communities, food, especially the choice kinds of food, are constantly increasing in price, the reason being that there is a constantly increasing demand, and it is sought to supplement the supply by imitations, and thus there is a general outcry against adulterations. The adulteration is, of course, by a cheaper commodity, and if it is a very good imitation it affords a larger profit. People generally have a superstitious idea as regards food produced, as they term it, naturally, in opposition to what they term artificially, and will pay a large price for a natural production, in preference to a small price for an artificial one, even though the artificial one be the best. What is food? Any substance capable of being chemically assimilated by the body, without anything in it detrimental to health, is perfect food, whether we get it directly from nature or through the secondary nature of man's brain. It is possible that original nature may be the best chemist, but it is also certain that occasionally her chemistry is very erratic. Take for example the article of fresh butter, which has grown to be almost a myth. Nothing can be more delicate than its flavor in the best condition, but it may happen to be made from a cow out of health, and it is not good. Butter is fat, and with what is called a butyric acid flavor, coming through the udder. But if a chemist take the fat of a cow, or any similar fat from other sources, and flavor it with artificial butyric acid, identical with the natural, the fat being so chemically treated as to free it from all extraneous matters, it is possible that better butter might be produced than that coming from the cow direct, and quite as natural. All that we have to complain of is, when an artificial article is produced of worse quality than the original. And if whale or porpoise oil, or herring oil, or palm oil, could be chemically converted to the analogue of the cow's fat, called butter, there is no reason why they should not become human food; nor is it yet quite certain that coal may not ultimately become a source of food. If alcohol can be produced from it, why not many other analogous substances, as sugar and starch.

There is a prevalent idea that life can only be sustained by organic matter that has once been living, but if we trace the fact downwards from man to the lower organizations we shall find that though man feeds on mutton which is made from sheep, and the sheep from turnips, and the turnips from guano, all organic, there are many plants that assimilate gases and inorganic minerals directly, and even man himself, when he takes minerals in the form of medicine, or in salt as a condiment, assimilates inorganic matter. Animals killed for food in a condition of physical weariness have no flavor and do not satisfy hunger, and "animal spirits" may be taken as a synonym for flavor. But if after eating this flavorless food subacid sweetmeats be taken, a chemical action is set up, and assimilation begins. The flavor of wild animals and game, that yield such relishing food, is, probably, due to the fact that they live in pure air, and are killed in a state of physical vigor, in addition to the healthy chemical vegetation on which they are fed—wild thyme and other herbs.

The food of man consists of milk, butter, cheese, eggs, poultry, flesh, game, fish, grain of many kinds, sugar, oil, fruit, both sugary and oily, and vegetables, some in the condition originally provided by simple nature, and others improved and otherwise varied by the complex nature of man. Examining these by chemical analyses, resolving them into their alternate constituents, what do we find? The gases, carbon, oxygen, hydrogen, nitrogen, and a modicum of minerals, the same that are found in coal. In the far west of America men occasionally use the grain of maize as fuel in the absence of anything cheaper.

Abstractedly considered, it is not a pleasant thought to bury dead animals within our own bodies, albeit they are gases at second hand. Generally, nature provides for us the materials of food cheaper than we can make them by our modifications, but they are not always specially available without our modifications. Forest trees furnish an abundant supply of the gases constituting animal bodies, and so do various kinds of fungi; but timber is not food, though a mushroom is, and very good food too, and the timber is, no doubt, convertible into mushrooms by chemical cultivation.

Wine, which "gladdens the heart of man," was originally the juice of the grape, but it grew to be the juice of many other fruits, and grains. The "low wines" of the distiller come from every vegetable substance convertible into sugar, and the Tartars contrive to obtain alcohol from animal juices, the milk of mares. Champagne wine is a manufacture occasionally from the juice of the grape, but very largely from many other juices. Chemists have proved that flavors and perfumes are convertible conditions of the same substances, and there seems no reason why the exhilarating and stimulating drinks consumed by man may not be wholly the production of man's secondary nature which we call art. There is no apparent reason why as perfect wine, as to flavor, and body, and healthy stimulus, should not be made by the chemist as by the grape grown in the vineyard.

The supply of fish as food seems to be abundant, if we only take pains to catch them, and possibly the time may come when we shall have fish farms, as we have cattle farms, tame fish instead of wild ones, but the supply of flesh in thickly peopled countries is far from abundant. Even grain and leguminous seeds are deficient till brought from countries where men are sparse. How to increase the quantity of food on a given area of land is a very important problem in human progress to a condition of higher civilization. Vegetable food we can preserve and accumulate, as Joseph did in Egypt. Animal food is more difficult to deal with.

There is much yet to do with the improvement of our vegetables to make them equally stimulating and nourishing with flesh. If carrots, turnips, and potatoes could be grown with the nitrogenous property and flavor of the mushroom, it would be an enormous advance in aliment. And if human art could convert the organic matter of coal, containing the elements of albumen, fibrin, and casein, into food, it would be a still greater advance. There seems to be no reason why cheese should not be made from peas, and beans, and lentils, flavored by the chemist, who gives us perfumes, and dyes, and oil from coal. There is no apparent reason why the coal should not yield us a food analogous to fresh butter, and we need not despair of obtaining milk quite as good as that of the cow in the best condition and pasture, direct from oily and albuminous vegetation, with a butyric flavor given by the chemist.

Nor have we yet done all that is possible in the growth of plants. We dig coals, and distil them into gas to light us, and with the refuse alone we make manure. We have not yet essayed the process of burning the coal in close chambers and passing the whole products of combustion underground, at a safe distance below the roots of the plants, giving them heat to stimulate their power of absorbing the gaseous nutriment. Our analysis has been extensive, but we are lamentably behind in our synthesis. We decompose, but with the knowledge thus gained we do not set inventors to work to compose with a will for useful purposes. Our gardeners try experiments here to produce curious varieties of flowers, to convert roses to all sorts of colors, not always of the most pleasing kind, and set up as a chief object of ambition the still unattainable black rose. And they make hideous dahlias, which can be excelled to outward appearance in wax-work. We can imagine that the time will come when "the sweat of the brain" within men's brows will be the true reading of the "sweat of the brow," and the production of all things useful to man will cease to be a painful drudgery, becoming only a healthy excitement, like the sports of hunting, rowing, or sailing, and athletic games. With all useful things in abundance, that poverty which consists in the privations of the sources of physical health will cease, and the great source of crime will disappear. If the supply of wants were merely from spontaneous production, men might be only a sort of wild savages, like those of the Pacific Islands—some of them, at their discovery—or like the inhabitants of the Landes, who were said to live on milk and chestnuts, without exertion of the body or brain labor. What is desirable is, that men should be enforced to labor, but not to excessive labor, only the labor essential to health, and to their several capacities, and that the means of healthy maintenance should exist for all. From the beginning men have been born with varying faculties, some quoted and signed by nature as rulers, not necessarily despots making slaves of their fellows, but with the capacities for devising law and order beneficial to general humanity. Such men are few in number, and probably we should find that in all ages of the world the percentage has been in about the same proportion, governed by some general laws that determine growth of all kinds under simple natural conditions.

Covetousness, avarice, greediness, and similar passions, are on the large scale the growth of habitual poverty, involving the possibility of starvation, and man, in proportion to the exercise of the reasoning faculties with which he has been endowed by nature, can prevent this poverty. He can, as his perception grows, store up the food of several years in one, and bid gnawing care avaunt! He can apply himself more and more to works of construction, and less and less to those of destruction, induced by the competition of two men having to divide at each meal the rations of one between them. They cannot form a "happy family" under such conditions. With these conditions removed, and replaced by better conditions, we may not attain the millennium, but we may, at least, obtain a distant view of it.

Universal Standard of Measurement.

According to the *Memorial Diplomatique*, the Austrian Government has just signified its assent to a proposal of the French Government for an International Commission to assemble in Paris in order to agree upon a common standard of measurement for all civilized nations. Already fifteen European powers have announced their willingness to take part in the Commission. Even England, which hitherto has been disinclined to depart from old customs, will be represented by the Directors of the Observatories of Greenwich and Oxford. The French Government now only awaits replies from the United States, Brazil, and the South American Republics previously to calling together the Commission. The Minister of Foreign Affairs would, of right, be the honorary president, but the proceedings will really be directed by the vice-president, General Morin, Director of the Conservatoire des Arts et Métiers, in whose archives is deposited the official standard of the meter recognized in France.

Survey of Routes for the Darien Canal.

A correspondent of the New York *Times* writes to that paper the following particulars of the progress made by the exploring expedition sent to examine routes for the proposed Darien Canal. He says:

"At about 10 A.M., April 17, a telegram was received at the camp on the Morti river from headquarters, announcing that Commander Selfridge had concluded to abandon the Morti river route, which was a great surprise to all. The party who went on a reconnoissance to the Chaquanaqua had returned, and all were in good spirits, although somewhat fatigued and shoeless, having worn out all their shoes on the tramp. They had fully accomplished the object of the expedition, having determined the exact position of the mouths of the Navigandi, Asuati, and Sucubti rivers, and learned one important fact from the Indians that no other explorers have touched on, and that is that the River Chuquanaqua does not extend beyond the mouth of the Sucubti; the river running north-east from the mouth of the Sucubti is called the Ana, and uniting with the Sucubti forms the Chuquanaqua. They found a great number of Indians and Indian villages on their route, the Indians all extremely friendly.

"The party followed Strain's old trail for a considerable distance down the Sucubti. After the announcement that Commander Selfridge had concluded to abandon the Morti route, he ordered both vessels to get ready for sea. This announcement took every one by surprise. Still, it was welcomed, as all were getting tired of Caledonia Bay, and desired a change. Monday and Tuesday (18th and 19th) were spent in getting everything ready for sea. The telegraph was taken down (a distance of nine miles) and carried to the beach, together with the insulators, and by 6 P.M., Tuesday evening, everything belonging to the telegraph and surveying parties were snugly stored on board the *Guard*, and the evening spent in discussing this sudden change in the base of operations. Wednesday morning the steam launch was hoisted on board, and at 1 P.M. the *Nipsic* steamed out of Caledonia Bay with the *Guard* in tow, bound for San Blas. The Indians lined the banks and waved us a friendly adieu. Thus the 'Grand Expedition' passed away from the Isthmus of Darien.

"The *Nipsic*, after towing the *Guard* about two miles outside of Caledonia, dropped her and put off for San Blas, where she arrived Thursday evening before dark. The *Guard* arrived early Friday morning. Great numbers of Indians were found, who are extremely friendly. The donkeys and machette-men were then landed near the mouth of the Mandingo river, at the point where the survey will start from. The machette-men at once commenced building houses for themselves and one for the telegraph office. Early Saturday morning the survey commenced, Mr. H. G. Ogden, Assistant United States Coast Survey, in charge; the entire party, however, being in command of Lieut. Hubbard, of the *Nipsic*, with Ensign Jasper as sketcher. This party only made a half mile, but they did not press very hard, as the object was only to break ground and make a show. Monday morning, April 25, the work commenced in earnest. The surveying party, still under command of Lieut. Hubbard, who now has charge of the compass, Mr. Ogden being too unwell to go out. Ensign Jasper, sketcher. Working party (except the machette-men), all from the *Nipsic*. Mr. Merinden, in charge of the level, follows close on the heels of the surveyors. Then come the telegraphers. Up to to-night the survey has reached two miles and a half in the interior. The country here is much lower than about Caledonia Bay, and very swampy, having a feverish look and smell. The men are all disgusted with it, in fact they are afraid of it. There are some ten on the sick-list on board the *Guard* now, and nearly the same number on board the *Nipsic*, and it will surprise me very much if they are able to stay at San Blas two weeks. However, the officers and men are all good pluck, and if human endurance will count for anything against a manifestly unhealty climate, they will not leave there before the 1st of June. Still, the men all feel that they have been in the climate long enough, and would gladly get out of it at once. Commander Selfridge desires to reach the mountains on this line, or do something to prove the necessity of another survey at San Blas. The Bay of San Blas is very beautiful. It is about six miles wide by seven long, and magnificently land-locked by numerous beautiful islands. The Indians inhabit the islands; none of them live on the mainland, which is sufficient proof of the unhealthiness of the mainland. The work of surveying the bay is in the hands of Capt. Sull, of the *Guard*, who commenced operations early Monday morning. Capt. Sull is assisted by Mr. Sullivan, of the Coast Survey, and Ensign Hawly, of the *Guard*.

THE PROSPECTS.

"It rained steadily at San Blas for two days, and when the *Nipsic* left on the 29th ult. there was no prospects of clearing; heavy thunder, and sharp lightning accompanied the rain. It was expected that an entire new party would start from the *Guard* for the front, three miles inland, on the 30th, and it is feared the surveyors will not be able to go through the country, which is much overflowed. The Mandingo river had risen six feet up to 3 P. M. on the 29th, leaving a rise of five feet more before it would be possible to establish a camp on its banks. Should the rain continue twelve hours longer it would be impossible to proceed. Commander Selfridge is determined to cross to the Pacific, even if it occupies a month or two longer. The *Nipsic* will coal here to-morrow, and return immediately to San Blas. The United States steamer *Nyack* is at Darien Harbor, Gulf of San Miguel, and had proceeded up the Savanna river as far as possible. Reports say that the Indians on the Pacific slope are arming to resist Commander Selfridge's passage. The harbor of Darien, on the Pacific, is said to be magnificent and capable of accommodating any quantity of shipping. The country is perfectly healthy.

PERSONAL OBSERVATIONS.

"I traveled in company with several of the officers of the expedition across from Aspinwall to Panama on the 2d inst., and all united in saying that they had seen no finer river than the Chagres; and as regards the country through which it flows, they considered it far superior to any they had seen at Caledonia or San Blas for the construction of a canal. This corroborates the statements that I have made from the first, and I am satisfied that the great Interoceanic Canal must be constructed along the line of the Panama Railroad. Commander Selfridge has already established one fact, and that is, the impracticability of constructing a canal at Caledonia Bay."

Have Plants Intelligence?

If the oyster fastened on the rock can feel, why not the rose or the convolvulus, or the great oak tree that is fast rooted in the ground? Of the glow of the sunshine, or the freshness of the rain and the air, are they not pleased recipients? Who can tell? Or who shall deny, and give good reason for his incredulity? Who, however learned he may be, can decide where animal life ends, and where vegetable life begins? What, for instance, is a sponge? And if, as Linnæus says, plants have no feeling, what makes the mimosa, or sensitive plant shrink so timidly from the slightest touch, and apparently with such pain or terror from a ruder blow? Whether I am scientifically and philosophically right or wrong, I take pleasure in believing that the possession of life in however infinitesimal a degree, presupposes in its possessor, whether animal or vegetable, a faculty of sensation that administers to its happiness, and that may consequently administer to its suffering. For, pleasure and pain are twins, and the one is not attainable without liability to the other. The idea is not new to poetry, though not accepted by science. It blooms and sparkles in the graceful mythology of Rome; as all who remember the Dryads and Hamadryads; the loves of Apollo for Laura, Daphne and Acantha; or who at school or college have pored over the metaphors of Ovid, will readily admit. The Oriental poets of India and Persia delighted to animate the flowers and trees, and, according to Hafiz, the rose appreciates the tender melodies of her lover, the nightingale. Greek superstition endowed the Atropa Mandragora with all the sensations of an animal, and believed that it shrieked with pain when its roots were wrested from the ground.

Science may laugh at all such notions, but science, though a very great and learned lady, does not yet know everything. Her elder sister, poetry, often sees further and deeper into things than she does. Did not Shakespeare, in the "Tempest," foreshadow the possibility of the electric telegraph more than two hundred years before Wheatstone? Did not Dr. Erasmus Darwin, long in advance of James Watt and Robert Stephenson, predict the steamship and the locomotive? Did not Coleridge, in the "Ancient Mariner," explain the *modus operandi* of the then unsuspected atmospheric railway?

Don't Closely Cover your Water Cisterns.

Dr. Ballard, the Medical Officer of Health for Islington, England, says: "A severe outbreak of typhoid (enteric) fever occurred in the school belonging to the Holborn Union on the rise of Highgate Hill. As I receive no sickness returns from that establishment, I knew nothing of it until twenty-six cases had been received into the London Fever Hospital. The first death from typhoid fever was recorded in the mortuary schedule which reached me on 31st March, that is to say, five weeks after the first recognized case of typhoid had occurred in the house. I mention this because it is a striking illustration of the necessity of weekly returns of public sickness being forwarded to sanitary authorities, as well as returns of deaths. I am morally certain that the disease might have been prevented from spreading as it did in the school had I been in a position to interfere at its first onset. The first recognized case occurred in a boy who was sent to the Fever Hospital on February 24th; afterwards the fever attacked both boys and girls. On visiting the house on March 31st, I found that the children were in the habit of drinking from a closely covered cistern, the waste-pipe of which, untrapped, entered directly into the drain which conducted the overflow of a cesspool communicating with the boys' closet. Both the boys' and the girls' closets, in separate parts of the premises, are defective in construction. Up to the close of the month of March, 31 cases, including a nurse and a washerwoman, had been sent to the hospital. I directed the waste-pipes of the cisterns to be at once disconnected from the drains, and the cisterns themselves to be cleansed and disinfected, and that carbolic acid should be thrown daily into each drain inlet on the premises, and used for flushing the closets, and that the night-stools in the infirmary and dormitories should be charged with the same disinfectant. Up to the date of this report only three fresh cases have been sent to the hospital, and one of these patients was ailing at the time of my first visit. Five cases of typhoid fever with two deaths in a house in the Barnsbury-road have been traced to a similar cause. Householders are scarcely even now aware of the danger to which they are exposed from the stupid but common practice of covering the water cistern and then carrying a waste pipe from the vacant space directly into the house drain, by which this space becomes virtually a receptacle for the foul gases generated in the latter and for any poisonous matter which they convey. The inmates of houses where this arrangement exists are at the mercy of an accident which may happen any day."

Spring Dangers.

Thousands of families are every year bereaved of the light and joy of the household, in the person of the little first-born especially, before the young mother has had experience to guide her in the preservation of the health and lives of children, but it is an easily avoided bereavement. Croup, diphtheria, and putrid sore throat have their fruitful cause in allowing little children to become chilled in the harsh, raw, penetrating damp atmosphere of sunset in spring-time. Out-door air is certainly beneficial, but not always so. Children under twelve years of age ought to be studiously kept within doors after half an hour before sun-down until the first week in May at least. There is a chilliness in the air about sun-down in spring which often makes even grown persons in good health uncomfortable in mind and body, penetrating and chilling the whole frame, and much more pernicious will it be to the tender constitutions of childhood.

In the afternoon of balmy spring days children engage in their plays and pastimes out of doors with great energy, the novelty of it inducing them to exercise beyond their strength, and as sun-down approaches, it finds them overheated, weary in body, and with a mind robbed of all its exhilaration; in this condition, the only safety is in bringing them into a warm room the very moment they cease their exercise, for if allowed to stand or sit, or loiter about in the cool of the evening, when more or less of a chill wind is always stirring, it requires but a very few minutes of such exposure to chill the whole body, which, falling on the throat or lungs, may prove fatal in any twenty-four hours.

Another fruitful source of these fatal diseases in children is in allowing them to get their feet wet in stormy, thawy, or muddy weather; hence, the moment a child comes in-doors from play in spring time, the feet should be examined by drawing off shoes and stockings, so as to be able to see and feel if attention is needed.

A third cause of death by the above-named diseases in spring time is over haste in removing winter clothing; the thickest flannel of mid-winter should be worn by all without any change to a thinner material, until the middle of May. This applies to old and young, and it is safest not to wear thinner outer clothing, because any given degree of temperature in spring is really colder by 15 or 20 degrees than in the fall, because the atmosphere is saturated with dampness which carries the heat from the body with great rapidity; besides this, the changes in spring are more sudden and violent than in autumn. There should be a bright, cheerful fire kept burning every day in the family room of every household until the middle of May north of thirty degrees north latitude. This one precaution alone would save multitudes of lives every year.—*Hall's Health Tracts.*

A Railroad in Greece.

The United States Consul at the Piræus, Greece, is writing to the *College Courant* a series of letters about Athens. Among the passages which sound oddly to the classical student, from the sharp contrast they present between the ancient and modern city, is the description of a trip by rail from Athens to the harbor. The road is only six miles long, and, though nowise extraordinary, it is a source of never-ceasing wonder to the natives. When it was first opened the Archbishop was present, and consecrated the locomotive and each car by sprinkling them with holy water. Still the average Greek cannot quite reconcile himself to it as anything in the ordinary course of nature, and when he takes passage he does not cease to cross himself until the motion has become familiar. Every day large crowds of countrymen flock to the depot, and gather on a bridge near by, to watch the train arrive and depart. Could some of their ancestors, who hewed the stone with which the track is laid, revisit their work, or look down upon it from the Acropolis, with what unutterable amazement would they contemplate the approach of a screaming locomotive, without even the poor protective of holy water! Accustomed as they were to the apparitions of gods, demigods, and monsters, this would be a spectacle for which even their mythology could furnish no parallel, and would dumbfound the wise as well as the ignorant. Think of Socrates soliloquizing over a steam engine, Diogenes with his tub dead-heading it to the Piræus, or haggling about a seven cent ticket, or Euripides working up a railroad catastrophe into one of his polished tragedies, or the courtly Xenophon taking topographical notes for his *Anabasis* from the window of a Pullman sleeping car! These unsophisticated old Greeks whom we imagine we understand fully, lived in an entirely different world, with which we can have but little sympathy. Shall some future generation say the same of us?

Oxygen Light.

M. Tessie du Motay has succeeded in obtaining a beautiful oxyhydric light by means of oxygen gas and supercarburreted hydrogen, doing entirely away with the lime, magnesia, or zircon pencils, which were the greatest objection to the universal application and public adoption of this new light. The great recommendation of this light is its brilliancy and cheapness. The cost, as we are told, is only two centimes per burner for five hours, or at the rate of three cents per week, for five hours each of the seven nights. In using this new method, M. Tessie du Motay has also avoided the high pressure formerly used, in order to obtain the brilliancy desired, and the two gases now arrive at the burner at a pressure of about one inch of water column.

The manufacture of oxygen by the manganate has also enabled M. Tessie du Motay to fulfill large contracts with alcohol bleachers and distillers in Paris and London, who are using the manganates to bleach and deodorize their spirits, to obtain the colorless and odorless Cologne spirits.

Machine for Upsetting Tires, Shafts, etc.

Our readers are so familiar with the old method of upsetting tires, that we need not dwell upon the particulars of the operation.

We herewith present an ingenious and simple machine which so greatly facilitates the process of upsetting, not only tires, but straight, angular, or round bars, shafts, axletrees, etc., that it is claimed a boy of twelve years may operate it, so as to upset tires without assistance.

