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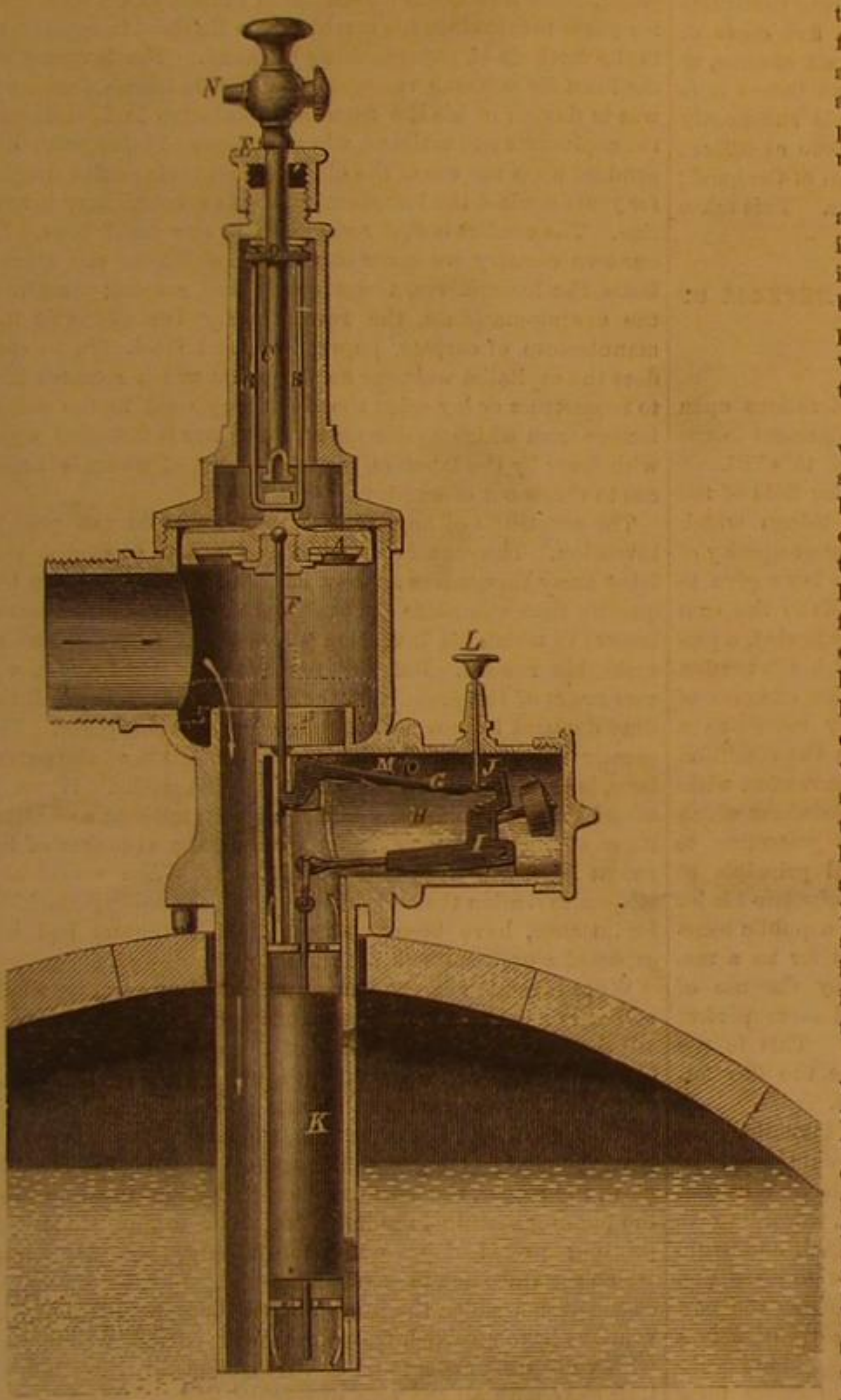
Improved Automatic Barrel Filler.

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 care 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.

