SCIENTIFIC AMERICAN

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

Vol. XXIV.—No. 8. [NEW SERIES.] NEW YORK, FEBRUARY 18, 1871. $3 per Annum. [IN ADVANCE.]

Improved Water Grate and Steam Generator.

Water grates are not, by any means, a novel idea. It was seen long ago that if water could be introduced into the hollow bars used in grates, that it would not only prove a protection to the bars from the effects of heat, but would also render the grate a more or less effective heating appendage.

The invention delineated in the accompanying engraving, it is claimed, is much more effective than those which have preceded it, and testimonials from those who have employed the device in connection with the boilers of stationary engines and locomotives, certify to its durability, and also to large saving of fuel through its use.

It is claimed—and these claims are sustained by the testimonials referred to—that the economy of fuel secured is more than 15 per cent where the grate alone is used, and from 25 to 30 per cent when both the grate and generators are used together.

Fig. 1 is a perspective view of a boiler with the improvement attached, in which A is the grate and B the steam generators. A top view of the grate is shown in Fig. 2, portions being broken away to show the tubular form of the grate.

Water enters the grate through the pipes, C, Figs. 1 and 2, the direction of the flow being indicated by arrows, and finally emerges in the form of steam through the pipe, D, Fig. 1, which conveys it to the steam space of the boiler.

The generators, B, Fig. 1, are corrugated cast-iron boxes, having connection at the bottom with one end of the outside grate bars, and being connected at the top with the steam space of the boiler through the pipes, E. The generators have also rectangular openings, as shown, through which the heated gases of combustion pass, so that both sides become effective heating surfaces.

Blow-off cocks, F, are supplied to both the grate and the generators, by which the sediment may be removed as often as necessary.

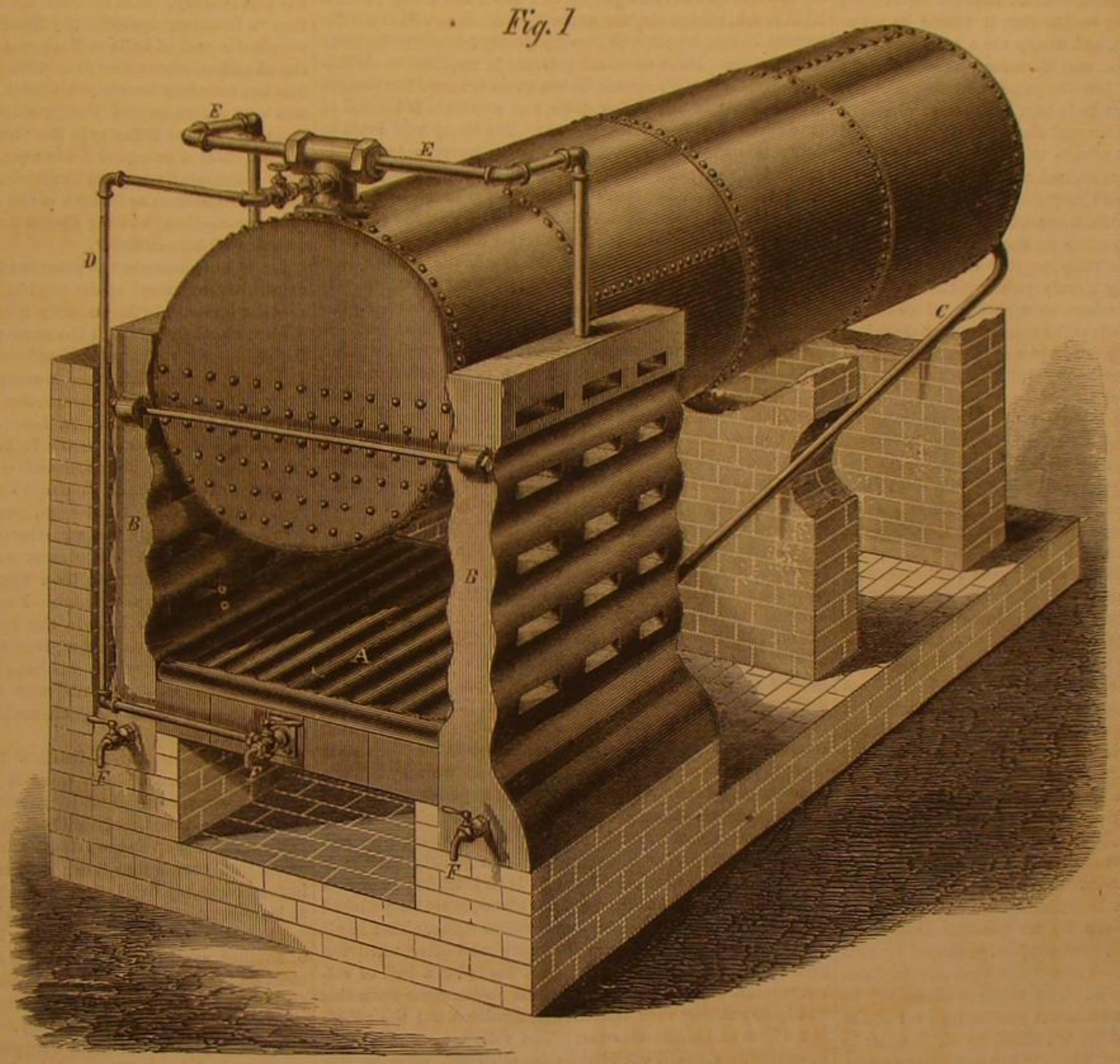
It is said that by making sections of the pipes, D and E, of glass, the circulation is shown to be perfect.

It is claimed that besides the durability and economy above mentioned as being secured by this construction, the following advantages are also attained, viz., increased heating surface; impossibility of cracking by expansion, as the grate and generators are only attached to the boiler by the pipes: the grate being fed from the bottom of the boiler, receives water constantly, as fast as the external heat converts the water into steam: also the grate is always kept so cool that no clinkers can adhere to its surface.

The grate is cast by a peculiar method which secures uniformity of thickness. The generators are also cast in single piece, and their use obviates the necessity of fire-bricks.

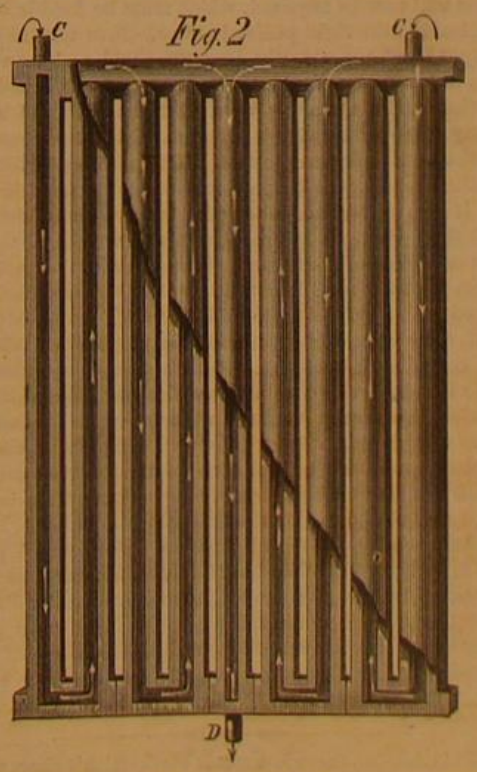
The patent on the water grate bears date Nov. 19, 1867, and that on the steam generator is dated March 24, 1868. Portions or the whole of these patents will be sold. For further information address R. L. Walker & Co., Globe Village, Mass.

Fig. 1



WALKER & CO.'S WATER GRATE AND STEAM GENERATOR.

Fig. 2



THE BALTIMORE OYSTER INDUSTRY.—In no country in the world is the oyster so popular an article of food as in ours; and our large inland states and territories are populated with men of like passions with ourselves of the seaboard States. What wonder, then, that the packing of this most nutritious of shell fish is a large and important industry, indeed one of the largest, in Baltimore? The oyster beds are chiefly in the Chesapeake river and its tributaries, and the annual crop is about 25,000,000 bushels, taken from beds covering 3,000 acres. The capital employed in the canning and preserving trade is estimated at $10,000,000; and the oysters dredged, canned, and packed, are sufficient in quantity to feed 20,000 persons.

How Eyes are Made.

"What do we think of this fellow?" asks the oculist of his client. "Study his features, his look, and say frankly what you think." "He looks well enough," answers the other, laboring usually under some little emotion. "Well, Jean, reveal your secret to this gentleman." Whereupon Jean introduces a knitting needle under his eyelid, removes his eye, places it in the hand of the astonished spectator as unconcernedly as though it were a shirt stud. How is it possible to resist such a demonstration? These gentlemen charge from forty to fifty francs for an eye. The manufacturer of the Rue du Temple has an entirely different way of doing business. He is generally a man pretty well informed; simple, polite, a little of an artist, a little of a workman, and a little of a tradesman. He scarcely employs either apprentice or assistant, except when he receives a good order from some naturalist for animals' eyes for his collection. All day long, seated at a table at one end of his workroom, he works by the light of a spirit lamp. Before him are arranged, in either cakes or sticks, the materials used by him in his profession. He takes a little enamel, melts it, and, by the aid of a blowpipe, blows it until it becomes a small ball at the end of the instrument. This ball is destined to represent the white of the eye. He next takes some more enamel, which is colored this time, and lets a drop of it fall upon the summit of the *cornea*.

Gently heating it at the flame, it spreads out in a round spot, and eventually becomes flat, and resembles the iris. A darker drop of enamel placed in the same manner in the center of the iris imitates the pupil. The ball is now detached from the blow-pipe, cut to an oval shape, and smoothed at the edges, so that on introducing it beneath the eyelid it may not wound any of the smaller nerves. These eyes cost no more than from twenty to twenty-five francs, which one can quite comprehend, as there is neither heavy rent to pay, nor the wages of a liveried cyclops.

The manufacture of artificial eyes is both difficult and tedious. It suits alike both men and women, and many of the latter succeed well in it; it is, moreover, one of the best remunerated of art industries. Most of the work-people are paid by piece-work; that is, so much per eye, varying from ten to fifteen francs, and a clever workman will turn out his eye per diem. Others receive from the large manufacturers a share of the proceeds arising from the sales of eyes manufactured by them, and have to take back any eyes not approved of by the customers. These they put on one side to serve for their stock in trade when they commence business on their own account.

One of these collections furnishes a somewhat curious sight. Reposing upon wadding at the bottom of a drawer are several scores of eyes, ranged side by side, and exhibiting a singular variety of expression. Some are small, others large; some black, others blue, hazel brown, light brown, bluish, and greenish gray: nearly all are brilliant; all have a fixed stare—all are, in fact, looking you through. On one side are laughing children's eyes, next to them the liquid-looking eyes of young girls, the languid eyes of middle-aged women, eyes with an amiable or sinister expression, severe official eyes; then come the old men's eyes, slightly filmy; and in a corner are the worn-out eyes—eyes that have been already used, and have been returned by the customers as

models to make other eyes by. The enamel eye, after being exposed to the action of the atmosphere for some months, loses alike its color and its luster, and becomes opaque-looking; a thick, dingy coating of solidified humors spreads over its polished surface, and it has a glassy look, like the eye of a dead person. "Touch them, you will do no harm," says the oculist to visitors, just as though it was a collection of coins or minerals they were inspecting.

ENAMELING WOOD WORK.

[From The Building News.]

We have very considerable doubts as to whether polished paint may be considered in good taste when used for the interiors of drawing rooms, or, in fact, of any room. There is a want of repose, and a garishness about gloss colors, which are scarcely compatible with that quietness and repose so necessary to the perfect satisfaction of the educated eye. Polished glass is beautiful, and never out of place; the same may be said of marble, of gems, and of all steel work or instruments. With all these, polish is the one thing needful to develope their beauty and finish, and, in fact, is a necessity of the material. This is so self-evident that we never for a moment doubt its propriety or imagine it would be better otherwise. Fitness, beauty, and utility are a consequence of the polish in all these cases, and therefor proper and right from every point of view; but the same reasoning will not apply to polished paint, that is to say, plain tints of colors. Of course, imitations of woods and marbles may be polished with propriety and without offense to good taste, simply because we expect to see them so, and they would not be finished if left unvarnished and unpolished. But it is otherwise with plain colors, which, when glossy, have too much the look of the japanner's shop or the tea tray business. These remarks apply principally to that so-called enamel work which is produced by merely painting the work and finishing it with varnish, when, as a matter of course, it very soon becomes discolored; and even when first done it is a mistake in name and execution, and a gross offense against good taste. The best enamel work—of which there is but little done in consequence of its great cost—is free, in some measure, from the objections urged against the common work. Its manipulation requires so much patience and care that it is a very difficult matter to find men who have the qualifications requisite for preparing such fine work, and therefore it is very rare to see a really good job. In getting up enamel work, much care is requisite in the selection and use of the material required. The filling-up color, which forms the body of the enamel, is of the greatest importance to the ultimate success of the work. Of this material there are several kinds manufactured—black, brown, and yellow, for coach painters, japanners, and others; but for use in interior decoration we prefer to use the white lead filling, as we can, by adding the necessary staining colors (which do not affect the properties of the enamel), form a solid body of color of the same tint, or nearly so, as that with which the work is required to be finished, and thus do away with the objections which may be urged against the black or dark-colored filling. For it will be evident to the plainest comprehension that if work which has to be finished white, or with very light tints of color, be filled-up with dark-colored filling, that the number of coats of paint which will be required to obscure or kill the dark color will be so many that there will be danger of the work becoming rough and uneven in parts—at all events there can be no question that work which is left with a smooth, even surface, produced by rubbing alone, must be much finer in texture than any that can possibly be left by the brush. The white lead should be ground stiff in turpentine, and about one fourth part of the ordinary white lead, ground in oil, added to it, in order to prevent the enamel cracking, which it has a tendency to do, except there be some little oil mixed with it. A sufficient quantity of polishing copal or best carriage varnish should now be added to bind it so that it will rub down easily, which fact cannot be properly ascertained except by actual trial, inasmuch as the drying properties of varnishes vary, and other causes influence the matter. If there be too much varnish in the stuff the work will be exceedingly difficult to cut down, and if too little, it is apt to break up in rubbing, so that it is always the safest plan to try the enamel color before commencing anything important. The color, being properly mixed, should be laid on the work in the ordinary manner, using it rather freely. It may be as well to state here that no filling should be put upon new work without the same having had two or three coats of ordinary oil paint, nor on old work without its having one coat. This gives a key for the filling to bind to. Successive coats of the filling should now be laid on the work until there is a sufficient thickness to cut down to a level surface, filling up the whole of the indentations and undulations of the panel. One day should intervene between each coat, in order to allow it to harden in some degree. When a sufficient number of coats is put on (which number will, of course, depend upon the state of the work to be filled up), it should stand for a fortnight or three weeks, until it is thoroughly hard; it will then be ready for cutting down, which is to be done with felt, ground pumice-stone, and water. The felt used should be such as the marble masons use for polishing marble, which varies in thickness from one eighth to half an inch, and about three inches square. This should be fastened by the aid of patent knotting or other resinous gum, to square pieces of wood of the same size, but one inch thick, so as to give a good hold for the hand in using. These pieces of wood, covered with felt, may be made of any size or shape, to fit molded surfaces or other inequalities. The pumice-stone to be used should be of different degrees of fineness, and should be carefully selected, so as to be sure that it is free from any foreign substance. It is sold ready ground, but in situations where it cannot be conveniently got, it may be prepared from the lump, by grinding or crushing with a stone and muller, and then passed through fine sieves or muslin; by using these of different degrees of texture the ground pumice may be produced of different degrees of fineness. Except great care be exercised in this matter, it will be found that particles of grit will be mixed with it, which in using, get on to the work, and make deep scratches, thus causing endless trouble and annoyance, besides spoiling the work. The greatest care is also required in keeping the felt clean and free from grit. Many workmen are careless in this matter, and when working set down the felt on the step-ladder or floor, and thus particles of sand or grit get upon it, and so mischief is done.

In cutting down, it is best to use a piece of soft lump pumice stone to take off the rough parts. The felt and ground pumice should now be used with water, the work should be wet with a sponge, and the felt soaked in water, and then into the powdered pumice, and the work rubbed with it, keeping it moderately wet, and rubbing with a circular motion, and not straight up and down and across, with a light touch, using only just as much pressure as will cause the pumice to bite, which will be very clearly felt while the hand is in motion. Much care and patience is required to do this properly, for if the pressure be too great it forces the pumice into the body of the filling color, and scratches it instead of cutting or grinding it fairly down. No hurry will avail in doing this work, it must have its time; hurry only defeats the end in view, and often causes much unnecessary labor. A scratch, caused by want of care and too much haste, will often throw the work back for days, and involve the cost and labor of refilling. We find in practice that the purpose is best answered by using the pumice stone, the coarser kind first, then the medium, and finishing with the finest last. It will be found advantageous to let a day elapse between the rubbing, for when the surface is cut down the filling will in all cases be softer underneath, and if it be allowed to stand for a day, the newly exposed surface gets harder, and of course rubs down better in consequence. The pumice stone should be well washed off the work occasionally, in order that we may see what progress is being made, and if it require more rubbing or not. If, while in progress, it be found not to be sufficiently filled up, it may have one or more coats of filling after it has been roughly cut down, and before much labor has been spent upon it.