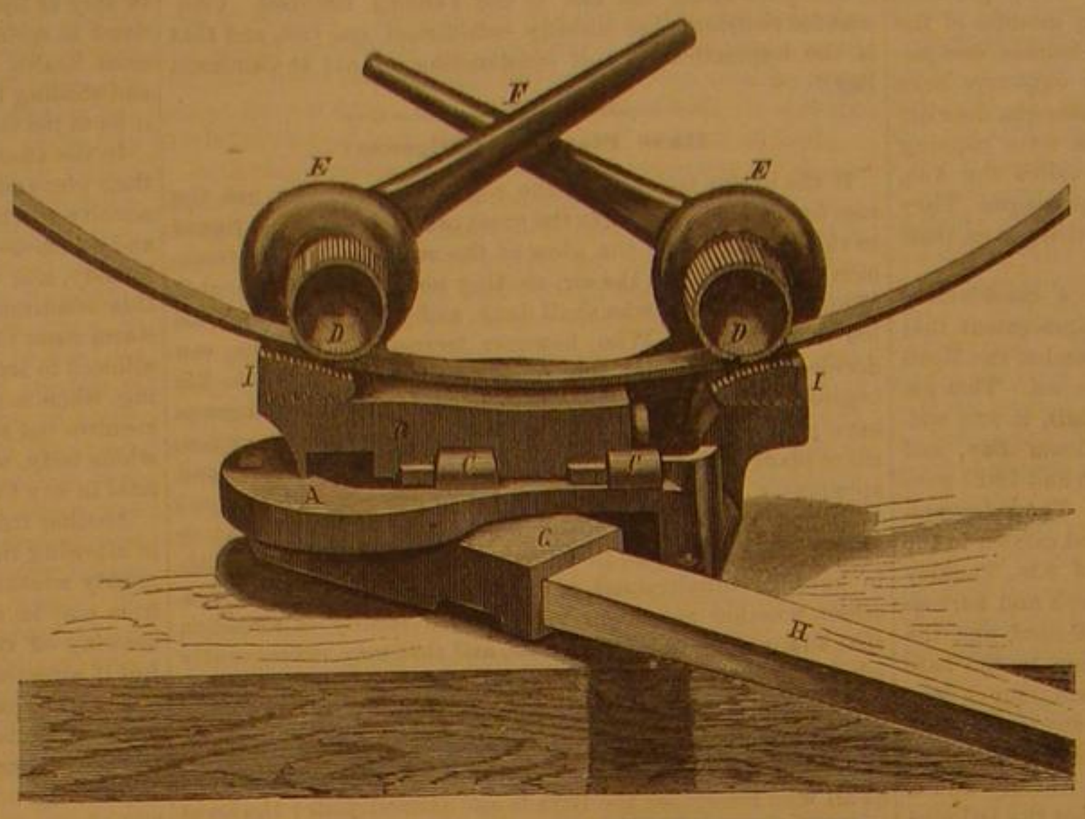
Referring to the engraving, A is a stationary frame, secured to a work bench. B is a sliding frame connected with the stationary frame by means of the slides, C. Serrated or eccentric cams, D, are caused to revolve on the uprights, E, by means of the handles, F, as shown. G is an eccentric, which revolving in the bed-plate of the sliding frame, B, when actuated by the lever, H, the sliding frame is moved backward and forward.

Serrated and notched blocks, I, are placed under the cams, D; said blocks being moved out or in to suit the different curves of the tire, or they can be taken off so as to form a straight line on the base, when the machine can be used for upsetting any kind of iron with equal facility.

The manner in which this machine is operated in upsetting tires is as follows: The sliding frame, B, is moved out from the stationary frame, A, by the movement of the lever, H. The handles, F, are then turned up so as to open the space under the cams, J, which are then ready to receive any sized tire.

The iron, when heated sufficiently, is placed under the cams, and the handles, K, are then turned down, which will securely hold the tire. The sliding frame, B, is then moved forward more or less by means of the lever, H, compressing the tire as may be desired.

These machines are manufactured and sold by E. Shopbell, to whom a patent was granted, Aug. 31, 1869. Address him for further information, at Ashland, Ohio.



SHOPBELL'S MACHINE FOR UPSETTING TIRES.

THE CLOTHES-MOTH AND ITS ALLIES.

[By Edward C. H. Day, of the School of Mines, Columbia College.]

The ladies of the household are now packing away the warm woolens and costly furs of winter, and every precaution is taken to secure them from the ravages of the insects that the heat of summer will bring forth; but in too many cases the care bestowed will be insufficient, and when the articles are called for again at the commencement of the cold season, we shall find, to our dismay, that our enemies have been ruinously at work. A ragged hole, a little cocoon tell the tale; or, if we are unpacking articles unused since last summer, a tiny winged creature fluttering away, as we unfold the injured fabric, bears livingwitness to another stage of the spoiler's existence. We crush the pest; and a little pile of fine dust is all that is left of a creature that, however mischievous in its habits, is still full of interest in its history and its associations. "Why, it is only a moth! a little plain-colored moth: the amount of whose destructiveness is indeed vast when compared with the sum total of its bodily insignificance" This is very true, but that little moth is the most familiar representation of a family of tiny beings, in many of which the most exquisite beauty is associated with habits none the less curious and even important to man, from being almost unnoticeable by the naked eye.

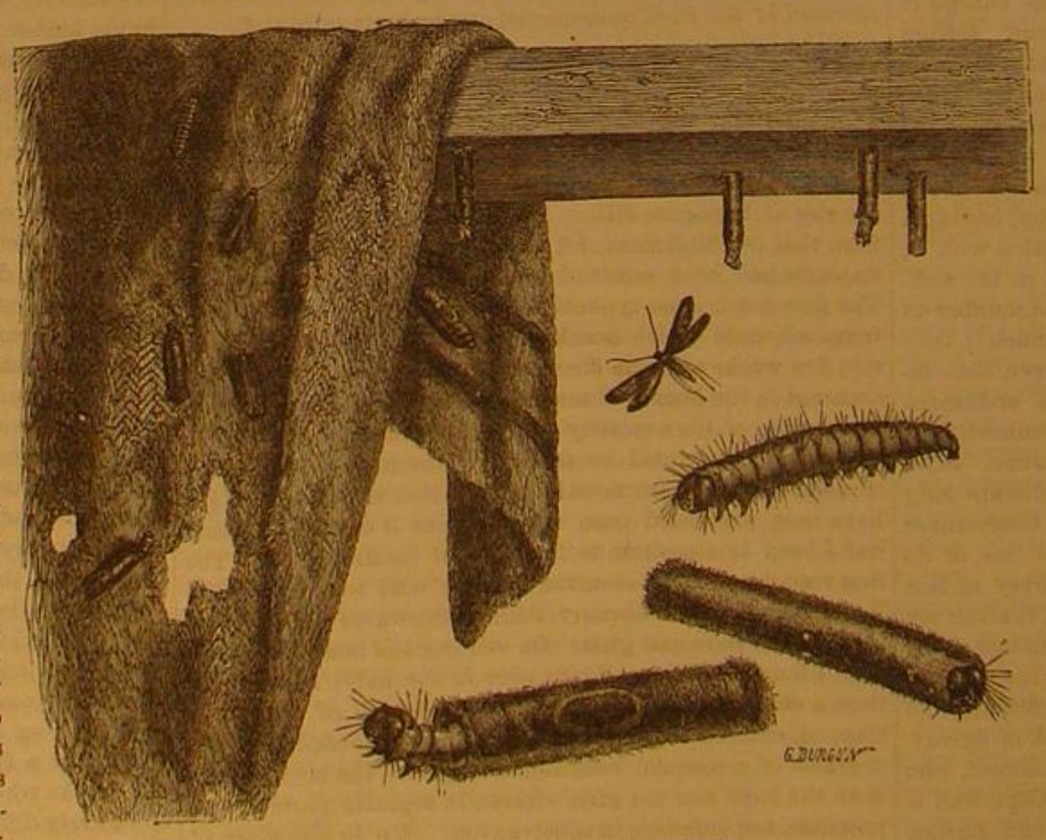
If you examine with a microscope the dust to which in great part you reduced the clothes-moth, you will find that it consists of feather-like scales that clothed its body and wings. Hence the name of the order, *Lepidoptera* or "scale-winged," to which the moths, sphinges, and butterflies belong. These delicate scales are often of the most beautiful colors, frequently burnished with metallic hues, and sometimes so exquisitely marked that the microscopist uses them as tests for the power and accuracy of his lenses. Of the moths or night-flying lepidopters, there are several families, each containing its hundreds or thousands of species arranged in a multitude of genera.

The clothes-moth belongs to a group consisting almost entirely of small species, and including those most minute members of the order which, from their minuteness, are known to the collector as the *Micro-lepidoptera*. The entire group was originally termed the *Pyralidæ*, from the Greek word *pyr*—fire—in allusion, it is said, to the attraction that a flame is to these insects; but this group is now subdivided into three families, for one of which the term Pyralids is retained; this is the family of the "snout-moths;" the second family is that of the Tortricids or "leaf curlers," so termed from the habit of the caterpillars of making their habitations by curling a leaf into the form of a tubular case; a family remarkable also as containing the genus *Hydrocampa*—moths whose caterpillars live in the water. The third family is that of the Tineids (from "tinea," a moth-worm), and is that to which the clothes-moth belongs. One may judge of the numerical importance of the Tineids from the fact that twelve hundred species of the family are known in Europe alone, and the sequel will show in a slight degree that their importance as pests to mankind is not even to be estimated by the vast variety of forms under which they appear—a variety which prepares us to expect to meet with every diversity of habit.

With the history of the clothes-moth and of the closely allied species which attack—one, furs and another, feathers, etc.—every one is but too well acquainted, and this history will be recognized at once in the accompanying engraving. Early in the summer the moths are seen fluttering about our houses, seeking their way through chinks and crevices into our closets and chests. Here they lay their eggs in the fabric which is to serve for food for the coming larva. The little stranger, when hatched, soon makes itself at home, building around it a tube with fragments of the material upon which it feeds. In this portable case it dwells and rapidly increasing in size, lengthens it as required by adding to each end, and from time to time enlarging it by opening it lengthwise and inserting fresh strips of material. Its period of growth completed, it attaches one end of the case to some convenient object, and passes into the chrysalis stage, in which it may remain till the following spring, when it undergoes its final transformation into the sexual moth.

Numberless have been the receipts prescribed for preventing the depredations of these insidious destroyers. Camphor, pepper, tobacco, benzine, corrosive sublimate, and the use of such woods as Spanish cedar and camphor wood, have each their value. We have found, when practicable, the common plan of carefully wrapping the fabrics up in newspapers with camphor inclosed, to be as effective as any, but frequent exposure to light and air, is especially distasteful to these little "imps of darkness." Closely allied species attack carpets, and even books are not sacred from them; while more than one kind work frightful ravages in grain stored up in granaries. Out of doors other Tineids lay their eggs upon flowers and the leaves of trees; the grubs of some of these make themselves portable cases of the skin of the leaf, while others have earned the title of "leaf-miners," from their habit of burrowing into the substance of the leaf.

From the nature of their habitation the smallness of the occupant may be inferred, and the patterns produced on the leaves by these creatures, must often puzzle the observant individual who is guiltless of the folly of being a "student of bugs!" But let such a one invest the affected leaves with a net of fine muslin, and he will presently find emerging from these thread-like burrows, a flight of miniature beauties, not larger in the body than the point of a coarse pin, and whose outstretched wings will scarce reach half way across his little finger nail—so small, in fact, that a single hazel leaf may harbor more than thirty full-grown grubs! With a lens he will discover that the wings of these atomies are either of the most delicate shades or else gorgeous in color, but generally flashing with streaks or specks of gold and silver luster, and always bordered by long fringes of exquisite fineness. The observer, astonished at his discovery, will be tempted to ask: Why this waste of beauty upon things so small that we all-important men cannot enjoy the sight of it without artificial aids; that mankind, in fact, has lived in utter ignorance of it till within the last few decades? Is it possible that the beauties of nature are not created for man alone, or even, directly, for man at all? May not these particular beauties be developed for the advantage of the moths themselves? May not these tiny dandies and fairy-like flirts, find such attractions and counter-attractions in their velvety vestments and spangled ornaments, as do the promenaders on Fifth avenue on a Sunday morning? Or, may not the luster of these hues assimilate the moths, in the glare of the sunlight, to the surfaces on which they rest, and so preserve them from destruction? Or even, on the other hand, may it not happen that when the race has played its part in the history of life, its very exuberance of beauty may be a fatal gift—causing its extinction, by attracting to it the easy notice of some exterminating foe? We are not of those who hold that these secrets are hopelessly inscrutable; much less that they are not to be pried into without profanity. Eyes were given to man to see with, and brains with which to reason, and he may make a much worse use of either than in admiring the charms and speculating upon the history of even such insignificant objects as the clothes-moth and its beautiful allies.



THE TAPESTRY MOTH.

Pepper.

Pepper possesses this peculiarity, that while its production is limited to a small extent of the globe, it is in universal demand, both among civilized and barbarous nations. The taste for this spice is no affair of caprice or fashion, and consequently its consumption must increase in the ratio of the facility and cheapness with which the cultivator and the merchant can supply it.

The quantity already produced per annum is 75,000,000 pounds—namely, from Java, Sumatra, Borneo, the Malayan Peninsula, the Moluccas, and various regions lying on the east coast on the Gulf of Siam. There is, generally speaking, abundant room for improvement in the culture; what is especially required, however—and we speak particularly with reference to India—is a larger application of European capital. When the price is high, a large extent of suitable land is at once put under culture; but no sooner does the price decline, than no care is taken to replace the exhausted plants or to enrich the impoverished soil, and the cultivation is not only neglected, but pepper districts wholly disappear.

The quantity of pepper we have given as the aggregate yield may appear enormous; but the amount named, if distributed among the inhabitants of the globe, would scarcely afford to each a grain a day. Unskilled cultivation is not the only fault connected with the production of this spice. The avidity of cultivators and dealers to bring pepper to a market frequently tempts them to pluck it before it is ripe, and from this cause it turns out light, hollow, and ill-flavored.

For years after the discovery of the Eastern Archipelago, pepper was the principal article of export to Europe. It is narrated that Vasco de Gama loaded two vessels with this article at the Spice Islands in twenty-four days. The first stimulus to the Eastern trade, now being so persistently pushed by the Americans, was by the success attending the fitting out of vessels from Boston to what is known as the Pepper Coast. The trade is now wholly in the of hands Europeans and Americans.

The Human Body.

The muscles of the human jaw exert a force of 534 lbs. The quantity of pure water which blood contains in its natural state is very great, it amounts to almost seven eighths. Kiel estimates the surface of the lungs at 150 square feet, or ten times that of the external body. The blood is a fifth the weight of the body. A man is taller in the morning than at night to the extent of half an inch or more, owing to the relaxation of the cartillages. There is iron enough in the blood of forty-two men to make a ploughshare of twenty-four pounds or thereabouts. The human brain is the twenty-eighth part of the body, but in the horse the brain is not more than the four-hundredth.

LIQUEUR DE LA GRANDE CHARTREUSE.—According to Dr Chevalier, the celebrated liqueur, made at the Abbey of the name, near Grenoble, is composed of: Essence of *melissa citrata*, 2 grms.; essence of hyssop, 2 grms.; essence of angelica root, 10 grms.; essence of best mint, 20 grms.; essence of nutmeg, 2 grms.; essence of cloves, 2 grms.; and 2 liters of rectified spirits of wine, of best quality. The liquid is artificially colored with turmeric or any other suitable material

Apparatus for Drafting Clothes.

The accompanying engravings illustrate a novel device for drafting pants. The engravings are not intended to represent any particular style, but to show the principles involved and the mode of operation. The apparatus is constructed so that the transverse wands, B, C, D, and E, can be set, the perpendicular wand, A, producing length measurements, while they carry with them any breadth measurements required. Thus, as is represented in Fig. 1, if the waist is 10 inches high, and the inside leg measure is 12 inches to the knee, and 28 to the bottom, the waist wand, D, sets upon 10, the knee wand, C, upon 12, and the bottom wand, B, upon 28. Now if the person measures 30 inches around the waist, and 36 inches around the hips, and the knee of the pants is desired 18 inches and the bottom 18, lines drawn from the said figures in their respective places, from point to point, produce the correct outlines for the front of the pants. It now only remains to curve and shape as the style may require.

Fig. 2 represents the reverse side of the same instrument, and scaled as is required for the back of the pants, which is laid out in the same manner as the front, but is produced independently therefrom, and may be cut first if desired.

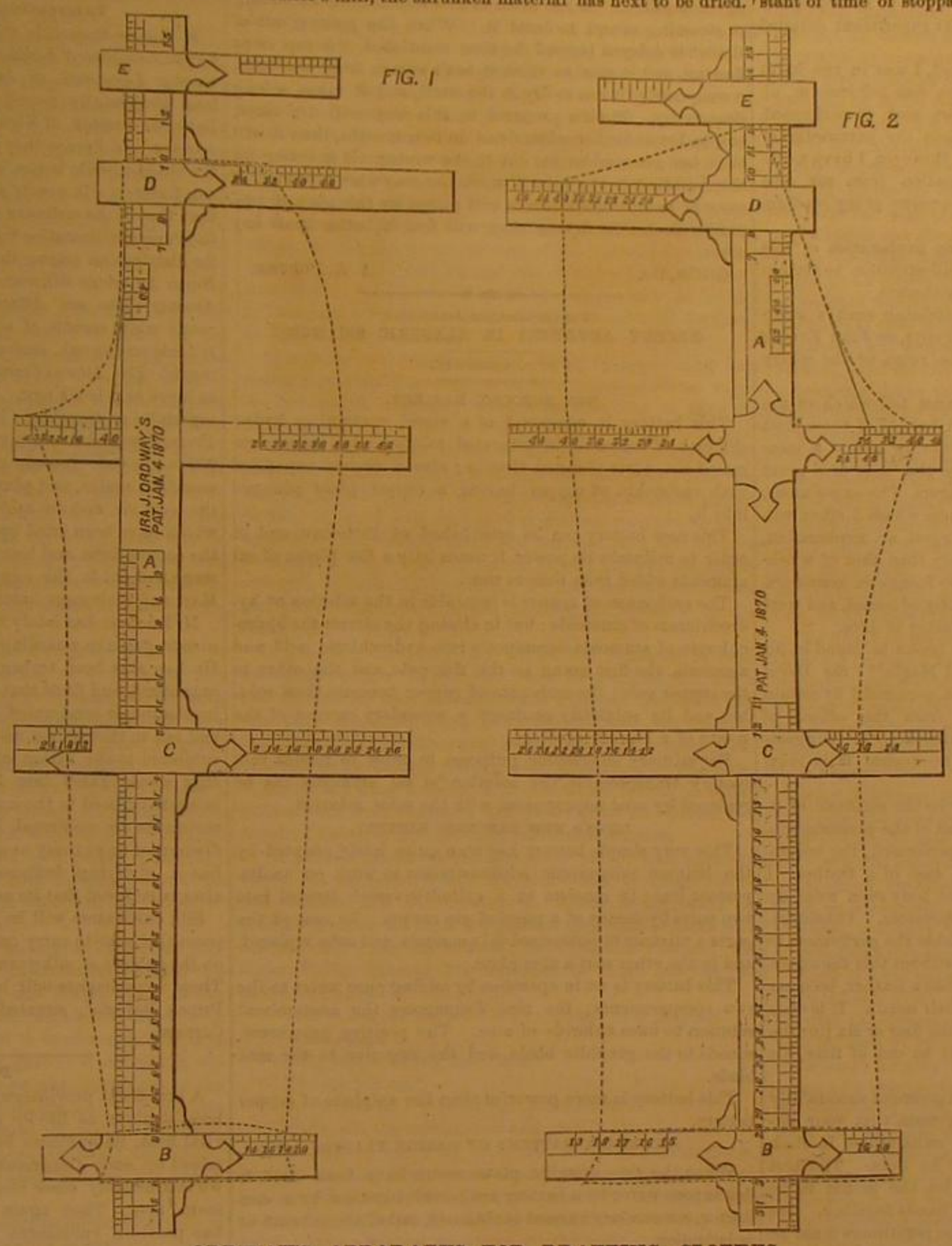
The movable wands are supported by elastic packing, which keeps them in the correct position at all points, and renders them self-supporting and self-fastening, yet allowing their easy movement.

The inventor has also devices for coats and vests, upon similar principles, and covered by the same letters patent. These, as well as the pants', are founded upon the fundamental principles of the art, and are not affected by changes in style.

The apparatus is based upon the celebrated "*Rouwel system*" combining actual measurement with the breast measure rule, thereby detecting errors and applying to disproportions.

Mr. Rouwel, whose extensive experience and reputation entitle his opinion to due consideration, states he has examined this apparatus for drafting gents' garments, and considers it the best invention for the purpose extant. It is based upon his system, which is practiced by thousands of the best cutters in the land, and it cannot fail to give satisfaction.

This invention was patented, through the Patent Agency of the SCIENTIFIC AMERICAN, Jan. 4, 1870, by Ira J. Ordway, of West Edmeston, N. Y., to whom inquiries may be addressed.



ORDWAY'S APPARATUS FOR DRAFTING CLOTHES.

How Broadcloth is Made.

We find in Morgan's *British Trade Journal* the following comprehensive summary of the various processes by which wool is made into broadcloth:

"The better to manifest what woolen is not, let us see what cloth is. Stage by stage, from sheep's back to gentleman's back, we will trace its history. The wool being shorn, goes to the stapler's, and by him is sorted. It is neither long nor short, and, for the cloth manufacture, if wool be not moderately short, it must be shortened artificially. It is next well oiled and spun into thread or yarn, then woven into a tissue that will be cloth by-and-by, though a long way distant from cloth when it leaves the weaver. The tissue, if examined at this stage of manufacture, would display its threads just like madam's stuff gown does. A coat of this material would be threadbare all over, despite its newness. Before this material can become commercial cloth, five chief things will have to be done to it. Its texture must be closed; it must be shrunk—that is to say, it must be cleansed; a nap must be put upon it; superfluous nap must be shorn off; finally, it must be hot-pressed. First, as to the closing or shrinking. If we bear in mind what has already been stated about the quality of felting possessed by wool, due to the presence of certain saw-like teeth, the reason of shrinkage will be understood. To accomplish this is the fuller's task, and he goes to work as follows: He takes the material to be shrunk, wets it, soaps it, and submits it to the fulling-mill for a considerable time—seven or eight hours—under which operation the shrinkage is effected. The fulling machine is an engine so contrived that certain heavy piles or hammers are brought to bear upon the texture, already soaped, wetted, and laid in a trough. The hammers are so fixed in the machine that not only do they fall upon the texture with heavy thuds, but at the same time turn it about, each stroke being delivered on a fresh portion. Now, bearing in mind the saw-like teeth, and the quality of felting what happens will easily be understood. The wool fibers are well soaped, as we already know, and but for their serrations all looking one way, they would slide upon each other in various and irregular directions. Practically, however, they can only slide one way—namely, with the roots foremost. The result is that the saw-like teeth catch among each other, at every catch making the wool fibers shorter, whereby the entire texture is shrunk, and, of course, proportionately closed up and thickened. This result being accomplished, the workman clears away the soap by means of fuller's earth and water, the fabric remaining still in the trough, and still wrought upon by the fulling hammers or piles. Being taken from the fuller's mill, the shrunken material has next to be dried. This is done by hanging it on tenter hook stuck into the margins of the texture at convenient distances. Obviously, this is an operation that would admit of considerable deceit in dishonest hands. The wet fabric might be injuriously stretched—made broader and longer to the prejudice of material. Formerly the exact amount of stretching to be used was regulated by Act of Parliament, so important did the matter seem. Well, our material, woven, fulled, and dried, is not cloth yet, though a considerable way advanced on its road to cloth. It has no nap, so the next process will be in imparting a nap to it. Let us suppose, now, by way of introducing the nap-imparting process, that a piece of our material having been laid flat on a board, a cat gets on it and scratches it. Puss would get a sort of nap on our material, though she would deal with it somewhat roughly. If the scratching effect of cats' claws were such as the clothworker required, he might imitate the operation by some sort of wire-tooth machinery. Altogether too violent it would be; for, although nap is really scratched up out of the threads, this is effected by little hooks incomparably finer than the claws of any cat—finer than any hooks man's ingenuity has enabled him to devise, the agent used by clothiers of to-day, as by the Romans, being the hook-like growths of the *Dipsacus fullonum*, or fuller's teasel. This plant, in growth, is something like a thistle, though, botanically, it differs from a thistle. It bears round heads, each about the size of a small apple, and studded all over with fine hooked protuberances. Many of these teasel-heads, being packed together and bound up tight on a flat surface, make a sort of comb, or currycomb, and this was the invariable way of packing teasels for use in cloth manufacture once. They may be also packed on a cylinder, but however arranged, their use in getting up nap out of threads will be obvious. Caused to rub against the incipient cloth, they scratch out little odds and ends of wool, and produce a hairy surface. One stage further, then, our woven material has advanced on the road to perfect cloth, but it is not cloth yet. The nap just scratched up by the teasel hooks is of all lengths, within certain limits. The manufacturer wants an even length, which he accomplishes by shearing. Next follows hot-pressing, which being done, we regard the cloth as made.