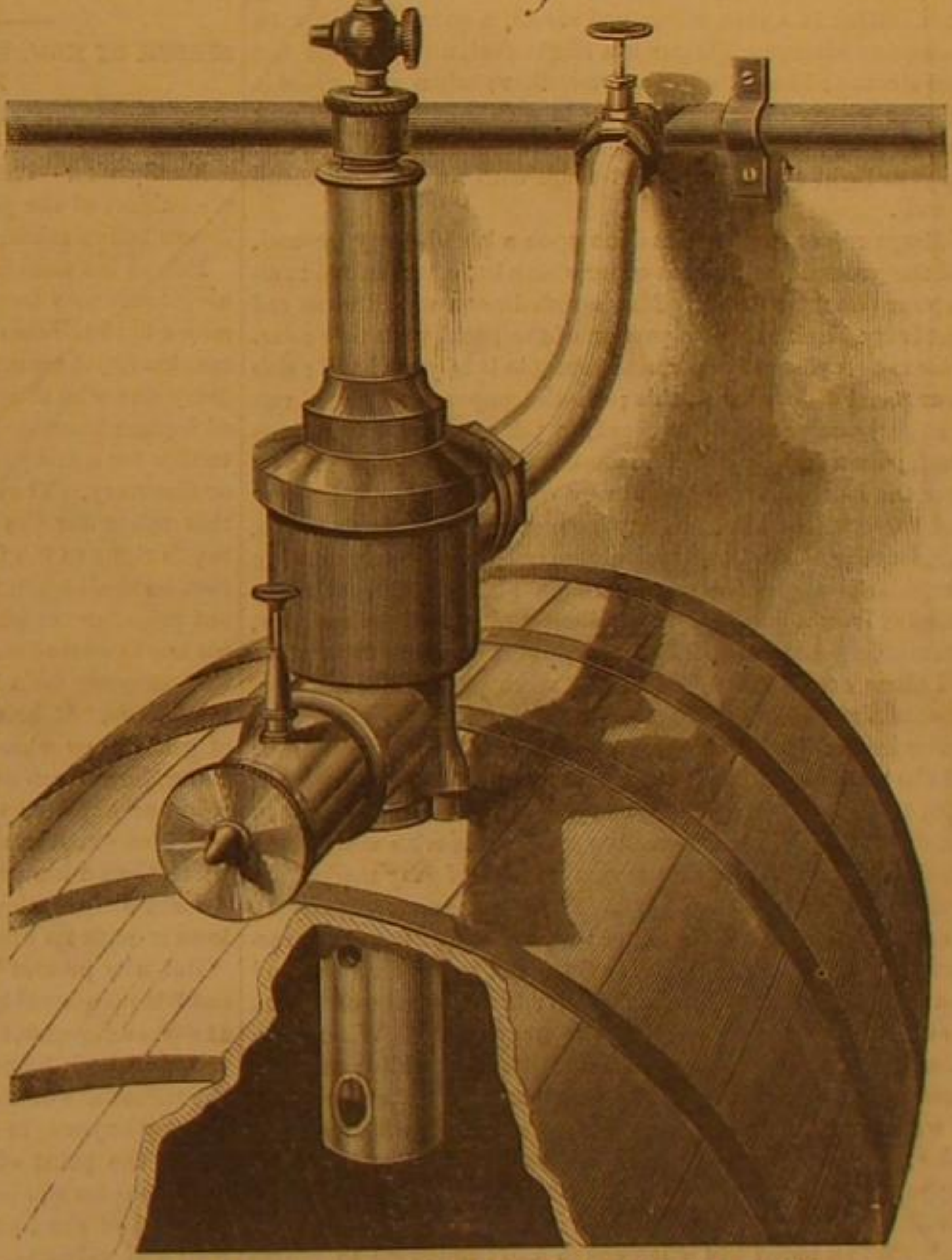
When the valve has been raised to the position shown in Fig. 1, as above described, the button, L, is pressed downward, and the end of the small vertical rod which it carries depresses the end of the lever, G, bringing that end under the catch, J, and the ledge at its opposite end under the end of the 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 it 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 age 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.

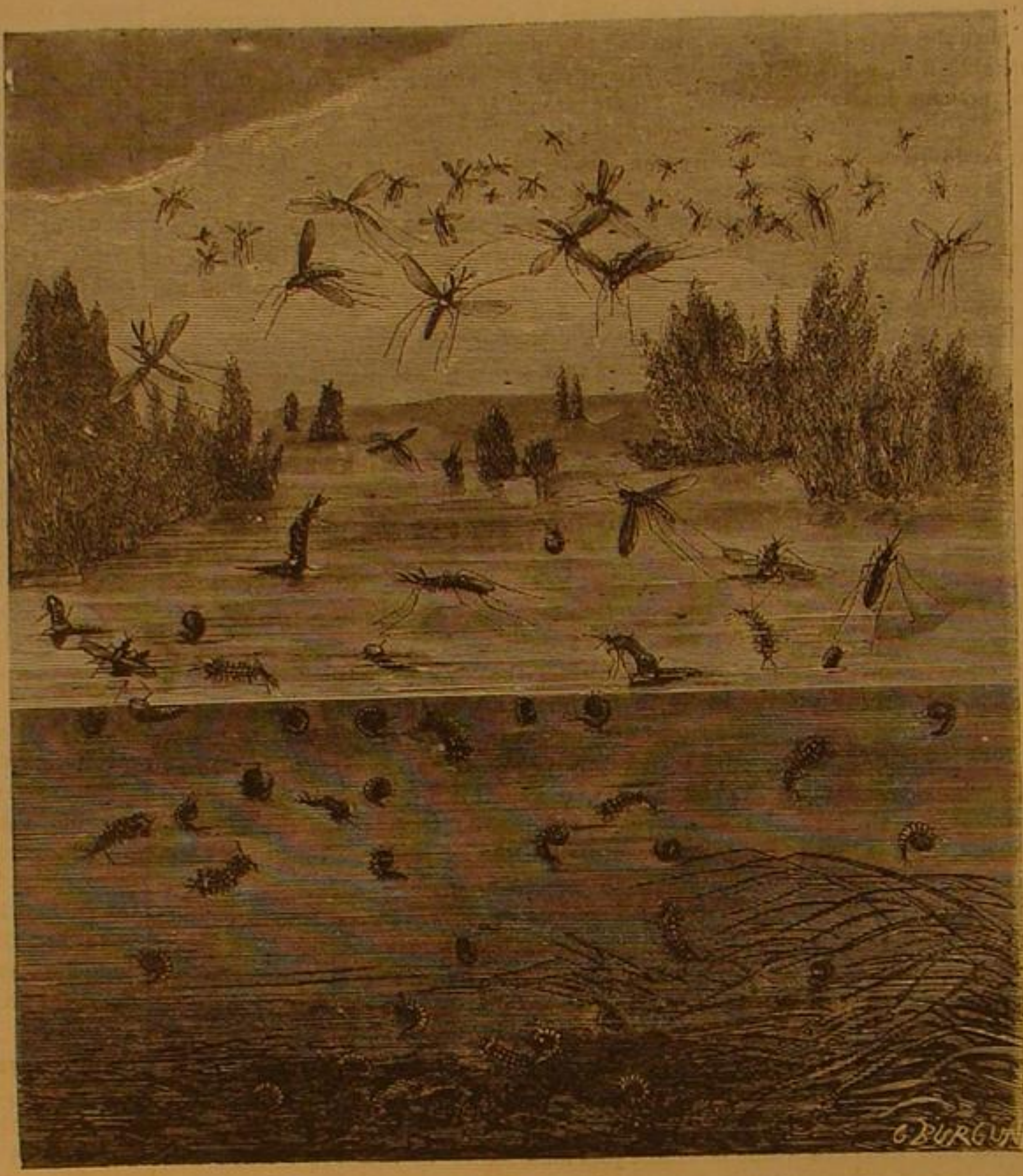
The metamorphoses or transformations of insects may be complete, as in the cases above cited; or more partial, as in that of the grasshopper, in which the larval and the pupal forms resemble the perfect insect externally in every thing, except in the imperfect development of the wings. Between these 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.