When sufficiently rubbed down with the pumice stone—that is to say, when it has been cut down to a fine, level, and uniform surface, the work should stand for a day or two to harden. It will now depend entirely upon the work, as to whether it must be polished upon the filling, or whether it will have to be varnished and polished. If the filling be of the right color, and has rubbed down of one uniform tint, we prefer it to be finished in this state, because, in the first place, it will have a surface and texture which cannot be got by any other means. Finished in this state there is an absence of that glare-polish—if we may use the term—which is inseparable from varnish polish. It has all the uniformity of surface and evidence of finish, without that appearance of varnish which is so objectionable, and therefore we prefer it to any varnish polish. After it has stood a day or two, the work, if it be intended to be left in the state we have been speaking about, must be polished in this wise: Take a clean felt and rotten stone, either in oil or water, and with this rub the work as before, until the polish begins to appear; then take a boss (*i. e.* a ball of cotton wool inclosed in fine silk), put the rotten stone upon this and keep rubbing with the circular motion until the polish is uniform and equal all over. The rotten stone must now be carefully cleaned off; if it be in oil, clean off with fine flour; if in water, with sponge and wash leather and water, taking care not to scratch. A clean damp chamois or wash leather will now be required, which must be held in the left hand, leaving the right perfectly clear. Now use the ball of the right hand, press gently upon the panel, and draw it forwards or towards you. If this be done properly, it will bring up a clear polish upon the work. The hand should be kept slightly damp by drawing it across the leather almost every time the hand is drawn forward. If this be done effectually, a rustling sound will be produced while the hand is in motion; if this be so, the polish will be sure to follow. The polish thus produced on the filling alone will be of the kind we have spoken of above, and will not be at all objectionable to even the most fastidious taste; but if the work has to be finished with a brilliant luster and to a high degree of polish, it will, after being cut down with the pumice and felt, have to be coated with two or more coats of the best polishing copal varnish, having a quantity of the best flake white from the tube; this should be mixed with the varnish in sufficient quantity to form a creamy mixture, with which the work must be coated—one, two, or three coats, as may be desirable. This should stand for three or four weeks, until it becomes hard, for the harder it is, the better it will polish. It must then be cut down with felt and the finest ground pumice stone in water, and polished with the rotten stone, as before described. By this means a bright and brilliant polish may be obtained, of a very enduring nature. The same process will of course answer for all varnished imitations of woods and marbles, and all work which will admit of the application of oil varnishes.

In Philadelphia there is a small blacksmith's shop, the bellows of which is operated by dogs. The bellows is connected with a wooden wheel box, which is kept revolving by the motion of the dog, something after the manner of a treadmill.

Birmingham Bell-Making.

In medieval times it was accounted a less difficult matter to cast a church bell than to convey it any long distance from the foundery to the steeple; and it was a common practice to cast these cumbrous articles in the immediate neighborhood of the church or cathedral in which they were intended to be hung. So late, indeed, as the year 1762, the great clock bell at Canterbury was re-cast in the cathedral yard. The early bell-founders were consequently an itinerant fraternity, roving through the length and breadth of the country, but seldom failing to pitch their tent in or near some cathedral town. That they were well skilled in their craft the Sunday chimes in many an antique temple bear ample witness, and a leading bell-founder of the present day does them the justice to remark: "One law of nature, indeed, they were acquainted with, which modern bell-founders in too many cases ignore—that a given weight of bell metal can only sound a very narrow range of notes with good effect, and that if bells are cast thinner to produce deeper notes, the quality of tone must suffer."

The commencement of bell founding as a staple of Birmingham industry appears to have dated from the middle of the last century. It is at least recorded in the local annals that "a foundery opposite the Swan at Good Knaves' End" supplied a peal of bells to Harborne and two other neighboring churches, about the year 1760. "Chimes" were cast at another foundery twenty years later, but from that time down to a very recent period the production of church bells became an obsolete industry in the "hardware village." Within the last half dozen years, however, Messrs. Blews and Sons have successfully revived the trade, and Birmingham bells promise to become as famous in the future as they have been in the past—thanks to the liberal and progressive enterprise of this well known firm.

Let us now describe the process of casting a peal of bells, as recently witnessed at the establishment referred to. The peal comprised six large bells for a church in New South Wales, which were cast in the same pit with three other bells for Mexico, the weight of the entire casting being about three and a half tuns. Bell metal is compounded of three parts of copper to one of tin, this proportion giving the greatest density of metal. Mr. Blews is, however, of opinion that the true chemical combination would be six atoms of copper to one in tin, or in weight three and one fourth to one. A less quantity of metal than is due to the caliber of the bell, though giving the same note, produces a meager, harsh sound; consequently, the superior dignity of tone in some old bells is ascribed to a greater weight of metal being allowed for the same note than would accord with modern ideas of economic production. Four tuns of bell metal is seething at a white heat in the furnace when the process of casting commences. At a given signal, an aperture at the end of the furnace, which had been stopped with fire clay, is opened by a workman armed with a long tamping bar, and the white fluid flows along channels of sand to the pit containing the molds.

There are two ways, Mr. Blew tells us, of making bell molds. The core in both cases is made of a brickwork or cast-iron cone, covered with molding clay, "swept" into the shape of the interior of the bell by a wooden "crook" fixed to a spindle set up in the middle of the core. The advantage of an iron core is that it can be lifted into a furnace to dry, instead of being dried by the application of internal heat, as is necessary in the case of the brickwork core.

The old method is to make a clay bell on the core by means of another crook, and when this is dry, to make the outside mold on the top of it. This mold has hair and hay bands, or (in large castings) bands of iron intersected to make it hold together, and lift off when dry. The clay bell is then knocked to pieces, the mold dropped down again over the core, and weighted with earth in the pit in which the bell is cast. The metal is then poured in at one hole at the top, another aperture being left for the escape of air. In the newer process no clay bell is made. The mold is an iron case lined with clay, and swept out internally to the outside shape of the bell. The "wires," or ornamental rings round the bell, are made in both cases by the second sweep, the letters and devices being stamped in the soft clay. These iron copes can be bolted down to a plate under the core, and need not, therefore, be sunk so deep in the ground, if sufficient care be taken to get an adequate "head" of metal above the bell, which is a very essential consideration. The process of casting in the case under review occupied about ten minutes, but a couple of days at the least would be required for cooling. The tenor bell of the peal for New South Wales had a happily chosen legend: "We sing the Lord's song in a strange land."

Church, school, plantation, factory, and ship bells, still closely adhere to the medieval type, and they vary in weight from fifty-six pounds upward. Other descriptions of bells are made very largely in Birmingham, by a goodly number of bell founders. Railway and dinner bells, from four to seven inches wide at the mouth, with wooden handles attached, musical hand bells for village ringing clubs, cattle, horse and sheep bells, with the ordinary house bells, are among the principal varieties, and the number produced is simply prodigious.

Some curiosities in bells are reported by the manufacturers, of which a few may be briefly noticed. Tiny house bells, ¾ in. to 1½ in., are largely made for the African market, where they are used for purposes of barter. Sleigh, dray, and caparison bells—which are small circular articles, with an iron ball cast inside—are extensively produced for Canada and the East India market. An order was not long since executed for 10,000 green, bronzed, and lacquered house bells, which now adorn the iron palace of a West African prince.

Another potentate of ebony hue ordered a number of polished ship bells in elegant brass frames, and mounted on mahogany stands, engraved with the assumed name of the sable prince, "Yellow Duke, Esq." The number of workpeople directly engaged in this branch of Birmingham industry, is estimated at about two hundred and fifty, and the increasing use of bells, both for outdoor and indoor purposes, promises to augment the number at no distant date.—*Mechanics' Magazine.*

A NEW STONE.

Architects have for some years past been indebted to Mr. Frederick Ransome for providing them with a constructive material of very great value, a stone which can be molded into any form, which can be produced in blocks of any size, and which, when made, is as durable as the best kind of natural stone known. The production of this material—the "patent concrete stone" as it is termed by Mr. Ransome—was the result of many years of persevering labor and struggles against difficulties; but we now find that Mr. Ransome, not content with what he had already accomplished, has succeeded in producing another new stone, which is in many respects as superior to its predecessor as the latter was to all other artificial stones produced before or since.

Before describing the process by which this new stone is made, it may be desirable that we should recall to the minds of our readers the method of manufacturing the artificial stone generally known by Mr. Ransome's name, as this will enable us to speak of the steps which led to the production of the new material. The ordinary "Ransome stone," then, is composed of particles of sand, mixed, in some cases, with a little ground carbonate of lime, the whole being incorporated into a solid mass by the formation in the interstices of a silicate of lime. After many fruitless searches after a method of procuring silicate of soda on a commercial scale, and at a moderate cost, Mr. Ransome hit upon the plan of boiling flints in a solution of caustic soda *under steam pressure*, and it is the silicate of soda thus obtained that Mr. Ransome employs to bring the materials we have mentioned into a plastic state, in which they can be molded to any desired form. This being done, the block produced is treated with a solution of chloride of calcium, when a double decomposition takes place, the silicic acid and the oxygen of the silicate of soda combining with the calcium of the chloride of calcium, and thus forming silicate of lime, while the sodium unites with the chlorine of the chloride of calcium, thus forming chloride of sodium. The silicate of lime produced in this way unites the particles of sand, etc., into a hard and perfectly durable mass, while the chloride of calcium remains diffused throughout the block, and has to be removed by washing.

Now, regarded from a manufacturing point of view, this washing process is rather a nuisance, particularly where large blocks are being made. If performed thoroughly, it occupies very considerable time, and, consequently, delays the turning out of the work; while, if not performed properly, there eventually takes place a greater or less efflorescence of the chloride of sodium, which, although not affecting the strength or durability of the stone, spoils its appearance. Under these circumstances, Mr. Ransome was led to endeavor to so modify his process as to render this final washing unnecessary, or, at all events, to reduce its amount, and, step by step, he arrived at the new method of manufacture, which we shall now describe. In carrying out these new plans, Mr. Ransome makes a mixture of certain proportions of ordinary sand, Portland cement, ground carbonate of lime, and some silica, readily soluble in caustic soda at ordinary temperatures, such, for instance, as the stone found in the neighborhood of Farnham and other places, and these materials he makes into a plastic mass by the addition of the silicate of soda already mentioned. The mass thus formed remains plastic a sufficient length of time to allow of its being rammed readily into molds of any desired form; but it gradually hardens, and ultimately becomes thoroughly indurated, and converted without any further treatment, into a hard stone, capable of resisting heat and cold, perfectly impermeable to moisture, and which, as far as can be judged from the experience hitherto obtained, goes on increasing in hardness, and bids fair to be thoroughly durable.

The chemical actions by which this wonderful result is produced are very curious, and Mr. Ransome's explanation of them is as follows: The Portland cement consists, as is well known, of silicate of alumina and lime; and when the materials are mixed up with the silicate of soda, the latter is decomposed, the silicic acid combining with the lime of the Portland cement, and forming silicate of lime and alumina, while caustic soda is set free. This caustic soda, however, immediately seizes upon the soluble silica, which constitutes one of the ingredients, and thus forms a fresh supply of silicate of soda, which is in its turn decomposed by a further quantity of the lime in the Portland cement, and so on. If each decomposition of silicate of soda resulted in the setting free of the whole of the caustic soda, the processes we have mentioned would go on as long as there was any soluble silica present with which the caustic soda could combine, or until there ceased to be any uncombined lime to decompose the silicate of soda produced, the termination of the action being marked by the presence in the pores of the stone of the excess of caustic soda in the one case, or of silicate of soda in the other. In reality, however, the whole of the caustic soda does not appear to be set free each time the silicate of soda is decomposed by the lime, there appearing to be formed a compound silicate of lime and soda, a small portion of the latter being fixed at each decomposition. The result thus is that the caustic soda is gradually all fixed, and none remains to be removed by washing or other process.

By his new process Mr. Ransome is enabled to produce admirable artificial marbles, while, by introducing amongst the materials fragments of quartz and a small proportion of oxide of iron, he obtains a stone of rich color, and hardly distinguishable from Peterhead granite. Like the natural granites and marbles, the artificial substitutes are capable of taking an excellent polish, while they possess the great advantage over the natural products of being capable of being molded in the course of manufacture into any form at a trifling cost. It would be idle for us to attempt here to enumerate the uses to which the new stone can be applied, for they are practically numberless. For decorative purposes it will be invaluable, and Mr. Ransome deserves the best thanks of architects, and we may add, of engineers, also, for having furnished them with a new constructive material at once so cheap and good.—*Engineering.*

Boiler Explosions.

The explosion of a steam boiler is *primâ facie* evidence of carelessness in its construction, or in its maintenance, or in its use. It is so regarded by the engineers, and ought so to be regarded by the law. It will be easy to convince any one who will examine the records of boiler explosions and inquire into the means of preventing them, that no injustice would be done to the owners of boilers by indicting them for criminal carelessness in all cases of explosion.

The history of boiler explosions is authentic and definite. The boiler has usually been erected under the full light of modern science. All the attending circumstances of the explosion have been immediately communicated to the public; curiosity has aided science in making every man an investigator of these circumstances and a searcher after causes; public and private commissions have been appointed to examine the subject generally; numerous legal tribunals have gone to the bottom of special cases, and innumerable private professional observers have witnessed results, searched records, weighed evidence, and arrived at general conclusions. All the plausible theories of explosions have been not only looked into, but worked out, in many cases, experimentally or theoretically, to their ultimate limits.

Now the remarkable and unprecedented result of all this investigation is, not the division of any large body of experts into schools; not the building up of rival theories, but the universal conviction of all concerned, that boiler explosions are certainly in most, and probably in all cases, the result of malconstruction or maltreatment, and of nothing else, and that the usual immediate cause is the unchecked deterioration of the boiler in service. In the great majority of cases the evidences of carelessness are as plain as the time of day on the face of a clock—a sheet furrowed nearly through; a stay bolt rusted off; a crown-sheet insufficiently supported; expansion and contraction unprovided for; water connections stopped up; bad material—some one of the many obvious and certain conditions of rupture. In a few cases the immediate causes are not apparent, and then the electricity theorists, and the gas people, and the mystery men fight over the remains in the newspapers; and the only reason why simple neglect is not discovered to be the cause, is that the parts of the boiler which would otherwise reveal it, are blown away, or are too much mutilated or obstructed to be legible. Simple bad treatment by the maker or user will account for the original rupture which ends in any explosion, however terrific may be its effects. There is force enough restrained within every steam boiler running today to perform the most terrible work of ruin that any similar boiler ever performed in exploding. When this force is once released, the amount of destruction depends on the point of rupture, the resistance, the surroundings, and on an infinite number of circumstances, mostly outside of our control. The only thing we can do, and it is enough, is to keep the resistance superior to the normal pressure.

Now that the causes of boiler explosions are so well understood as to be a matter of commercial calculation—where companies make money by insuring such boilers as are constructed and maintained according to established professional rules—it is to be regretted that the Government should stand helplessly by, and see scores of people scalded to death every few weeks, for the want of an adequate law and a system of inspection. Boiler insurance and inspection companies—and they are no new or experimental thing—simply prove that boilers constructed and maintained according to certain well known rules, are practically safe; that the chances of explosion, even with ordinary water-tending, are very remote, and they stake their money on this knowledge; and yet the United States Government has been unable to even check the increase of these disasters. If Congress cannot at once provide for the security of the public against boiler explosions, it had better let out the job of protecting its citizens to some insurance company, and then it will be done on scientific principles, and by competent men.—*N. Y. Times.*

The Domestic Silk Trade.