The Divers' Visit to the Oneida.

On the 24th day of February, the "borrowed" steamship *Arcostook*, with Charles and J. S. Lougee, practical and experienced divers from San Francisco, went to where the *Oneida* lies in 123 feet of water. After the usual preparations had been made, and, by sounding, it was ascertained that the deck of the *Oneida* was 103 feet beneath the surface of the bay; after every caution had been given to eight strong sailors to keep the air-pump in constant motion, and allow not an instant of time of stoppage to occur, as thereby depended the life of the bold diver; after Charles Lougee had been helmeted and shut from air, except that supplied through the slender tube of coiled rubber, with a life-line around his body and leaden clogs to his feet, with "Good-bye" and "God bless you" from all aboard, he was dropped over the side, and slowly disappeared in the blue waves, while a nervous tremor shot through our frame as we realized the fearful risk undertaken by that man who was seeking for truth in over 100 feet of water.

Away to the leeward, borne by tide and wind, came floating bubbles to the surface—life signals from below. The men at the pump were laboring manfully, but, becoming fatigued, attempted to change for fresh hands, and there was a stop. "Great God! you will murder my brother! Quick! for heaven's sake, quick!" And as the men recommenced the revolutions of the air-pump, the elder Lougee, with blanched face and trembling lip, gave a signal on the life-line below. For an instant there came no response, and the face of that brother seemed to turn to marble; but then we saw two quick motions from the submarine station, and knew it was the welcome signal of "all right," and then Lougee turned to the man at the wheel, who came so near sending both below, and simply said: "My only brother's life depends upon your efforts in keeping that pump in motion—stop again at your peril." The calm face and passionate eye told these men not to stop again, and, with Lieutenant Tanner close by, they kept at work until stopped by orders from Lougee.

Meantime, while we were on the deck of that "sand-pan," counting the tedious moments which lengthened to half an hour, Charley Lougee was searching the *Oneida* at the tremendous depth mentioned. At last came the signal for "surface," and instantly the life-line was put in motion: slowly came the coiling hemp and rubber on deck, and at last, away in the deep blue waves, came in sight the diver, shrouded and panoplied in weird garments. As he came to the surface he reached Minister de Long a sword and a lackered box, and then was his helmet loosed, and our party crowded around to hear of the gallant ship. Among our party were many of the survivors of the *Oneida*; among them were William Crowninshield, Captain Clark, Master Yates, and Dr. James Suddard, who were intensely excited to hear the tidings.

Said the diver—"The water for the first seventy feet was quite clear, as the sun gave excellent light, and although my supply of air was once choked for an instant, I reached the deck of the ship just astern of the mizzen-mast, and close by the mess-room hatch; the tide was ebbing quite strong, and I was compelled to hold to lines from the rigging to keep from being swept forward. I first examined the side of the ship; she was cut from the mizzen-rigging (at an angle of about forty degrees) across the whole stern of the ship, her timbers, far below the water-line, being crushed and broken, the Captain's cabin cut in two, the wheel and steering gear all carried away, and, in fact, the whole side and end of the ship, stove in or cut away. The ship is heading southwest, and sits upright on the bottom, and is making sand slowly. I laid down on the deck, and peered over the broken end into the cabin, but did not dare trust my air-line in contact with the jagged timbers. The guns and armament, except one, are all in place aft; but I did not go forward, as I was afraid of entanglement in the rigging." Turning to Crowninshield, he said: "Your evidence, which I read, described almost exactly the injury, except that she was cut deeper than you could have known." Lougee expressed the belief that it will be impracticable to raise the ship, but that the splendid battery, personal effects, etc., can be saved if the Government sees proper.

By this survey the testimony of the living is verified, and the memory of the dead without a stain, for the position of the ship was found; and the positions of both the *Oneida* and *Bombay*, as testified to by the navigating officers, shows that it was impossible for the Captain of the *Bombay* to have seen the red light of the *Oneida*, and that the order of "Port your helm," by Captain Eyre, was wrong, and the "Starboard,

hard-a-starboard" of Master Yates was right.—*Correspondence of the Sacramento Bee.*

Correspoodence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Buzzing Up.

MESSRS. EDITORS:—In your issue of April 16, I observed a communication over the signature of "C. H. Ladomus," asking an explanation of the singular experiment detailed therein.

Many years ago, while a boy at school, I was in the habit of witnessing, and participating in, the feat referred to, almost daily. Since then, I have seldom seen it performed, but have never ceased to speculate upon the extraordinary features it presents for consideration. However, I have neither succeeded in evolving an explanation from my own mind, nor have I come across any in the course of my reading, or in conversation with others.

My purpose now is, not to suggest an explanation of this strange phenomenon, but rather to call attention to certain (what I may term) historical references thereto.

The first work, in point of time, containing such a reference is the diary of either old Samuel Pepys, or John Evelyn—both of whom lived and wrote in the reign of the merry Charles II.

Not having the books by me, I cannot tell which of the works named mentions the experiment, but one of them most certainly does. The author speaks of having seen at a monastery in France, four small girls raise the body of a great heavy man on the very tips of their fingers. The experiment, as detailed, conforms throughout to those which I often witnessed at school. He then tries to suggest an explanation, but fails to furnish any more satisfactory than that of witchcraft—which, however, he is induced to forego in consideration that the girls were being religiously educated, and were too young to have dealings with the Father of Lies.

The only other notice I have seen in books is found in Sir David Brewster's work on "Natural Magic." Sir David Brewster mentions having seen the feat performed by certain naval officers, who had learned it from the officers of an American ship in the Mediterranean. He suggests no explanation, and, indeed, seems to regard it as inexplicable.

I will add here, that whatever may be the *rationale* of it, there can be no earthly doubt of the fact of the phenomenon.

When the experiment is properly performed, the recumbent body is raised with the apparent ease of a feather. I have seen it, when I thought that the body even went up beyond the reach of the fingers of the operators. Considerable practice, however, is required to enable the performers to inhale and exhale in strict unison, for without this the experiment fails, and what ought to ascend like a feather, becomes like so much lead—a dead weight on their hands. It is even said, and I think truly, that if one of the four or six (for the number need not be restricted to four) be out of time, his part of the body will lag behind.

It is so long a time since I saw the experiment successfully performed that I cannot be absolutely certain that your correspondent gives the inhalations and exhalations in their proper order. I think, however, that he does. The best way to insure unity of action is to let the person to be raised give the signals by clapping his hands together. One fact must be borne in mind, namely, the performers must be in contact with the person who is to be raised; that is, they must actually touch him, or his clothing, for if he lies on a board, and they touch only the board, the experiment will inevitably fail. This is one of the features that render the thing so extraordinary. M.

Nevada City, Cal.

Very Curious Electrical Phenomenon--Explanation Wanted.

MESSRS. EDITORS:—I have observed in the shop in which I work a phenomenon which I would like to hear explained. There are two belts which run the fan for the foundery furnace, which on a dry day will emit electric sparks to the knuckle when held close to it. But what is incomprehensible is, that an oil-can with a small nozzle held 2 to 4 feet from the belt while running, will eject a small stream of oil horizontally towards the belt as if driven out by a considerable force.

While the belt is running downward with considerable velocity, the oil moves in an almost horizontal line, and therefore is not drawn, as might be supposed by the downward current of air caused by the downward motion of the belt, but drawn towards it, as if by attraction.

What is the force that impels the oil, and where does it reside? SERENO S. LUKENS.

Rock Falls, Iowa.

Drying Timber.

MESSRS. EDITORS:—I see in your valuable paper an article on the subject of drying timber. As the last clause of the article invites discussion I would say that I don't propose to give a better or quicker way of seasoning timber, but to give an idea or two derived from my experience for over twenty years.

A point which the writer of the article referred to has left out is the time to get out or prepare the timber for drying. The time for getting out timber for any purpose, or any kind of timber, in this section of country, is from the 15th of May to the 10th of June. I would say in the Northern States it would do something later, say from the 25th of May to the 1st of July. The question will be asked why I select this particular time for preparing timber. My answer is that it is a time when the sap of the tree is in full flow, and when the timber is cut the sap runs out at once like water. It is thinner at the time mentioned than at any other time of the year, consequently the timber shrinks and dries faster than when got out at any other season, and it will be harder, firmer, and more elastic, as the timber is in full growth at this time. It will be the clearer of sun cracks, and less liable to attack from insects.

The timber when prepared should be put in the shade to dry if possible. When dried in this way it needs no boiling or steaming except to bend it. When the getting out of timber is delayed beyond the time mentioned, the sap stops flowing, and it gets so thick it can't escape from the cells, consequently it has to dry in the wood, and it takes a long time to dry. Timber prepared in this way will dry more, and be better timber when dried, in four months, than it will be in two years when got out in the winter. It is better for ship-building or any kind of work you may wish to put up. If some of your correspondents will please try this plan of preparing timber for drying they will find it better than any other.

Griffin, Ga. A. A. PORTER.

[For the Scientific American.]

RECENT ADVANCES IN ELECTRIC SCIENCE.

BY C. WIDEMANN.

NEY ELECTRIC BATTERY.

This battery is composed of a vessel containing hydrochlorate of ammonia in saturated solution with an amalgamated zinc plate plunged therein; also a porous cup filled with carbonate of copper having a copper plate plunged into it.

This new battery can be established at little cost, and in order to maintain its power, it needs only a few pieces of sal ammonia added from time to time.

The carbonate of copper is insoluble in the solution of hydrochlorate of ammonia; but in closing the circuit the hydrochlorate of ammonia decomposes into hydrochloric acid and ammonia, the first going to the zinc pole, and the other to the copper pole; the carbonate of copper becomes then soluble, and its solubility produces a secondary current of the power of a Daniell's battery.

For military telegraphic purposes, in order to render this battery transportable, the solution of sal ammonia can be replaced by sand impregnated with the same solution.

DEVO'S NEW ELECTRIC BATTERY.

This very simple battery has been quite lately adopted by the Belgian telegraphic administration to work on an important line; in consists in a cylindric vessel divided into two parts by means of a piece of gas carbon. In one of the parts a mixture of pulverized sal ammonia and coke is placed, and in the other part a zinc plate.

This battery is set in operation by adding pure water to the two compartments; the zinc decomposes the ammoniacal solution to form chloride of zinc. The positive pole corresponds to the graphite blade, and the negative to the zinc blade.

This battery is more powerful than the sulphate of copper battery.

SECONDARY BATTERY OF GASTON PLAUTE.

When the two metallic plates which have been used to decompose water by a battery are joined together by a conductor, a secondary current is obtained, called the current of polarization.

The intensity of this current varies according to the substance of which the plates are made, and its maximum action takes place when leaden plates are used.

This last property has been discovered by Mr. Gaston Plauté, who has constructed a battery in which he takes advantage of this polarization current.

A gutta-percha cup, of a parallelopipedic form, contains six lead plates, separated from each other by a free space, and the even-numbered plates are put into communication with one of the conductors, and the odd-numbered plates with the other conductor. The gutta-percha cup contains water acidulated by sulphuric acid.

In attaching to the two conductors the rheophores of a small Bunsen battery, the current passes through the acidulated water and decomposes it. The positive leaden blades, where the oxygen is sent, are very soon coated with binoxide of lead. This latter having a great tendency to decompose water by its avidity for hydrogen, which action is the reverse of the electrolytic action, it happens then very soon that the decomposition of the water into its two elements, hydrogen and oxygen, ceases very rapidly.

Then suppressing the Bunsen battery and rejoining the conductors to which the two systems of lead blades are attached, a current of a larger intensity than the one formerly used is obtained.

In using two lead electrodes having a double surface of 2 square meters, Mr. Plauté has obtained similar results to those produced by 70 Bunsen cups of 8 inches in hight.

With the six leaden blades (having a dimension of about 20 to 22 centimeters) of the battery we have just described, a large steel knitting needle is melted by having this polarization current passed through it.

To obtain results of quantity and tension as desired, Mr. Plauté disposes near each other 40 gutta-percha cups, containing the acidulated water, in which 20 lead plates, about 7½ inches square, are dipped. These blades are joined as above described by even and odd numbers, and the battery is worked as described to obtain results of quantity; but to obtain results of tension a peculiar commutator is used, joining together the lead blades in the following order: No. 2 with 3; No. 4 with 5; No. 6 with 7, etc.

In joining the two extremes, a current capable of an enormous resistance is obtained, enabling a platina wire of two meters in length and ‡ of millimeter diameter to be brought to a red heat. An iron wire burns immediately, and an intense light is obtained from a metallic point over a surface of mercury; also in putting in contact two carbon points.

As it has been seen, this secondary battery is to the battery which charges it what the Leyden jar is to the ordinary electric machine.

Interesting to Silk Growers.

M. Guerin-Meneville, states in the Bulletin of the *Société Imperiale Zoologique d'Acclimatation*, that in the last two years, the *Bombyx Yama-mai*, or Japanese oak-feeding silkworm, has been successfully reared on a large scale, in Austria, by Baron de Bretton, of Vienna. His last year's crop was 14,000 cocoons. In France they have not succeeded so well. M. Guerin-Meneville hopes, however, yet to produce from their oak forests a silk nearly as handsome, at a much lower price than that of the ordinary mulberry silkworm. The Council of the Paris Acclimatation Society have taken measures to procure for distribution among their members cocoons of some of the North American silkworms, which seem to merit attention. Among these are *Attacus Polyphemus*, which produces a round white cocoon, of which about fifty-five weigh a pound. It feeds on the oak, cephalanthus, poplar, hazel, quince, and maple. The *Attacus Cecropia* produces a yellow cocoon nearly as large as a hen's egg. It feeds on all species of trees, but especially on the elder; it is very easy to rear. The *Attacus Promethea* produces a very small cocooon, of which there are 200 to a pound. It feeds on the cephalanthus, poplar, barberry, sassafras, azalea, and plum. These worms can be reared in the open air, and are said to promise more success than many which have been cried up of late. They pass the winter in the cocoon form, and hence would have to be sent in that stage and not in the egg form. The butterflies appear in May, and their eggs hatch in from ten to fourteen days.

M. Duclaux has lately been experimenting on the effect of certain gases in retarding the incubation of silkworms' eggs. He has also been trying the effect of cold upon the same organisms, and finds that instead of retarding the period of incubation, it accelerated it; in fact, that eggs laid in autumn and left to themselves would only incubate in spring; but if subjected to the action of a freezing mixture for forty days, they would hatch into larvæ immediately afterwards, on being submitted to the action of a gentle heat. If these experiments are confirmed, M. Duclaux will have undoubtedly discovered an entirely new principle in physiology—that cold has a vivifying influence. Hitherto physiologists have always believed that its action was diametrically opposite.

Silk cultivators will be glad to learn that M. Pasteur proposes this year to carry out an elaborate series of experiments on the subject of silkworm growth, health, and nourishment. These experiments will be carried out on an estate of the Prince Imperia', situated between the Gulf of Trieste and Carnero.

Pure Air.

A beneficent providence has arranged that while the air we breathe gives us life by purifying the blood and imparting vital heat, its unfitness for these purposes is instantly determined by such disagreeable impressions on the senses, that we instinctively cease breathing, or hasten from the contaminated spot. Then again, from her bountiful stores, nature has provided substances which purify filthy localities and remove the nauseous smells. Some of these substances destroy the disagreeable odors but do not arrest decay, hence those odors would return constantly, as long as any of the substance remained which was the source of the evil.

Chlorine removes a bad smell from putrid meat, but it will return in a few hours. A London chemist has ascertained the fact that if a piece of fresh meat is coated with a substance distilled from coal and mixed with sulphurous acid, called carbolic acid, it will prevent the meat from decaying, and that such meat after being kept two or three months, is, if cooked, as sweet and fresh as meat just purchased from the butcher's stand; hence, chlorine deodorizes, that is, only takes away the bad smell for the present, but decay still goes on. Carbolic acid not only destroys the bad odor but prevents decay, arrests it, and is thus a deodorizer and disinfectant combined; it takes from a substance its polluting character, its power to make sick, to communicate disease. If further and more careful investigations and experiments confirm the statements made by Mr. Crooks, he is justly entitled to be named among the benefactors of the age. The practical lesson to be impressed on the mind by these statements is, that a deodorizer does no more than take away the ill odor of substance or locality, temporarily; a disinfectant not only destroys that odor but prevents its return, by changing that condition of the substance from which the odor came, in a manner which does not allow the process to go on which gave rise to the odor. A disinfectant also takes from a thing its power to cause disease. A contagious disease is that which is caused by actual contact, and cannot be communicated in any other way, as glanders in horses, and syphilis in men; infection is that which may be communicated by touching or handling the clothing, as itch, plague, measles, small pox; the air of a room in which these diseases are can communicate the disease, hence that air is infectious, that is, makes into, fixes, implants, thrusts into the body, the disease with which it is loaded. A real disinfectant deprives the air and the clothing of that power. It seems that carbolic acid is the most perfect deodorizer and disinfectant yet made known to man.—*Hall's Health Tracts.*

IT is said that peach blossoms are mostly double this season.

THE HISTORY, SCIENCE, AND ART OF WHIPPING.

A very curious book has made its appearance bearing the following title: "FLAGELLATION AND FLAGELLANTS. A History of the Rod in all Countries from the Earliest Period to the Present Time. By the Rev. Wm. Cooper, B. A. London: John Camden Hotten, Piccadilly."

The Rev. Mr. Cooper commences with the Jews and Romans, and tells us how the scourge was used in public and private among the people of these nations. The Roman ladies must have been pleasant women to serve. He says:

"It was quite a sufficient excuse among the Roman ladies to whip a slave, if, as Juvenal expresses it, 'their nose displeased them;' in other words, if they were not satisfied with the state of their charms. Their wantonness of power was carried still further. It was a customary thing with some of them, when they proposed having their hair dressed with both nicety and expedition, to have the dressing maid stripped to the waist, ready for flagellation, should she be guilty of any fault or mistake in performing her task. The fair termagants at last carried these cruelties to such a pitch that in the beginning of the empire it was found necessary to restrain their license.

"During the reign of the Emperor Adrian, a lady was banished for five years for inflicting undue cruelties on her female slaves. The smallest faults, such as breaking glasses or over-seasoning dishes, exposed these wretched serfs to grievous whippings, which were sometimes inflicted in presence of guests who happened to be entertained at the table, as a means of affording a little diversion. The following is a literal translation of a passage from Juvenal, in which he describes the way an angry woman treats her slaves upon an occasion when her husband has slighted her: 'Woe to her waiting women! the dressing maids lay down their tunics, the errand slave is charged with having returned too late, the straps break on the back of some, others redden under the lash of the leather scourge, and others of the twisted parchment.'"

The author writes at length of the discipline practiced in convents, and gives a long description of a religious sect called the "Flagellants," whose religion consisted in flogging and self-torture, and whose practices, though curious, were extremely unpleasant to hear of. Under the head of penal flagellation there are one or two curious anecdotes:

"Cowper, in a letter to his friend John Newton, relates a droll incident which he witnessed at Olney. A young fellow, having been caught thieving, was ordered to be flogged through the town. As he performed this penal pilgrimage at the cart's-tail, the ruddy stripes upon his back stirred the compassion, while the fortitude with which he bore them excited the admiration of the spectators.

"But it turned out that it was an imposition on the public. The beadle, who was the executioner, wielded his whip with the utmost tenderness, and before every stroke drew the lash through his left hand, which was filled with red ocher, so that when he applied it to the culprit's skin it left an imprint like a bleeding gash. A constable, detecting the deceit, applied his cane to the shoulders of the beadle by way of exhorting him to do his duty. A country lass, pitying the pitiful beadle, assailed the pitiless constable. Thus the beadle thrashed the thief; the constable, the beadle; and the lady, the constable; and the thief was the only person concerned who suffered nothing.

"A young man, sentenced for some slight misdemeanor to be whipped through the streets of Glasgow, turned out, on being stripped, to be a female! She was identified at the time, by a mark on her shoulder, to be the daughter of a highly respectable merchant, who had run away from her home at a very early age, and been lost sight of for a great many years. After leaving her home she made her way to Port-Glasgow, and became cabin-boy in a West Indian sugar vessel. As her uncle was a town councilor at the time, she was pardoned the public exposure by the Lord Provost of the period, on condition of submitting to be whipped by the matron of the gaol."

The author gives "an old magazine" as the authority for the above story.

"The last whipping through the streets of Glasgow by the hangman took place on the 8th of May, 1822. On that day, at twelve o'clock, a strong detachment of the 4th Dragoon Guards paraded in front of the gaol, and at the same time a large party of police and civil officers attended, under the direction of the superintendent of police. Soon afterwards the culprit—a man sentenced to be flogged at the cart's-tail for assisting and encouraging a riot—was brought out of the gaol by the north door, and bound to the cart, which was in waiting. Parties of the dragoons were placed in front and rear to keep off the crowd; and when all was ready, the cavalcade moved round to the area of the south side of the gaol, where the culprit's back was laid bare by the hangman, who then gave him his first twenty lashes with a formidable cat-o'-nine-tails. The like punishment was repeated at the foot of the Stockwell, and also at the head of the Stockwell; but the last twenty lashes, making eighty in all, were given by Thomas Young, the hangman, at the crowded Cross of Glasgow, the prisoner all the time groaning and lamenting his fate. 'This example,' says a commentator, 'had the most salutary effect; it taught the mob that there was a power over them after all, and there was an end of rioting.'"

In treating of the use of the rod in Eastern nations, the author takes occasion to speak of its absence in the Japanese schools. A ladies' school among the subjects of the Tycoon must be a pleasant place:

"A Japanese female finishing establishment has the following among other peculiarities—namely, all the masters pay for the privilege of teaching, instead of, as is the case with us, being paid for their lessons. This makes the instruction a labor of love. Then, again, to a certain extent, a Japanese young lady is allowed considerable freedom as to the selection of her instructors—she generally prefers the best looking. A lady principal of one of our English finishing establishments for young ladies would not be a little surprised, if she could be suddenly transported to Japan, there to study the peculiarities of Japanese customs. She would find herself, not in a close pent-up room filled with girls bolt upright, each perched upon an educational stool, but in a delightful garden, fragrant with the odor of tea and flowers. She would see a number of little summer-houses, embowered in the midst of those charming vegetable products for which Japan is so justly famous, brought to perfection by the most exquisite horticulture. She would see bright-eyed damsels, with cheeks pink as the roses, moving about with graceful steps, each bearing a small lacker tray with tea and cakes. She would see those damsels, with joyous smile and modest mien, wending each her way to a summer house. In each of the summer-houses she would see a master or professor, either waiting the return of one of the refreshment-bearing damsels, or else sitting by the side of one who had already come back. It is impossible for a stranger, new to Japan not to be struck with the peculiarities of an educational discipline so different from our own."