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.



METAMORPHOSES OF THE MOSQUITO

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 2¾ 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 9½ inches, its width varied from 6¼ to 6½ inches, and its thickness was 1⅞ 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 1¼ 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	2¾

Feb. 15th, 9·30 A.M. Temp. 30° Fah.

Deflection of upper surface below chord	3⅜
" of lower surface below its original horizontal position	3¾

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.

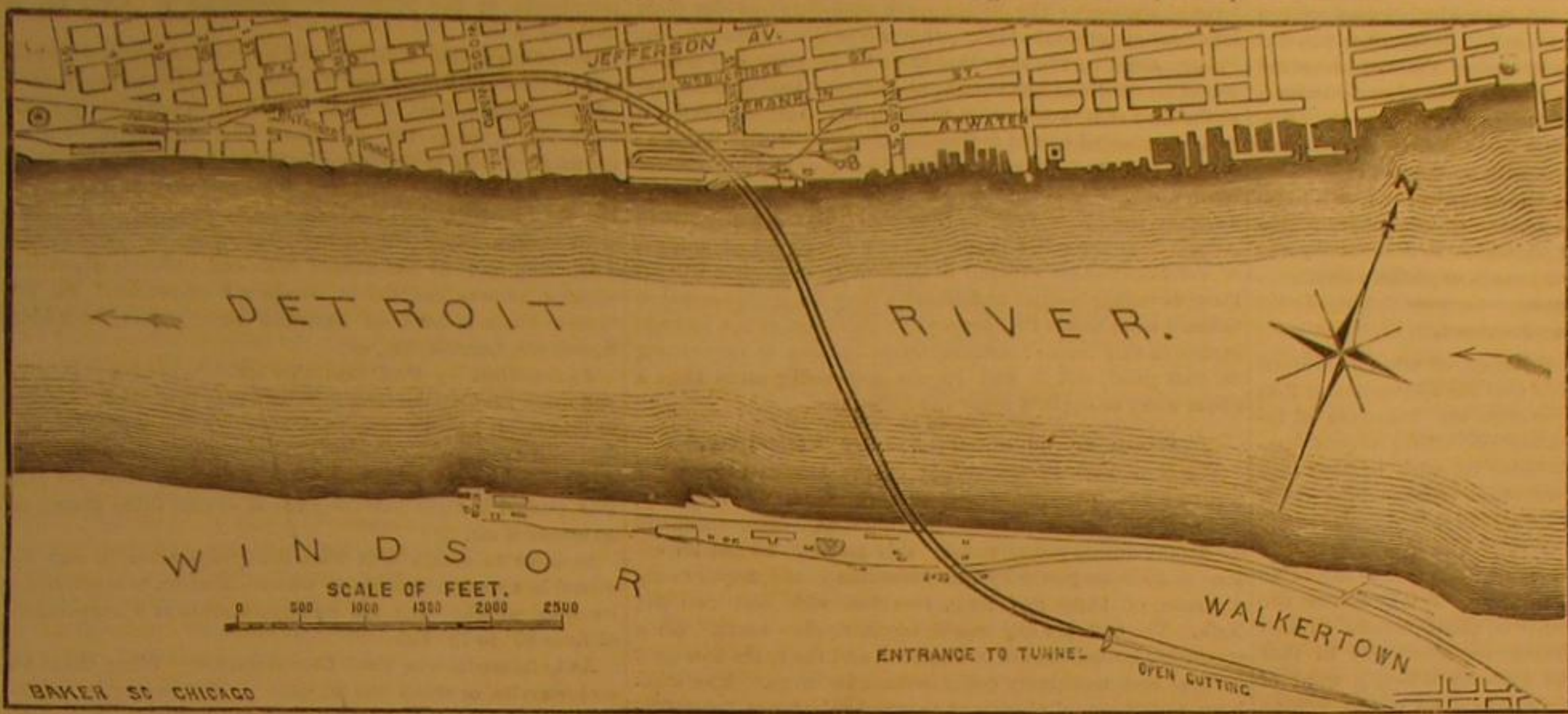
I have found that a good coating of nickel can be deposited by the battery process from the solutions hereinbefore mentioned, provided they are prepared and used in such a manner as to be free from any acid or alkaline reaction.

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.