The interruption to the Lyons silk manufactories, naturally resulting from the Franco-Prussian war, has proved, according to the *Chicago Bureau*, of very material benefit to the producers of silk fabrics in this country. The sales of the principal makes of American silks have, we are informed, increased fully 100 per cent since the outbreak of the foreign war. Our manufacturers were competing successfully with foreigners in the production of colored silks, while the trade, though taking all the black goods manufactured here, manifested a decided preference for those of foreign make. The war has had the effect of increasing the demand for both black and colored domestic silks, though this is more noticeable in the former. Another result of the foreign disturbances—a result equally gratifying and unexpected—is the decline in the price of American goods. It seemed natural to believe, at the beginning of the war, that the inevitable result would be an advance in prices, consequent upon the increased demand and in sympathy with a rise in foreign goods. This, however, has not been the fact. Our manufacturers, like their Lyons competitors, always depended chiefly upon Italy and France for their raw silk, the California production not having become sufficiently well developed to furnish a supply anything like adequate to their demands. Now that the Lyons manufacturers are forced, by reason of the war, to suspend operations to a great extent, the Italian and French growers, especially the former, are looking to America for buyers of their staple, and finding our dealers ready to buy for cash, their desire to realize quickly induces them to make liberal concessions from current prices, which are, in fact, no higher than before the war. To this we owe—what must have been remarked by every silk buyer—the fact that American silks are now selling at lower prices than when brought into more active competition with the products of the principal silk-manufacturing districts of the world.

Extract from the Diary of Isambard Kingdom Brunel, in 1835.

53 Parliament street, Dec. 20.

What a blank in my journal (the last entry is dated January, 1834), and during the most eventful part of my life! When last I wrote in this book I was just emerging from obscurity. I had been toiling most unprofitably at numerous things: unprofitably, at least, at the moment. The railway was certainly being thought of, but still being uncertain. What a change! The railway is now in progress. I am the engineer to the finest work in England. A handsome salary, on excellent terms with my directors, and all going smoothly. But what a fight we have had, and how near defeat, and what a ruinous defeat it would have been! It is like looking back upon a fearful pass; but we have succeeded.

And it is not this alone, but everything I have been engaged in has been successful. Clifton Bridge, my first child, my darling, is actually going on; recommenced work last Monday—glorious!! [Here follows a list of the undertakings in which he was then engaged.] I think this forms a pretty list of real sound professional work, unsought for on my part, that is, given to me fairly by the respective parties—all, except the Wear Docks, resulting from the Clifton Bridge, which I fought hard for, and gained only by persevering struggles. . . . And this at the age of twenty-nine. I really can hardly believe it when I think of it. I am just leaving 53 Parliament street, where I may say I have just made my fortune, or rather the foundation of it, and I have taken 18 Duke street.

Remarkable Cave in Thomas County, Georgia.

We find the following interesting account in the Thomasville *Enterprise:*

Near the line of Brooks and Thomas counties, there has long been known an opening or cave in the earth, called "Devil's Hopper." Many persons residing in the neighborhood had visited it, but not one of these attempted a real exploration. We have before us, however, a letter written two months ago by a young gentleman in this city, to his father, describing an exploration of this cave by himself and a physician friend of his, residing in Boston. The writer says it was the most beautiful place he ever saw in his life, and he would not have missed seeing it on any account. He says that, after creeping through a narrow entrance at the surface, they descended to the depth of two hundred feet, winding about in the narrow path walled with solid flint rock, until they came to a well, which they descended by means of a rope, and found it to be forty-five feet deep, without water. At the bottom of this well they found the narrow passage leading off from the first, in a tortuous course, still walled with flint rock; they continued to follow it, and at some distance from the wall entered a large room or hall, walled with the same impenetrable flint rock, but jagged and pointed in a thousand fantastic shapes. The writer declares his inability to describe the grandeur and beauty of this hall by torchlight, but says he found himself in a large room walled with flint rock so jagged that a fall against it would cut one to pieces, and beautifully hung with stalactites that reflected the light in a thousand forms and sparkled with diamond brilliancy in the nooks and corners of the hall.

Manufacture of Glycerin in Cincinnati.

In Cincinnati, two million hogs are annually slaughtered for pork, bacon, and lard. The average weight of the heavier animals is 400 pounds. In former years, the chief attention was bestowed upon the manufacture of stearin candles and soap grease, in addition to salting and smoking meats, but latterly, since the demand for glycerin has called it into notice, more attention has been given to its preservation. For this purpose the lard is treated with water at 662° to 720° Fah., by which the glycerin is separated from the fatty acids, and freed from the disagreeable odor that characterizes glycerin made in the process of soap manufacture. Two or three large establishments manufacture annually 500,000 pounds, valued at $200,000 for the crude article. As there is an average of one hog to each individual in the United States (nothing personal intended), the forty million porkers can supply us with all the glycerin we are likely to want for an unlimited amount of artificial champagne, doctored cider, and rectified beer, not to speak of sirups and candy.

The Public Printing Office, in Washington, is to be connected with the Capitol, by telegraph, and a pneumatic tube is talked of for carrying messages, proofs, etc.

EXERCISING CLUB.

This club, invented by John L. Dibble, of New York city, consists of a hollow metallic cylindrical shell, as shown in the annexed engraving. In the interior of the shell there is arranged a system of adjustable cylindrical sliding weights, by which the muscular exertion necessary to handle the clubs, may be increased or diminished to suit the power of endurance of the exerciser. Such clubs can be used by per-

sons varying greatly in muscular strength, as by placing the weights near the hand, the power necessary to manipulate the clubs in the usual manner is much lessened, and *vice versa*. Patented in May, 1867.

THE PRESENT AND THE PAST.

NUMBER IV.

Fierce have been the contests waged among scientific men in their well-meant endeavors to assign true causes to natural phenomena. In these, as in other controversies, one side must be, on some points at least, in the wrong; while, as frequently happens, neither may be altogether in the right; and such errors, supported by great authorities, argued with surprising one-sidedness and prejudice, and too frequently interlarded with disgraceful personalities, would necessarily, it might seem, retard the advance of science. The evil, however, is most frequently brought about by too hasty generalizations upon insufficient data, and fortunately, sooner or later, corrects itself; and the accurate investigations and cautious experiments, and the acute and exhaustive criticisms, that the very acrimony of the contest calls forth, effectually winnow the truth from the falsehood, and determine the former sooner and upon a firmer basis than might otherwise have been done.

Several such contests are at the present day in progress, and notably one regarding the mode of origin of valleys. Lyell, who was very largely indebted for the groundwork of his great work, the "Principles of Geology," to Playfair's "Illustrations of Hutton," on this point discarded the older opinion that valleys were the result of atmospheric destruction and of river erosion, and substituted a theory of his own, that they were largely due to the action of the sea, operating on lines of faults, prior to the emergence of the land from its waters.

Of late years, this submarine theory has been violently attacked by many British geologists, and as energetically defended by others. The "sub-ærials" have, however, had decidedly the best of the argument; it is in vain that the "submarines" point to inland escarpments, as ancient sea-cliffs, and to many other phenomena that seem to support their cause; general principles are against them, and the logic of their own favorite facts is turned upon them.

The action of breakers does not extend to any great depth beneath the surface of the ocean, even in the heaviest gales, and all their work tends to straighten coast lines and to make even plains, and not to indent the shore or to excavate deep valleys in the bed of the sea.

Lay off upon paper a section of a sea bed as marked by soundings in its true proportions, and you will be astonished to find that the elevations and depressions of its surface are scarcely noticeable, save in very exceptional instances, and even these prove the rule; for if we find a mountain on the sea bed, it is a mass which the waves have not had time to remove, and a hollow is a pre-existing valley that they have not had time to fill up. The sea rough-hews the block and squares it off, but it is atmospheric agency and its consequents, running water and moving ice, that carve anew all the details upon the upheaved and dry land surfaces. Perhaps nowhere on the earth are such convincing proofs given of this truth, as on this continent, on either side of the Rocky Mountains.

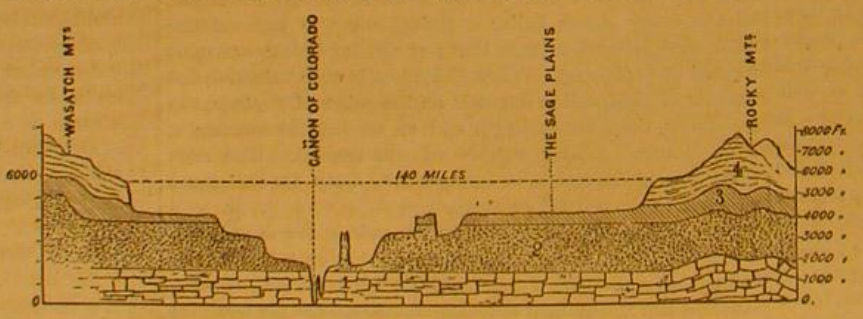
Let us confine ourselves to a few remarks upon only one district, and we shall not only elucidate this point but shall also enable the reader to recognize more clearly than ever the wondrous results that are achieved by the air, the rain-drop, the rill, and the river.

The great region of the Colorado of the West and its tributaries has not been beneath the ocean since the latter laid down the cretaceous deposit; that is, it has, during the entire tertiary period, been subjected to atmospheric agencies of destruction; and if we study out the lesson afforded by the accompanying diagramatic section, given us by Dr. J. S. Newbern, the well-known geologist, of a part of this region which he explored, we may well pause astonished at the conclusions to which it points. On the line where this section is taken, crossing the junction of the Grand and Green rivers, at the head of the Grand Cañon of the Colorado, the Rocky Mountains on the east are distant some 140 miles, more or less, from the Wasatch Mountains on the west. Above this line, the cretaceous sea laid down its final loads of deposit in an even though slightly inclined plain, at what is now at the very least 6,000 feet and upwards above the level of the river's rocky bed, and fully 8,000 feet above the present sea level. In other words, when rain first began to fall upon the gradually emerging cretaceous strata, when rills first threaded their way down the slight incline, seeking the sea, the rocks which now are washed by the waters of the Colorado, were then buried under upwards of six thousand feet of newer strata. As the land gradually emerged more and more from the waves, and exposed a constantly increasing and more elevated surface to the rain fall, the rills became noisy brooks, hollowing out and widening their channels, and boisterously rolling the fragments they detached downwards, wearing them away, in their sport, to pebbles, and to sand, and to fine-grained mud; the brooks in turn became rivers, and the rivers grew more and more powerful and impetuous.

These rivers of the past cut their way into the higher rocks over which they then flowed, just as their descendants of the present are eating into their more deep-seated rocky beds; when an obstacle, such as a stratum of harder rock, for a time arrested their progress in one direction, they exerted themselves laterally, spread out their forces, widened their banks, altered their channels, but all the time kept on bearing away the millions of tuns of *débris* that the rain and the rill rolled into them. By and by the barrier gave way, their outfall was lowered, and they soon set to work on a lower and older series of rocks, while the higher plain was drained more effectually than ever; and rapid drainage of a district implies also its more rapid superficial destruction. The more steep the hill, the more bare its sides.

The brooks had settled tens of feet into the cretaceous rocks, and their channels already coursed through narrow valleys or coombs; the rivers had eaten down hundreds of feet, and their valleys had broadened into plains bounded by ever-deepening escarpments; they sank thousands of feet, and valleys had been formed within valleys, and the remains of the old valley beds were now wide plateaus bordering the new excavations. The work of the water was easier and more rapid in the more recently formed and softer cretaceous and triassic strata, than in the ancient metamorphosed and crystalline rocks, through which they are now running; and, moreover, during all the vast time that has elapsed between now and then, rain and rills have been incessantly eroding

Section to illustrate the denudation of the region of the "Colorado of the West."



1. Palæozoic. 2. Triassic. 3. Lower Cretaceous. 4. Upper Cretaceous.

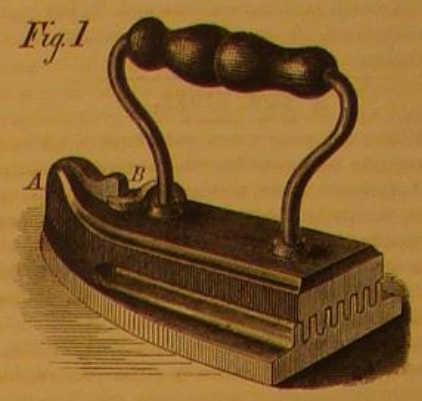
and widening the original watercourses, and bringing down more and more of the bounding escarpments. We thus see how the upper and primitive valleys (now plateaus) have been widened so much above—in places it is estimated to 180 miles; while those at present being scored out are to be measured by but hundreds of yards.

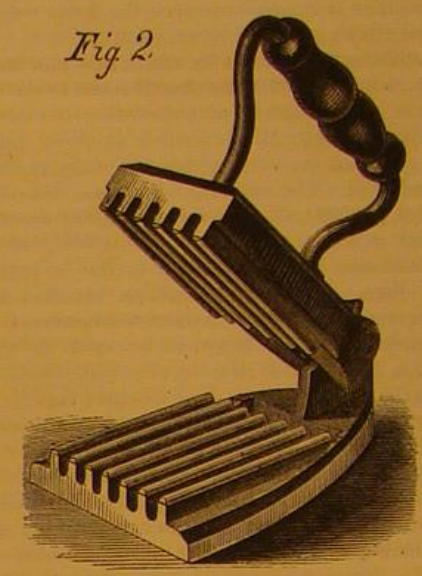
AERIAL TEMPERATURE.—As a large portion of the traveling public is now interested in balloon voyages, it is interesting to know that the generally received opinion, that the temperature of the air decreases uniformly with increase of altitude, is a fallacy. We have Mr. Glaisher's authority for stating that the mean temperature in summer, at 50 feet from the surface of the earth, is, during evening and night, higher than at 4 feet, and in winter the same relative temperature is always preserved, both by day and night. At sunset, in summer, the temperature is nearly the same for the first 2000 feet of ascent; but at night and in winter, it increases with the altitude. Thus the phenomena observed near the earth's surface are at variance with those of the etherial atmosphere beyond.

BLACK COPPER.—The beautiful enameled surface possessed by paintings on copper, may be produced, on a black ground, by the following process: Clean the copper with sand and sulphuric acid, and then apply the following mixture: 2 parts of white arsenic, 4 parts of hydrochloric acid, 1 of sulphuric acid, and 24 of water.

KNAPP'S FLUTING AND FLAT IRON.

The annexed engraving is a representation of a combined fluting and sadiron, invented and patented August 2, 1870 by M. H. Knapp, of Fulton, N. Y. The demand for fluting irons and machines for fluting has latterly been on the in-





crease, and this invention is designed to supply a convenient apparatus at a much cheaper rate than fluting machines can be afforded.

It will be seen that the iron is made in two parts, pivoted together at A. When closed, these parts are held together by a button and catch; shown at B, Fig. 1. To insert the cloth for fluting, the upper part of the iron is raised, as shown in Fig. 2, and when closed, the cloth is pressed into the grooves in the lower part, and thus fluted.

For light laundry purposes this implement will answer a good purpose, and take the place of expensive machines, where rapidity in the performance of the work is not a desideratum.

Persons wanting these articles, desiring rights to manufacture, or agencies to sell them, may address for further information Knapp and York, Fulton, N. Y.

Polishing Collars and Shirts.

Put a little common white wax in your starch, say two ounces to the pound; then if you use any thin patent starch, be sure you use it warm, otherwise the wax will get cold and gritty, and spot your linen, giving it the appearance of being stained with grease: it is different with collar starch, it can be used quite cold; however, of that anon. Now then, about polishing shirts: starch the fronts and wristbands as stiff as you can. Always starch twice, that is, starch and dry, then starch again. Iron your shirt in the usual way, making the linen nice and firm, but without any attempt at a good finish; don't lift the plaits; your shirt is now ready for polishing, but you ought to have a board the same size as a common shirt board, made of hard wood, and covered with only one ply of plain cotton cloth. Put this board into the breast of your shirt, damp the front very lightly with a wet sponge, then take a polishing iron, which is flat and beveled a little at one end—polish gently with the beveled part, taking care not to drive the linen up into wave-like blisters; of course this requires a little practice, but if you are careful and persevere, in a short time you will be able to give that enamel-like finish which seems to be so much wanted.

TO DRESS COLLARS—For this purpose use the best starch, say 2 lbs., and 4 oz. of wax and 6½ pints of water; first dissolve the wax in the boiling water, take the vessel off the fire and allow it to stand for five minutes; during this time dissolve the starch in the smallest possible quantity of cold water, then pour it gradually into the vessel and boil for 25 minutes—keep stirring all the time; this starch can be used quite cold; rub it well into the collars, wring as tight as you can, finish by wringing in a cloth, then iron; thus you will have them stiff without being hard, and when well dressed will have that beautiful elastic finish so much admired in new collars.

NOT A BAD IDEA.—It is said of a shrewd merchant that he has his bill heads printed upon paper of three different colors—red, green, and white. When the bill is made out upon a red paper it denotes "danger," and the messenger is not to leave the goods without the cash; if on green paper, it means "caution," as the customer is doubtful, and the man is to get the money if he can; if on white, it is safe to leave any quantity of goods on credit.

AGRICULTURAL PATENTS OF THE YEAR.