In a paper on the whipping of young ladies, bearing date nearly a hundred years ago, a curious punishment in vogue in fashionable boarding schools at that day is thus described:

"What would you think of having your pretty 'mouth plastered up for letting your tongue run too freely? Yet that was the punishment for talking in improper hours at Regent House. A broad strip of sticking plaster was put slanting across the lips, holding them fast together, and that kept on for many hours. It used to be one large piece put completely over the mouth and covering it; but one rather delicate girl was almost choked by the process, and it had to be discontinued."

If the queer correspondence which has appeared in some periodicals within the past two years be genuine, the rod is still extensively used in families and schools. Did space permit, we might quote whole columns of curious and interesting matter from Mr. Cooper's book. We may conclude our extracts, as he does his labors, with the following anecdote:

"A certain king had lost a much-valued falcon, on whose golden bells were engraven the *fleur de lis* and offered two hundred francs to the fortunate finder and restorer.

"A peasant presented himself at the palace door with the hawk, but the porter would not allow him to enter till he had promised him half his reward. Kings being easily accessible in those old days, the peasant soon came to speak with his majesty. Having caressed the bird and thanked the finder, Philip directed his treasurer to count out the two hundred francs.

"'That is not the reward I desire, please your Majesty.'

"'What else?'

"'Fifty lashes on my bare back.'

"'You are joking.'

"'By no means, I will take no other reward.'

"'Well, call the executioner and gratify him.'

"The peasant bared his back, and the lashes were administered; not very severe ones as may be supposed, the King having whispered to the officer to come down lightly. When twenty-five had been given, the peasant cried out 'Stop your hand, I have a partner who is to get the rest,' and he went on to tell of the porter's incivility and the bargain that had been made.

"The knave was brought in, and received his stripes, which were laid on with no light hand; and when all was over, it was an additional punishment to him to see the peasant passing out with his two hundred francs in a good canvas bag."

How Cigarettes are Made.

Our cotemporary, the New York *Mercantile Journal* prints the following description of the manufacture of cigarettes, which, like most articles published in that journal, is interesting and instructive:

From the days of Sir Walter Raleigh, in the Western world, and for ages and ages before he was born, in the oriental and barbarian regions of the earth, the narcotic fumes of tobacco have been indulged in by millions of the human family. Although the use of tobacco is, incontestably, among the most deplorable vices into which man can fall, it constitutes an important staple of production, particularly in our own country, and is quoted, crude and manufactured alike, among our most valuable commodities. Little by little, in the lapse of time, the cigar has encroached upon the use of the pipe, and may ultimately supersede it. In tropical countries, the cigar, in turn, has a formidable rival in the *cigarette*—that delicate, graceful little envelope, which in Spain and her old colonies is not disdained even by the lips and fingers of the fair.

So rapidly has the consumption of cigarettes increased within the last decade, that many large establishments, involving a heavy outlay of capital, have been started for their exclusive manufacture. As an example of this new and interesting side branch of industry, we may, without further particularizing, mention a very curious and celebrated concern now active at Havana, its transactions being based upon the main idea of perfect fair dealing in material, treatment, prices, etc. *Honradez*—honesty—is a sounding word in the old Castilian tongue.

The concern to which we now refer was established about twelve years ago, on slender capital, and has now reached such extent of resources and efficiency that it turns out *three millions* of cigarettes per diem. It employs 300 hands inside, and 2,200 outside of the central concern, and among them are 50 little orphan apprentices. Most of these people are Chinese. They all wear a sort of uniform, consisting of a blouse or sack, a pair of striped pantaloons, and a cap on which are the marks of their position in the works, from the foreman down to the latest apprentice, and all are gradually instructed, step by step, in every process most recently known to science, assisted by the very latest improvements in machinery.

The tobacco used in the Havana factory comes chiefly from the small plantations in the western part of Cuba. When brought in, the first process is to place it on a sieve-table, set in motion by machinery. This sifts away all the sand and other foreign bodies from the leaf, twelve skillful workmen standing on either side of the table to snatch away all bad leaves or stems from the mass, as it travels along by the pressure of the mechanism. It is next thrown upon a huge ventilator, which winnows off the dust, and after that it is spread in thin layers on outside terraces, where the tropical sun can have full play upon it, and dry it thoroughly. It is then taken inside and dropped into huge casks, where it is subjected to intense hydraulic pressure, after which it is conveyed by an almost imperceptible motion, effected by means of series of screws, beneath a huge fly-wheel set with sharp blades, that chop it to pieces. Then it is again ventilated, winnowed, and subjected to the action of finer cutting apparatus, until it is reduced to the desired tenuity, after which it is spread out in the lower floor of the building, and besprinkled with an aromatic liquid, the composition of which is a secret of the manufacture. Chinamen alone are employed at this last stage, because their ignorance is regarded as a guarantee that the secret will not be betrayed.

The tobacco being once more partially dried, now requires only its paper envelopes. For these the material comes from Spain, and the Havanese cigarette maker imports 35,000 bales of it per annum. The paper is passed beneath a press, which stamps it indelibly, and is then submitted to mechanical scissors, which clip off hundreds of wrappers at a stroke.

The final process consists of the folding and packing, and these are intrusted to hundreds of hands, some permanently employed, some working in their own rooms outside, some inmates of charitable institutions, and even of prisons. In one saloon a visitor saw three hundred convicts, black and white, hard at work rolling the cigarettes delicately between their fingers.

Every workman gets a certain quantity of tobacco and wrappers, and must deliver a *round* of 5,000 cigarettes from it, with perhaps 50 over, which he is allowed to keep for his own use. For this amount of work he gets from the overseer a metal check, entitling him to the payment of one dollar, at sight, on presentation to the cashier or foreman. Everything, of course, is strictly controlled and checked, with all the aid of scientific arrangement and apparatus.

There is some smoking tobacco for pipes, pressed and put up in tablets, by the same concern, but to no extent comparable with the cigarettes. The articles once packed are adorned with all sorts of gilded and colored papers and fancy devices, the concern keeping its own lithographic and printing apparatus for that purpose. To such perfection, indeed, have the proprietors carried this subsidary branch of their operations, that the local Government has more than once requested them to execute its bank bills!

In conclusion, we may mention that the gas-lightning and water supply, as well as the drainage, ventilation, etc., of these factories, have been carried to perfection, and that by the steady application of energy, skill, and science, an enterprise that began with almost nothing has been raised to the point of supplying 1,000,000,000 of cigarettes per annum.

However we may reason with regard to the industrial and economical question involved in this application of high resources to the supply of a mere passing indulgence—and we admit that the debate would be a fair one—we cannot withhold the reflection which strikes us when we see so trifling a matter as the manufacture of a cigarette develop such important intellectual and industrial resources. This progress is one of the remarkable features of our time, showing how the minutest wants are converted into great forces, and the homeliest objects made subservient to the advance of useful invention and a species of refined taste. The same discoveries may, to-morrow, be applied to far loftier purposes.

An Ingenious Lunatic.

The *Pall Mall Gazette* tells the following story of a lunatic who recently escaped from an asylum in Ireland, and who was noted for his mechanical ingenuity:

"He could do things quite beyond what men in general can perform, and his cleverness was even exceeded by his versatility. He was a good shoemaker, a tailor, a weaver. He made from a scrap of iron a key by which he could open the door of his division. He put together a wooden sewing machine of his own contrivance, with which he made clothes for himself; and his mind just before his escape seemed so intent on improving this machine that there was little apprehension of his attempting to escape.

"His career, it is stated, before he came to the asylum was most extraordinary. He had been in the British army, in the French army, in the French navy; and had been in British, German, and Russian prisons.

"He had a fair grammatical knowledge of French, he knew something of German, and was completely self-taught; his age, although he had passed the various phases of existence above described, was only twenty-seven."

STEPHEN, the famous guide at the Mammoth Cave, used to say that more visitors came from Europe to view that subterranean wonder, than from all parts of the United States combined.

Improved Rotary Churn.

The churn family is a numerous one, and comprises, like most other old and large families, many "poor relations." Every attempt to dodge the principle of agitation to rupture the oil globules suspended in milk or cream, and to substitute chemical for mechanical action, has proved more or less a failure; and churn manufacturers have been obliged to come back to first principles, relying for success upon perfection of details in the construction of the machine.

The aim of the inventor of the churn under present consideration has been to secure all the advantages of the rotary churn, and to eliminate so far as possible, any inconveniences hitherto pertaining to churns of this class.

Nearly all parts of the churn which come in contact with the milk or cream are made of wood, so that no corrosion can take place. The interior is made perfectly smooth, and is destitute of recesses and corners which it is difficult to thoroughly clean. The dashers are four in number, and perforated, so that they thoroughly agitate the liquid.

The general form of the churn is shown in Fig. 1. Fig. 2 shows the mode of attaching the crank. A bracket, A, is screwed to the body of the churn, as shown in Figs. 1 and 2. This gives two bearings for the short shaft, B, Fig. 2, which is kept in place when in use by a key, C, driven through a slot in B. The annulus about the shaft is closed firmly against leakage by a rubber-faced metallic washer, kept tight by a second key, D.

The end of the short shaft, B, is squared to enter a mortise in a plate, E, screwed to the dasher arms; and by tapping out the key, C, it may be withdrawn and the dashers removed, while the churn is half full of milk, if desired.

The inventor claims that this churn breaks the cream easily and makes good butter, and that it churns with ease, so that a small child can work it; that it will churn a small or large quantity equally well; that it is very convenient for putting in the cream, taking out the butter, and for cleaning after use; that the dasher can be removed at any time and the milk left in the churn, though it be full; and that the device combines all the merits of both the box and the barrel churns, with several advantages over both.

Patented, through the Scientific American Patent Agency, March 22, 1870, to C. Blust, whom address for further information, at Lucas, Ohio.

Fig. 1



BLUST'S IMPROVED ROTARY CHURN.

Improved Faucet.

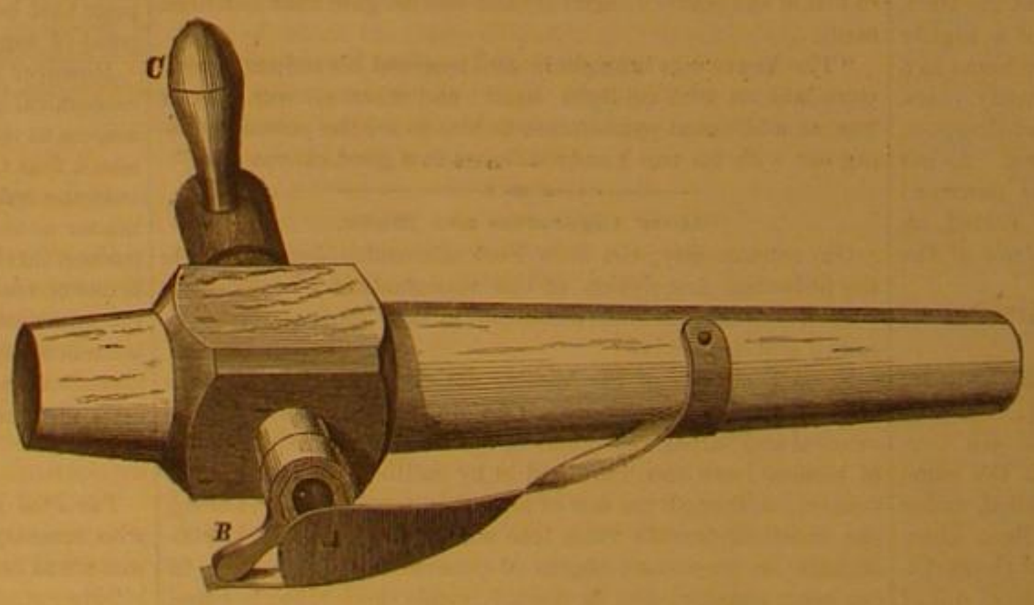
When faucets are left for some time unused, the lower end of the plug frequently becomes stopped and foul with insects and their webs, and it is not easily cleaned without loss of first flow of the liquid or being removed from the cask.

We, however, are able to give an engraving this week of a simple device which entirely obviates this annoyance, by cutting off all access to the end of the plug, except when in use.

A spring gate, A, is attached to the faucet, as shown, the part at A being so formed that when the faucet is closed it entirely covers and rests upon the end of the plug, so that the hole is entirely stopped. A lever arm, B, serves to force the spring gate to one side when the plug is turned by the lever, C.

This simple arrangement completely removes the difficulty specified, and as there it nothing expensive about it, or likely to get out of order, we judge it has a good prospect of coming into extensive use.

Patented, April 19, 1870. Address, for rights, etc., Joseph Heine & Co., 19 John street, Toledo, Ohio.



HEINE & VONFICHT'S IMPROVED FAUCET.

Improved Method of Fixing Colors on Fabrics.

The principle or basis of this method is that when gelatin, gum, or an analogous body is mixed with a solution of chrome salt, and the compound exposed to the action of light, it becomes insoluble in water, and so shuts in or fixes any pigment which may have previously been mixed therewith, making it a fast color.

The inventor, Mr. Kipping, of Manchester, England, availing himself of this known principle, prepares coloring matters for printing and dyeing by mixing them with gelatin, gum, or an analogous body and a salt of chromic acid, and then uses the colors so prepared in the usual manner adopted in printing and dyeing. The same end may, however, be attained, although not so completely, by dyeing or printing in the ordinary manner, and then subjecting the goods to a treatment with the chromatized gelatin or solution of the chromate.

In carrying out the method, the proportions of the substances employed may be varied. Gelatin of commerce is taken, and dissolved in water, after which bichromate of potash is added in the proportion of, say 3 oz. to 20 oz. of gelatin; this operation should be effected in a room from which strong light is excluded. The proportion of gelatin to water will vary according to the consistence to which the printing color is to be brought, such consistence also being governed by the nature of the pigment employed; but these details will readily be arrived at by competent printers. The coloring matter is now added to the chromatized gelatin and so prepared. Any ordinary printing machine is made use of, and the goods subjected to the action of light, by the effect of which the colors become imprisoned, as it were, in their vehicle, and are not affected by the process of washing or other treatment with moisture.

The time required for exposure to the light will of course vary, as is well known in reference to mixtures of bichromates and gelatin applied to other purposes, a few minutes being sufficient in bright weather. This exposure to light, however, is not indispensable, as such compounds decompose by process of time without the direct action of light, although perhaps not so completely. The exposure to light may be left to circumstances, such as the sale or use of the goods, which will bring them under its influence.

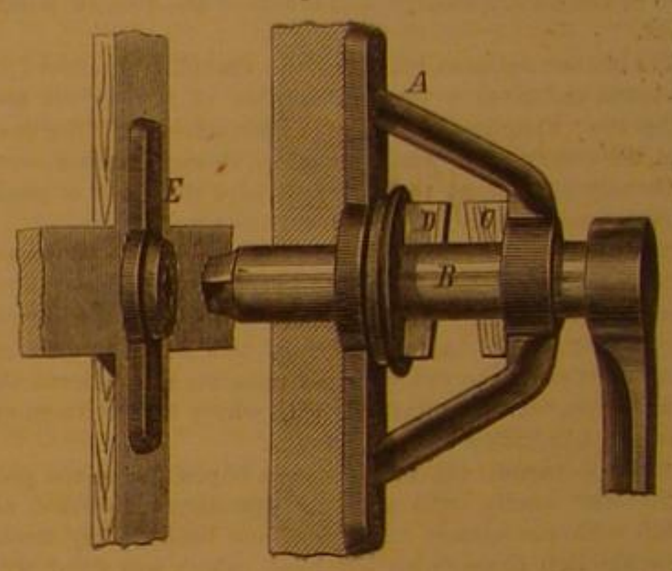
In printing with colors prepared as above the mixture may be liable to gelatinize when the printing room is below a certain temperature. To avoid this the room should be heated to the required degree, and the color boxes kept warmed by a gas jet.

The Legitimate Gratification of Curiosity.

The principle of curiosity, says a writer in *Stewart's Quarterly*, is deeply implanted in the human mind, and from its exercise and gratification much of the enjoyment experienced in human life derives its origin. The increase of the sum of knowledge already possessed, and the efforts put forth to enlarge the field of intellectual contemplation awaken feelings of pleasure that exalt man above all the tribes of irrational creatures. Persons of cultivated minds pursue knowledge for its own sake. Intellectual treasures are prized, not for the mere purpose of increasing the number of facts with which the mind is already stored, but because they are accompanied with feelings of elevated enjoyment and satisfaction—furnish new materials upon which the understanding may exercise its faculties, and open wider fields to the creative powers of imagination.

The power of curiosity impels thoughtful minds to devote themselves assiduously to various branches of learning, such as literature, history, philology, or the various departments of art and science. The philologist experiences a pleasure almost as keen as that of the chase, while he pursues some lingual root through the various languages of Europe or Asia. The historian feels himself rewarded for his toils amidst the dusty tomes or manuscripts of a library, when he discovers some important but forgotten fact in the history of an individual or a nation. The artist pursues his labors with unceasing diligence for the very pleasure they yield him. So the student of natural history continually finds objects new and strange rising round him, inviting investigation and awakening interesting reflection. Some hitherto unobserved mineral or vegetable production, or vital form, meets the eye and invites him to study its life-history, its qualities, and its links of connection with other objects of the same class. He thus extends the series of organic forms with which he was previously acquainted, or fills up some gap that detracted from the completeness of his knowledge. The many seeming paradoxes in nature—the strange metamorphoses of insects—the peculiar forms of animals suiting them to the various positions they are designed to occupy—the changes produced on vegetable organisms by climate or atmospheric influences depending on temperature or elevation—the dependence of certain plants for their very existence upon the presence of certain insects, these and a thousand other subjects for examination appeal strongly to the curiosity of the student How strange the many adaptations and contrivances everywhere around us.

Fig. 2



There is, for instance, a fly which deposits its eggs within the stamens of a Scrophularia, and secretes a poison which produces a gall, on which the larva feeds; but there is another insect which deposits its eggs within the body of the larva, within the gall, and is thus nourished by its living prey; so that here a hymenopterous insect depends on a dipterous insect; and thus depends on its power of producing a monstrous growth in a particular organ of a particular plant. So it is in more or less a plainly marked manner, in thousands and tens of thousands of cases, with the lowest as well as the highest productions of nature. The misletoe derives its nourishment from the juices of the apple and a few other trees, and its seeds are disseminated by birds. Its existence consequently depends upon the existence of both the few species of trees upon which it lives and the presence of the birds that scatter its seeds. The failure of either of these would result in its extinction.

Darwin tells us that in England the fertilization of the common wild pansy and red clover depends upon the humble-bees that abound in the neighborhood. "The number of humble-bees in any district depends in a great degree on the number of field-mice that destroy their combs and nests. Now the number of mice is largely dependent, as every one knows, on the number of cats. Hence it is quite credible that the presence of feline animals in large numbers in a district might determine, though the intervention first of mice and then of bees, the frequency of certain flowers in that district." The scientific investigation of nature gratifies the curiosity by lifting the veil from thousands of these connecting links that unite the different departments of natural history.

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THE CITY TRANSIT QUESTION.

Two questions press for immediate solution, both of them vital to the future prosperity of the city of New York. One of these—the coming pavement—interests all cities in common; but the question of transit in this city presents some features not found in connection with other cities, arising chiefly from the contour of the island upon which the city stands.

The lower part of the island, as far up as Fourteenth street, is now practically absorbed for business purposes. A short time only can elapse before a first-class residence below this street will be regarded as a relic of the past.

The vast concourse of people which daily moves to the lower part of the island and returns after business hours, together with the constant movement each way through the day, exacted by business requirements, has swelled the human tide to such a degree that its ebb and flow overcrowd all the present means of conveyance, so that the positive discomfort, as well as the demands made upon time in getting to and fro, has become intolerable.

A portion of the pressure is relieved by the Brooklyn and Jersey City down-town Ferries, which transport immense crowds of people to and from those cities; but when the rivers are crossed the tedious, incommodious, and crowded horse-cars are the only means available to the masses whereby they can reach their suburban homes.

These cities can never so draw the population from New York, that there will not remain a pressing need for far more capacious and rapid means of transit than exist at present.

Scheme after scheme has been devised from time to time, each professing to be the best, if not the only way, in which this difficult problem can be solved; but few have been backed by such capital of money and brains as to command public approval, or to secure such legislative action as could give even the uncertain existence which a charter can impart to a radically defective system.

To the end that our readers may know the way in which the various plans now pressed upon public notice are regarded by our most prominent and influential citizens, as well as those who have given this subject most careful examination and study, we have been at the pains to visit and obtain expressions of opinion from a number of gentlemen, which we now propose to lay before our readers.

OPINION OF MR. A. T. STEWART.

Mr. Stewart says that while none of the, at present, proposed methods of transit meet with his entire approval, that known as the Underground Railway is, he thinks, the most feasible of any. First, the route is a better one for a tunnel, and the promoters of that plan are men whose character and means are such as will insure its construction should it ever be commenced. The Arcade scheme he condemns in toto, for the reasons that the aggregated capital of the fifty-seven incorporators would not construct the road from the Battery to the City Hall park, and he is opposed to any and all tampering with Broadway above or below ground, for various reasons made known during his recent opposition to the Arcade Railway bill.

The Pneumatic Railway Company have by their admirable method of excavation shown that the work can be done without injury to the street, or obstruction to public traffic, and thus have weakened the feeling of opposition with which he at first regarded the project. But he still thinks that this plan cannot eventually pay, and that had it been supposed that the tunnel would be constructed of a size suitable for passenger traffic at the time a charter was asked for, the incorporators would not have got it.

The West side Elevated Railway he regards as a most ridiculous and hopeless scheme, so dangerous to passengers, and so expensive, that it never could, by a remote possibility, succeed; while it is a standing public nuisance, and would be declared such, were the courts to do their duty.

He regards with greatest favor a viaduct railway, similar to that in London, that is, an elevated way composed of mason work, with parapet walls. This railway should pass through blocks, and bridge over crossings. It should be erected on a line as nearly parallel to Broadway as practicable, and not too remote from it. Such a railway would be far less expensive than any other, and could be made of ample capacity. The first cost and current expenses would not be so great as to be incompatible with low fares.

Mr. Stewart expressed his views with a clearness and force to which this summary written from memory does feeble justice.

OPINION OF MR. WILLIAM A. WHITBECK.

Mr. William A. Whitbeck, President of the West Side Association, and a large real estate owner, has perhaps given this subject as careful a survey as any other man in the city. He has visited Europe expressly to examine the various city railways of London, as well as the systems of sewerage in London and Paris, and the celebrated asphalte pavements and other improvements of the latter city; his object being to gain such information on these important questions as would enable him to form correct opinions upon any proposed improvements of a similar nature in New York.

In our interview with Mr. Whitbeck, which lasted nearly an hour, he said very much more than we can find space to repeat, but we shall endeavor to give a fair epitome of his remarks.

Although he went to Albany expressly to urge Gov. Hoffman to approve the Arcade Railway bill, and submitted to His Excellency a memorial in behalf of numerous citizens to the same purpose, he pronounces the Arcade scheme a Humbug. Any seeming incongruity between Mr. Whitbeck's action with reference to the bill and his opinion, as thus expressed, is accounted for by the fact that he regarded the so-called Arcade Railway bill as really in effect a *tunnel bill*, and he regards the system of tunnels as the true solution of the question of city transit in New York.

His reasons for regarding the Arcade Railway bill, as practically a tunnel bill, are, that the words of limitation and condition imposed in the act require two consents by property owners, and one by Trinity Church, which consents never could be obtained for the arcade plan; but he thinks the bill contained ample provision for construction on the tunnel plan.