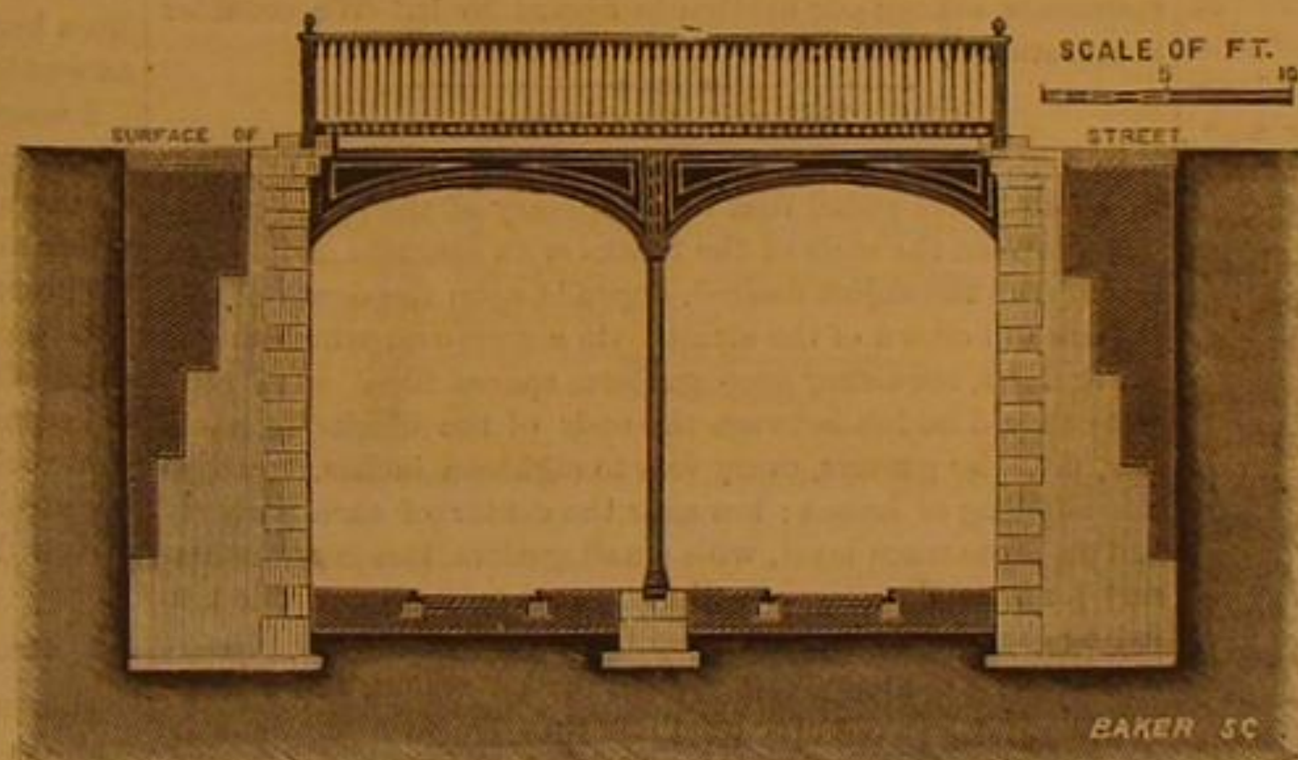


PLAN OF THE DETROIT RIVER TUNNELS.

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.

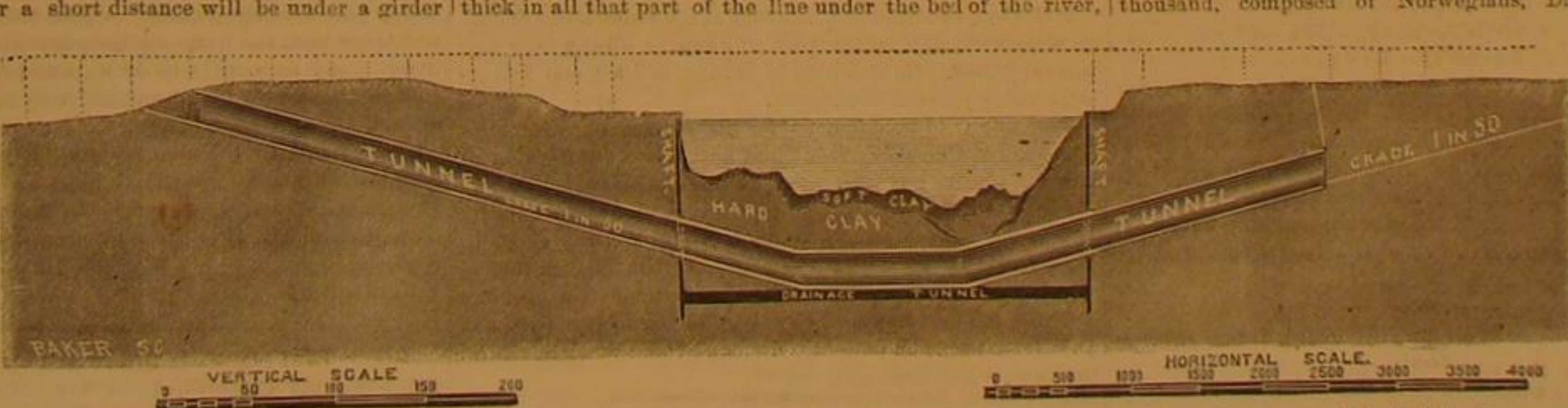
The preliminary surveys and borings in the river bed, made to the full depth of the tunnel, discovered the path across the river, shown in the accompanying map, which passes the entire distance through stiff blue clay, a soil of the most favorable character for works of this kind. Occasional pockets 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.



TUNNEL ENTRANCE, DETROIT.

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.



1—Michigan Central R.R. Depot, in Detroit. 2—Third street. 3—Second street. 4—First street. 5—Cass street. 6—Wayne street 7—Shelby street. 8—Griswold street 9—Woodward avenue. 10—Bates street. 11—Randolph street. 12—Woodbridge st. 13—Brush street. 14—Beaubien st. 15—Atwater street. 16—G. W. Railway. 17—Sandwich street. 18 to 21—Highways.

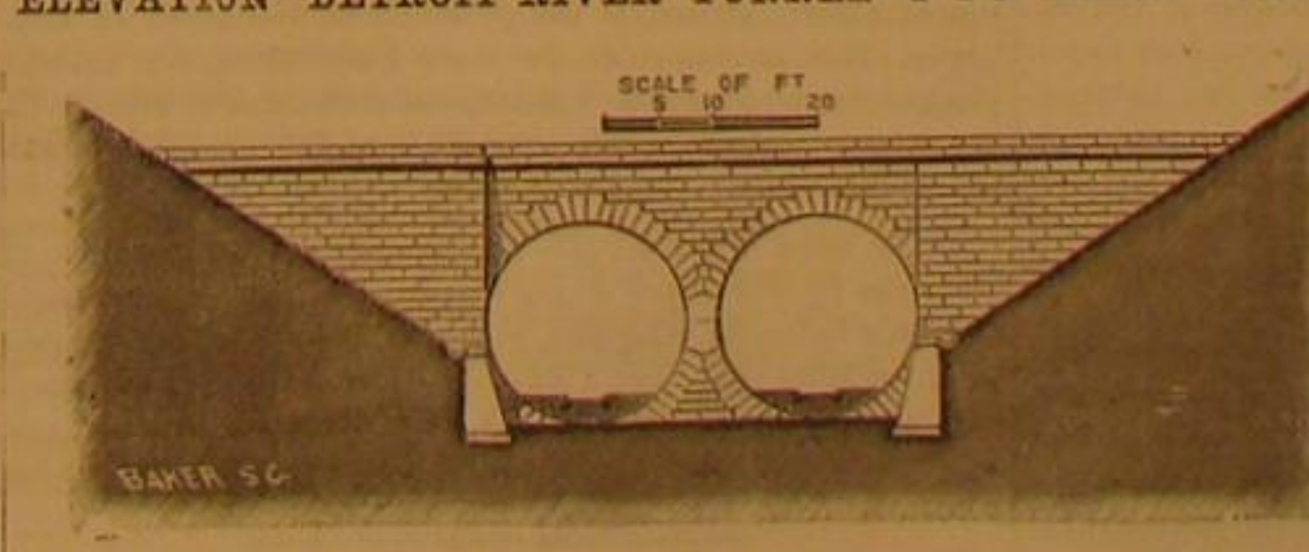
SECTIONAL ELEVATION—DETROIT RIVER TUNNEL—1 1-3 MILES LONG.