There is no object of more interest in Washington than the United States Patent Office, the repository of all the silent but eloquent memorials of the genius and efforts of our inventors, and there is no department of this vast institution more pleasing to the general visitor than that devoted to agriculture. The models are generally so simple in structure as to suggest their purpose without reflection or conjecture, as many of the more complicated machines do not. The hall containing the agricultural models is about two hundred and seventy feet long, and is provided with sixty cases (exclusive of those in the galleries), each case being about twenty-five feet long by five feet wide, and provided with four shelves, upon which the models are arranged as closely as they can be made to stand. Of these sixty cases, thirty-one are devoted to agricultural models, systematically arranged in classes, each class being subdivided into years, and every model bearing a card having the subject of invention, the name and residence of the inventor, and the date of the patent on it.

During the year 1869, nineteen hundred patents were issued, in this department, which may be classified as follows:

Bee hives, houses, traps, etc.	62
Butter workers, tubs, etc.	20
Cattle ties, slaughterers, catchers, etc., chicken coops, nests, etc.	35
Churns and churning	130
Corn shellers, huskers, etc.	40
Cotton gins, pickers, etc.	30
Cultivators	150
Diggers and spaders	30
Drills	30
Egg carriers, detectors, etc	8
Fertilizers	6
Forks—hay, manure, pitch, etc.	100
Fruit boxes, crates, pickers, etc.	20
Garden implements	5
Grain bins, granaries, etc.	10
Grain cleaners	20
Harrows, drags, pulverizers, etc.	80
Harvesters and attachments	195
Hay spreaders	25
Hay tedders	10
Hedge trimmers, setters, etc.	6
Hoes	25
Markers	12
Milk coolers, safes, pails, and dairy apparatus	45
Mowing and reaping machines	30
Planters	150
Plows and attachments	252
Pruning	15
Racks	6
Rakes	90
Rollers	15
Sap spiles	5
Scythes	5
Seeding and sowing machines	80
Separators and smut machines	50
Stalk cutters	7
Straw, hay, and fodder cutters	30
Thrashing machines	35
Yokes	15
Miscellaneous	18

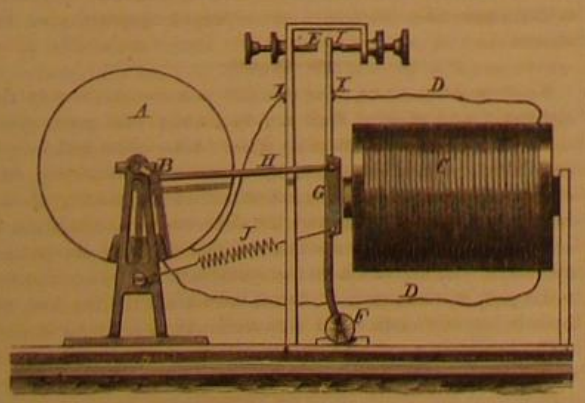
It will be observed that the plow takes front rank in numbers, as it does in point of importance. It is, of course, understood that a patent is not granted on every application as all inventions are not novel, and it is safe to say that applications for patents for improvements on the plow average one for each day. Notwithstanding this rapid increase, there is, apparently, as much room for improvement as ever. One of the examiners states that when he first entered the Patent Office, he considered the field of invention nearly closed; so much had been done that he could see little room for further improvements; but after an experience of nearly seven years, he concludes that there is no limit to inventive genius. Though a thousand improvements have been pat ented, the field is still open; and there are as many applications for improvements now as when there had been but five hundred patents issued.—*Commissioner Capron's Report.*

PERPETUAL MOTION.

NUMBER X.

Fig. 26 is an attempt to secure a perpetual motion by the application of electricity. It is the invention of a citizen of

FIG. 26.



Kansas. In his communication inclosing the drawing, he say's:

"You will observe friction (the old enemy) is an ally in this. If a magnet of a certain power will not move the electric plate, the power could be increased without perceptible loss of tension, by decreasing the resistance which the magnet and conductor offer."

In the engraving, A represents a frictional electrical machine; B, a crank; C, an electro magnet; D, wire conductors; F, a trunnion; G, an armature; E, a circuit closer; H, a pitman; I, an insulating substance, and J, a spiral spring.

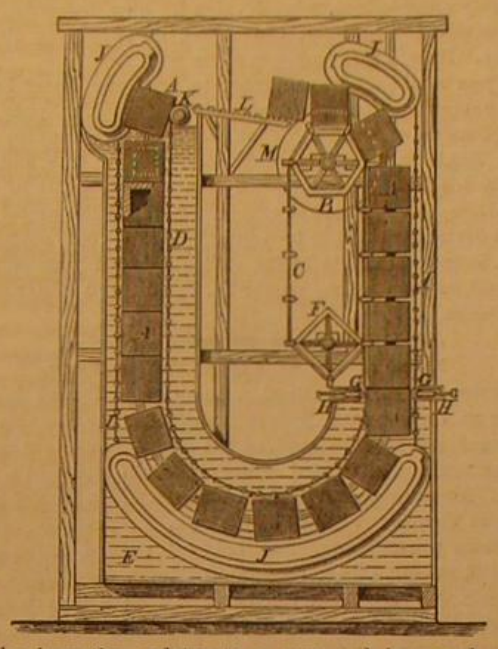
The device is expected to operate as follows:

The frictional electrical machine is started, which magnetizes the temporary magnet and draws the armature towards it. This breaks the circuit at the point, I, E, which demagnetizes the temporary magnet and allows the spring, J, to again close the circuit. By this means a continued motion is expected to be kept up.

To those not familiar with the science of molecular physics, this device may appear very plausible; a little reading, however, upon the subject of the correlation of forces, will serve to show its utter fallacy.

Fig. 27 is the invention of Jean Clunet, of Lyons, France, patented in England, 1869, under the name of "A New and Improved Motive power." It is thus described.

FIG. 27.



The invention relates to a new and improved motive power operating without noise and without expense. It consists in giving a rotary motion to a wheel, which is destined to transfer, by the ordinary means, the power obtained by the employment of any even, smooth blocks of stone, petrified mortar, iron, cast or wrought, or other heavy materials, in the form of cubes preferred, and of which the number and volume are governed by the amount of power desired, and causing them to descend in the ordinary atmospheric air, but to ascend in a liquid whose density is equal to their density, by which means their weight is annulled. For this purpose these blocks, when descending, are hung to hooks fixed to an endless chain turning upon the wheel receiving the motive power, which is of a shape of a hexagon, and placed on the top of a suitable framework, and upon another wheel of the shape of a square, which is placed at the bottom of said framework, and partially in a receptacle or tank of water, or any other liquid. When these blocks have arrived at the lower portion of their course, they detach themselves from the hooks on which hitherto they hung attached to the chain, which latter continues its ascending and rotary motion, and the said blocks descend and re-ascend within the tank, confined to their place and guided by an endless band and conducting wires stretched from supports for that purpose fixed on the top and bottom of the framework. They now, being thus guided, and following one upon another, find their way into another species of tank, placed vertically, likewise filled with a liquid similar to that in the first mentioned tank, and when arrived at the top of this second tank they tilt and slide along upon a horizontal shelf of rollers until they reach the hexagon-shaped wheel and the endless chain, when they recommence their descent. In order to prevent the liquid from running or descending from the second tank into the first, the blocks enter from one tank to the other between rollers and grooved pulleys pressed against the blocks by springs so as to shut off all way to the water. The detaching of the blocks from the endless chain takes place of itself, so to speak, from the position they find themselves in, in consequence of the rotary movement and of the turning over the said chain upon the lower wheel in the shape of a square. The endless band receives a continuous descending and rising motion from the weight of the blocks, which give every motion that the apparatus possesses, and which motion would be perpetual, if, upon the axle of the hexagon-shaped wheel transmitting the force obtained to the machinery by means of a driving pulley keyed to one of its ends, there were not keyed to the other end a break wheel with a hand crank, by means of which the movement may be stopped or modified. Instead of two receptacles it would perhaps often be better to have but one, the rollers and grooved pulleys already alluded to being placed at the entrance of the single tank instead of the second, the blocks acting in the same manner.

The engraving is a side section, in elevation, of the whole apparatus.

A represents the blocks; B is the hexagon-shaped wheel; C is the endless chain, which remains attached to the said wheel by means of its pointed hooks, which successively enter similar recesses made in the circumference of the wheel, the other end of said hooks being square, serving to keep the blocks in their place while descending in conjunction with the conducting wires, D, placed two in front and two behind each block, and one at each side; E is the receptacle; F is the square wheel from which the chain, C, at the bottom of its course is detached to re-ascend round the wheel, B; G, rollers, of which there are four, made of india rubber or other elastic material, placed at the entrance of the receptacle, E; and H is the india rubber or other suitable angle pieces, also placed at the entrance, between which rollers, G, and angle pieces, H, pass with slight friction the said blocks, after being disengaged from the chain, C. These blocks, A, angle pieces, H, and rollers, G, being in close contact, form a permanent stoppage, so that the water cannot issue, and said blocks, when in the receptacle, are placed in the middle of the same, where they are kept in equilibrium by the water, and are pushed and moved forward by the blocks which descend after them. I is the endless band, resting on supports, J, fixed to the inside of the receptacle, supporting the blocks and moving with them. The blocks, when in the vertical part of the receptacle, are conducted by four wires, one on each of their four sides. K is a roller upon which tilt the blocks, guided by the endless band when on the top of the receptacle to leave the same; L, friction rollers, on which fall and roll the blocks after having tilted, in order to reach the hexagon wheel, B; M, M, are the two pulleys on each side of the hexagon-shaped wheel, for applying the break and for transmitting the power obtained to other machinery. The equality in the density of the liquid and the blocks is obtained by hollowing the blocks so that they may easily rise to the top of the receptacle when therein. The desired result is obtained by the use of any other liquid, the volume of the blocks being proportionate to their density; also the weight of the blocks may be more or less than that of the liquid, but equality in weight is preferable.

Correspondence.

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

Ingrowing Toe Nails.

MESSRS. EDITORS:—The trouble and pain from this cause can be immediately and permanently relieved, without pain, in the following simple manner: Take a file, some four inches in length, bastard cut, flat on one side and round on the other, new and sharp. File down thin all the exposed part of the nail, till it is soft and pliable. This will immediately relieve the part pressing into the flesh, which need not be cut or extracted. The filing is not in the least painful, as the file will not take hold of the skin or flesh. In the course of several months, the nail will grow out thick again, when the filing should be repeated. The edges of the nail will never grow into the flesh so long as the top of the nail is soft and pliable; and there is nothing so simple, convenient, safe, and painless for keeping it so as a file.

Philadelphia, Pa. D. S.

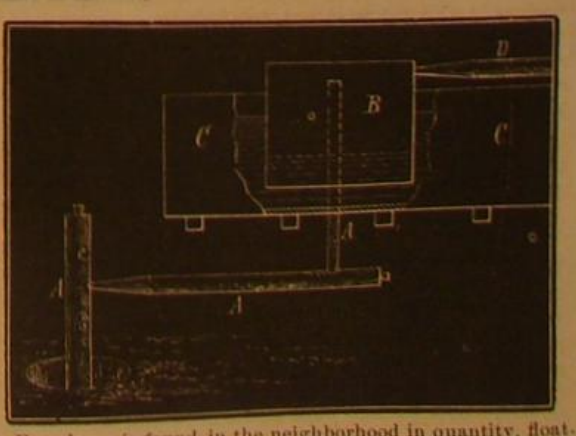
American Gas Wells.

MESSRS. EDITORS:—I have seen no account in any paper of one of the oldest and most remarkable oil wells there is in the United States, and will therefore write a short notice of it for the SCIENTIFIC AMERICAN. It was sunk in the winter of 1828–9, by Col. Rufus Stone, opposite McConnellsville, Morgan county, Ohio. The boring was for salt water, and when he found it he obtained all he needed to make salt, except "elbow, and a pinch of coal;" for, in drilling through a stratum of rock or clay, he not only found salt water, but hydrogen gas under pressure sufficient to lift the salt water to the surface. The well is, we believe, some three hundred feet deep, and has never ceased to furnish gas enough to lift water and evaporate it during the forty-two years of its existence.

The brine is lifted at irregular intervals into a large tank, whence it is drawn as needed. At times, it will rush through the pipes for a minute or more, but usually only flows for a few seconds at a time.

In the accompanying sketch, A A are the pipes, terminating at the top of the gas chamber, B. The brine falls to the bottom of the chamber, filling the tank, C, while the gas is carried away by the pipe, D, to the furnace, where a small coal fire is kept burning, to relight the gas in case the supply should cease during a long flow of water from the well.

It is seventeen years since I examined it, and the method of using the gas may have been improved since. The gas burns with a pale blue flame, and imparts no disagreeable taste to the salt.



Petroleum is found in the neighborhood in quantity, floating upon springs and the water of salt wells. It used to be called "rock oil," and was used for sprains, chapped hands etc. But no petroleum, or disagreeable smell of it, annoys the owner of the "works" described. J. B. GAGE

36 W. 16th st., New York city.

[In connection with the above statement, we will add tha

Mr. C. C. Peck, of Chicago, sends us an account of a remarkable gas well in West Bloomfield, Ontario county, N.Y. The well was sunk about three years since, for oil, a smell of petroleum and appearance of gas having manifested themselves on the banks of a small stream. The boring was stopped at a depth of 500 or 600 feet, for want of funds; but there has issued ever since a large volume of gas, having the color of petroleum. Our correspondent states that the flow of gas is, by actual measurement, more than enough to supply the city of Rochester, and a company is now organized to supply the town of Lima, preparatory to supplying the city of Rochester, from this source. The illuminating quality of the gas is said to be superior to gas made from coal.

Another correspondent, Mr. George L. Benton, writing from Shambury, Venango county, Pa., states that about ten miles from where Oil Creek empties into the Alleghany river, at a place called East Sandy, there is a remarkable gas well. The gas from this well is conveyed 1800 feet, through a two-inch pipe, and then employed to drive three engines, of from ten to twelve horse power, the gas being used *in the cylinders, like steam*, instead of being burned to generate steam. The surplus gas burned would, it is stated, more than make steam for the engines. When the engines are running the gage shows a pressure of 80 lbs. Under this pressure the amount of gas delivered must be very great.—EDS.

What a Woman thinks of Modern Microscopists.

MESSRS. EDITORS:—Among the whole tribe of your scientific men, there are none who trouble me so much as your microscopists. I am a faithful reader of your paper, taken by my son, Dr. S. P. Duffield, and rejoice in the modern improvements of machinery of all kinds; but this microscopic information about what I eat and drink is most appalling to my sensibilities.

I have not a *modern* stomach, *that* having performed its duty for seventy-one years; consequently, cannot *imagine* (in these days when imagination does such wonders), that I have in it some patent filter that might catch the horrid creatures which these gentlemen say we take in by the wholesale.

How sweet was the recollection in former days that "a cup of cold water" presented to a good individual entitled us to "a reward" by a kind Providence! Now, alas! that pleasant idea is abandoned; as, according to these wise men, we may give him a horrid worm which may be his death—consequently, we deserve no reward—to say nothing of those creatures which accompany said worm. After reading one of your late numbers I was reduced to despair; as my last refuge of pure things in the eating line is swept away by these unmerciful microscopists.

Oysters—the pure delicious oyster, so nice when eaten fresh from the shell—we are informed, very coolly, have in them multitudes of small oysters swimming nimbly about in the juice "covered with shells;" and not content with making us put up with swallowing oysters, shells and all, they unmercifully add that the liquor contains a "variety" (listen to their audacity in telling us of *a variety*) of animalculæ; and, in their benevolent (?) love of modern science, they go on to say, "there are three species of worm also."

Were it not for my belief in Job's words, (poor Job would be informed in these days that he had a thousand worms in each of his boils) "After my skin, worms shall destroy this body," I should, I fear, die of inanition, as I never would be able to take the "food convenient for me," that the happy ignorant Agur prayed for.

Then, too, these amiable *savants* tell us, by way of reward for gulping down this nauseous dose, that if we take our oyster into a dark room we will see a "luminous star;" verily, I should rather do without the luminary than have it shine from such a verminose panorama.

I have tried to find relief from the old adage, "Where ignorance is bliss, 'tis folly to be wise," but having a learned professor for a son, of course I have acquired a little science myself, and find it more difficult to do so.

I look to these wise men for some relief. Cannot they make their "luminous star" less of a "blue" one?

ANTI-VERMICULE.

The Manufacture of Irish Poplin.

MESSRS. EDITORS:—Every civilized nation has some specialty of manufacture, Ireland being famous for poplins and linen. When in Dublin I visited the well-known establishment of Pim Brothers, the most extensive poplin manufacturers of the kingdom. The spinning is the only part of the work that is done by machinery. Every other part is performed in the most primitive manner by hand labor. Almost the first thing that meets your eye on entering is a number of old women sitting beside old-fashioned flax spinning wheels propelled by the foot, and winding the thread on spools.