The arguments by which he maintains the entire impracticability of the Arcade scheme are numerous and forcible. We shall only give some of the most important.

First, he argues that although on the pictured plans which have been circulated, the excavation is made to appear as being only about seventeen feet feet in depth, and although it has been represented that this depth would be ample, it is absurd to think of anything less than twenty feet as the minimum depth, while in places it would need to be much more than that, to secure a sufficiently easy grade, and this depth of excavation immediately in front of the buildings would be ruinous. He maintains that proper arching to secure sufficient strength for the surface roadway will compel this depth, and that it can be dodged by no ingenuity.

The plan recently submitted by the arcade people, whereby they proposed to bridge the points where excavation is proceeding, he deems as utterly absurd and impracticable, and believes the projectors themselves share this opinion.

The proposed four tracks he also regards as absurd, as the inner tracks could only be reached by crossing the outer ones; which is not to be thought of where trains are passing in both directions, at frequent intervals.

The sidewalks and arcade shops and stores are also in his opinion a part of the absurdities of this scheme. No one could be induced to perambulate these subways, except when compelled by necessity, as the close proximity of frequently passing trains would produce a state of nervousness, if not of actual fear in most people, fatal to that pleasure which the promoters of the scheme have endeavored to make people believe would attend these subterranean promenades. The stores would be merely receptacles for carbonic acid gas, and customers would seek pleasanter places to transact their business.

Ventilation would in his opinion be extremely imperfect. He thinks it is a demonstrated fact—accepted as such by the engineers which have paid most attention to this subject—that a separate tunnel for each track is the only way to secure good ventilation where frequent open cuts are not practicable. With such tunnels the advancing trains act as pistons forcing out the air ahead of them, and by the partial vacuum produced behind them, draw in a fresh supply at each transit.

The Pneumatic Railway he thinks impracticable for passenger traffic for any but short routes, and claims that this has been demonstrated by experiments in Europe.

He regards all elevated railways as impracticable; first, because it is impracticable to secure the necessary legislative action. In considering the question of practicability of any plan, he thinks this is the first thing to be thought of, as the people will fight to the death anything which they think likely to injure their property. There can be no question that elevated railways will encounter the most determined opposition of property owners in any route proposed, and therefore they will always meet with such opposition as will kill them. Such was the fate of Swayne's three tier scheme, and such would have been the fate of the West Side Elevated Railway but for the peculiarity of the act under which it was constructed.

We shall resume this subject next week, and hope to be able to give expressions of opinion from other prominent men.

ADVANTAGES OF COMPRESSED ASPHALTE FOR ROADWAYS, AND THE PRODUCTION OF SOLID SURFACES FOR OTHER PURPOSES.

An American gentleman residing in Paris has furnished us with some important information relative to the use of compressed asphalte for public and private roadways, walks, etc., from which we draw the facts and conclusions embodied in this article.

Our readers will recollect an illustrated description of the process of preparing and putting down asphalte so as to form roadways as practiced in Paris, published not long since in this journal. The article was extensively copied in English journals, and the information it contains was obtained directly from Paris, together with the drawings from which our engravings were prepared. It appears from the information of which we are now in possession, that the compressed asphalte has by its incontestable advantages obtained the approval of all the engineers of the Municipality of Paris, and of a great number of provincial cities: in fact the hardest working streets of Paris are now paved with it, and the question is now seriously discussed in the Council of Administration, of extending the asphalte system to all the streets and boulevards. It is highly probable that this will be done as fast as the present road surfaces wear out.

It is so solid in wear that it is superseding granite paving even in places where this stone is abundant and cheap; as, for instance, in Geneva, in the very center of easily worked granite quarries, and Grenoble in the center of the French Alps. Both these towns have used and are using asphalte pavements extensively.

A very great advantage in the use of asphalte is the rapidity with which it can be laid. It is not unusual to construct five hundred square yards per diem, and the larger the undertaking the more rapid in proportion may the work proceed. The pavement laid is ready for use the next day, so that thoroughfares are not kept obstructed.

The same is the case when repairs are needed, as they can be done in sections, each section being ready for use on the day succeeding repair.

Horses' feet and wheels of vehicles make scarcely any noise on this pavement, and it always possesses a slight elasticity, manifesting the latter quality rather more in warm than in cold weather.

It is kept perfectly clean by the use of besoms, and washing with hose, so that it produces neither mud nor dust; and, as it has no cracks or crevices in which animal or vegetable matter can accumulate and decay, its sanitary qualities are of the highest order.

We are informed that its first cost would be less than stone paving in nearly all countries, and that the cost of maintenance is very much less than that of Macadamized roads, and generally less than that of any other modern pavement. It is also stated that it is positively free from all the disadvantages of other pavements.

Slipperiness, which has been charged against it, is, we are assured, not essentially a fault of this pavement, it only being observable when mud has been carried upon the asphalte from adjacent Macadamized roads, and entirely disappearing when the mud is washed off.

It has also been objected that these roads need frequent repairs. On this point we are assured that complaints have only been heard within the last two years; and that they have had their origin in the imperfections of experimental pavements constructed of other and inferior material from that of the first-class asphalte roads. The material known as the asphalte of the "Val du Travers" was that originally employed, and has never given any cause for complaint. It contains a much larger proportion of bitumen than any other, and this renders it superior to other varieties for this purpose.

A preparation of asphalte, called liquefied asphalte, has been used for sidewalks, terraces, basement floorings, and yard pavement, and is highly recommended.

It is a mixture of bituminous calx or asphalte proper with purest bitumen, the latter serving solely to complete the fluidity of the asphalte, or, so to speak, as a flux for melting it. The mastic thus obtained is mixed again with a certain proportion of sand, and then run over the surface.

It is stated that the majority of cities in France have adopted this system, and that its use is extending to other countries. It has been employed in Paris since 1838. A single workman can put down from seventy to eighty square yards of this surface per day, and it is ready to be used two hours after it is down. It rarely needs repairs, and when necessary these are the work of only a few minutes. Used in this way it gives a waterproof and perfectly cleanly surface, and its use in sidewalks in Paris has shown an average duration of fifteen years for a layer three-fourths of an inch thick. It is very much cheaper than flagged walks, not costing more than from one-fourth to one-half as much, according to the quality of flags employed.

These facts seem to us worth considering in connection with the subject of pavements in this country, perhaps a question of as great present and general importance as any engineering problem of the time. That the importation and use of asphalte may be the solution of this problem seem at least possible enough to lead to thorough experiment in this direction.

PHOTOGRAPHIC EXHIBITION AND DR. VOGEL.

The photographers of this country propose to hold an exhibition at Cleveland, in June next, and have invited the president of the Berlin photographic Society, Dr. Herman Vogel, to come over as their guest. The invitation to Dr. Vogel was sent by cable and when he went to the Minister of Education to ask for leave of absence, this fact had much to do in securing a favorable reply. The Minister said that this was an honor that had not been extended to any member of the Cabinet, and he at once courteously accorded the necessary permission to Dr. Vogel to accept the invitation, and a response came back by cable—"I shall come."

No man has done more to add to our knowledge of the scientific principles involved in the science of photography, than Dr. Vogel. He has been a patient and original worker, and has contributed many articles on the chemical action of light, and on the re-agents to be employed to obtain good pictures.

It is to be hoped for the credit of the profession that photographers will unite in giving a suitable reception to this delegate from foreign societies. The opportunity is a favorable one for a more thorough organization of photographers into a society for the protection of its members, and for the elevation of the profession to the dignity of an art.

When the vice-president of the New York Photographic Society visited Berlin, a few years ago, a grand reception was accorded him, at which nearly three hundred of the most distinguished professional and amateur photographers of the city were present. Everything was done to honor America in her representative, and now that an opportunity offers to return the compliment, our best men must not hesitate to come forward with their hearty co-operation. Let Dr. Vogel have a reception worthy of the man and of the high condition of the photographic art in this country.

DEATH OF A DISTINGUISHED PROFESSOR.

Gustavus Henry Magnus, since 1831 professor of physics at the University of Berlin, born in Berlin, May 2, 1802, died in his native city, April 4, 1870. He was the cotemporary and intimate friend of Henry Rose, Gustavus Rose, Wœhler, Ehrenberg, and Poggendorff, and was the brother of the distinguished portrait painter whose picture of Jenny Lind has been so frequently copied, and of the banker whose collection of works of art is so well known in Berlin.

Professor Magnus was an industrious investigator in the department of physics, and although he never contributed startling and grand discoveries to our stock of knowledge, was able to add much that was new and valuable. During the earlier part of his career, he devoted his attention to chemical analysis, but afterward following the example of Faraday, he applied himself to the study of electricity and physics. He accomplished much by the force of his example, by the encouragement he held out to young men, and by the judicious use of a considerable fortune, that came to him by inheritance. The University of Berlin has had few professors more highly respected, or more thoroughly useful than Gustavus Magnus; and his death will be deplored by a large circle of scientific friends, both in this country and in Europe.

CAPTAIN ERICSSON'S NEW METHOD OF SUBMARINE ATTACK.

Captain Ericsson seems to have a mind so prolific of ideas that he has scarcely time to put them in good working shape so fast do they succeed each other. Standing as he does in the very front rank of the engineers of his time, each successive invention of his fertile brain only adds to the evidence of his great ability as a thinker and a constructor.

It is, however, in naval engineering that his talents are most conspicuous, and his inventions most numerous and valuable. No sooner does he complete a monitor, seemingly impregnable to all known species of attack, than he sets himself about inventing a destructive agent that even iron-clad vessels will be as powerless to resist, as wooden vessels are powerless to withstand the battering of modern heavy artillery.

Captain Ericsson has published at length in English engineering journals and in the *Army and Navy Journal* an account of his newly devised system of submarine attack. The fundamental principles upon which it is based may be stated as follows:

It is well known that a ball fired from a gun, being acted upon by the projectile force, the resistance of the air, and gravity, describes a parabolic curve till its period of impact, either against some object at which it is directed, or the earth's surface. If the force of gravity were suspended, the ball would move in a straight line till the resistance of the air or some intervening obstacle brought it to rest, provided, of course, that no currents existed of sufficient power to deflect it from its course.

The elements of the curve depending upon the three forces above specified, of course any change in either of the forces will affect the curve, and it follows that the projectile may within certain limits be made to strike the surface of the earth at any angle, and at any required distance from the point of discharge, by varying the elevation of the gun and the amount of powder which generates the projectile force.

Secondly, a body moving through a fluid medium of the same specific gravity as the body itself is not acted upon by gravity, or rather gravity acts upon it and all parts of the fluid medium in such a way that it does not tend to change the position of the body relatively to the parts of the medium. In other words the body floats in the medium, and, if projected by any force through the medium, would describe a straight line instead of a parabola as would be the case if the projectile were the heavier.

It follows from these considerations that if a projectile so constructed that its specific gravity is the same as that of water, it may be made to penetrate the surface at such an angle that the straight line it will pursue after penetrating the surface, shall bring it into contact with the submerged part of the hull of any vessel towards which it may be directed, which of course would be fatal to any of the breastwork iron-clad vessels, the armor of which does not inclose the submerged portion of their hulls.

The projectiles are designed to be of the nature of torpedoes—to explode upon striking. Capt. Ericsson offers to meet any first-class, swift, iron-clad ship with a swift screw vessel constructed to carry two smooth-bore 15-inch guns, and provided with the necessary apparatus for submarine attack, the whole provided at his own expense and risk, and to attempt to sink the iron-clad, which he is confident he will be able to do in spite of her armament and armor, and in spite of any and all evolutions she may make; it being understood that no attack shall be made at a less distance than five hundred feet.

NEW YORK LYCEUM OF NATURAL HISTORY.

AMMONIUM AMALGAM.

At the meeting of the Chemical Section of the Lyceum of Natural History, on Monday, May 9, Professor Charles A. Seely read an interesting paper "On the Constitution of Ammonium Amalgam." He began by referring to its original discovery in 1808 by Berzelius and three other chemists almost simultaneously. Davy's reduction of potash and soda preceded the discovery of the amalgam, and led the way for other researches in this direction. The ammonium radical theory, as now generally accepted, was founded by Berzelius. Professor Seely differed in his opinion as to the constitution of the amalgam; he thought that the gases ammonia and hydrogen were only intimately and mechanically mixed with the mercury, and the peculiar spongy appearance of the so-called amalgam was due to the expansion produced by the escaping gases. If this theory be correct the uncombined gases ought to obey Mariotte's law of condensation, and Professor Seely proceeded to illustrate his idea by an experiment. Preparing a quantity of the ammonium amalgam in a tube closed at one end he submitted it to pressure by means of a piston accurately fitting the tube. The contraction and expansion of the amalgam were clearly seen and were evidently proportional to the pressure. On increasing the pressure to six or eight atmospheres the amalgam becomes liquid, resembling mercury, and on removing the pressure it resumes its original bulky condition. The liquid produced by great pressure he considered to be merely a compressed froth of mercury.

Professor Barker, of Yale College, being called upon to offer some remarks, said that he thought Professor Seely's experiment exceedingly interesting and a valuable contribution to our knowledge of ammonium amalgam, but he could not entirely agree in the explanation of its action. In what condition is the gaseous hydrogen and ammonia while under the greatest pressure. There was no visible escaping gas during the compression, and the fact that on removing the pressure the amalgam resumed its original bulk, appeared to him to be opposed to Professor Seely's physical theory.

Mr. O. Loew, of the College of New York, thought it possible to calculate the amount of hydrogen developed by a known quantity of sodium. If a portion of the hydrogen was combined with the mercury it could be determined by measuring the free hydrogen evolved. He was of the opinion that Professor Seely's experiment was additional proof of the chemical combination theory.

Dr. Isidor Waly remarked that if we adopt the physical theory we must agree that a decomposition and a recombination takes place each time that the pressure is applied and removed.

The discussion occupied nearly the whole evening, and was participated in by the leading chemists of the Society. The recent investigations of Graham and Loew into the properties of metallic hydrogen have called the attention of chemists everywhere to this subject, and hence the importance now attached to any new researches and experiments that may tend to throw light upon the questions at issue.

MANUFACTURE OF GRAPE SUGAR.

Large factories for the production of grape sugar from corn and other starch grains have been established within a short time in New Orleans, Buffalo, and Brooklyn. The first part of the process is analogous to that pursued in the manufacture of starch; and it is from the starch that the grape sugar is actually made.

The grain employed in this country is usually corn. The corn is steeped in very weak soda lye, for the purpose of softening the husk and gluten, and is then ground wet and run through revolving sieves to separate impurities; afterwards it is made to flow through ways or troughs, in which the starch gradually settles as a white powder. The wash water is run into a large cistern, and allowed to ferment and produce a weak vinegar. The starch from the troughs is put wet into the mash tub, and treated with water containing one per cent of sulphuric acid, for three to eight hours. The time of this treatment depends upon whether it is designed to convert the whole of the starch into sugar, or to make a sirup. The acid is neutralized with chalk or carbonate of lime, and the liquid evaporated to get rid of the gypsum, and afterwards further evaporated in vacuum pans, and run into barrels ready for crystallization.

Where it is only desired to make sirup, a certain percentage of dextrine is left in the solution, which keeps it liquid, and in this latter case the precaution must be observed to remove all traces of sulphuric acid. The concentrated sugar liquor is sometimes cast into blocks six inches square, and dried on plaster plates, as heat would discolor it.

A large amount of acetic acid is now made from grape sugar, as, according to a recent decision, this manufacture is not liable to the Government tax levied upon distilled spirits, and the process is cheaper than from alcohol. Brewers find it very advantageous to use sometimes as much as one half grape sugar in the mash, as there is a large saving of malt.

Grape sugar also finds a ready sale to manufacturers of wines; also as a substitute for liquid honey, for candies, and for the adulteration of cane sugar. It is a remarkable scientific fact that, while chemists can easily convert cane sugar into grape by the addition of the elements of water, the reverse operation of subtracting these elements is impossible and we cannot at present make cane sugar out of grape. The discovery of a process to effect this would be a fortune to any one, and would confer a great favor upon society, as it would then be possible to make crystallizable sugar out of a large class of refuse material. Although it is possible to make grape sugar out of linen rags, paper, shavings, sawdust, and any kind of cellulose, the operation does not pay, and a cheap starch material like corn is preferred.

The properties of grape sugar, and other facts with reference to it have been given in former numbers of this journal and need not be repeated here.

A NEW PROCESS FOR FIXING IMAGES BY EXPOSURE TO HEAT.

1st. Prepare a mixture of 60 centil. (¾ pint) of a solution saturated with bichromate of potassium, 6½ grammes (4½ dwt.) of gum-arabic, and 6 grammes (3¾ dwt.) of grape sugar, dissolved together in 150 centil. (a little more than 2½ pints) of water, and 6 centil. (one gill) thick glycerin. After the mixture has been thoroughly stirred up, filtered, and left to settle, a part of it is poured out on a glass plate, laid in a flat-bottomed, wrought-iron vessel, under which a spirit-lamp is placed in order to heat the temperature until the liquid mixture in evaporating has deposited a yellow sediment, or a coating of a uniform thickness.

2d. The engraving to be reproduced on enamel (whether

it be on stone, copper, wood, etc.) is immersed in a solution of equal parts of balsam of Canada and spirit of turpentine till it has acquired complete transparency, and the shades have taken the appearance of a wash on a glass. After this operation it is hung up to dry, and when diaphanous it is used instead of a glass positive. The image side must be placed in contact with the impressible coating, and on the whole unground plate glass must be laid, in order to obtain a complete adherence of the image to the gum coating.

3d. The whole is then brought out to daylight to render insoluble the parts exposed to its action, whilst those protected by the lineaments of the drawing preserve their mucilaginous properties, so that a viscous image is obtained on a dry ground.

4th. The image is then developed by means of a vitrifiable color of impalpable consistence laid down on the whole surface; if there is an excess of color it must be removed with a soft brush as soon as the image presents a sufficient degree of intensity. If it be dim it may be highly improved by heating and gently brushing it over.

5th. Subsequently crude collodion of good quality mixed with a few drops of refined castor-oil is poured on the entire surface, as practiced in the preparation of negative glasses. This application must not be allowed to over-dry, and it is taken off by keeping the plate in a forward and backward motion under a moderate but constant jet of water until the salt of chromium contained in the coating is almost washed off. Finally the proof is deposited in a capsule filled with acidulated water, an operation which will dissolve the last remnants of chromate, and afterwards wiped off with a piece of fine linen or calico. From that moment the work being fit for the furnace is left to dry. It is next deposited in a muffle, which is gradually brought to a red heat. The collodion burns away and the design is easily imprinted on the glass. If the image is to be fixed on other bodies than plate glass, it is advisable to wash it previously in a bath composed of one part of sulphuric acid and fifty of water, which will enable it to be easily transferred to and fixed on any other body. This operation being over the plate must undergo another minute washing in order to remove entirely the sulphuric acid, which would destroy the brilliancy of the image; but in this case it will be found expedient to add a solution of gum or of sugar in order to procure a perfect adherence of the image.

SCIENTIFIC INTELLIGENCE.

REGENERATION OF THE LAMING MASS.

It is now conceded that the best material for the purification of illuminating gas is the sesquioxide of iron, known as the Laming mass. This mass is placed in purifiers, the same as formerly, and after it has done its work it has a bad odor and must be regenerated for future use. To avoid disseminating a bad smell near the gas house, illuminating gas is forced backward through the mass for 1½ to 2 hours, which sufficiently disinfects it so that it is safe to remove the covers. One twenty-fourth as much as was originally purified is sufficient for this purpose, and this is not lost, as it can be returned through the purifiers and forced into the gasometer. With the Laming mass and the above precaution there need no longer be any gas nuisance.

NORMAL UNIT OF MEASUREMENT.

It is difficult to make a standard measure, and many devices have been suggested for the purpose. According to Fizeau the beryl expands by heat in a direction perpendicular to the principal axis and contracts on the direct line of the axis—there must be a point between the two where the contraction and expansion would be equal to zero. Soleil recommends the cutting of large beryl crystals in such a way as to afford a measure that would remain constant at all temperatures, and hopes to obtain in this manner a unit of measurement suited to the most accurate work.

RUSSIAN MINERALS.

The Russian Government has recently presented to the cabinet of the School of Mines, of Columbia College, a very choice collection of minerals. Conspicuous among them are nuggets of native gold, native platinum, iridosmine, large emeralds from the Urals, single and in clusters in the gangue; topaz, chrome garnet, malachites, etc., in all 456 rare specimens.

ADULTERATION OF ANILINE DYES.

Mr. S. Dana Hayes writes to the editor of the *American Supplement to Chemical News*, that he has recently found a curious adulteration in aniline dyes:

"It consists of fine granulated sugar, and each particle, or crystal, is so well covered with a thin film of the true aniline dye, as to produce a very good imitation, in color and form.

"The first instance was a case of sixty pounds of Hofmann's Violet, which was sold for about six dollars per pound, without discovery. It contained more than half its weight of this colored sugar, the remainder being ordinary crystals of aniline violet.

"These dyes have not been heretofore so extensively adulterated, and although this fraud may be easily detected, still it is a dangerous one, and one against which dyers and colorers should be cautioned."

A CLEVER HOAX---WHO IS DR. IVAN SLAVONSKI?

The following from Table Talk in *Appletons' Journal*, of May 28th, is a very bungling rehash of an article which appeared in the *World*, of May 1st, purporting to be a theory found in the posthumous papers of one Dr. Ivan Slavonski, an erudite Russian mathematician, in which it was attempted to prove mathematically man's immortality.

If the editor of *Appletons' Journal*, who seems to have swallowed this joke as a serious discussion, will call on the managing editor of the *World*, we have no doubt he will be favored with an introduction to the learned doctor himself, in the person of our old friend Mr. James Davis, in whose merry eye and fine metaphysical mind he will find evidence of talent, both for the perpetration of a good joke, and the elaboration of the fine-drawn theory to which the following epitome does feeble justice, besides misquoting and misrepresenting the author in various ways. He might also, perchance, be enlightened upon the subject of Dr. Meissner's "Theory of Life" and "The Hydropollusis," which we have no doubt are referable to the posthumous papers of Dr. Ivan Slavonski.

We shall not attempt to correct the errors in the following extract, as they do not spoil the joke. We confess to some surprise that the learned *savans* known to be connected with the journal referred to should have been so badly taken in.

"The immortality of the soul is so conclusively established in the teachings of Christianity, that an attempt to prove it on grounds apart from revelation must naturally seem to most minds a mere labor of supererogation—even if it be not one of irreverence; but, as evidence of the curious themes the human mind can invent, we would call the attention of our readers to a most remarkable theory propounded by the late Dr. Ivan Slavonski, a very distinguished Russian mathematician, in which he attempts to give 'Mathematical and Physical Proof of the Immortality of Man.' But it is not immortality, as we ordinarily understand it, that the learned mathematician believed himself to have established, for his 'mathematical and physical' proof consigns us for vast and indefinite periods of years to utter oblivion, but recalls us upon the stage of life at regular recurring eras, to re-enact our little drama of existence—to be born again, to enjoy, to suffer, to die, exactly as we are now born, and as we now enjoy, suffer, and die.