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.

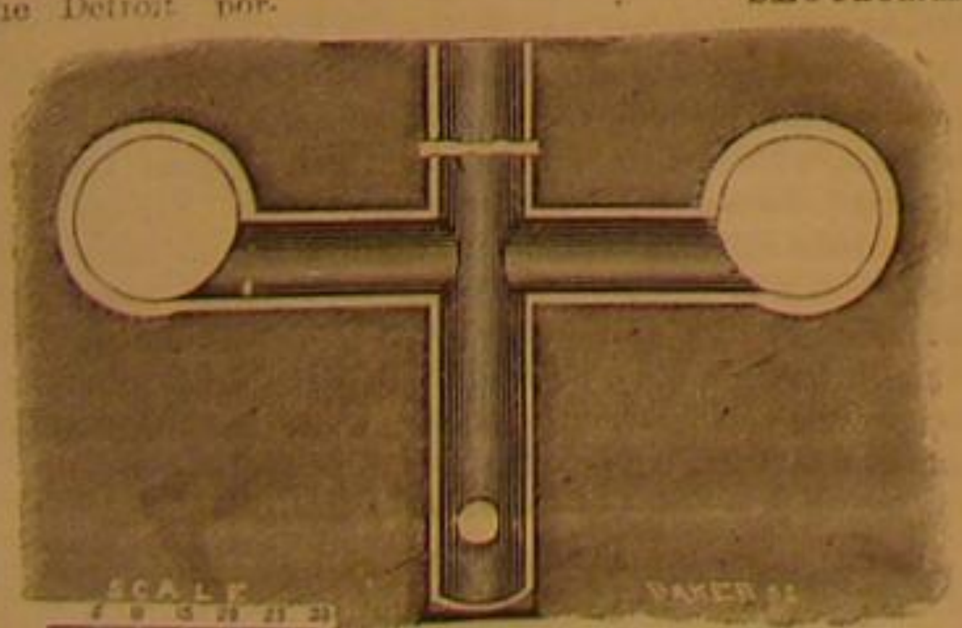
SIZE AND ARRANGEMENT OF TUNNELS.

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.



DETROIT RIVER TUNNELS—ENTRANCE NEAR WINDSOR.



WORKING SHAFT AND HORIZONTAL DRIFTS

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.

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 Greenlaad—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 Errick, 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 Green land 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 navigation of 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 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 those 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 $325,000,000; 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, planing 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 kerosene 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, 6½ 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 those; 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 pre-eminently 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.

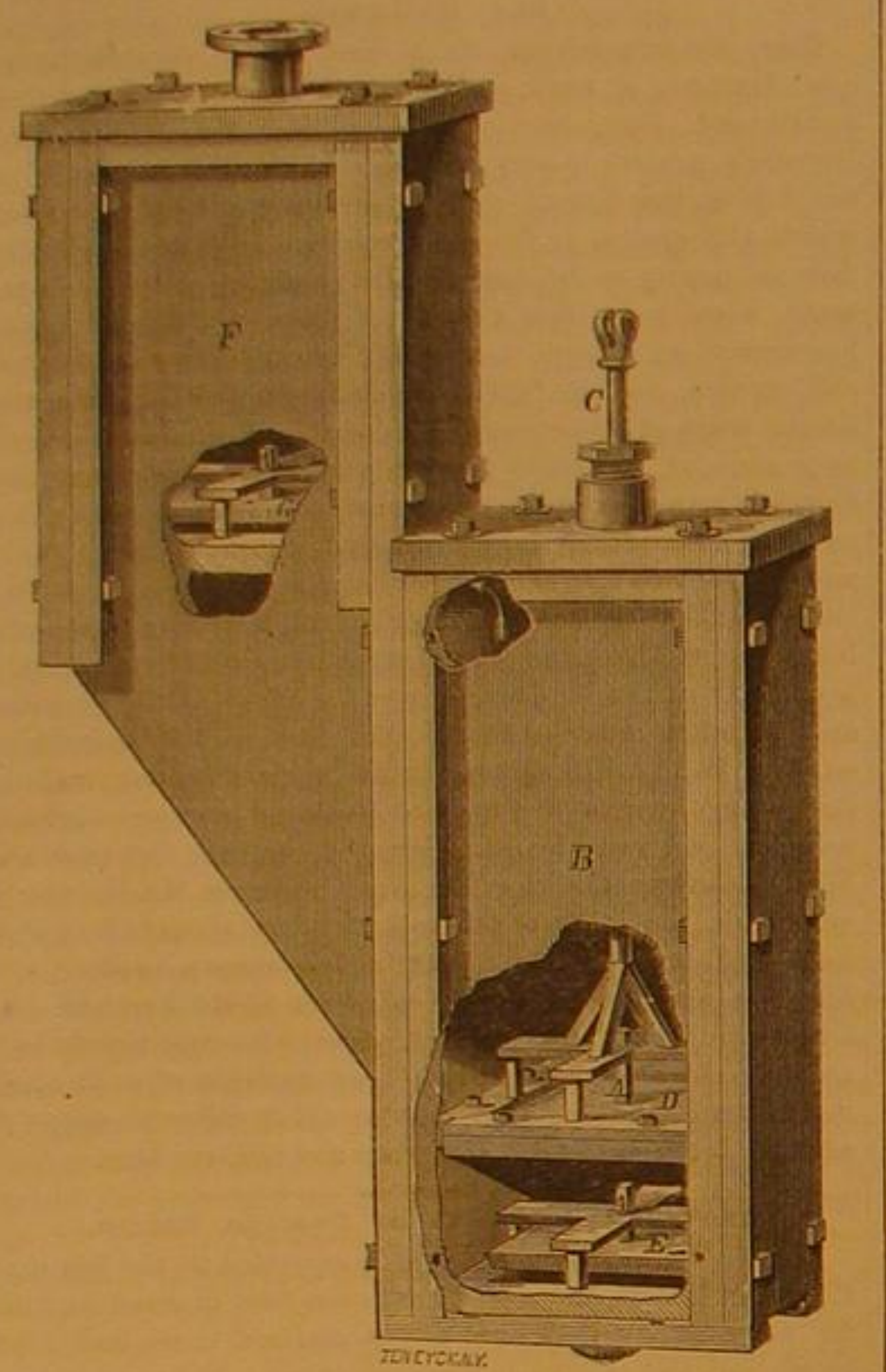
Deep Sea Life and Taxation.—Says Mr. Lowe, in a recent speech on the Budget, in the English Parliament. "I will state what I believe to be the true principle of taxation, and will illustrate it by what is in Dr. Carpenter's recent voyage in the Arctic Ocean. He states that they found the frailest and 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.