In this establishment there are employed two hundred and thirty looms, of the rudest possible construction, in appearance resembling those of our great-grandmothers, manufactured during our colonial struggles. Every thread is put through with the old-fashioned shuttle by hand; and the treadles are worked by the operator's feet. The looms are all operated by men, ten yards being an average day's work, and fifteen yards the largest ever known to have been woven in one day. The greatest skill seems to be displayed in producing the colors, and their power of retaining their richness for an indefinite length of time.

Any one who will take the trouble of examining a piece of Irish poplin, will notice the irregularity in the size of the threads, and the imperfections in weaving. I asked one of the managers if he did not think that power looms could be used for weaving; his reply was that it was possible, but not practical, as labor was so cheap with them that it would probably cost more than to do the work by hand. Nearly all other parts of the work except weaving is done by female labor.

That the far-famed Irish poplins should be manufactured in so simple and primitive a manner was to me a matter of surprise. J. E. E.

Industrial Competition.

MESSRS. EDITORS:—I have read your notice, in No. 5, of my paper upon "International Industrial Competition," concerning which I beg to say that I by no means wish, as you express it, to "deal a death blow to commerce and trade."

It is very true that I prefer domestic commerce and trade to the comparatively insignificant foreign commerce, which arrogates to itself the exclusive right to be called commerce. The former is a sure indication of prosperity; the latter is far from being so, and may be the direct cause of national impoverishment.

What I insist upon is, that each nation which intends to be truly independent, must develop its own resources, so as to contain within itself the means of supplying its own wants. Here, I feel sure you agree with me.

If you would do me the honor to read the latter half of my pamphlet, you might probably reconsider your view that I am an extremist. That I love my own country more than England, Germany, or France, is most true, and I desire to see it resist successfully the trade assaults of those countries; to equal and to excel them in all the useful arts. That desire is shared in by yourselves and your readers; it may, in fact, be said to be the *raison d'être* of your valuable journal, as it was of my pamphlet. JOSEPH WHARTON.

Camden, N. J.

Luminosity of Cloth When Torn.

MESSRS. EDITORS:—About a month ago I read in your paper an extract from *Nature* mentioning the singular phenomenon, recently observed, of the evolution of light caused by the tearing of twilled cotton cloth into strips in a dark room. About seven or eight years ago, while in the dry goods trade at Victoria, Vancouver's Island, I repeatedly noticed this same phenomenon. Not only soft twilled cotton cloth, but stiff, smooth calico, containing a large quantity of lime dressing, will emit light when torn in a dark or even dimly-lighted room. In cold, dry weather the phenomenon is more noticeable than in warm or damp weather. In Montana, during an extraordinary cold spell in the winter of 1867–68, the thermometer ranging from ten to thirty-two degrees below zero, I noticed that common printing paper, when torn in a cold dark room, will emit light. I have always attributed the evolution of light in these cases to electricity. At the time I noticed the so-called phenomenon in Montana, the amount of electricity "knocking around loose" was really astonishing. One day, presenting my knuckle to the tip of a cat's tail, a spark flew out of it (the cat's tail) as large as that which comes out of a twelve or fifteen-inch electrical machine. Often, at night, when undressing for bed, as I was pulling off my woolen overshirt, I would hear a crackling noise, like that made by the breaking of thin glass stems, and while extracting my head and arms from it, I would see hundreds of little flashes at the points where the over-shirt and under-shirt were parting. In violently shaking my overshirt, after taking it off, I would see innumerable flashes of light, and hear a continuous crackling sound. When the cold spell was over, the pyrotechnics on my shirt ceased, the cat no longer gave forth sparks, and no matter how luminous the articles were in the newspapers which I tore, light refused to issue from them. G.

San Francisco, Cal.

Illustrious Inventors.

MESSRS. EDITORS:—It is with pleasure that I acknowledge the receipt of the beautiful engraving, "Men of Progress." You will please accept my grateful thanks, and rest assured that I shall use what influence I may have in presenting the claims of the SCIENTIFIC AMERICAN to my friends and to the public, not simply for the reward that I have received, but from my appreciation of a paper so full of useful information. J. F. LESLIE.

Haverhill, Mass.

[Concerning this group of illustrious inventors, whose portraits are faithfully represented in this picture, the following are among the dead: Thomas Blanchard, Samuel Colt, Charles Goodyear, Joseph Saxton, Isaiah Jennings, Henry Burden, and Wm. T. G. Morton.

We shall continue to give a copy of this superb work of art to any one who will send us ten new subscribers, at our club rates—twenty-five dollars.

J. F. Kingsley, Owego, N. Y., writes that he has received the engraving, and feels well paid for the trouble he has been to, in getting up the club.

JEWELLER'S CEMENT.—The following is a recipe for a strong cement, used by some oriental nations, for the purpose of attaching precious stones to metallic surfaces: Take six pieces of gum mastic, the size of peas, and dissolve in the smallest possible quantity of alcohol. Soften some isinglass in water, and saturate strong brandy with it, till you have two ounces of glue; then rub in two small pieces of sal ammoniac. Mix the two preparations at a heat. Keep well stoppered. Set the bottle in hot water before using. It is said by the Turks that this preparation will unite two metallic surfaces, even polished steel.

There has never been a successful advertising agency south of Baltimore. Several have been started in New Orleans, but proved failures.

The Old Confidence in Superstition.

That prosaic and coldly rational temper with which modern men are wont to regard natural phenomena was in early times unknown. We have come to regard all events as taking place regularly, in strict conformity to law; whatever our official theories may be, we instinctively take this view of things. But our primitive ancestors knew nothing about laws of nature, nothing about physical forces, nothing about the relations of cause and effect, nothing about the necessary regularity of things. There was a time in the history of mankind when these things had never been inquired into, and when no generalizations about them had been framed, tested, or established. There was no conception of an order of nature, and therefore no distinct conception of a supernatural order of things. There was no belief in miracles as infractions of natural laws, but there was a belief in the occurrence of wonderful events, too mighty to have been brought about by ordinary means. There was an unlimited capacity for believing and fancying, because fancy and belief had not yet been checked and headed off in various directions by established rules of experience.

Physical science is a very late acquisition of the human mind, but we are already sufficiently imbued with it to be almost completely disabled from comprehending the thoughts of our ancestors. "How Finn cosmogonists could have believed the earth and heaven to be made out of a severed egg, the upper concave shell representing heaven, the yolk being earth, and the crystal surrounding fluid the circumambient ocean, is to us incomprehensible; and yet it remains a fact that they did so regard them. How the Scandinavians could have supposed the mountains to be the moldering bones of a mighty Jötun, and the earth to be his festering flesh, we can not conceive; yet such a theory was solemnly taught and accepted. How the ancient Indians could regard the rain clouds as cows, with full udders milked by the winds of heaven, is beyond our comprehension; and yet their Veda contains indisputable testimony to the fact that they were so regarded."

We have only to read Mr. Baring-Gould's book of "Curious Myths," from which we have just quoted, or dip into Mr. Thorpe's great treatise on "Northern Mythology," to realize how vast is the difference between our standpoint and that from which, in the later Middle Ages, our immediate forefathers regarded things. The frightful superstition of werewolves is a good instance. In those days it was firmly believed that men could be, and were in the habit of being, transformed into wolves. It was believed that women might bring forth snakes or poodle dogs. It was believed that if a man had his side pierced in battle, you could cure him by nursing the sword which inflicted the wound. "As late as 1600, a German writer would illustrate a thunder storm destroying a crop of corn by a picture of a dragon devouring the produce of the field with his flaming tongue and iron teeth."—*John Fiske, in Atlantic Monthly for February.*

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for December, 1870:

During the month 457 visits of inspection have been made, and 866 boilers examined—845 externally and 274 internally, while 87 have been tested by hydraulic pressure. Number of defects in all discovered, 486, of which 88 were regarded as dangerous. These defects were as follows: Furnaces out of shape, 22; fractures, 30—14 dangerous; burned plates, 22—3 dangerous; blistered plates, 63—12 dangerous; cases of sediment and deposit, 78—14 dangerous; cases of incrustation and scale, 83—9 dangerous; cases of external corrosion, 23—2 dangerous; cases of internal corrosion, 20—5 dangerous; cases of internal grooving, 15—4 dangerous; water gages out of order, 22—2 dangerous; blow-out apparatus out of order, 22—12 dangerous; safety valves overloaded, 25—2 dangerous; pressure gages out of order, 50—2 dangerous; cases of deficiency of water, 3—2 dangerous; broken braces and stays, 9—4 dangerous; boilers condemned, 3—all dangerous.

During the month there have been seven explosions in the United States, namely: Locomotive, tug boat, pile driver, grist mill, brass foundery, iron foundery, and steamboat, one each. By these explosions 12 persons were killed, 14 severely wounded, and many thousands of dollars worth of property destroyed. It is safe to say that the greater part of these explosions, and the consequent loss of life and property, would have been avoided by a proper inspection of the boilers.

What an easy thing it is to drive a locomotive, says the *National Car Builder*. Pull a lever, away she goes; push it, she slacks up and stops. That's all. The quick eye, firm hand, prompt courage, the knowledge of every furlong of the road, the putting on steam on an ascent, or the shutting off on a down grade, the difference of expansion in the rails between hot and cold, wet and dry, and the perpetual risk of life and limb and property are matters unknown to the people who pay their fares, take their tickets, and get to their journey's end. All the while their lives have been in the hands of a grimy looking man, at the end of the train, whom, if they meet him on the platform, they avoid, lest they should soil their silks or kerseymeres by the contact. These men should be, and often are, scientifically educated; but they have no social position, and their wages are absolutely inadequate to their responsibilities. The gentlemanly conductor is a personage of consideration, the petted of passengers, and the respected of directors. The engineer is a mere mechanic. The world is full of irregularities and injustice.

Cement from Gas Lime.

We gave, a short time since, a description of a new English process for making cement from gas lime, invented by Mr. Prideaux. Of this new cement, a correspondent of the London *Builder* says: It bids fair to become an important manufacture. In Sheffield upwards of 700 tons of gas lime have been worked up. The larger part has been applied to walls and floors, hearths and mantelpieces. Of the latter, about 200 have been moulded and sent out. In four of the busiest parts of the town, causeways have been paved by laying the cement with a certain proportion of broken slags from the neighboring furnaces. These have stood the late rains very well, and are likely to come into close competition with the asphalte usually employed. Perhaps the most happy application of this new material is for floors and roofs. Old boarded floors of warehouses have been covered with about an inch layer, and even in workshops, where polishing machinery keeps everything in vibration, the Prideaux cement stands intact. I have daily inspected the roof of a shed which had been covered with the cement. Upon a light frame of wood the material was laid on and troweled to a smooth face, and in the space of twelve hours it was hard enough to bear standing upon. The rain water now washes over it without the slightest trace of white particles, nor is there any alkaline reaction to be discovered on the hardened surface. The smoothness of walls and plinths molded with the Prideaux cement is very striking, and must recommend it strongly to builders.

Now, it may be asked, what is the composition of a cement which possesses these useful properties? It is not a Portland or a Roman cement, although some hydraulic characters are very distinct. It does not set so quickly, but allows more time for finishing up the faces of molded work. It is far from common mortar; for without any sand it can be formed into blocks which set hard throughout. A piece of a mantelpiece, which had been made some six months, gave the following results upon analysis:

Carbonate of lime	69·08
Sulphate of lime (hydrated)	22·63
Calcic hydrate	1·36
Calcic sulphide	*trace*
Insoluble matter	6·50
Alumina and oxide of iron	·45

It is obvious, from the above, that the setting must at first be due to the combination of water with the dehydrated calcic sulphate, or, in other words, the plaster of Paris formed by the calcination of the cement. The quantity of caustic lime which is present in the cement, keeps the plaster of Paris always fresh, that is, dehydrated, until mixed with excess of water employed at the moment of using it. This will account for the fact that the cement does not lose its quality by keeping, as the hydraulic cements do. After the plaster of Paris is set, the caustic lime goes on absorbing carbonic acid, and thus indurating the mass in the ordinary manner of lime mortars.

This will be better understood by the following partial analysis of a sample of the cement ready for use:

Sulphate of lime (dehydrated)	17·46
Caustic lime	54·00
Alumina and oxide of iron	5·00
Insoluble residue	4·15
Hygroscopic water	·24

Now, when it is considered that such a material is made from a waste product of a most offensive kind, this invention deserves every fair trial of its merits. Gas lime is a necessity, if the best and purest gas be wanted. Only the expense and annoyance of its removal drove London gas companies unwillingly to replace it partly by the ferric hydrates. It is pretty certain that with a market for the waste product they would gladly return to lime purifiers, and it may be predicted that the Prideaux cement manufacture will surely bring on this revolution.

Fortunes in Scraps.

The "old junk" business is much more extensive than most people suppose. It includes refuse of all kinds, cotton waste, woolen rags, old newspapers, iron, tin, lead, etc., patiently gathered from all quarters, insignificant in detail, but valuable in the aggregate. It is believed that over $15,000,000 worth of old material is annually worked over in New England, and that at least $5,000,000 worth of this peculiar stock could at any time be thrown upon the market by the Boston dealers. The amount consumed by the mills is astonishing, especially of shoddy. Woolen mills could be named that purchase each year from $3,000 to $4,000 worth of the above stock, and this, too, in addition to flocks. Very many paper mills have standing orders with the largest paper dealers for thirty and fifty tons of stock per week. The Kingsley iron and machine company receive and consume from sixty to seventy five tons of scrap iron each week, and the Old Colony and Ames' shovel companies stand ready to take all the old wrought iron offered in the market. The war in Europe seems to have closed up the avenues for using a large percentage of the Mediterranean rags, and as a natural consequence, they have all drifted here. The immediate effect on our market is to put foreign stocks at the lowest quotable figure, while domestics are, and are likely to be for some little time a drug. There are firms in Boston each holding $100,000 worth of foreign and domestic, patiently awaiting a rising and a favorable market. The importation of old junk grows in importance each year. Old newspapers are brought from England and find a ready sale at remunerative rates; the rags from London and the Mediterranean average more in quantity and better in quality each succeeding year. It has been supposed that imported rags have been a source of epidemic diseases in many instances, but one of the largest dealers in Boston, who has been in the trade fifteen years, states that he has yet to learn of a single case of sickness occasioned by the opening or bundling of a bale of foreign rags. New England rags are worth more and will readily bring from one to three cents per pound more than those from any other section, the reason being that an almost universal custom prevails there, among the housewives, of washing the rags before putting them in their rag bags—so that time, labor and shrinkage are directly saved to the mills. One firm in Boston receives over $300,000 worth of paper stock per month from the South, New Orleans being the chief point of collection.

Steam Boiler Legislation.

The Manchester (England) Steam Users Association held a conference January 13th, to consider the subject of steam boiler legislation. Sir William Fairbairn presided, and the following resolutions were adopted:

1. "That the use of steam, as at present conducted, entails great suffering from the destruction of life and property occasioned by the constant recurrence of boiler explosions. That boilers are now to be found under the pavements over which the public walk, behind walls close to which they pass, in the basement of buildings crowded with busy workpeople, and that, in short, they are to be found everywhere. That many of such boilers have given rise to the most disastrous explosions, so that the lives of all those living near so dangerous an instrument as a boiler, or even casually passing by, are seriously jeopardized unless suitable precautions are adopted to ascertain whether the boiler be safe and trustworthy, and if not, to render it so. That most of those who have suffered from these explosions have had no voice in the management of the boilers, and thus were helplessly victimized, some being women in their own houses and others children at play. Further, that in the generality of cases those injured by the explosions of boilers at the works at which they earn their livelihood are in a similarly helpless position, and, as a rule, too poor and too ignorant to defend themselves. That the subject, therefore, becomes one of general and public interest, demanding immediate investigation, more especially as the use of steam is daily on the increase, and, notwithstanding any precautionary measures at present adopted, explosions still recur with the most persistent regularity and frequency."

2. "That boiler explosions are not a necessary consequence of the use of steam, but that they are, as a rule, preventible. That though complicated in result they are simple in cause, arising, in the main, from bad boilers—bad either in construction or bad in condition. That six explosions are due to bad boilers, through neglect of the boiler maker or boiler master, for every one due to the neglect of the boiler minder. That competent inspection is adequate to detect the badness of the boiler, and thus to prevent by far the greater number of the explosions now occurring."

3. "That notwithstanding the proved efficiency of competent boiler inspection and the publicity constantly given to the subject, yet that steam users refuse to protect the lives of their workpeople, or those residing near to their works, by having their boilers inspected. That it appears approximately that out of about 100,000 boilers in the country only 20,000 are enrolled either with the inspecting associations or insurance companies, so that out of every five boilers one only is enrolled. That a great number of boiler owners are totally ignorant of the risk to which they expose their own lives and those around them, and in many cases are undeceived only by the shock of explosion. That, judging from experience, there can be no doubt that there are now a number of dangerous boilers on the very verge of explosion, being worked on at the risk of all those living near them. That under these circumstances the public safety demands that competent periodical inspection should be enforced by law."