"We will endeavor to make Slavonski's extraordinary theory clear to the reader in as few words as possible. Dr. Slavonski asserts the atomtic theory of the universe. The world is composed of a limited and definite number of indivisible atoms. Atoms are defined as the smallest existing portion of matter. The infinite divisibility of matter has been asserted by some philosophers, but Dr. Slavonski asks pertinently whether or not there is the smallest existent portion of matter. To say there is *not*, is to say there is a portion of matter smaller than itself, which is an evident absurdity. The universe being composed of a definite number of atoms, these are ceaselessly undergoing change of place, constantly combining in new forms, and with variable results. But the question arises, Into how many possible forms may these atoms be arranged, and, when every variation of form is expressed, must not former combinations recur? The letters *a* and *b*, for instance, can only be formed into *ab* and *ba*; the letters, *a*, *b*, *c*, give six variations, or permutations, which are *abc acb, bac, bca, cab, cba*. Two things may be arranged by pairs in four ways, as *a* and *b* can be placed *aa, ab, ba*, and *bb*. These letters may be varied by pairs nine ways, and, as evidence 'of the number of combinations of a few things taken by twos, by threes, by fours, and so on, it is only necessary to state that in this way the letters of the alphabet would give 1,391,724,288,887,252,999,425,128,493,402,200 changes, and not one more. This result is definitely fixed by the law of their arrangement.' And, just as there is a law of limitation in the combination of three, six, or twenty-six letters, so there must also be a law of limitation in the combination of any number of items or atoms.

"There must come a time, then, according to this rule, when all possible place-changes of the atoms composing the universe will have been exhausted, and Nature must return to forms or combinations that have previously existed. This theory, the reader will understand, asserts that the time *must* come 'when the earth will be in the same condition it is at this moment, and that it has already been a vast number of times. The geological eras which have made it what it is will again work out their necessary results, and man will appear again, each individual being precisely the same individual he is now, born of the same parents, be reared under the same circumstances, and live the same life.' This surprising theory assumes, it will be noted, that each person is no more than a 'fortuitous congregation of atoms,' and entirely eliminates all conception of soul or spirit. The vast interregnum between each of our eras of existence is described as in no way affecting us, because we should be unconscious of the duration of time. Of what that duration may be, we can form some sort of breathless guess when we recall what we have already told of the number of combinations the English alphabet is capable of.

"If any one would like to estimate how many years must elapse before the world returns to its old courses, and things that have been shall once more be, let him assume the largest possible number his imagination can grasp as a possible enumeration of the number of atoms in the universe, and then let him apply the rule of permutations, which is as follows: To find, say, the permutations of two letters, multiply one by two; of three letters, multiply one by two, and the result by three; of four letters, multiply one by two, the result by three, and the last result by four. Seven letters will give five thousand and forty possible changes—and with this start we hope some of our industrious readers will ascertain the time when our earthly turn ought to come round again. But how strange and startling is this proposition! If it assumes that, at each recurring era, we should be unconscious of preceding ones, then this sort of immortality is nothing to us; immortality, if it concerns us at all, must mean the perpetuation of our individuality—and if it does meant this, then Dr. Slavonski's theory is worse than any purgatory ever dreamed of. Think of men and women being compelled in ever-recurring eras to endure over and over again all their trials, struggles, disappointments, and sorrows, all their pains and ills, all their delusions and sharp disciplines. Think of calamity, and war, and famine, of crime and disease, of persecutions and cruelties, of sloth and debauchery, of oppression and wrong, being also immortal, forever and forever returning to renew their terrible history! Why, this conception of immortality renders life absolutely appalling, and may well make us hope that Dr. Slavonski's 'Mathematical Proof,' will be found to have omitted some important factor, by which the dire result predicted may never come about."

Accident on the West Side Elevated Railway.

An accident occurred on the 16th inst., on the West Side Elevated Railway. It seems that the directors of this novel scheme were desirous of testing the speed and strength of the road, and for this purpose had loaded a freight car with ten tuns of pig iron, and proceeding up town at a good rate of speed came to Houston street, where the propelling rope for the lower section south of that street terminates. The propulsive power is then taken up again by another "endless" rope, and by the impetus given just up to the street the cars generally cross the span without fresh power. A sharp curve occurs on the southeast corner, and the passenger car, containing about fifteen people, passed over safely enough; but the freight car, with its heavy load of iron, was too much strain on the span of about eighty feet, and it was precipitated on the street, dragging with it the passenger car. This luckily alighted "plumb" on its wheels, only two of the occupants sustaining injuries, and those of a slight nature.

Editorial Summary.

LOUD'S PROPELLER—In answer to numerous inquiries, we have to say that the "Loud propelling wheel" consists of two disks or annular rims, secured upon a shaft at an angle varying from a right angle about fifteen degrees, so that the two disks intersect each other along a right line passing transversely through the shaft. The inventor's idea is that the wheel acts upon the water like an oar in sculling a boat. Mr. Loud's right to the patent was strongly contested by Senator Cole, but the matter was finally decided in his favor by the Supreme Court of the District of Columbia, and a patent was issued to him May 3, 1870. We expect shortly to publish an engraving and description of the wheel in this paper.

THE Commissioner of Mining, Mr. Raymond, in his report to Congress, estimates the bullion product of 1869 as follows:

California	$20,000,000
Nevada	14,000,000
Oregon and Washington	4,000,000
Idaho	7,000,000
Montana	12,000,000
Colorado and Wyoming	4,000,000
New Mexico	500,000
Arizona	1,000,000
All other sources	1,000,000
Total	$63,500,000

PREPARATION OF HYDROGEN ON A LARGE SCALE.—This new process consists in bringing to red heat a mixture of wetted coals and of alkaline hydrates, producing a compound of hydrogen and carbonic acid. This compound is sent through carbonates which, withholding the carbonic acid, become bicarbonates. The pure hydrogen is gathered in gasometers to supply light or heat. The bicarbonates are employed as they are, or as carbonic acid reservoirs. As for the oxides produced by the carbonization of the alkaline coals, they can be made use of in general agriculture, or other industries, or serve to form hydrates for new operations.

SPECIMENS of a new silver coinage have just been struck at the United States mint in Philadelphia of the denominations of ten, twenty-five, and fifty cents. Three different specimens of each of these denominations have been submitted to the Treasury Department for approval. The standard value of the new coins is reduced to correspond in actual value with our present "currency," with a view to its immediate use instead of the ten, twenty-five, and fifty-cent notes.

ARRANGEMENTS are being made to carry sea-water into London, so that sea baths may be enjoyed at all times of the year, without enduring the inconveniences of a journey from home. The water will be carried up in tanks on the railways at rates so moderate that the hitherto expensive luxury may be enjoyed by nearly all. The same thing ought to be done in New York. Uncleanness in body and corruption of morals always go together.

THE British Museum has cost the Government nearly $20,000,000, and it now costs nearly $600,000 a year to maintain it, or more than a dollar for every person who visits it. But the [illegible] Kensington Museum, which cost much less, is visited by three times as many people. The difference is said to be in the management rather than in the attractiveness of the collections.

AT a recent meeting of the American Geographical and Statistical Society, in New York, Paul B. Du Chaillu, the eminent African explorer, was presented, through President Daly, with a silver medal, awarded by the Imperial Geographical Society of Paris.

SOMEBODY says our Government ought to send a commission of scientific gentlemen to ascertain in what manner railroads are built and conducted in Russia. It is said that but five lives were lost on all the railroads of that empire last year.

MODE OF NOURISHING THE SHADE TREES IN PARIS.—All the boulevards in Paris are planted with trees, many of which were, however, destroyed during the revolution of 1848. New trees were therefore planted, and their growth fostered with an amount of skillful attention that has produced astonishing results when the natural disadvantages are taken into consideration. The trees are planted in loam that has been previously mixed with sand and transported to the city. This is contained in large receptacles, lined with brick, sunk below the surface of the footway and coated over with cement, so as to render them impervious. They form, in fact, gigantic flower-pots, and into them are conducted the roof-drains of each house block, from which the earth receives its water supply. These vessels or flower-pots are built of a capacity sufficient to admit of considerable expansion of the roots of the trees. An ornamental circular grating, set flush with the footway, is placed over these basins, and around the trunks of the trees. This admits of air for the proper support of the roots.

THE "COSTON TELEGRAPHIC NIGHT SIGNALS" have lately been adopted by purchase of the patent, in the Italian Navy—they having been adopted in the Navy of France three years since, and by the U. S. Government at the commencement of the late rebellion; and, to use the words of Secretary Welles, "were of incalulable value throughout the war." These signals are the more highly appreciated by the Italians for the fact of the application and combination of the Italian national colors, viz.: red, white, and green. They are in process of adoption by several others of the great maritime powers, and are also applicable for army purposes.

HARD AND COLD WATER.—Dr. Letheby considers moderately hard water better suited for drinking than that which is very soft—an opinion which is confirmed by that of the French authorities, who took the Paris water from chalk districts instead of from sandy strata. He also stated that a larger percentage of French conscripts are rejected from soft water districts than from neighborhoods supplied with hard water, and that English towns supplied with water of more than ten degrees of hardness have a mortality of four per one thousand less than those whose inhabitants use soft water.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

R. O., of Ind.—Printing in colors is done by using different sets of types for each color, care being taken that the sheets be laid always in the same position, for each successive impression. Shades and blended tints are not obtainable with types. Such printing is done on stone and is called lithography. Bronzed letters in imitation of gold, silver, etc., are produced by printing the letters first with a size, and afterwards rubbing them over with a soft leather pad, dipped in bronze powders. White letters are produced by plates or types on which the letters are sunk, instead of being raised, as in ordinary types.

G. E. K., of N. Y.—We believe the genuine asphalt, now so largely used in Europe, is the best material for concrete walks. See an article on the subject in another column. It is, however, probably not attainable by you. You can make a good walk of a concrete of coal-tar and gravel. Dig down four or five inches, and ram down a layer of pebbles; cover these with a layer of gravel dipped in hot coal-tar, adding coal ashes to absorb the surplus tar after the gravel has drained. Roll or ram very hard, and put on a third coat of very fine gravel in the same manner.

J. G. M., of Texas.—Metallic pens sold as steel are not all made of steel. Iron and various alloys are used. The best quality of pens are, however, steel.

J. H. W., of Cal.—You will find full instructions for softening hard water on page 217, Vol. XXI., of the SCIENTIFIC AMERICAN.

L. R. B., of Pa.—Paper hat bodies are by no means a new thing. Your method of making them may, however, be new.

D. P. D., of La.—The heads on pins are formed by dies on the blanks after they are cut from the coil of wire by the machines.

G. S., of Ohio.—You can clean rubber erasers by washing them with soap and water.

F. G. M., of N. C.—What is called British gum is identical with gum dextrine.

G. B. P., of Mass.—The commercial potash varies so much in its saponifying power that no definite rule for its weight in proportion to the amount of grease used in making soap can be given. The best way for you is to make a strong lye—sufficiently so to float a hen's egg—(the old rule for lye made from wood ashes), and then proceed exactly as in making soap from wood ashes. This correspondent has tried filling iron water tanks with pure soft water to prevent rusting, when they are not to be used, and says he finds it a thorough protection.

J. B., of N. Y.—Galvanized iron pipes are liable to attack from water containing free ammonia, or any other solvent of zinc oxide. They are therefore only proper to be used when analysis shows the water to be free from any solvent of the oxide of zinc. We believe block-tin lined lead pipe, if properly made and connected, are the best pipes yet devised to convey water for domestic use.

C. D. M., of N. Y.—The reason for using dilute acid when it is intended to scale, or brighten iron surfaces, is that the active agent in attacking the iron is the oxygen of the water used to dilute the acid. The acid itself acts to combine with the oxide as fast as found, producing sulphate of iron, which, being soluble in water, is thus removed at once from the surface of the iron.

L. M., of Vt.—Few articles in market are more commonly adulterated than beeswax. The most common adulterations are Venice turpentine, fatty matters of various kinds, stearine, flour, starch, white lead, salts of soda, baryta, and various earthy matters.

J. T. C., of Ill.—The black shining mineral you send appears to be a lead ore, and may be of value. The other mineral, showing grains of golden color, appears to consist of iron pyrites, of no value.

C. W. C., of Cal.—The diamond parlor matches contain no sulphur. The splints are dipped in paraffine, which answers the same purpose as the sulphur, but has not the bad smell of the latter.

D. V., of N. Y.—Shaddocks are supposed by many to possess a peculiar tonic medicinal virtue, and are often used to make bitters, by slicing them up in alcoholic liquors of various kinds.

E. J. G.—You cannot by any process that we know of soften or restore rubber belting that has become hard. If properly vulcanized it will not harden. Such belting is worthless.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

An established house, with extended custom among western manufacturers, desires Western Agency for some valuable invention. Irrefutable credentials furnished as to ability and integrity. Address Lock Box 304, Pittsburgh, Pa.

Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 61 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

One 60-Horse Locomotive Boiler, used 5 mos., $1,200. Machinery from two 500-ton propellers, and two Martin boilers, very low. Wm. D. Andrews & Bro., 414 Water st., New York.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

Stiff, heavy, powerful lathes, planers, shapers, slotters, and radial drills, in stock. E. & A. Betts, Wilmington, Del.

Wanted—The address of parties making belt hooks, for use with the patent round belting. Darrow Man'f'g Co., Bristol, Conn.

The New York and Eastern readers of the Scientific American will do well to remember that all of H. C. Baird's Books are for sale by S. R. Wells, 389 Broadway, New York. Send to him for catalogues.

Second-hand donkey pumps, 12, 25, and 35-H. engines, leather hose, old style blowers, cocks, valves, etc., etc. Wm. D. Andrews & Bro., 414 Water st., New York.

To Manufacturers—A mowing and reaping Machine, with front and rear cut, gearing only one wheel meshing into a spiral screw, a third less draft than any other machine. Also, a new Rake and Reel. Shop rights or States for sale. Address N. A. Wood, New York.

A Molder Wanted, with a small capital, 42 miles from any foundery. The advertising party has first-class machine tools. For particulars address Robert M. Weir, Montana, Boone Co., Iowa.

Wanted—A good second-hand milling machine. Index Miller preferred. Address P. & F. Corbin, New Britain, Conn.

Steel Makers' Materials—Wolfram ore, oxide manganese, Spiegel iron, borax, titanium, chrome, lubricating black lead, for sale by L. & J. W. Feuchtwanger, 55 Cedar st., New York.

Revolving Head-screw Machines, Gang Drills, Lathes, Tapping, milling, profiling, and other machines for sewing machine works, with latest improvements and excellent workmanship, constantly on hand or finishing, by the Pratt & Whitney Co., Hartford, Conn.

Pictures for the Household—Prang's "Four Seasons," after Jas. M. Hart. Sold in all Art Stores throughout the world.

For Sale by State or County—the improvement in Buckets, etc. as described in this paper of Sept. 11, 1869. Address John H. Tomlinson, 150 Madison st., Chicago, Ill.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the U. N. Co., 17 Warren st., New York.

Of Washing Machines, there is nothing to be compared with Doty's.—Weekly Tribune, Dec. 15, 1869.

An experienced mechanical and railway engineer wishes a position as Master of Machinery, or Manager. Address "Engineer," Station "G," Philadelphia, Pa., Postoffice.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

BOSTON, May 18, 1870.

MESSRS. EDITORS:—As your readers and correspondents have been much interested to know the results of the Water-wheel tests at Lowell, last summer, will you inform them that they will find a full report of the test of the Swain wheel, with descriptive diagrams and tables of the experiments (90 in number) on a 42-inch wheel, in the Journal of the Franklin Institute for March, 1870. This gives the mean result as follows: "With full gate, 81 3-10 per cent of the power of the water; with ¾ gate, 77 3-10 per cen; with ½ gate, 69 3-10 per cent of the whole power of the water." This wheel was of the ordinary finish. At a subsequent test, another of these wheels gave 83 7-10 per cent of useful effect. Further information on this subject can be had by addressing the "Swain Turbine Company, North Chelmsford, Mass."

Yours respectfully, L. B. STONE, C.E.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

REVOLVING GRATE.—Adolph Brase and Lemuel Salladey, Sciotoville, Ohio.—This invention has for its object to furnish an improved fire-place grate, which shall be so constructed that it may be revolved, or turned into the chimney, or into the next room, and which shall have a fireboard, formed upon its rear sides or end, which may be turned out, when no fire is required, without removing the grate.

COMBINED DOOR FASTENER AND KEY RING.—Bryant H. Melendy, Manchester, N. H.—This invention has for its object to furnish an improved combined door fastener and key ring, which shall be simple in construction and effective in operation in either capacity.

CRANK AND PITMAN.—Thomas Kealy, Lewisville, Texas.—This invention has for its object to furnish an improved crank and pitman for use upon mowing machines, reapers, pumps, and other places where it is necessary to change crank, or circular motion, into rectilinear motion, and which shall be so constructed as to greatly diminish the strain and wear attending such change of motion, when made in the ordinary manner.

HORSE HAY FORK.—John W. Hull, Connersville, Ind.—This invention relates to a new horse hay fork, of very simple construction. The invention combines the advantages of the ordinary pronged fork with those of the harpoon, by so constructing the projecting ears, so that they will be concealed like harpoons, when the load is to be discharged.

SAW FILING INSTRUMENT.—George E. Norris, Glen's Falls, N. Y.—This invention has for its object to furnish a simple and convenient instrument, by means of which a saw may be filed conveniently and accurately, at any desired pitch and bend, and which will insure all the teeth being filed exactly alike.

AUTOMATIC CARTRIDGE EJECTOR.—G. W. H. Calver, M.D., Burlington, N. J.—This invention has for its object to furnish an improved cartridge ejector, designed for attachment to all kinds of revolving or cylinder small arms, which shall be simple in construction, automatic in its action, and effective in its operation.

STEAM TRAPS.—Isaiah B. Coleman, Detroit, Mich.—This invention relates to improvements in steam and water traps, and consists in an arrangement of such traps for the application of disk valves.

HORSE HAY RAKE.—John S. Shrawder, Fairview Village, Pa.—This invention relates to a new mechanism for dumping and elevating horse hay-rakes, and for causing the automatic descent of the teeth after they have been dumped. The invention consists in the application of a peculiar gearing connection of the separate axles, with the dumping mechanism, the said connection being such as at all times to apply the joint force of both wheels to said mechanism.

BORING TOOL.—C. F. Whitney and R. Jones, Union Mills, Pa.—This invention relates to a new and useful improvement in a tool or bit for boring wooden pipes for pumps, or wooden tubing for conveying water, steam, or gas, or other liquid or fluid.

THOROUGH-BRACE SPRINGS.—John Goller, Los Angeles, Cal.—This invention relates to improvements in springs for thoroughbrace wagons and carriages, and consists in an improved arrangement of steel and wooden springs, for operation separately or together, according to the load suspended upon them, in a manner to provide more uniform elasticity, whether the load is heavy or light.

DOOR PROTECTOR.—Charles W. Gschwind, Port Republic, N. J.—This invention relates to a new plug or block, which shall serve to protect doors and walls from injury by the too far opening of the doors. The invention consists in securing a hollow rubber ball to the end of the plug or block, so that such ball will receive the pressure and shock of the door, and prevent injury to the same.

BOLT CUTTER.—Levy Daniels, Oak Hill, N. Y.—This invention relates to a new bolt cutter, in which the movable jaw is so hung that it can be operated with great power. The invention consists in so hanging the movable jaw in a pair of pivoted straps, and in a bracing lever, that the motion, although short, will be extremely powerful.

ONE-ARMED MAN'S ASSISTANT.—George W. Dalbey, Carrollton, Miss.—The object of this invention is to provide an implement whereby one-armed persons can be enabled to hold articles of food for cutting, or paper for writing and drawing. The invention consists chiefly in the employment of a spring bar, which can be pushed forward by means of the arm-stump or shoulder of a one-armed person, to operate a pivoted bell crank. This crank carries a fork or pressure pad, which when pressed upon a plate or table, will serve to hold down whatever may be placed under it.

POTATO PLANTER.—J. Krehbril, Clarence Center, N. Y.—This invention has for its object to furnish a simple and convenient machine, by means of which potatoes may be dropped and covered rapidly, thoroughly, and regularly, and in such a way as to mark the ground, so that the planting may be done with exactness and uniformity.

SPOKE TENONING AND HUB BORING MACHINE.—John Deming, Salem, Ohio.—This invention relates to improvements in machines for tenoning the spokes, and boring the hubs for mortising, also for boring fellies, and it consists in improved arrangements of devices for effecting the vertical adjustment of the boring tool head, and feeding apparatus for reciprocating the boring tool; also, in the holding devices for holding and centering the spoke for the reception of a hollow auger or tenoning tool; also, in an improved centering device for receiving and holding the hub while boring it, or tenoning the spokes, and for spacing the hubs for boring; also for holding the fellies for boring, and in an improved tenoning tool for tenoning the spokes.

RAILWAY STATION INDICATOR.—Julius P. Pfan, Lansingburgh, Conn.—This invention relates to improvements in railway station indicators, and it consists in the application between the rollers on which the canvas is wound, of a tension roller placed in front of the opening in the case for the observation of the names of stations, and the arrangement of the upper and lower rollers to be forced against it by springs or other yielding mechanism, whereby they will be moved by it, and the canvas stretched over the front side of the said middle roller, and in front of the opening, and maintaining it in a taught condition, whether it be wound more on one roller than the other or not. The invention also consists in a ratchet and pawl mechanism of peculiar construction applied to each end of the said middle roller, for moving it in opposite directions, as the cars are reversed at the ends of the routes, the said ratchet and pawl mechanisms being so constructed that after each movement the pawl is raised out of contact with the wheel, leaving it free to be moved backward if required.

AMERICAN CALENDAR WITH MOVABLE BLOCK AND DATE.—Vve. Adrien Maurin and Gustave Toiray, Paris, France.—This well known calendar is composed of a block or book, 365 paper leaves thick, the leaves representing every day in the year, and having each of them various useful notes printed thereon, as the date, the day, the month, the phases of the moon, ephemerids, etc. The said block, one sheet of which is to be taken off every day, is fixed permanently, either by glue or otherwise on a pasteboard or other ornamental plate or stand, bearing the number expressive of the current year, the whole being suspended or held within sight in the office, store, room, or other places, where it may be desired to place and expose it. The improvements consist: first, in making this block or book movable, so that it may at will be slided in and displaced and detached from its supporting or standing plate; second, in making said holding or standing plate, which may be of any suitable material, preferably of metal, so that it may serve indefinitely.

STEAM BOILER.—W. H. Law, Birmingham, England.—This invention relates to a novel method of constructing steam boilers, whereby the steam generating surface is greatly increased, a full and free circulation of water is secured, and the strength of the boiler increased.

SADDLE STIRRUP.—J. A. Dunnagan, Mexico, Miss.—This invention relates to a new and useful improvement in stirrups for riding saddles, whereby ease, convenience, and durability, are combined, and it consists in the application of spiral springs (two or more) to the stirrup by which the foot piece or tread of the stirrup is made elastic.

AUTOCRATIC LAMP AND TAPER LIGHTING ATACHMENT.—W. H. Weeks, New York city.—This invention has for its object to furnish a simple, convenient, and effective, self-lighting attachment for lamp and taper burners, and it consists in the construction of the burner and wick.

INK ERASER.—H. T. Cushman, North Bennington, Vt.—This invention relates to compound tools for erasing ink on paper, and preparing the place of erasure to receive subsequent writing without blur and blot.

SPRING BED BOTTOM.—J. F. Duffy and W. P. Frailey, Chicago, Ill.—This invention relates to a new and useful improvement in bed bottoms, whereby they are made elastic and durable, and so that they may be readily taken apart for transportation or repairs, and it consists in the combination and arrangement of bow or elliptic steel springs with hoop iron and woden frames.

HULLING MACHINE.—G. A. Buchholz Regent's Park, London, Eng.—This invention relates to improvements in the horizontal or longitudinal hulling machine, previously patented to the same inventor, the object being to reduce the cost of its construction, and increase its efficiency. Instead of making the outer case and the drum which it contains, conical, as heretofore, it is now made both cylindrical, and the central shaft which carries the drum and supports the case in position, is mounted so that it may receive any desired inclination towards the delivery end of the machine. The invention also consists in an application of the outer case of friction surfaces to the inner surfaces of the sections.