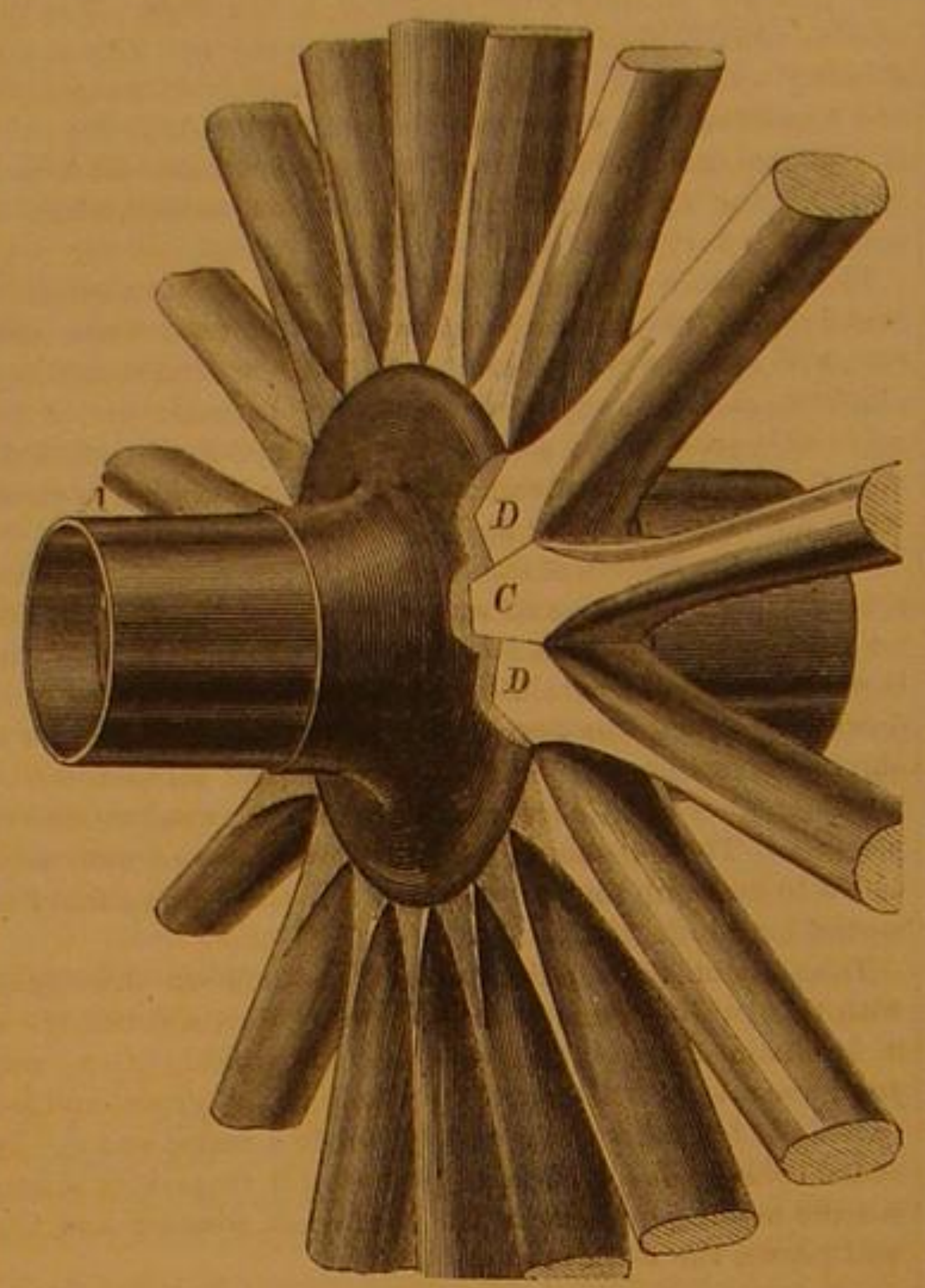
Professor Henry said that the paper was a very valuable contribution, as these storms, in our country, were more frequent than anywhere else, and that scientific men had been censured for not observing them more closely. The cause of these storms or spouts had not as yet been definitely determined. They 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.