4. "That, although it is necessary in the interest of the public that inspection should be enforced by law, it is not advisable either in the interest of the steam user or the public at large that inspection should be undertaken by the Board of Trade, or any other department of the Imperial Government, as such a course would, it is feared, harass the steam user and hamper progress."

5. "That while the administration of a system of enforced inspection should not be committed to the Imperial Government, neither should it be committed to local authorities, nor to private inspecting associations, nor to insurance companies."

6. "To secure the purity of the inspection let the administration be above all local, party, or private interests, and let it be undertaken, not for profit, but to promote the public safety. To prevent the administration becoming arbitrary, stereotyped, and old-fashioned, and to render it capable of adaptation to the constantly altering and growing requirements of the boiler owner, let it be administered by district boards, constituted partly of gentlemen elected by the steam users themselves, and partly of ex-officio members to be chosen on behalf of the public, the boards having the power of making such laws, rules, and regulations from time to time as might be found necessary for the conduct of the service."

INSULATING COVERING FOR STEAM BOILERS.—The radiation of heat from steam boilers and engine cylinders may be effectually reduced to a minimum by the employment of a jacket of wood, and filling the space between the boiler and the jacket with gypsum. This plan deserves the suffrages of boiler tenders, whose health and comfort suffer so severely from overheated engine rooms. The gypsum (plaster of Paris) will harden in time, and can easily be removed. This material will be found superior to cork or felt, and can be universally applied.

The Use of Glue.

A correspondent writes to the *Coachmakers' Journal* as follows:

"To do good gluing, the work must be well fitted. We use a scratch plane and file, in fitting work for gluing. The shop must be warm, the parts to be glued well warmed, and a kettle of good glue in readiness, well cooked, and brought to the proper consistency. Badly tempered glue is one great point of failure. If the glue be too thick or too thin the work is ill done. It is most frequently used too thick. In gluing panels for carriage work, etc., the work should be well run over a few times with the glue brush, until the pores of each part are well filled, and if the work be well warmed, the glue hot and of the right thickness, the first coatings will frequently strike in, or be absorbed by the pores of the wood. This striking into the pores is what gives a glue joint its great strength and durability. Now, having clamps, hand screws, etc., ready, put together immediately, bringing the parts firmly together, leaving no *body* of glue between, but do not get in a hurry. If you wish to hurry, do it in getting everything ready and at hand before you put on your glue. Use nothing but the best glue. If we do a bad job of gluing, screws will not cure it; it is a bad job at best, and will give out sooner or later. When glue joints open they begin at corners or ends, and work in by degrees. Screws at those points may stop the openings for a while, which is the most they can do. They are of but little use in panels to carriage bodies.

A California Railroad Pier.

The Central Pacific Railroad has erected at Oakland, on the east side of San Francisco Bay, a wharf 11,000 feet long, running out to a depth of 24 feet at low tide, and of 31 feet at high tide, having twelve railroad tracks upon its last 1,000 feet, a wide carriage way, a passenger depot and railroad offices, warehouses, and outside storage for 40,000 tuns of grain or other merchandise, and three large docks, one of which affords ample space for five of the largest steamers or clippers afloat. The extreme end of the main wharf is only three miles from the foot of Second street, where freight is landed in San Francisco, and is less than two and a half miles from the foot of Pacific street, where passengers are set down. The piles used, where the water deepens, are 65 feet long, and are 42 to 54 inches in circumference. The main wharf is 800 feet wide at the extreme or western end, and on it are pens for 500 cattle, two immense warehouses (one 50 by 500, another 50 by 600), and the passenger depot, 75 by 305 in size.

Obituary--The Late Henry Steinway.

Henry Steinway, the head of the well known firm of piano manufacturers, Steinway & Sons, died in this city on Tuesday, the 7th instant.

He was born in Brunswick, Germany, in 1797, and learned the business of piano-making thoroughly. He was a successful manufacturer long before he came to this country, which was in 1850. In this city he began business in Varick street, and then moved to Walker street, near Broadway, where, in a little old-fashioned house, formerly a dwelling, he won for his pianofortes the reputation which has made the Steinway pianos celebrated all over the United States. At the Crystal Palace in this city, in 1855, one of his instruments took the first prize. In 1860, the large up-town manufactory was built, and soon after, the splendid warerooms on Fourteenth street. Of late years, Mr. Steinway, Sr., has lived in retirement.

THE HUDSON RIVER RAILROAD ACCIDENT.—The daily papers have carried to every corner of the land, the news of the disaster which occurred at New Hamburgh on the night of the 6th inst. We need not, therefore, dwell upon its horrible details. An inquest is now in progress, and no doubt the blame, if any attach to the employés on the trains which collided, will be fixed upon the right persons. We shall defer further comment till the evidence is all taken.

SCIENTIFIC PERSONAL.—Baron Liebig writes to a friend in this city that his health is so far restored as to admit of his conducting the usual course of lectures at the University of Munich. Since he broke his leg, he has not been able to take as much exercise as usual, and the severe labors of the laboratory more readily tell upon him. We must also recollect that he is fast approaching the three score years and ten, which, the Psalmist tells us, is all that is allowed to man, unless by reason of unusual strength.

MANUFACTURE OF MUSTARD.—W. G. Dean, of New York, has obtained a patent for improvement in the manufacture of mustard flour, by which, it is stated, the unpleasant taste and smell of turmeric, as well as the natural bitterness of mustard, is entirely removed. The process completely destroys the disagreeable properties of the turmeric, and at the same time gives a sweetness to the flour, besides changing almost instantly the natural gray color of the mustard to a rich and beautiful yellow.

WE are in receipt of the annual report of Commissioner Capron, for 1869, upon the subject of Agriculture, which embodies much valuable information to our farmers. We intend to make several extracts from this report, such as exhibit the progress of inventions designed for agricultural purposes. These extracts will guide the minds of inventors into safe channels, upon which they may venture to push their ingenuity in search of other improvements.

Savannah has $20,115·15 worth of wooden pavements.

Improved Ore Washer.

The device illustrated herewith is an apparatus for washing ores. In its use, ore previously pulverized is thrown into a receiver, A, and falls thence into an inclined pipe, B. Here the ore is caught by jets of water forced upward into the pipe, B, through nozzles placed just below the juncture of A and B (not shown in the engraving), by means of a powerful steam pump.

The water jets carry the ore upward into a chamber, C, which is supported by the frame, E, and which has an inclined bottom, D. In the chamber, C, there is placed a perforated barrier (not shown in the engraving), extending downward from the arched roof of the chamber, and against which the mixed ore and water is forcibly dashed.

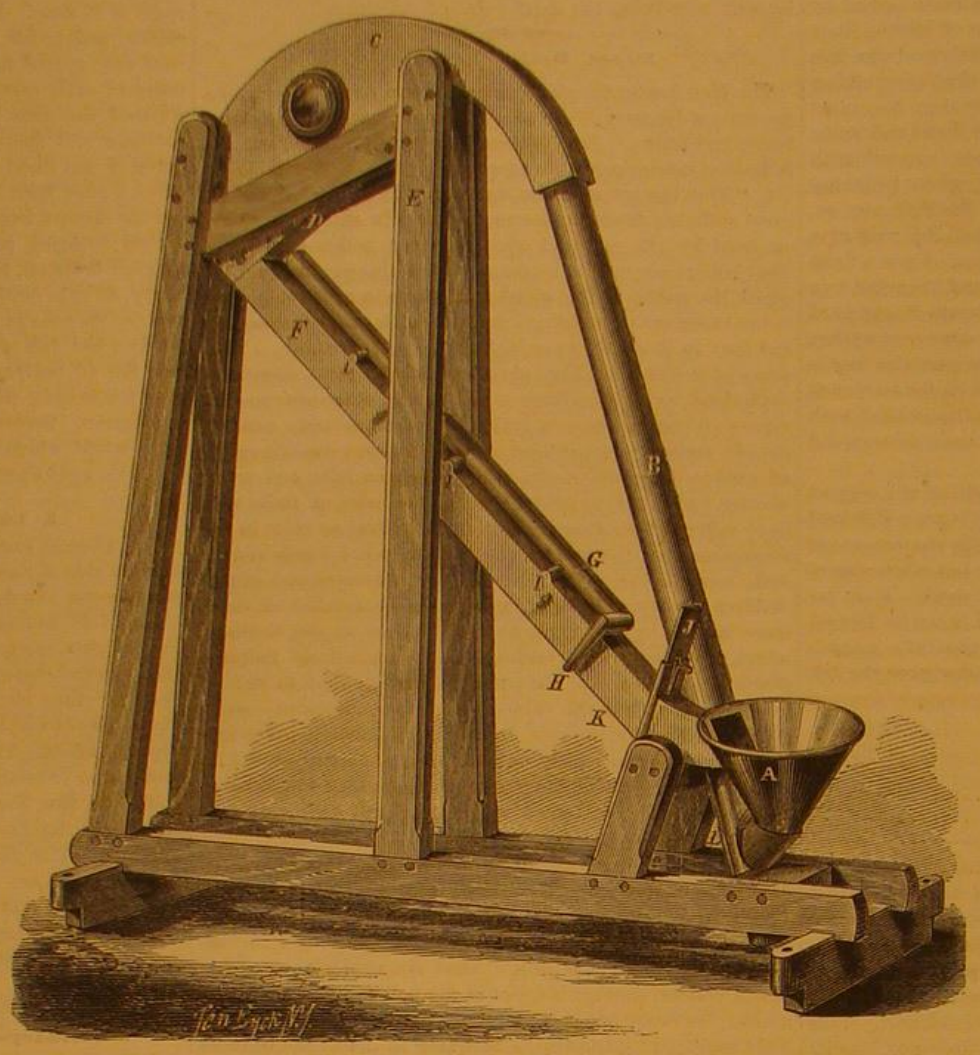
The perforated barrier does not extend entirely down to the bottom floor, D, of the chamber, C, but has beneath it a space left, through which the ore, after falling down the side of the perforated barrier, passes. A portion of the water, also, with some of the dirt, rushes through the perforations of the barrier, and the whole mass flows onward to the inclined trough, F, the upper end of which opens into the lower corner of the chamber, C.

The water now escapes through perforations in the bottom of the trough F, while the ore falls to its lower end, and is removed, if cleaned, through a gate placed at K, formed in the bottom of the lower end of the trough, F, and not shown in the engraving. If not sufficiently cleaned, which is ascertained by examining a small sample, the vertical gate, J, is raised, and the ore then falls through into the receiver, A, for a repetition of the process, or it may be passed through a suitable channel into another machine, for a second washing.

During its passage down the trough F, the ore is met by small jets of water from apertures, I, in the pipe, G, the water being forced in at H by a steam pump. Under each aperture, I, on the inside of the trough, F, there are formed lips which direct the jets upward against the descending stream of ore. The ore is by this means kept constantly agi tated, and every part is acted upon by forcible jets of water.

A sliding gate, L, is used to remove the clogged ore or to relieve the pipe from a surplus of water.

Patented through the Scientific American Patent Agency, Oct. 4, 1870, by Edwin Platt, whom address for further information Charleston, S. C.



PLATT'S ORE-WASHING MACHINE.

Patent Weatherboard Bracket.

The operation of weather-boarding is tedious, and attended with many practical difficulties. The spaces for the lap of boards are generally taken with compasses, or some kind of marking gage, a mark made, and nails driven in to support the board, which must be held in place with one hand, while the workman clambers from end to end of the staging, scribing and handling tools with the other. The board must always be taken down to be sawed, and replaced to be nailed on, and the supporting nails must then be worked out with the fingers, or drawn with the claw hammer, more or less defacing the work.

Very often, when a board extends past a corner board to be scribed, a wind whisks it off the nails, tumbling tools and nails to the ground.

The simple and efficient implement, herewith presented, effectually obviates all these difficulties, and greatly shortens the work.

It takes the space, and, at the same time, offers a secure bracket, to receive the next board and hold it firmly, in exactly the right position, while it is scribed, sawn off (without taking it down), and nailed on, leaving both hands free to handle nails and tools throughout the operation.

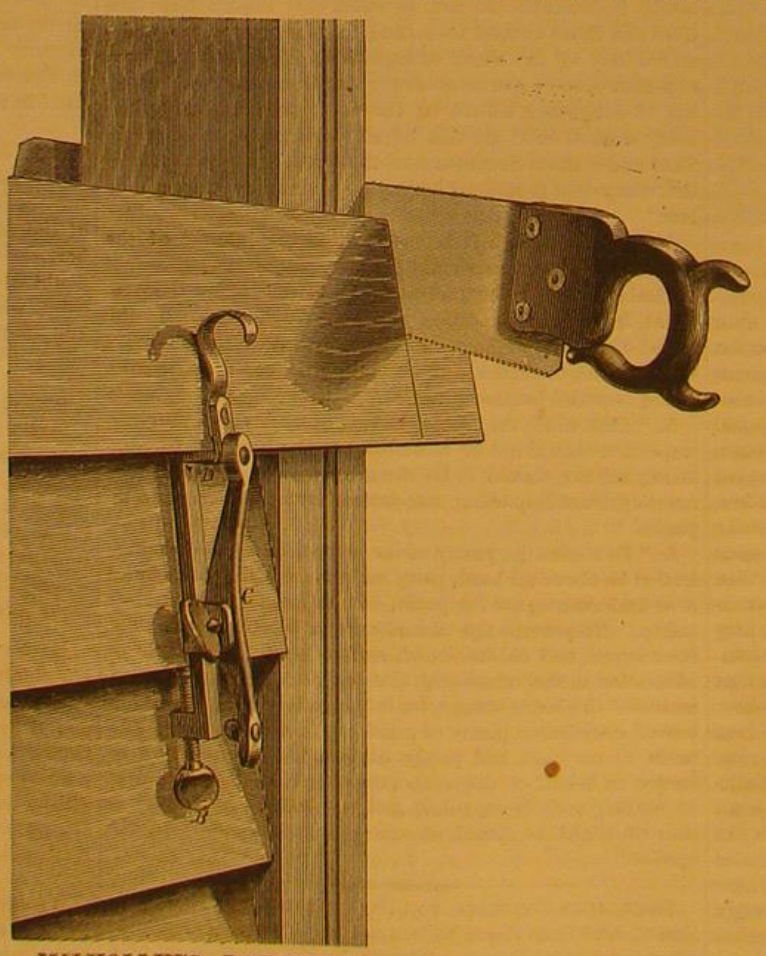
It consists of an elbowed spacing bar, A, carrying at its lower end an adjusting screw, B, which travels over a graduated scale, cut on the face of the bar, and terminating at its upper end in a bracket carrying a light holding spring, to keep the board upright against the studs or sheathing boards.

The bar carries ears near its middle point, in which is pivoted the middle point of an oscillating lever, C, the upper end of which carries a spike, D, by which the tool is fastened to the wall. One bracket is used to support each end of the board.

The adjusting screw being turned to the proper division on the scale to allow for any required lap of boards, the tool is slid upwards across the last board nailed on, till the end of the adjusting screw hitches on its lower edge; then a tap with the hammer on the upper end of the lever secures the tool to the wall in exactly the right position. The board is then dropped vertically behind the springs and scribed, then drawn past the casing or corner board and sawn off; then slid back to place and nailed on. One tap of the hammer on the lower end of the lever disengages the tool, when it is slid upwards and driven fast to the wall as before.

It will be seen that this tool is not one that must be put away and picked up again every time it is used. It is only a moment in the hand at each operation, and when not in the hand, is doing duty in its place on the wall. The utility of this bracket as a time and labor-saving implement is obvious.

Patented through the Scientific American Patent Agency, October 18, 1870. The patent is for sale. For the entire right, or right to manufacture on royalty address the inventor, J. M. Milhollin, Champlin, Hennepin Co., Minnesota.



MILHOLLIN'S PATENT WEATHERBOARD BRACKET.

To Prevent the Adhesion of Gold Leaf.

Painters and decorators will find the following plan a good one to simplify a most troublesome part of their work: A small piece of ball liquorice, dissolved in water, applied with a flat camel's hair brush to the place intended to be left ungilt, will prevent the leaf adhering. The solution must be weak. Made thick and gummy, it is very useful to protect ornamental parts of work that is to be repainted. We have the authority of the *Coachmakers' International Journal* for the above facts.

Improvements of Plows.

In the matter of swing plows, it can scarcely be said that any decided and unusual stride has been made during the year; nor has any strikingly unique form of mold board, landside, standard, brace, colter, or clevis been patented in that period. Applications have been chiefly for improvements in those devices.