APPARATUS FOR STEAMING LARD AND OIL VESSELS.—C. J. Yergason, Brooklyn, N. Y.—This invention relates to improvements in apparatus for discharging steam into barrels and other vessels containing lard oil, and other like substances, through the bungs or other openings, as is required in oil refining and lard repacking establishments, in removing the lard and oil and refining it, and it consists in the application of nozzles or short discharging tubes to the screw-threaded ends of steam pipes, by means of pipe T's plugged at one end, and fitted to screw the plugs against the ends of the steam pipe, for stopping the flow of steam, and adapted for being received in the bung-holes of the barrels containing the lard to be removed, the said barrels being placed over the nozzles. The said arrangement is much less expensive than the cocks now used, and is intended as a substitute for them.

CLOCKS AND WATCHES.—William H. Horton, Jersey City, N.J.—The object of this invention is to provide means for counteracting the effects of variations in temperature on clocks and watches.

BREECH-LOADING FIRE-ARM.—Jarvis Davis, Buffalo, N. Y.—This invention relates to a new and useful improvement in breech-loading fire-arms, whereby they are made more simple and durable than they have hitherto been.

FLUTING SCISSORS.—Henry Gerecke, Carlstadt, N. J.—This invention relates to improvements in the construction of fluting scissors, and consists in making the handles of cast metal and the fingers of wrought or rolled wire, and attaching them to the ends of the handles, below the pivot point by screwing or otherwise fastening them into holes in the ends of the handles.

BATHING APPARATUS.—Wm. Tell Street, Frankford, Pa.—This invention relates to improvements in safety bathing apparatus, and consists in the employment of a light bathing car, provided with rotating guards, floats, and wheels, and with hauling tackle, the latter connected to a windlass on shore, and a buoy, at sea, so arranged that the car can be drawn from the shore into the water and back again, without danger to the occupants who may enter before the car enters the water, and remain therein until it is drawn out again.

TOBACCO ROLLING MACHINE.—J. W. Stone, Paris, Tenn.—This invention relates to improvements in machines for rolling tobacco for forming it into plugs, and consists in a combination of feeding apparatus for the prepared fillings, and another for feeding the wrappers, with folding apparatus for folding the wrappers over the fillings, and inclosing them, previous to the condensing operation of the rollers. It also consists in an arrangement of the condensing rollers in sections, for the application of disks for dividing the spaces for making narrower plugs; and it also consists in the combination with the rotary cutter, for cutting the plugs, of a sliding bed, arranged to move with the cutters, while they are in contact with it.

ALARM TILL.—John F. Baldwin, Nashua, N. H.—This invention relates to improvements in alarm tills, and consists in mounting the locking bolts in a tilting case, with which the bell-hammer catch is combined in such a way that an effort to withdraw the till, without contracting the bolts, will cause the case to swing back against the bell-hammer catch, and trip the hammer, to allow it to sound the alarm. The invention also comprises a novel arrangement of the bolts and the dogs, by which they are operated to obstruct the opening by unauthorized persons, and to facilitate the changing of the combination; and it also comprises a novel construction of the bolt case, calculated to facilitate the changing of the bolts, and arranged, also, so as to be cheaply constructed.

TRACTION MACHINE.—S. S. Stuntz, Jamestown, N. Y.—This invention relates to improvements in traction machines for drawing plows, and for other heavy draft purposes, and consists in a car or truck, mounted on an endless traction device composed of broad bars or planks, connected to belts or chains, or hinged together, working over pulleys at each end, and carrying rollers or wheels, mounted in bearings, on the inner faces, on which rails, attached to the truck, rest and roll along, as the truck is propelled, in any way, the said wheels supporting the bars of the traction device on the upper side of the said rails when in the upper or returning position. It also consists in the application, to each end of the truck, of draft frames with guiding caster wheels so attached that the weight of one side, or a portion thereof, may be transferred from the draft device to the guiding wheels, when required to turn it either way from a straight line.

Official List of Patents.

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FOR THE WEEK ENDING May 17, 1870.

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103,005.—PRUNING TOOL.—G. W. Anesley, Marengo township, Mich.

103,006.—FURNACE FOR ROASTING, OXIDIZING, AND CHLORIDIZING ORES.—J. P. Arey, Georgetown, Colorado Territory.

103,007.—HANDLE FOR BOAT HOOKS, ETC.—F. F. Bibber, Boston, Mass.

103,008.—REIN HOOK.—Grinfill Blake, Taunton, Mass.

103,009.—BOBBIN.—Milton Bliss, Ionia, Mich, assignor to A. M. Bliss.

103,010.—WINDOW SCREEN.—A. C. Brown, Chicago, Ill.

103,011.—LAMP.—Abner Burbank, Rochester, N. Y., assignor to himself, H. S. Joy, and G. D. Williams.

103,012.—MEDICINE CASE.—Alphonzo Button, Dunkirk, N. Y.

103,013.—REVOLVING FIRE-ARM.—G. W. H. Calver, Burlington, N. J.

103,014.—DIGGING AND TAMPING PICK.—Chas. Carroll, North Vernon, Ind.

103,015.—AUTOMATIC FRICTION DOG LATHE CHUCK.—Loring Coes, Worcester, Mass.

103,016.—STEAM TRAP.—I. B. Coleman, Detroit, Mich.

103,017.—GAS HEATER.—Joshua Cromly, Philadelphia, Pa.

103,018.—MANUFACTURE OF IMITATION HAIR CLOTH.—J. J. Comstock and Jas. Aborn, Providence, R. I.

103,019.—SUB-BASE REED ORGAN COUPLER.—Geo. Cook, New Haven, Conn.

103,020.—SHAFT TUG.—W. H. Correll, Nashville, Ohio.

103,021.—SHAPING MACHINE.—Alfred B. Couch, Worcester, Mass.

103,022.—SEEDING MACHINE.—C. H. Cowles, Nebraska City, Nebraska.

103,023.—ONE-ARMED MAN'S ASSISTANT.—G. W. Dalbey, Carrollton, Miss.

103,024.—SEAT FRAME FOR VEHICLE.—J.W. Dann, Columbus, Ohio.

103,025.—SPIKE, BOLT, AND RIVET MACHINE.—Maxime Decelle, Newburg, Ohio.

103,026.—SLEEPING COLLAR.—Levi Dederick, New York city.

103,027.—SUB CUTANEOUS EXHAUSTER.—G. Dieulafoy, Paris, France.

103,028.—CONSTRUCTION OF TUNNELS AND DAMS.—Lewis Dodge, Chicago, Ill. Antedated May 14, 1870.

103,029.—EARTH CLOSET.—J. A. Drake (assignor to W. R. C. Clark), New Orleans, La.

103,030.—SPRING BED BOTTOM.—Jas. F. Duffy and Wm. P. Frailey, Chicago, Ill., said Frailey assigns his right to said Duffy. Antedated May 7, 1870.

103,031.—SADDLE STIRRUP.—J. A. Dunnagan, Mexico, Mo.

103,032.—HEAD BLOCK FOR SAW MILLS.—Joseph Duvall and John Winterbottom, Kewaunee, Wis.

103,033.—WOOD LATHE.—L. H. Dwelley, Dorchester, Mass. Antedated May 9, 1870.

103,034.—COMPOSITION TO PREVENT THE SLIPPING OF MACHINE BELTS.—Ithamar F. Eaton, Boston, Mass.

103,035.—ELECTRO-MOTOR ESCAPEMENT.—Thomas A. Edison, New York city.

103,036.—GAS GENERATOR.—T. B. Fogarty, New York city. Antedated May 12, 1870.

103,037.—INSECT TRAP.—Peter Funk and Jo. Nicodemus Baader, Buffalo, N. Y.

103,038.—PLOW.—Horatio Gale, Albion, Mich.

103,039.—FLUTING TONGS.—Henry Gerecke (assignor to himself and Augustus Gerecke), Carlstadt, N. J.

103,040.—PROPELLING VESSELS.—Joseph Ghisi, Genoa, Italy.

103,041.—THOROUGHBRACE SPRING.—John Goller, Los Angeles, Cal.

103,042.—DOOR GUARD.—Chas. William Gschwind, Port Republic, N. J.

103,043.—PADLOCK.—E. P. Hall, Chicago, Ill.

103,044.—DOOR CHECK AND HOLDER.—S. L. Hart, Menasha, Wis.

103,045.—SAW TEETH.—Geo. L. Hiles, Chicago, Ill.

103,046.—MUSIC RACK.—J. R. Hill, Hyde Park, assignor to himself and H. E. Hill, Lowell, Mass.

103,047.—TRUSS.—Henry Howe, Council Bluffs, Iowa.

103,048.—LAMP EXTINGUISHER.—John Hughes, New Berne, N. C.

103,049.—SMUT MACHINE.—Fred Ihlenfeldt, Le Roy, Ill.

103,050.—LOOPING HOOK FOR SEWING MACHINE.—M. A. Keables, Brattleborough, Vt.

103,051.—MACHINE FOR STRETCHING SILK, ETC.—G. R. Kennedy, Worcester, Mass.

103,052.—MACHINE FOR SPINNING WOOL.—Edward Kilbourn, New Brunswick, N. J.

103,053.—REVERSIBLE LATCH.—Jacob Kinzer, Pittsburgh, Pa.

103,054.—REVERSIBLE LATCH.—Jacob Kinzer, Pittsburgh, Pa.

103,055.—SAUCEPAN HANDLE.—Jacob Kinzer, Pittsburgh, Pa.

103,056.—STAMP FOR FRUIT CANS.—Jacob Kinzer, Pittsburgh, Pa.

103,057.—VEGETABLE CUTTER.—Nicholas Kipper, Seymour, Ind.

103,058.—POTATO PLANTER.—John Krehbril, Clarence Center, N. Y.

103,059.—STEAM GENERATOR.—William Hartill Law, Birmingham, England.

103,060.—CORPSE PRESERVER.—Henry Lee, Washington, D. C.

103,061.—ELECTRIC FOOT WARMER.—Caleb V. Littlepage, Austin, Texas.

103,062.—SAFETY VALVE.—John D. Lynde, Philadelphia, Pa. Antedated May 2, 1870.

103,063.—FLUTING MACHINE.—Eli J. Manville, Waterbury, Conn.

103,064.—COLD-CAP STILL FOR THE DISTILLATION OF ALCOHOLIC AND OTHER LIQUIDS.—J. B. Mason, Chapel Hill, N. C.

103,065.—HORSE HAY RAKE.—Joseph A. McGee, Sharpsville, Ind.

103,066.—CHAIR, BEDSTEAD, AND CRIB.—Wm. McGregor, Chicago, Ill.

103,067.—COMBINED COTTON-SEED PLANTER AND FERTILIZER DISTRIBUTER.—W. M. McLendon, Greenville, Ga.

103,068.—COMBINED DOOR FASTENER AND KEY RING.—B. H. Melendy, Manchester, N. H.

103,069.—CORD-TENSION DEVICE FOR WINDOW SHADE.—C.H. Miller, Buffalo, N. Y.

103,070.—SEWING MACHINE.—Adam Moltz, New York city.

103,071.—PACKING FOR THE JOURNAL BOXES OF RAILROAD CARS.—Nathaniel Monroe (assignor to himself, W. T. Keen, and C. P. Stowe), Boston, Mass.

103,072.—CONDUCTOR FOR TELEGRAPHS.—Jas. Montgomery, New York city. Antedated April 30, 1870.

103,073.—TORCHLIGHT.—F. A. Morley, Syracuse, N. Y. Antedated May 2, 1870.

103,074.—COMPOUND FOR MANUFACTURE OF VARNISH AND PAINTS.—Joseph Naftel, Cleveland, Ohio.

103,075.—SAW-FILING INSTRUMENT.—G. E. Norris, Glen's Falls, N. Y.

103,076.—STEAM VACUUM PUMP.—J. H. Pattee and George H. Nye (assignors to themselves, H. J. Graham, and H. H. Pattee), Monmouth, Ill.

103,077.—ELECTRO-MAGNETIC MOVEMENT.—F. L. Pope, Elizabeth, N. J.

103,078.—BREECH-LOADING ORDNANCE.—A. F. Potter, San Francisco, Cal.

103,079.—CARTRIDGE CASE.—Timothy J. Powers, New York city.

103,080.—PLANING MACHINE.—John Richards, Philadelphia, Pa., assignor to J. A. Fay & Co., Cincinnati, Ohio.

103,081.—STEAM GENERATOR.—Peter Riley, Lancaster, Pa.

103,082.—TRANSPLANTING IMPLEMENT.—E. B. Roberts and Wm. Graham, Sturgis, Mich.

103,083.—COOKING STOVE.—Francis H. Root, Buffalo, N. Y. Antedated April 10, 1870.

103,084.—CURTAIN FIXTURE.—Franklin Root, Chelsea, Mass. Antedated May 9, 1870.

103,085.—COMPOSTING MANURE AND FERTILIZER.—Daniel Ruggles, Fredericksburgh, Va.

103,086.—STRAW CARRIER FOR THRASHING MACHINE.—C. Russell and W. K. Miller, Massillon, Ohio.

103,087.—STEAM GENERATOR.—G. O. Sampson, Jamestown, N. Y.

103,088.—GRUBBING IMPLEMENT.—John Sattazahn, Jr. Pine Grove Township, Pa. Antedated May 10, 1870.

103,089.—COMPOSITION METAL OR ALLOY.—Wm. Schrier, Logansport, Ind.

103,090.—MANUFACTURE OF SUGAR.—Constantin Rosswog, New York city, administrator of the estate of Sebastian Schuzenbach, deceased.

103,091.—MANUFACTURE OF EXTRACT OF HOPS.—C. A. Seely, New York city.

103,092.—HORSE HAY RAKE.—John S. Shrawder, Fairview Village, Pa.

103,093.—STUD FOR FASTENING NECKTIES TO COLLARS.—W. E. Simonds, Hartford, Conn.

103,094.—MANUFACTURE OF STEEL.—F. G. Slade, Trenton, N. J.

103,095.—CEMENT FOR PAVEMENTS, WALKS, ROOFS, ETC.—G. B. Smith, New York city. Antedated May 4, 1870.

103,096.—COLUMNAR MATTRESS.—H. E. Smith, New York city. Antedated May 3, 1870.

103,097.—SLEEPING-CAR BERTH.—W. B. Snow, Chicago, Ill.

103,098.—Suspended.

103,099.—MACHINE FOR RAKING AND COCKING HAY.—Z. C. Steele, Pana, Ill.

103,100.—MACHINE FOR RAKING AND COCKING HAY.—Scott Stewart, Lowell, Mass.

103,101.—SIDE-SADDLE TREE.—Jacob Straus, St. Louis, Mo.

103,102.—TRACTION MACHINE FOR PLOW.—S. S. Stuntz, Jamestown, N. Y.

103 103.—BRIDLE BIT.—J. A. Swan, North Anson, Me.

103,104.—MODE OF MAKING BOOTS.—Hiram Thayer, Monson, Mass.

103,105.—PAVEMENT.—Aaron Van Camp, Washington, D. C., and M. M. Hodgman, St. Louis, Mo.

103,106.—GRINDING MILL.—A. J. Vandegrift and G. W. M. Vandegrift, Cincinnati, Ohio.

103,107.—BRACKET FOR SUPPORTING STOVEPIPE SHELVES.—Horace Vansands, Middletown, Conn.

103,108.—CAR COUPLING.—Joseph Van Steenberg, Chicago Ill.

103,109.—MANUFACTURE AND PURIFYING OF IRON.—James Webster, Birmingham, Eng. Antedated May 4, 1870.

103,110.—AUTOMATIC LIGHTING WICK FOR LAMPS.—W. H. Weeks, New York city.

103,111.—BOX FOR TRANSPORTING EGGS.—George A. Wells, Oskaloosa, Iowa.

103,112.—WASHING MACHINE.—Philander Wilbor, Milan, Ohio.

103,113—KNIFE SHARPENER.—P. M. Withington, Stoughton, Mass.

103,114.—CARRIAGE WHEEL.—Mileden Wonser, Norwalk, Ohio.

103,115.—PREPARATION OF FIBROUS MATERIAL.—James Woodruff and Frederick Boyd, Quincy, Ill.

103,116.—APPARATUS FOR STEAMING LARD AND OIL CASKS.—C. J. Yergason, Brooklyn, N. Y.

103,117.—ALARM TELEGRAPH SIGNAL BOX.—Job Abbott, Canton, assignor to Automatic Fire Alarm Co., Leetona, Ohio.

103,118.—WHIFFLETREE.—J. J. Adair, Portland, Ind.

103,119.—MACHINE FOR JOINTING STAVES.—J. W. Alesworth, Santa Cruz, Cal.

103,120.—STEAM GENERATOR.—Dexter Amsdell, Hamburgh, N. Y.

103,121.—AIR-COMPRESSING APPARATUS.—B. T. Babbitt, New York city.

103,122.—INSULATOR FOR TELEGRAPHIC WIRE.—R. B. Baker, Philadelphia, Pa.

103,123.—STEAM COTTON PRESS.—Augustine Baldwin, New York city.

103,124.—ALARM TILL.—John F. Baldwin, Nashua, N. H., assignor to himself and the Miles Alarm Till Manufacturing Co., Providence, R. I.

103,125.—CAN OPENER.—Abel Barker, Wyoming, Pa.

103,126.—DOOR FOR RAILWAY BOX CARS.—Charles Barker (assignor to himself and T. C. Thomas), Knox county, Ill. Antedated May 13, 1870.

103,127.—APPARATUS FOR LIGHTING GAS BY ELECTRICITY.—W. W. Batchelder (assignor to George Viles, Boston, Mass.

103,128.—HARNESS BUCKLE.—Alma Bedford, Cold Water, Mich. Antedated May 5, 1870.

103,129.—WAGON SEAT ATTACHMENT.—Wm. Beers, Milan, Ohio.

103,130.—RAILWAY CAR COUPLING.—James Blakeney, Springfield, Ohio.

103,131.—ROLLER FOR SASH STRAP FOR CARRIAGES.—J. H. Bloodgood, Bridgeport, Conn.

103,132.—HARNESS SADDLE.—Valentin Borst, New York city.

103,133.—CLOTHES DRYER.—Harvey Bosworth, Champlain, N. Y.

103,134.—GRATE FOR FIREPLACE.—Adolph Brase and Lemuel Salladey, Sciotoville, Ohio.

103,135.—MACHINE FOR BREAKING, SCUTCHING, AND SEPARATING FIBROUS MATERIAL.—Edward Brasier, New Cross, assignor to J. E. Hodgkin, Liverpool, England.

103,136.—HARVESTER.—C. H. Charlesworth and J. H. Short, Avoca, N. Y.

103,137.—MILK CAN.—C. L. Clamp and J. H. Chappel, Brooklyn, N. Y.

103,138.—SPRING BED BOTTOM.—G. O. Capen (assignor, by mesne assignments, to S. A. Barker), Providence, R. I.

103,139.—SLIDING DOOR APPARATUS.—Jacob Capron, New York city.

103,140.—PISTON PACKING.—John Clark, Harrisburgh, Pa.

103,141.—PROCESS OF PURIFYING LINSEED OIL.—Richard T. Clarke (assignor to himself and Gabriel A. Taylor), Cincinnati Ohio.

103,142.—FLAP FASTENER FOR THE DASHER OF CARRIAGES.—R. Clingen (assignor to Thomas Goddard), Boston, Mass.

103,143.—LATCH FOR GATE.—Henry Clymo, Galena, Ill.

103,144.—TRAVELING-BAG FASTENER.—Friedrick Coeller, New Haven, Conn., assignor to Cornelius Walsh, Newark, N. J.

103,145.—FAUCET.—W. S. Cooper, Philadelphia, Pa.

103,146.—HAND-STAMP FOR CUTTING CHECKS, BONDS, ETC.—J. F. Cory and J. H. Brown, Brooklyn, E. D., N. Y.

103,147.—BEATER FOR THRASHING MACHINE.—JohnCrowley, Sparta, Wis.

103,148.—PLOW COLTER.—George Curkendall, Dixon, Ill.

103,149.—ERASER.—Henry T. Cushman, North Bennington, Vt.

103,150.—SIGNAL BOX FOR FIRE ALARM TELEGRAPH.—S. D. Cushman, New Lisbon, assignor to the Automatic Fire Alarm Company, Leetona, Ohio.

103,151.—STAVE-JOINTING MACHINE.—Amos Cutter, Boston, Mass.

103,152.—BOLT-CUTTING DEVICE.—Levi Daniels, Oak Hill, N. Y.

103,153.—HAND CORN PLANTER.—Augustus C. L. Davis, St. Louis, Mo.

103,154.—BREECH-LOADING FIRE-ARMS.—Jarvis Davis (assignor to P. Smith), Buffalo, N. Y.

103,155.—CLOTHES LINE HOLDER.—Jos. Davis, Harrisburg, Pa.

103,156.—RAILWAY CAR COUPLING.—T. J. Delany, Loudoun county, Va., assignor to himself and Clinton Lloyd, Washington, D. C.

103,157.—SPOKE-TENONING AND HUB-BORING MACHINE.—John Deming (assignor to himself and A. R. Silver), Salem, Ohio.

103,158.—MILK PAIL WITH STRAINER ATTACHED.—Loyal M. Doddridge, New Mount Pleasant, Ind.

103,159.—GUIDE FOR SEWING MACHINE.—Wm. C. Dodge, Washington, D. C.

103,160.—FORGE BONNET.—Walter Dunkerly, Woonsocket, R. I.

103,161.—AXLE BOX FOR CARRIAGES.—G. B. Durkee, Alden, N. Y.

103,162.—WATER WHEEL.—Wm. T. Duvall, Georgetown, D. C.

103,163.—FIRE KINDLING.—G. W. Eldridge, South Chatham, Mass.

103,164.—SHOE.—Thomas Richard Evans, Philadelphia, Pa.

103,165.—FURNITURE CASTER.—Frederic G. Ford, New York city.

103,166.—BEEHIVE.—Thomas A. Frakes, Middletown, Ill.

103,167.—CURTAIN FIXTURE.—G. P. Fuller, Humphrey, N. Y. Antedated May 19, 1870.

103,168.—BITUMINOUS ROCK PAVEMENT.—J. L. Fulton and Julius Brace, Covington, Ky.

103,169.—MATERIAL FOR ROOFING AND PAVING.—J. L. Fulton and Julius Brace, Covington, Ky.

103,170.—LUBRICATOR.—Gregory Gerdom, Albany, N. Y.

103,171.—STUMP EXTRACTOR.—Charles Gernes and John H. Gruenhagen, Winona, Minn.

103,172.—RAILWAY CAR COUPLING.—William F. Grassler, Muncy, Pa.

103,173.—FILTER.—John M. Hackney, Danville, Ky.

103,174.—ELECTRO-MAGNETIC RAILROAD ALARM.—Thos. S Hall, Stamford, Conn.

103,175.—MECHANICAL MOVEMENT.—R. B. Hamel and J. B. Holden, Jersey City, N. J., assignors to themselves, Arthur M. Smith, and Henry W. Newkirk.

103,176.—RADIATOR FOR HEATING FURNACES.—Chas. Harkinson, Philadelphia, Pa.

103,177.—Suspended.

103,178.—SPRING BALANCE STOP FOR SAFETY VALVE.—Bayliss Hathaway, Elizabeth Port, N. J.