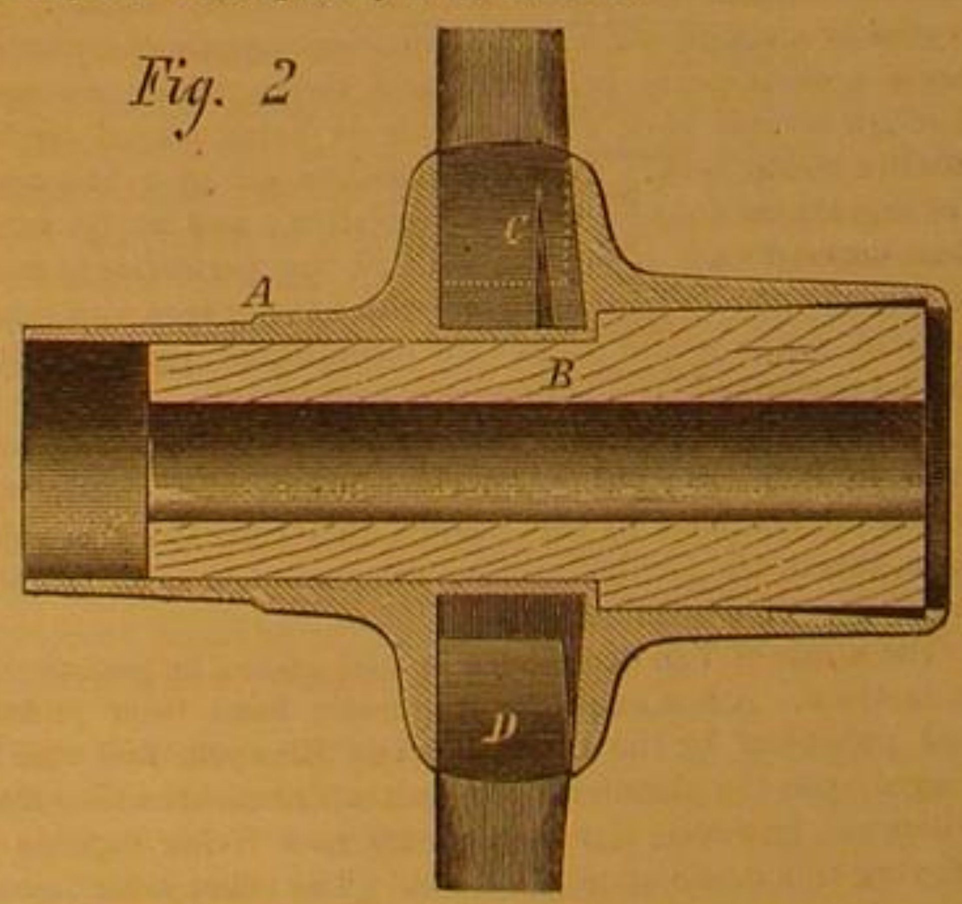
Fig. 1



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.

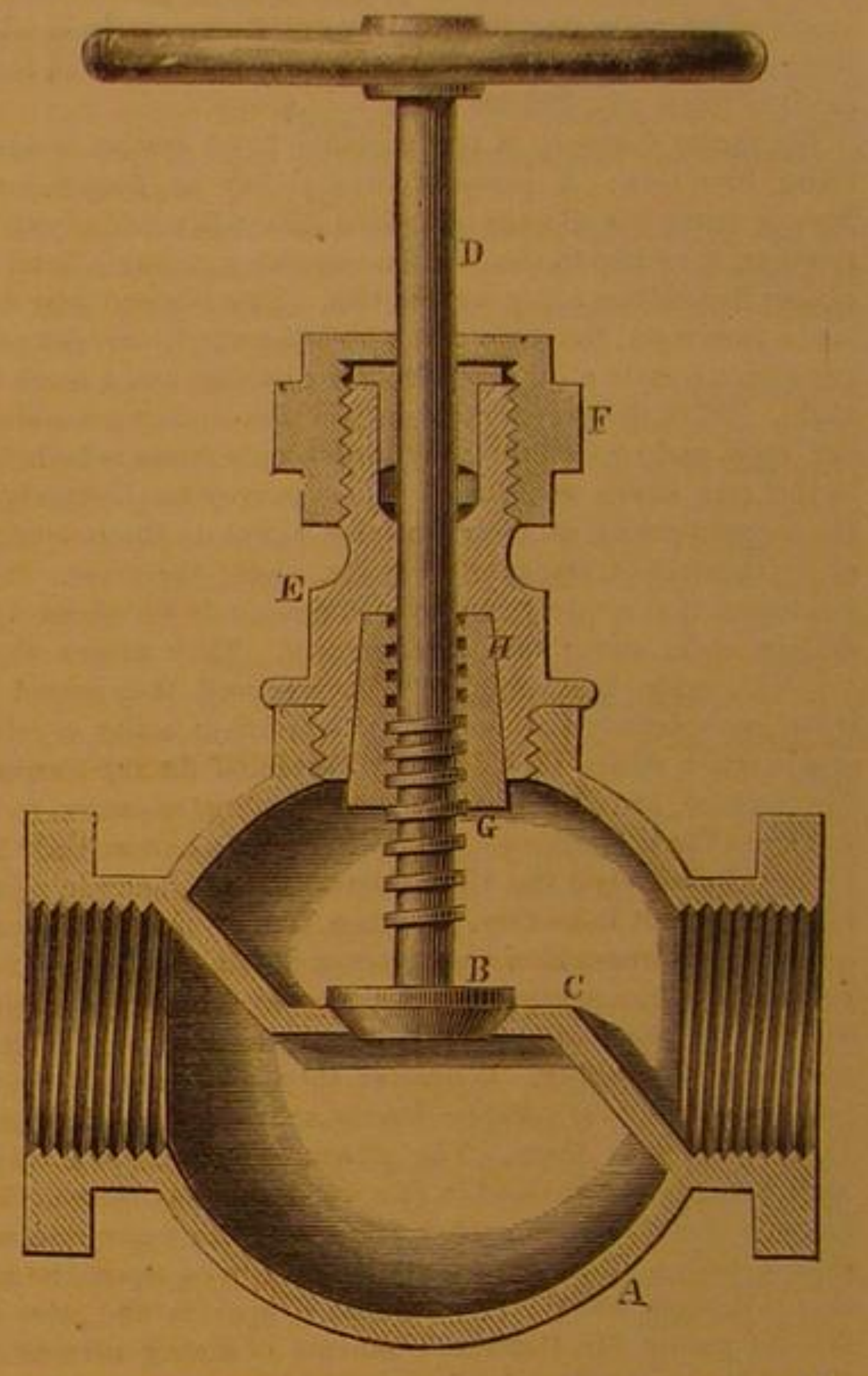
These wheels are manufactured by Thompson & Keyes, of Terre Haute, Ind., and a license to manufacture will be granted to one or two responsible wheel manufacturers in the Eastern States.