Quite a competition has sprung up in an attachment of plows known as a "fender," which, although invented years ago, has received, until recently, but little attention. While the position of the fender is about the same in all plows to which it is applied, viz: pendent from the beam, and slightly in advance of and removed from the mold board: its purposes differ according to the style of the plow with which it is employed. Thus, on a breaking plow, one intended for raising and turning over the unbroken sod, it is used for bending the weeds and other trash away from the mold board when likely to interfere with the plowing, or being down in such a way of to fall beneath the ridge of soil turned over by the plow. The fender is also used on cultivators, for the purpose of protecting the growing corn and preventing the heavy clods from falling on the young plants.

The majority of plows patented are those known as swing plows, by which is to be understood a plow unsupported by wheels, and the chief aim of the inventors has been, while otherwise improving their efficiency for general and specific purposes, to make them lighter and cheaper. In this respect, our American inventors have good reason to boast over their competitors in other lands, as may be readily appreciated by a comparison with foreign implements, of our light and jaunty-looking plows.

There is a strong tendency toward wheel plows, "gang" and "sulky," in the prairie country west. By "wheel plows," are meant those in which the plows are carried between a frame supported on two wheels, and having a seat for the driver. There seems to be no diminution of interest in this class of plows in any section where they have been introduced.

The points to which attention has been directed by inventors of wheeled plows, are various. They have mostly reference to the frame and its appurtenances, and rarely concern the construction of the mold board, or parts which have to deal directly with opening the furrow. Either lateral or vertical adjustability has generally been kept in view, while much has been done with reference to a diminution of the draft, and to a construction that will keep the plow in the ground firmly and uniformly, while permitting it to be readily raised above the surface.

It is worthy of note, that the patents granted on wheel plows, in 1869, to residents of California and Oregon, largely exceed in number those granted for inventions of a like character from all the other States of the Union.

The Curled Hair Trade.

This article, which to almost any casual observer would be of small moment, is, says the *Trade Journal*, really of very great importance to the nation, as, with all our ingenuity, we have never yet been able to find a substitute for it in the manufacture of bedding, furniture, and many articles of use which contribute to our comforts. The amount of business done in this article is something really astonishing when reduced to figures. We imported into this country, from the various ports in South America, during the past year, a little over 3,000,000 pounds, amounting to about $960,000. When imported, it is not curled, but in the natural state, just as it is taken from the horses, of which many thousands are killed every year on the vast pampas in Central South America, and it is made up into robes here, and afterwards picked by machinery and by hand, when it is ready for use. The business in curled hair is increasing every year, and although the manufacture of hair cloth has, in a great measure, died out, there is still a very great increase in the amount of hair imported each year for this one purpose of curling. Two or three large houses in this country do most of the business, and are situated in New York, Boston, and Baltimore. The raw material is worth from 32 to 34 cents gold, and, after manufacture, brings from 50 to 70 cents currency, but the cost of manufacture is a very large item, and employs a large amount of capital, and a great deal of skilled labor. The imports of hair into this country, this year, in the opinion of parties in the business, will be from one to two thirds larger than last year.

Of the 7,391 residents of New Orleans who died last year twelve were over 100 years old.

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Co.," Agents, 121 Nassau street, New York.
☞ "The New York News Co.," 8 Spruce street, New York.

VOL. XXIV., NO. 8 . . . [NEW SERIES.] *Twenty-sixth Year.*

NEW YORK, SATURDAY, FEBRUARY 19, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

KEROSENE MURDER.

It is a matter of growing astonishment that the almost daily record of loss of life and property, through kerosene explosions, does not provoke some sort of special legislation upon the sale of dangerous fluids vended under different names throughout the length and breadth of the land. Petroleum has proved to be of vast and varied importance in the arts, but its more volatile products, have been made the instrument of the most heartless and wicked frauds; and these frauds are still daily perpetrated, and their authors go unhung, though their victims—called to meet the most horrible death known to man—constantly increase in number.

These victims are for the most part women, who, if they escape death, are obliged to undergo what is hardly less cruel to a young and beautiful woman, disfigurement for life.

It would seem in this case that the pecuniary risks involved would stimulate the fire insurance companies to action, though the public at large remain indifferent.

Our readers may recollect the case of Mary Gibson, who, only a short time since was burned to death by an explosion, of Danforth's (so-called) "Non-explosive Oil." This same material has figured before in other disasters. Its dangerous character was exposed in a former issue of this paper, yet still its sale is unblushingly continued.

We are now struck with horror at the disaster at Kenosha, in which the Halliday Hotel was destroyed, seven persons burned to death, and others fatally injured, the fire originating in a kerosene explosion; while from Baltimore comes another sad story of the burning to death of a child six years old, from the same cause.

If we chose, we might fill this column with the list of disasters which occurred last year from the explosions of petroleum fluids.

The public ought to know (surely it has been often enough told) that there is such a thing as safe kerosene, and that the dangerous fluids are either more volatile liquids, or kerosene mixed with more volatile liquids to increase the profits on its sale.

Most of these mixtures are sold under fanciful names, and are recommended by their manufacturers as better than kerosene. Now, when any manufacturer or dealer makes such a recommendation, he utters knowingly a wilful falsehood, to cheat innocent customers into buying a spurious dangerous article. No petroleum fluid more volatile than kerosene is a safe article for promiscuous and general use, and the man who sells it, is as criminal in so doing as a man who should knowingly introduced arsenic into table salt and sell it to his customers as an improved article. Let purchasers beware of these fancy names. In nine cases out of ten they are adopted as a cloak to cover cheating.

As to legislation upon this subject, it is perhaps not our province to propose measures to reach the root of the evil, but it certainly is a fact that the scoundrels who peddle death in the shape of burning fluids, are neither imprisoned nor hung. It would seem not a very difficult thing to frame a law that should bring to condign punishment such offenders.

ORGANIC MATTER IN WATER.

A very interesting paper touching upon a sanitary question of the first importance, was recently read before the Chemical Society, London, by Charles Heisch, of the Middlesex Hospital Medical College. Our views have long coincided with those of Mr. Heisch and many other chemists, viz., that "the deleterious nature of organic matter is dependent upon its containing living germs, which grow and set up a fermentative action within the body," so that the quantity of such matter which may exist in the water we drink, is not of so much importance as hitherto supposed. If the germs be present in any sensible quantity, the water must prove more or less deleterious. It is in the nature of this class of poisons that the quantity entering into the system does not greatly influence the result, as witness the effects of poison received in wounds in the dissecting room, the poison of rabies, vaccine virus, etc.

Although, as we have said, many have for some time held the belief that organic poison in water was no exception to the above rule, there perhaps existed no very firm grounds upon which these convictions rested. They were arrived at more from theory than from demonstrated facts. But Mr. Heisch has been applying the test of elaborate experiment to the theory, and hence the results of these experiments are of more than ordinary scientific interest.

In his paper, Mr. Heisch says he was first led to a means of determining the characteristic properties and appearances of such germs by being called on to assist a large manufacturer of lemonade, who, some years ago, almost suddenly found it impossible to make lemonade that would keep. After a day or two it became turbid, and its odor anything but agreeable. On examining the liquid under the microscope, he found it full of small, spherical cells, with, in most cases, a very bright nucleus, and after a few days the odor of butyric acid was unmistakable. After examining all the materials employed, he found that the water was in fault. On putting a few grains of the purest crystalline sugar he could procure into some of the water, it became turbid in a few hours, and the same cells were distinctly to be seen with an one-eighth inch object glass; but the butyric odor did not come on for some days. This water was procured from a deepish well; it was hard, and contained a considerable amount of nitrates, but not any unusual quantity of ammonia, or unoxidized organic matter. On inquiry, he found some digging had been going on near the well, and it appeared that some drainage must have got in, though at the moment so small in amount as to be hardly appreciable. When water from the water works was substituted, everything got right again. This led him to try all the samples of water he could procure in the same manner, and in every case where diarrhea or other mischief could with any kind of certainty be traced to the use of a certain water, when that was treated with sugar these same smells made their appearance, usually within twenty-four hours, if the temperature were kept up to between 60° and 70°, and plenty of light admitted to the bottle in which the sample was contained.

During the past year he has been trying what substances contain these particular germs, which are so peculiar as to be quite unmistakable when the observer is once familiar with them. By permitting the action of these germs on sugar to go on, they present uniformly the following appearances: The cells gradually group together in bunches something like grapes, quite differently from the ordinary yeast globules; they next spread out into strings, with a wall surrounding and connecting the cells; the original cell-walls then seem to break, and leave apparently a tubular sort of threads branched together. The strong resemblance of these to, if not identity with, the sewage fungus, coupled with the almost universal properties of water which produced them, led Mr. Heisch to look to sewage as their source, and he found that the smallest quantity of sewage, mixed with a water which might be treated with sugar and remain clear and sweet for weeks, at once produced these germs, or rather set them growing. Water was procured from various sewers, and after standing a few days to settle, six drops of clear water were mixed with 10,000 grains of West Middlesex and New River water. To six ounces of this mixture ten grains of pure sugar were added, a like quantity being mixed with six ounces of the water without the sewage. All these samples were placed in stoppered bottles in a window, where plenty of light could reach them. The water and sugar remained clear and sweet. The water with this trace of sewage did the same. The water, sewage, and sugar became turbid, in times varying from twenty-four to sixty hours, and exhibited the cells and strings before spoken of, and ultimately the odor of butyric acid was always perceptible. One drop of fresh urine in 10,000 grains of water, a mixture which may be kept for weeks without showing any sign of turbidity, produced in twenty-four hours, abundance of cells, and in forty-eight hours, branched strings.

No other substances tried produced the same result, although urea, albumen, nitrates, milk, and other substances of unstable character, were experimented upon. Some of these produced growths of some sort, but none resembled the peculiar and unmistakable cells and strings referred to.

Mr. Heisch asserts that filtering the water through the finest Swedish paper does not remove the germs, as on the addition of sugar they grow as fast as ever. Boiling for half an hour in no way destroys their vitality. Filtration through a good bed of animal charcoal is, as far as he can find at present, effectual in removing them, and if the charcoal be well aired from time to time, it retains its power for several months; but if the water be passed continually through it without this precaution, it soon loses it, and the filtered water is as bad as the unfiltered. The softer the water the faster the germs grow.

In conclusion the author remarks, that he does not think these germs are the only unwholesome kind of organic matter that exists in water, or that water containing small numbers of them might not sometimes be taken with impunity; but he regards with great suspicion any water in which they exist, even in the smallest number, as they increase and multiply with great rapidity. The fact that in multitudes of cases increase of health and comfort has resulted from giving up the use of water in which they could be found, even where its use had not produced positive disease, confirms this opinion.

STONE CUTTING BY MACHINERY.

All materials except stone are now successfully worked by machinery. We do not, of course, mean to say that stone is not so worked to a limited extent, but, in general, hand work of this material still maintains itself, against all the innovations of inventors.

The general reason for this is, undoubtedly, the abrading action upon tools which do their work by scraping, or by continuous cutting. Steel tools thus used soon wear out, and require a great deal of attention to keep them in working order. There are some kinds of soft stone which may be planed or turned by steel tools to advantage; but with the harder varieties, chipping with hand tools is the only method extensively employed.

A glance at some of the attempts hitherto made at substituting machinery for manual labor in this field, may not be unprofitable in this connection.

One method consists in the employment of a sliding eccentric, connected with a bar, in which a series of chisels is fitted; the chisels being made to adapt themselves to the surface by suitable mechanism, and being forced into the surface of the stone by the revolution of the eccentric.

Another method consists in the employment of rocking beams, carrying tools with serrated edges bearing upon the surface of the stone to be cut, and acting upon it by virtue of the rocking motion of the beams. Disks with serrated edges have also been used, which were caused to press upon and roll backward and forward over the stone, abrading it, and reducing it approximately to the form required. Rolling edges not serrated have also been tried.

Another plan is that of weighted cutters, actuated by wipers, cutting the stone by the force of their fall.

Rotating cutters, operating on the principle of drills worked in gangs, have also been used. To make a long story short, it may be said that scarcely any conceivable form of steel tool, or method of applying it, has not been tried, but without any marked success.

The introduction of the black diamond, or carbon points, as stone-cutting tools, however, seems to re-open the entire field again. In this material we have a substance harder than the hardest flint, and if properly applied to its work, capable of sustaining a vast amount of wear. It can be applied on the principle of either chipping or grinding. Drills pointed by it penetrate the hardest materials with astonishing facility.

Already several important machines for rock drilling, dressing millstones, etc., in which these points are employed, have been invented, patented, and successfully worked. It now remains for some enterprising genius to demonstrate that, by the use of these points, stone moldings may be cut as wood moldings now are, entirely by machinery.

A description of a new English machine, somewhat enthusiastically praised in the London *Builder*, will remind our readers of many attempts unsuccessfully made in this country, and the *Builder's* encomiums will therefore be received with some grains of allowance.

The machine is at work at Battersea, England. It consists of a bed made to travel longitudinally, with a shaft mounted over it for receiving the revolving cutting or molding head. So far, the machinery resembles that used for sawing; the head, however, instead of being a plain disk, with cutters, is shaped to the profile of the required molding, and has the cutters fixed in it according to that outline. The rough block being fixed on the bed, which is made to advance while the head revolves, the upper face of the stone is cut very nearly to the shape of the desired molding; the edges, however, are rather blunt, and the surface shows the tool marks. When this operation has been performed, a scraping tool, formed exactly to the molding, is fixed over the block; and the block being made to traverse several times under this scraper, has its face finished true and smooth, with sharp, clean edges, and the perfect profile required.

The *Builder* says that, by this machine, strings and molded steps are well worked in a remarkably short time. The cutters being built up, as it were, can be made to give any required outline, and their form is such that they work a considerable time without needing grinding. A large amount of work for St. Thomas's Hospital has been done by one of these machines.

The journal referred to also asserts that great saving of money and time is effected by this improvement, and it thinks the machinery can scarcely fail to come extensively into use.

Possibly it may, but we do not share our cotemporary's hopes in regard to it.

THE ELECTRO DEPOSITION OF COPPER AND BRASS.

The above is the title of a paper recently read before the British Association by W. H. Walenn. As we cannot give place for the whole of this paper in our columns, and as a review may be made to contain such portions as are not of purely theoretical interest, we shall endeavor to compress into the present article the practical information contained in it, abstracting perhaps some portions which may be of such a character as to be only properly given in the language of the author.

The commencement of the paper is devoted to a review of Smee's work on Electro-Metallurgy, published in 1851, in so far as it relates to the subject under discussion. Much attention is given by Smee to the electro deposition of copper, from acid as well as neutral solutions, and he alludes to the cyanide of potassium as a menstruum for dissolving copper when articles of iron are to be coated with the first-named metal; but he omits to notice the evolutions of hydrogen

during the deposition of the copper. He also gives five pages of his work to the discussion of the reduction of alloys in which, among other things, he mentions that zinc and copper have been deposited simultaneously by galvanic action, and afterwards alloyed by heat.

Mr. Walenn remarks that Smee was evidently not informed of Professor E. Davy's discoveries in 1830 (see "Phil. Trans," Vol. cxxi., pp. 147-164) or of the labors of M. de Roulz in 1841, or of Mr. C. Walker in 1845. Certain patented inventions also refer to electro-brassing at this early date, *e.g.*, Fontaine Moreau's invention, No. 10,282, A.D. 1844; De la Salzède's process, No. 11,878, A.D. 1847; Fontaine Moreau's plan, No. 12,523, A.D. 1849; Russell & Woolrich's discoveries embodied in No. 12,526, A.D. 1849; and Steele's patent, No. 13,216, A.D. 1850.

Smee undoubtedly believed that the evolution of hydrogen gas was evidence of the existence of the metal in the non-reguline form. At the present time, however, it is well known that there are solutions which deposit reguline metal during the copious evolution of hydrogen, and this generally takes place during the deposition of alloys. The views of Smee will not stand the test of vigorous experiment when alkaline solutions are employed.

In regard to alkaline solutions, Mr. Walenn remarks that if first principles be consulted, it will appear that, in alkaline solutions, the proneness to evolve hydrogen gas during deposition, arises from the joint action of two causes, one electrical, classified as such by Mr. Smee, the other chemical. The electrical cause is the small quantity of metal in solution in comparison to the electric power employed; this cause can be lessened or removed by using a solution that contains a greater percentage of metal than that usually employed. The chemical cause is the disposition of the metal of the alkali to go to the negative pole along with the heavy metal or metals, and thus, by being electro-deposited for an infinitely small space of time in contact with them, decomposing the water, thereby getting oxidized and setting free the hydrogen as a secondary effect; this cause can be eradicated by providing in excess a decomposable compound radical that will take a certain amount of combined oxygen with it to the cathode, and thus, when decomposed, will enable the hydrogen that would otherwise be evolved to be oxidized into water.