103,179.—STATION INDICATOR FOR RAILROAD CARS.—Wm. Hebdon, New York city.

103,180.—CULINARY VESSEL.—C. W. Hermance, Schuylersville, N. Y.

103,181.—STAY FOR TRUNK.—Louis Hillebrand, Philadelphia, Pa.

103,182.—ICE CREAM FREEZER.—B. H. Hilliar, New London, Conn.

103,183.—PERMUTATION LOCK.—J. C. Hintz, Jr., Cincinnati, Ohio.

103,184.—STEAM TRAP.—James Wilson Hodges, Baltimore, Md.

103,185.—COMBINED RAKE AND REEL FOR HARVESTER.—Pliny F. Hodges, Moline, Ill.

103,186.—COMBINED RAKE AND REEL FOR HARVESTER.—Pliny F. Hodges, Moline, Ill.

103,187.—SWIVEL PLOW.—Frederick Holbrook, Brattleborough, Vt., and James A. Howe and Joel Nourse, Boston, assignors to Joel Nourse, Boston, Mass.

103,188.—METAL INJECTOR.—John W. Hollingsworth, Mount Vernon, Ind.

103,189.—ARTIFICIAL TEETH.—J. W. Hollingsworth, Mount Vernon, Ind.

103,190.—COMPENSATING REGULATOR FOR WATCHES.—Wm. H. Horton, Jersey city, N. J.

103,191.—SAND-PAPERING MACHINE.—Philip Hufeland, New York city.

103,192.—HORSE HAY FORK.—John W. Hull, Connersville, Ind.

103,193.—JACK SPOOL.—B. James, Worcester, Mass.

103,194.—POTATO DIGGER.—Moses Johnson, Three Rivers, Mich.

103,195.—COMBINED SHIRT AND COLLAR.—James A. Jones, (assignor for one half his right, to Wm. S. Teel, Washington, D. C.

103,196.—PITMAN.—Thomas Kealy, Lewisville, Texas.

103,197.—PRUNING SHEARS.—Clement A. Kellogg, Elyria, Ohio.

103,198.—FABRIC FOR CARPET LINING, ETC.—J. L. Kendall, Foxborough, Mass., and R. R. Trested, New York city.

103,199.—MANUFACTURE OF ROOFING FELT.—Samuel Kingan, New York city, administrator of the estate of James Anderson, deceased.

103,200.—CUTTER HEAD FOR PLANING MACHINES.—John Kushnle, Cincinnati, Ohio.

103,201.—NICKEL PLATING.—Wm. Jacob Kuhns, Brooklyn, N. Y.

103,202.—AUTOMATIC RAILWAY SWITCHES.—Lewis E. Kurtz, Baltimore, Md.

103,203.—CLOD FENDER AND PULVERIZING ATTACHMENT FOR SHOVEL PLOW.—Edward Lannay, Mowrytown, Ohio.

103,204.—COOKING STOVE.—Silas H. La Rue, Allentown, Pa.

103,205.—ANCHOR.—Albert H. Law, San Francisco, Cal.

103,206.—FILTER FOR CISTERN.—Patrick Laughlin, Danville, Ky.

103,207.—CAR COUPLING.—N. Edward Leaman, Dayton, Ohio.

103,208.—TANK FURNACE FOR MAKING GLASS.—Geo. Leuffgen, Charlottenburg, near Berlin, Prussia.

103,209.—COATING FABRICS WITH PARKESINE.—John Lewthwaite, Woburn Place, London, England. Patented in England, March 4, 1868.

103,210.—KNIFE POLISHER.—Charles H. Lithgow, Chicago, Ill.

103,211.—MILL SPINDLE DRIVER.—J. M. Logan, Springfield, Ill.

103,212.—STEAM ENGINE.—H. E. Long, Decatur, Ill.

103,213.—LAMP BURNER.—William D. Ludlow, New York city.

103,214.—VARNISH FOR SURFACING RAILWAY HEADS, DRAWING AND SPINNING FRAMES.—Alfred Marr (assignor to himself and George W. Buckman), Lewiston, Me.

103,215.—CUTTER STOCK FOR SWIVEL PLOWS.—Elbridge G. Matthews, Oakham, Mass.

103,216.—CALENDAR.—Vve Adrien Maurin and Gustave Toiray, Paris, France.

103,217.—HARVESTER RAKE.—Edwin R. McCall, Simcoe, Province of Ontario, Dominion of Canada.

103,218.—MANUFACTURE OF ILLUMINATING GAS.—Edmund P. McCarthy, San Francisco, Cal.

103,219.—CHURN DASHER.—Jacob W. McClure, Jefferson City, Mo.

103,220.—NUT LOCK.—Thomas B. McConaughey and James Adams, Newark, Del.

103,221.—COUNTING REGISTER.—William H. McNary, Brooklyn, N. Y.

103,222.—GAS HEATER.—George F. Meiggs (assignor to himself and Retire C. Meiggs), Boston, Mass.

103,223.—SASH HOLDER.—Nathan J. Meigs (assignor to himself and E. P. Merriman), West Haven, Conn.

103,224.—FLUTING TONGS.—Sarah E. Mersereau, Binghamton, N. Y., administratrix of J. B. Mersereau, deceased.

103,225.—SAWING MACHINE.—P. Andrew Myers, Round Hill, Pa.

103,226.—BED BOTTOM.—Joseph N. Newell, Adrian, Mich.

103,227.—PREPARING GOLD FOR DENTISTS' USE.—G. J. Pack, New York city.

103,228.—ELECTRO-MAGNETIC ENGINE.—Henry M. Paine, Newark, N. J., assignor to himself and M. S. Frost, New York city.

103,229.—MAGNETIC ENGINE.—H. M. Paine, Newark, N. J., assignor to himself and M. S. Frost, New York city.

103,230.—ELECTRO-MAGNET.—H. M. Paine, Newark, N. J., assignor to himself and M. S. Frost, New York city.

103,231.—CONSTRUCTION OF ELECTRO-MAGNET.—Henry M. Paine, Newark, N. J., assignor for one half to M. S. Frost, New York city.

103,232.—SHIRT BOSOM.—Moses Palmer, Jr., Boston, Mass.

103,233.—BRIDGE.—Charles H. Parker, Boston, Mass.

103,234.—RENDERING LARD.—Jas. W. Patterson (assignor to Sarah E. Patterson, and John Ashcroft), New York city.

103,235.—COOKING STOVE.—Alexander G. Patton, Troy, N. Y.

103,236.—MANUFACTURE OF BUNCHES FOR SEGARS.—Adolph Pearl, New York city.

103,237.—RAILWAY STATION INDICATOR.—Julius P. Pfau, Lansingburg, N. Y.

103,238.—FRAME FOR STREET LAMPS, ETC.—Jacob Radston, San Francisco, Cal.

103,239.—SAND AND AIR CHAMBER FOR TUBULAR WELLS.—J. E. Robinson, Boston, Mass.

103,240.—MACHINE FOR MAKING FILES.—Edward B. Rollins, Poland, N. Y.

103,241.—MACHINE FOR CUTTING OFF LEAD-PENCILS.—Philip Schrag and Philip Hufeland, New York city.

103,242.—TOOL-GRINDING ATTACHMENT TO LATHES.—James Shoughnessy, Cincinnati, Ohio.

103,243.—FEED-WATER HEATER AND FILTER.—D. E. Shaw, Chatsworth, Ill.

103,244.—BOOT AND SHOE-SOLE CUTTER.—E. F. Shaw, Boston, Mass.

103,245.—HEAD BLOCK FOR SAW-MILLS.—Andrew Shearon, Richmond, Ind., assignor to Abraham Gaar, J. M. Gaar, Jonas Gaar, and W. G. Scott.

103,246.—BARK MILL.—Robert H. Shultis, Ellenville, N. Y.

103,247.—LID AND PLATE-LIFTER AND POT HOOK.—Thomas Simpson, Newark, Ohio.

103,248.—STEAM GENERATOR.—William P. Skiffington, New York city.

103,249.—SPRING BED BOTTOM.—Charles I. Skow, Racine, Wis.

103,250.—SAWING MACHINE.—O. C. Smith and T. S. Doll, Menallen, Pa.

103,251.—TIME ALARM.—T. H. Smith, Urbana, Ohio.

103,252.—PIPE FOR TRANSMITTING PNEUMATIC CURRENTS FOR MOTIVE POWER.—Robert Spear, New Haven, Conn.

103,253.—APPARATUS FOR THE PRODUCTION OF BROMINE.—Hermann Stieren, Mason, West Va., and William A. Nisbet, Natrona, Pa.

103,254.—SEWING MACHINE.—Levi W. Stockwell, Akron, Ohio.

103,255.—TOBACCO ROLLING MACHINE.—J. W. Stone, Paris, Tenn.

103,256.—KEY-HOLE GUARD LOCK.—H. R. Towne, Stamford, Conn.

103,257.—CLOTHES DRYER.—J. N. Valley, Detroit, Mich.

103,258.—POTATO DIGGER.—Cornelius Van Derzee and Benj. Reamer, Albany, N. Y.

103,259.—CORN PLANTER.—W. E. Vernon, Franklin county, Mo.

103,260.—EARTH CLOSET.—C. A. Wakefield, Pittsfield, Mass.

103,261.—SAW MILL.—Charles Warren, Center Groton, Conn.

103,262.—CLOTH PRESS.—C. H. Weston and John Dennis, Lowell, Mass.

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103,264.—HARNESS.—Lewis Whitehead, Nunda, N. Y.

103,265.—BORING TOOL.—E. F. Whitney and Reuben Jones, Union Mills, Pa.

103,266.—ARTIFICIAL FUEL.—Charles D. Williams, St. Paul, Minn.

103,267.—EMBOSSING ATTACHMENT FOR PRINTING PRESSES.—Henry Willson, Chicago, Ill.

103,268.—WRENCH.—Walter F. Wolfkiel (assignor to Morris, Tasker & Co.), Philadelphia, Pa.

103,269.—GEARING FOR CLOTHES WRINGERS.—G. C. Wright, Leroy, Ohio.

103,270.—FENCE.—W. P. Wright, Winamac, Ind.

103,271.—APPARATUS FOR REFRIGERATING AND MAKING ICE.—H. T. Yaryan, Nashville, Tenn.

103,272.—REGISTER FOR ODOMETERS, ETC.—William Yorke, Portland, Me.

103,273.—FELLY PLATE FOR CARRIAGE WHEELS.—Francis B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn. Antedated May 12, 1870.

103,274.—KING BOLT SOCKET FOR CARRIAGES.—F. B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn. Antedated May 12, 1870.

REISSUES.

3,969.—MACHINE FOR MAKING WROUGHT IRON NAILS.—Daniel Armstrong, Chicago, Ill.—Patent No. 98,008, dated December 21, 1869.

3,970.—APPLE-PARER.—A. G. Batchelder, Lowell, Mass.—Patent No. 87,322, dated March 2, 1869.

3,971.—CHILDREN'S CARRIAGES.—B. P. Crandall, Wm. E. Crandall, and C. T. Crandall, New York city, assignees of B. P. Crandall.—Patent No. 98,351, dated December 28, 1869.

3,972.—CHILDREN'S CARRIAGES.—W. E. Crandall, New York city.—Patent No. 100,121, dated February 22, 1870.

3,973.—MOLDING WATCH CASES, LOCKETS, AND OTHER ARTICLES FROM HARD RUBBER.—Halsey's Patent Box and Case Company, New York city, assignees of W. H. Halsey.—Patent No. 81,082, dated August 18, 1868.

3,974.—Division No. 2.—NEW ARTICLES OF MANUFACTURE FROM HARD RUBBER.—Halsey's Patent Box and Case Company, New York city, assignees of Wm. H. Halsey.—Patent No. 81,082, dated August 18, 1868.

3,975.—WAGONS.—L. M. Ham, Boston, and John H. Dodge, Chelsea, Mass.—Patent No. 39,345, dated July 28, 1863.

3,976.—GRAIN DRILLS.—Joseph Ingels, Milton, Ind.—Patent No. 37,345, dated January 6, 1863.

3,977.—HARVESTERS.—C. H. McCormick and L. J. McCormick, Chicago, Ill., assignees of McClintock Young, Jr.—Patent No. 21,287, dated September 21, 1858; reissue No. 779, dated July 19, 1859; reissue No. 866, dated December 13, 1859.

3,978.—HARVESTER RAKES.—C. H. McCormick and L. J. McCormick, Chicago, Ill., assignees of McClintock Young, Jr.

3,979.—COMBINED RAKE AND REEL FOR HARVESTER.—C. H. McCormick and L. J. McCormick, Chicago, Ill., assignees of McClintock Young, Jr.—Patent No. 30,103, dated September 18, 1860.

3,980.—FARM FENCE.—C. W. Reeder, Chillicothe, Mo.—Patent No. 92,259.—Dated July 6, 1869.

3,981.—REFLECTOR.—W. G. Schmidlin and J. W. Driscoll, New York city.—Patent No. 32,722, dated July 2, 1861.

3,982.—Division A.—EQUILIBRIUM SPRING.—Charles Shea, Newark, N. J.—Patent No. 95,736, dated October 12, 1869.

3,983.—Division B.—COMPENSATING SPRING.—Charles Shea, Newark, N. J.—Patent No. 95,736, dated October 12, 1869.

3,984.—Division C.—COMPENSATING OR EQUILIBRIUM SPRINGS.—Charles Shea, Newark, N. J.—Patent No. 95, 736, dated October 12, 1869.

3,985.—MACHINE FOR MAKING PAPER BOXES.—S. B. Terry, Jr., Waterbury, Conn., and D. S. Robeson, Philadelphia, Pa., assignees, by mesne assignments, of S. B. Terry.—Patent No. 25,325, dated September 6, 1859.

3,986.—FOLDING CHAIR.—E. W. Vaill, Worcester, Mass., assignee of J. D. Merriam.—Patent No. 37,324, dated January 6, 1863.

DESIGNS.

4,023.—CLOCK FRONT.—John H. Bellamy, Charlestown, Mass.

4,024.—STEAM RADIATOR.—Wm. Burdon, Brooklyn, N. Y.

4,025.—TRADE MARK.—W. J. Clark, Providence, R. I.

4,026 and 4,027.—CARPET PATTERNS.—Jonathan Crabtree, (assignor to James Bromley & Brothers), Philadelphia, Pa. Two Patents.

4,028.—CARPET PATTERN.—Jonathan Crabtree (assignor to Israel Foster) Philadelphia, Pa.

4,029.—AX.—C. B. Drew, Boston, Mass., assignor to Underhill Edge-tool Company, Nashua, N. H.

4,030.—LABEL.—J. S. Dunham, St. Louis, Mo.

4,031.—DOVETAIL.—H. H. Evarts, Chicago, Ill.

4,032.—CARPET PATTERN.—Israel Foster, Philadelphia, Pa.

4,033.—GRATE.—J. B. Gayle, Raleigh, N. C.

4,034.—FACE PLATE FOR LOCKS FOR SLIDING DOORS.—Wm. Gorman (assignor to Russell & Erwin Manufacturing Company), New Britain, Conn.

4,035.—CARPET PATTERN.—William Kerr (assignor to Israel Foster), Philadelphia, Pa.

4,036.—TOBACCO KNIFE.—Jacob Kinzer, Pittsburgh, Pa.

4,037.—HAND STAMP.—Charles G. Mortimer, New York city.

4,038.—LAMP CHIMNEY.—George W. Moyers, Gordonsville, Va.

4,039 and 4,040.—CARPET PATTERNS.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass. Two patents.

4,041.—WHEEL-HOLDING BLOCK FOR A CASTER.—S. J. Parker, Williamsport, Pa.

4,042.—PACKAGE.—George Pastkuchen, New York city.

4,043 to 4,049—STOVE PLATES.—S. H. Ransom, Albany, N. Y. Seven patents.

4,050.—ARROW GUN.—Charles Robinson, Boston, Mass.

4,051.—LAMP SHADE.—G. L. Smith and D. W. Kissam Bridgeport, Conn.

4,052.—TOY STEAM ENGINE.—Alanson Pierson Tyler, Boston, Mass.

4,053.—STOVE.—S. S. Utter, Brooklyn, N. Y.

4,054.—STOVE PLATE.—N. S. Vedder, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to J. L. Mott, New York city.

EXTENSION.

FURNACES FOR SMELTING IRON.—T. H. Powers, Milwaukee, Wis.—Letters Patent No. 14,827, dated May 5, 1856.

APPLICATIONS FOR EXTENSION OF PATENTS.

ORE WASHER.—Hezekiah Bradford, Reading, Pa., has applied for an extension of the above patent. Day of hearing July 27, 1870.

MACHINE FOR PRESSING BONNETS, BONNET FRAMES, ETC.—Mary J. Osborn, Louisville, Ky., administratrix of William Osborn, deceased, has petitioned for the extension of the above patent. Day of hearing August 3, 1870.

LIME KILNS.—Levi Averill, Elmira, N. Y., has petitioned for an extension of the above patent. Day of hearing August 3, 1870.

HAND SEED PLANTERS.—J. Herva Jones, Rockford, Ill., has applied for an extension of the above patent. Day of hearing August 10, 1870.

HORSE-POWERS.—Albert W. Gray, Middletown, Vt., has applied for an extension of the above patent. Day of hearing August 24, 1870.

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Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,068.—TREATMENT OF METAL SURFACES COATED BY ELECTRO-DEPOSITION WITH NICKEL.—Isaac Adams, Jr., Boston, Mass. April 12, 1870.

1,070.—STRUCTURES FOR THE PRESERVATION OF FRUITS, ETC.—Nathan Hellings, Philadelphia, Pa. April 12, 1870.

1,093.—LOOMS FOR WEAVING.—James Brierly, Millbury, Mass. April 14 1870.

1,125.—STUDS OR BUTTONS.—J. B. Carter, Hartsville, and W. D. Knowles New Albany, Ind. April 19, 1870.

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CONTENTS.

A SELECTION OF GEOMETRICAL PROBLEMS.

PLATE I.—To draw a straight line parallel to a given line, and at a given distance from it; to bisect a given straight line; to divide a given line into any number of equal parts; to draw a straight line equal to the circumference of a given circle; to construct a plain scale for drawing a small plan proportionate to a larger one; to find the center of a circle or the radius of a curve; to draw a circle through any three given points; to erect a perpendicular.

II.—To strike a segment by a triangular guide, the chord and hight being given; the chord and hight of a segment of a circle of large radius being given to find the curve without recourse to the center; having an arc of a circle given, to raise perpendiculars from any point or points without finding the center; to draw a tangent to a circle or portion of a circle without having recourse to the center, upon a given straight line to describe any regular polygon; upon a given side to draw a regular pentagon.

III.—Upon a given side to draw a hexagon; to draw a hexagon; how to describe an octagon in a given square; to draw a straight line equal to any given part of a circle; to find the stretch-out of a semicircle; definition of polygon; definition of parallelogram.

IV.—To strike an ellipse or oval with the compasses, the length or major axis being given; to describe an ellipse within a given square, or when the major and minor axes are given; method of drawing an egg-shaped oval; graphic illustration of what an ellipse really is; another method of drawing an ellipse to draw a parabola; to draw an ellipse with a trammel.

V.—To strike a pattern for a round, tapering, or flue article, or a frustum of a cone; the plan of a round flue body to be cut in three pieces; two or three methods of describing ovals.

VI.—The pattern of an article where the sides are straight and the ends semicircular; the pattern of an oblong tapering pan in two parts or sections.

VII.—The pattern for a tapering oblong article in one piece, such as a flue oblong candlestick; the pattern for a tapering oval article in four pieces or sections.

VIII.—To describe a tapering oval body in one piece; a method of drawing an ellipse or oval with a string and pencil.

IX.—The pattern of an egg-shaped oval tapering body; another method of describing an oval tapering body.

X.—To describe a tapering oval body where the tapering is not equal on all sides.

XI.—The pattern for a square tapering article or pyramid; the pattern for a tapering octagon body in one piece; the pattern for a diamond-shaped tapering body, in one piece; the pattern of a square funnel where one side is straight or upright.

XII.—The pattern for a square or rectangular tapering top or tray, with sides and bottom in one piece; the pattern for a hexagon mold or tray, having the bottom and sides in one piece; the pattern of an irregular octagon pan or tray, with the sides or bottom in one piece; the pattern of an oblong pan, with round corners, but struck from different centers, and tapering more at the ends than sides.

XIII.—A pattern for a tapering top, the base being straight at the sides, and with circular ends, the hole in the top to be circular and parallel with the case (similar to a tea bottle top).

XIV.—The pattern for a tapering article, oval at the base and round at the top (such as an oval canister top, having a round hole for the neck and cover).

XV.—A pattern for the tapering sides of a tray, having various curves.

XVI.—The pattern for an oblong tapering bath.

XVII.—The pattern of an elbow at right angles, in a round pipe; a pattern of an elbow in a round pipe at any angle required (in this case an obtuse angle); the pattern of a tapering piece of pipe to join two upright cylinders to form a double elbow.

XVIII.—The pattern for a T-piece, or to join two cylinders at right angles; the pattern of two cylinders for joining at an oblique angle for slanting direction.

XIX.—The pattern for a lobster-back cowl; the pattern for a round pipe, to form a semicircle for connection to other pipes.

XX.—The pattern for a cone and cylinder to intersect or meet at right angles with their axes.

XXI.—A cylindric section through any given angle; to draw an ogee arch; another method; to find the covering of an ogee dome, the plan of which is hexagonal.

XXII.—The pattern for a rectangular base and bottom in one piece, where the flue or curve is equal on all sides (such as may be used as a base for either an aquarium or a fern case); the pattern for an hexagon base.

XXIII.—The pattern for a vase, octagon shape.

XXIV.—The pattern for a vase having twelve sides (duodecagon).

XXV.—The pattern for a cone with an elliptic base; the pattern of an oblique cone, or the frustum of a cone cut parallel with the base.

XXVI.—The pattern for a round-end bath tapering more at the ends than at the sides.

XXVII.—The pattern for a hip bath.

XXVIII.—The pattern for a traveling sitz bath.

XXIX.—The pattern for a globe formed of twelve pieces joined together; the pattern for a triangular pedestal or pyramid, with all three sides alike (an equilateral triangle); to obtain the radius required for striking the pattern of a slightly tapering article, without the necessity of producing lines to meet.

XXX.—The patterns for the sides of an irregular octagon pan.

XXXI.—The pattern for a cover and neck of an irregular octagon article, such as a tureen.

XXXII.—The pattern for the top of a jack screen.

APPENDIX.

RULES FOR BOILER-MAKING, ETC.

Template making; to build a tubular boiler of 36 in., inside diameter of two plates in the circle; to find the breadth of the template for a given dome at any particular place, by calculation; to find the template for a given short egg-end spherical: to find the template for a given a long egg-end parabola; the breadth and length of the template at any particular place; to find the templates for a given barrel spheroid; the breadths and lengths at any particular place by calculation; mensuration of surfaces and solids; approximate rules for finding the weight of different figures of wrought iron and steel; tables of weights of iron, steel, etc., etc.

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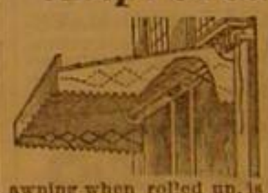
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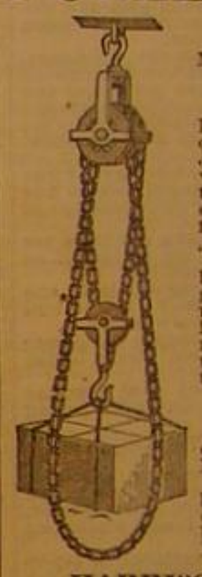
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