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 object 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.

Contents:

(Illustrated articles are marked with an asterisk.)

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—1/8	0·2	0·5 —1/2	0·67
0·15	0·24	0·55	0·72
0·175	0·28	0·625—5/8	0·79
0·2	0·32	0·666—2/3	0·82
0·25 —1/4	0·4	0·7	0·85
0·3	0·45	0·75 —3/4	0·89
0·333—1/3	0·5 —1/2	0·8	0·93
0·375—3/8	0·55	0·875—7/8	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 compositio i 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, andwaswell known to all who areacquainted 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 'nk, 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, 150 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 Mongeno, 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. Lawsha, 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 lengthwise 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 Moog, 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. Th 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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The Leclanche Battery, illustrated in Scientific American, Jan. 22. For sale by C. Williams, Jr., 109, 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.

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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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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 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.
102,2 3.—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 Flianigan, 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 Campany, 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. 93,497, dated September 28, 1869.
3,935.—Shuttle for Sewing Machine.—J. C. Wade, Boston Mass.—Patent No. 93,845, dated Aug. 17, 1869.
3,936.—Ventilated Horse Cover.—Penuel 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. 88,898, dated April 13, 1869.
3,938.—Fluting Machine.—Susan R. Knox, New York city.—Patent No. 59,918, dated Nov. 20, 1866.
3,939.—Urinal.—Samuel Males, Cincinnati, Ohio.—Patent No. 73,007, 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.—Threshing Machines and Driving Mechanism.—G. B. Hamlin, Willimantic, Conn. March 8, 1870.
714.—Fire Extinguisher.—C. G. Wheeler, Chicago, Ill. March 10, 1870.
733.—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.—R. Carter, Aylmer, Canada. March 16, 1870.
786.—Elastic Rolls for Clothes Wringers, etc.—J. Moulton, Boston, Mass. March 16, 1870.

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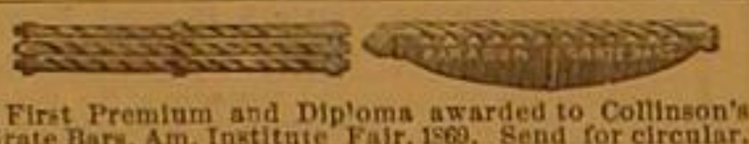

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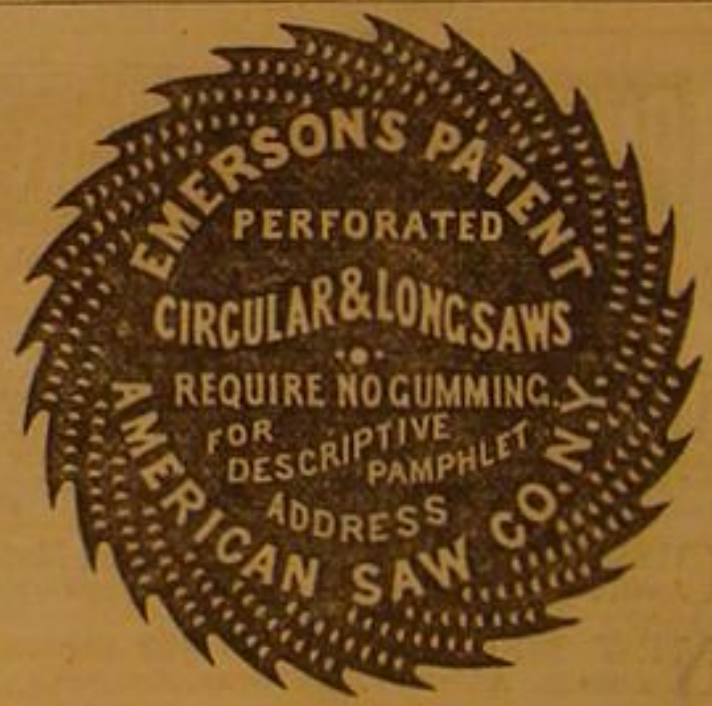

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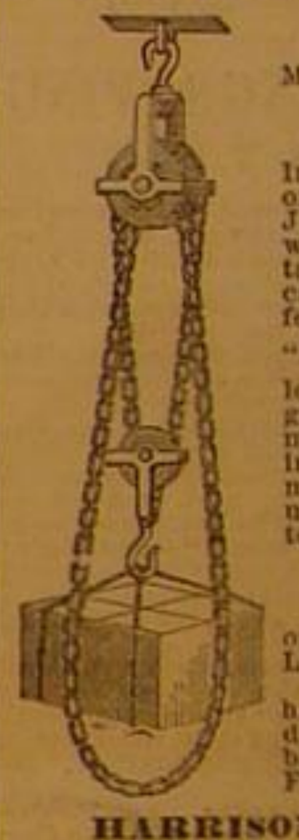

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