In the case of brass, a solution containing the cyanides of the component metals dissolved in excess of potassic cyanide, possesses the remarkable property of furnishing the copper and zinc to the cathode in such a form that, during during deposition, they unite and form a true alloy; this tendency to form a true alloy is increased by the presence of a salt of ammonium, for in connection with copper the gas that would otherwise be given off is replaced by metal, this result being secondary, and, in so far, a chemical reaction. It is usually deemed sufficient to charge the solvent solution (the potassic cyanide and ammoniacal salt solution) with brass by electrolysis, but this will be found on trial to evolve gas, and to be only workable by two Grove's cells. The author finds that it is practically serviceable to add to a solution that is charged with not less than two ounces of brass per gallon, as much of the metallic cyanides as it will take up, and then it will probably take still more of the copper and zinc oxides respectively. Should this treatment not perfectly prevent the evolution of gas, the ammonide of copper is added—about two or three ounces per gallon.

In treating the ordinary cyanide copper solution for the prevention of the evolution of hydrogen, the zinc cyanides and oxides, mentioned in the instance of the brass solution, are left out. When the evolution of hydrogen gas has been stopped by the means above set forth, a single Smee's cell is sufficient to deposit the alloy, thus showing that an intense voltaic current is not absolutely necessary, but that the process requires a certain condition of solution to give a perfect result.

The author prefers to use a menstruum containing potassic cyanide and neutral ammonium tartrate in equal parts, and dissolved in five times their weight of water, to dissolve the brass in. This is then treated, as explained above, to prevent the evolution of hydrogen. This solution is employed in conjunction with heat, and a single Maynooth cell or a magneto-electric machine of suitable power. It has been found, with some electro-brassing solutions, difficult to deposit continuously a given quality of brass; with this solution, the regulation of the proportions of copper and zinc in the alloy is made by altering the heat accordingly. If the solution be kept uniform, as shown by a ready test, it is very easy to deposit a given alloy at all times.

In coating wrought or cast-iron work, it is often advisable to coat with copper prior to electro-brassing; the alkaline bath should be employed at above the temperature of the air, sometimes 160° Fah.; this method of working promotes the contact of the coating. The article should be well cleaned, so as to have a metallic appearance, with a pickle of weak sulphuric acid, scrubbed with sharp sand, washed, scrubbed with a portion of the depositing solution, and then placed in the depositing trough. The electrical connections may then be made, and the coating allowed to form for two hours or more. When a sufficient thickness had been obtained, the article is washed, and dried in hot mahogany sawdust. The "tarnishing" of the coating increases its beauty, and does not impair the article, for the tarnish is not corrosive rust, like the oxide of iron, but is a protective film. Two hours' coating will protect from rust in ordinary indoor work, but the best protection from rust (and this is serviceable even in damp air) is to give two hours' coating in an alkaline bath, and then let the article remain all night in an ordinary acid sulphate of copper bath. If desired, a brass coating may be given over the last-mentioned copper coating. By suitable mechanical arrangements, the articles in the acid bath, and the dissolving plates therein, may be moved—preferably by a to-and-fro movement—during deposition. This treatment shortens the time of the deposit, and makes the deposit uniform.

The uses to which electro-brassing may be applied have yet to be greatly developed; among the rest may be mentioned: the prevention of rust; the giving of an improved printing surface to type and electro-types; coating the poles of electro-magnets for the prevention of the "residual charge" therein; covering rams, plungers, piston rods, rollers, etc., with an adhesive and enduring coating; also lining cylinders, pumps, and iron vessels with copper or brass. The application of the processes that have been described to many purposes of ordinary life, such as railings, architectural ornaments, etc., will exemplify the good results to be obtained by the union of the strength of iron with the beauty of copper or brass.

THE USES OF APATITE.

Since the discovery of phosphate of lime in South Carolina, considerable attention has been bestowed upon the importance of working all similar deposits that may be found in any part of the country, and much inquiry has been made in consequence for mines of apatite, or mineral phosphate of lime. We understand that this mineral has been found in the neighborhood of Crown Point, in this State, also at some point on the Hudson, and quite extensively in Canada. As it is likely to become an important article of commerce, we propose to give some account of its properties and uses. In its crystalline form, the mineral closely resembles the beryl, or emerald; so slight is the difference that mineralogists have been constantly deceived by it, and it early received the name "apatite" from a Greek word signifying "to deceive." It occurs occasionally on our island of New York, in six-sided prisms, and we hear that it has also been met with massive, and in considerable quantity. It is one of our most valuable rocks, very little known to unprofessional men, and yet capable of extensive use in agriculture and the arts. It occurs in altered crystalline rocks, especially in granular limestone, and ores of tin, iron, and other metals, and with gneiss, syenite, and mica rocks. The color is not always the same, but the prevailing shade is green; we have also blue, grayish green, grayish white, and brown.

The Canada deposit is an extensive bed ten feet broad, three feet of which are pure, sea-green apatite. At Crown Point, the deposit is fibrous; in New Jersey, shafts have been sunk, and the apatite brought out in masses weighing occasionally 200 pounds.

The composition of apatite varies almost as much as its color, but it is essentially composed of phosphoric acid, 42·00; lime, 54·00; fluorine, chlorine, etc., 4·00. Many specimens, however, do not have more than 90 per cent of phosphate of lime. The occurrence of phosphorus in association with iron renders the ore useless for metallurgical purposes, but if the apatite be in sufficient quantity, it might be worked for superphosphates and fertilizers.

The uses of apatite are not many, but they are important. It has been proposed and used as a substitute for bone ash, and in the manufacture of porcelain and milk glass, and in England, the apatite from Estremadura is taken for this purpose.

In the manufacture of phosphorus, the pulverized mineral is mixed with twice its weight of silica, in the form of sand or ground quartz, and 25 per cent. of charcoal, in a closed vessel, or peculiarly constructed furnace, and the whole heated to approaching white heat. The phosphate of lime is decomposed, and silicate of lime produced, and the phosphoric acid is reduced by the charcoal to the vapor of phosphorus, which passes into proper coolers, where it is condensed. The latest improvement is to add some soda to the quartz, thus producing a silicate of lime and soda, which is more readily fusible and more easily handled than the simple silicate.

The operation is carried on in France in something like a blast furnace, and is made continual by feeding with alternate layers of ore and fuel. In England, a native phosphate from the West Indies, called sombrerite, is somewhat used in the manufacture of phosphorus; and as this material, together with the South Carolina deposits and the mines of apatite of Canada, is much nearer us, we ought to make an effort to introduce this industry among ourselves. At the present time, very little, if any, phosphorus is made in this country.

The acid phosphate of lime can be made, according to Horsford's patent, from native phosphates. The mineral phosphate is dissolved in nitric acid, of specific gravity 1·23, in the proportion of two nitric acid, by weight, to three of phosphate of lime; and to the filtered solution is added two parts, by weight, of oil of vitriol, diluted with water, for the purpose of removing the lime and other impurities. This process furnishes the acid phosphate of lime in superior condition, for medicinal and culinary purposes.

This use of apatite alone would be of the utmost importance, could it be carried out economically and on a large scale, as chemistry has introduced no compound of greater value in medicine and in food than Horsford's acid phosphate. But the use to which phosphorus has been applied more extensively than to any other, is in the manufacture of a fertilizer known as the superphosphate of lime. The manufacture of this article is carried on in England and Canada, and in some parts of the United States, and is of the utmost importance to our agriculture.

We find in the *American Chemist*, for February, an article by Mr. Gordon Broome, giving the methods employed in Canada for the manufacture of superphosphates from apatite. The mineral is ground by an engine of fifteen horse power, which also turns the agitators during the treatment of the mineral by acid, and supplies steam to the sulphuric acid chambers adjacent to the mill. After the apatite is well pulverized, it is thoroughly mixed with oil of vitriol of the strength known as pan acid, in a suitable vat or tub, where it is thoroughly agitated until the conversion is deemed to be complete. The pasty mass is allowed to flow out of the bottom of the converter over the floor, where it soon becomes sufficiently dry to be fit for transportation in barrels, each containing about 286 pounds. It is, in this condition, only suited for agricultural purposes, as it is very impure. In a sample analyzed by Mr. Broome, there were found: Superphosphate of lime, 20·33; sulphate of lime (gypsum), 63·84; water, 5·50; other constituents, 10·33. The soluble phosphoric acid amounted to 12·33 per cent.

It is evident that this manufacture cannot be carried on profitably unless the same establishment manufactures its own sulphuric acid. As pan acid can be used, the expense of concentrating in glass or platinum vessels is saved, and the cost of packing and transportation avoided.

There is one serious difficulty encountered in the fumes of hydrofluoric acid that come off during the digestion of the mineral. These are very suffocating and dangerous, and it would be a valuable improvement if they could be condensed and made use of in the arts. This is done where fluor spar is employed as a flux in blast furnaces, and important applications are made of the acid thus economized.

In countries where hydrochloric acid is very abundant and cheap, it is substituted for sulphuric acid in the decomposition of apatite; but the resulting chloride of calcium absorbs water so rapidly, and keeps the mass so wet, that it is difficult to handle, and objectionable in every way. Manufacturers of artificial fertilizers sometimes remedy this evil by mixing various refuse animal matters with the mass, and then drying it, and at the same time adding to its value.

The chief importance of apatite is as a manure upon our crops. The strength of lands in the Eastern States has deteriorated so much that few crops can be profitably raised upon them, and it is becoming a serious question to decide what fertilizers are best adapted to remedy the evil. There seems to be no doubt that the phosphates are among the best enrichers of soil, and it is, therefore, important to have this industry more fully developed. To sum up the case for apatite, it will be seen that it has the following important uses;

1. In the manufacture of phosphorus.
2. Acid phosphate of lime.
3. Superphosphate of lime for manure.
4. Manufacture of porcelain.
5. Manufacture of milk glass.
6. Hydrofluoric acid, as an incidental product.

THE AVERAGE CITY DWELLING HOUSE.

The average city dwelling house of 1871 is not what it ought to be, when contrasted with the vast improvements made in all other departments of construction. Built to make as much show as possible with the least expenditure, it is a delusion to the inexperienced buyer, and a snare to the tenant, who has not yet learned the defects that a year or two of use will be sure to develop.

A young couple beginning their experience in house hunting and house keeping, after spending a week or two in discouraging search, at last find a tenement which seems adapted to their wants, at a rent which does not, perhaps, greatly exceed what they can afford to pay; or the house is, perhaps, purchased at what seems a reasonable price. The house is prettily painted, the walls are clean, white, and unbroken (being new), the modern improvements—including bath room, water closets, and gas fixtures—are seemingly convenient and substantial, and the courtyard is laid out with some show of taste. But ere long the walls show ugly seams and cracks; the doors shrink incontinently; the water fixtures obstinately refuse to be kept in order; the floor planking begins to creak, and the entire structure shows decided evidences of weak constitution.

The boiler which supplies hot water to the bath begins to develop troublesome leaks. The plumber is called to the rescue, and loads it with unsightly heaps of solder, which might almost be silver at the prices charged. It is astonishing how the specific gravity of solder increases in this sort of patching.

Then, by and by, the water is drawn off, and the goddess of the kitchen, through ignorance or neglect, lets the boiler collapse. The plumber is again called, who gives the comforting information that its thinness will not permit it to be re-rolled, at an expense of ten or twelve dollars, but that it is, and always was, a shabby affair, and if the luxury of warm bathing be continued, it must be at the expense of forty or fifty dollars for a new boiler.

Winter comes, and a new difficulty is experienced with the water pipes. Relying upon the fact that these are carried up between two buildings and inclosed in the walls, it is supposed they cannot freeze; but they *do* freeze, and burst; and walls, carpets, and furniture are injured, if not ruined, by the flood. Again the plumber is called. You can find plumber's shops as plenty as drug stores. No wonder; there is plenty of business going. The plumber is all smiles. He proceeds to demolish the plastering to reach the pipes, so that in addition to the damage by water, there is the damage by lime-dust. His labors completed, and his not small bill settled, the plasterer follows, careful not to let his work be speedily forgotten, by bespattering with mortar every available spot of floor and paint upon which his mark can be left.

Why water pipes should be placed under the plastering is a mystery to us, especially as they seem artfully contrived to give as much trouble as possible to the inhabitants of the average city dwelling house.

Further developments will show that the roof is made to last scarcely more than four or five years. The leaders are made of some flimsy material, the nature of which is concealed by painting, but which in two or three years is found to be consumed by rust, and to crumble into pieces like a Boston cracker.

The moral of all this is, that if a man want a good house he must own, not rent it; and if he would own a house that shall be worth the money he pays for it, he must have it built under his own supervision; or, if he be not competent to supervise, he must employ the services of a competent and reliable architect.

The profits to builders of the average dwelling house are very great, as any one will find by a proper investigation of the cost of materials and labor. Invest these profits in superior material and workmanship, and, while your house will cost you no more, it will be at least one third better.

ANNUAL REPORT OF COMMISSIONER OF PATENTS.

UNITED STATES PATENT OFFICE, January 31, 1871.

To the Senate and House of Representatives of the United States of America, in Congress assembled:

By the 9th section of the Act of Congress, approved July 8, 1870, entitled "An act to revise, consolidate and amend the statutes relating to patents and copyrights," the Commissioner of Patents is required to lay before Congress, annually, in the month of January, a report, giving a detailed statement of all moneys received for patents, for copies of records or drawings, or from any other source whatever; a detailed statement of all expenditures for contingent and miscellaneous expenses; a list of all patents which were granted during the preceding year, designating under proper heads the subjects of such patents; an alphabetical list of the patentees, with their places of residence; a list of all patents which have been extended during the year; and such other information of the condition of the Patent Office as may be useful to Congress or the public.

In compliance with this requirement of the statute, I have the honor to submit the following report:

The receipts and expenditures of the Office for the year ending December 31, 1870, and the condition of the balance in the Treasury on account of the patent fund, as well as the character and extent of the business done by the Office during the year, are shown in the following statements:

Amount received on applications for patents, re-issues, extensions, caveats, disclaimers, appeals, and trade-marks, etc.	$669,456·76
Amount paid for salaries, photography, stationery, and miscellaneous expenses, etc.	557,147·19

STATEMENT OF BALANCE.

Amount to the credit of the Patent Fund, January 1, 1870	531,045·64
Fund of receipts during the year 1870	669,456·76
Total	$1,200,502·40
From which deduct expenditures for the year 1870	557,147·19
Balance on the 1st of January, 1871	$643,355·21

BUSINESS OF THE OFFICE FOR THE YEAR 1870.

No. of applications for patents during the year 1870		19,171
No. of patents issued, including reissues and designs		13,321
No. of applications for extensions of patents		200
No. of patents extended		111
No. of caveats filed during the year		3,273
No. of patents expired during the year		2,543
No. of patents allowed, but not issued for want of final fee		1,016
No. of applications for registering trade-marks		188
No. of trade-marks registered		131
Of the patents granted, there were to citizens of the United States	12,677	
Subjects of Great Britain	349	
Subjects of France	89	
Subjects of other foreign governments	206	
		13,321

The patents issued to citizens of the United States were distributed among the citizens of the several States, Territories, etc., as follows:

Alabama	36	Montana	1
Arkansas	11	Nebraska	16
California	216	Nevada	9
Colorado Territory	18	New Hampshire	111
Connecticut	739	New Jersey	474
Delaware	39	New Mexico Territory	21
District of Columbia	174	New York	2,962
Florida	5	North Carolina	54
Georgia	81	Ohio	982
Illinois	835	Oregon	22
Indiana	452	Pennsylvania	1,481
Iowa	208	Rhode Island	197
Kansas	46	South Carolina	35
Kentucky	143	Tennessee	109
Louisiana	111	Texas	48
Maine	139	Utah Territory	1
Maryland	206	Vermont	123
Massachusetts	1,448	Virginia	110
Michigan	401	Washington Territory	1
Minnesota	70	West Virginia	47
Mississippi	50	Wisconsin	22
Missouri	210	Wyoming Territory	1

Citizens of the United States residing in foreign countries	17
Persons in the U. S. Army	7
Persons in the U. S. Navy	1
Total	12,677

COMPARATIVE STATEMENT OF THE BUSINESS OF THE OFFICE, FROM 1837 TO 1870, INCLUSIVE.

YEARS.	Applications filed.	Caveats filed.	Patents issued.	Cash received.	Cash expended.
1837	—	—	435	$29,289·08	$33,506·98
1838	—	—	520	42,123·54	37,402·10
1839	—	—	425	37,260·00	34,543·51
1840	765	228	473	38,056·51	39,020·67
1841	847	312	495	40,413·01	52,666·87
1842	761	391	517	36,505·68	31,241·48
1843	819	315	531	35,315·81	30,776·96
1844	1,045	380	502	42,509·26	36,244·73
1845	1,246	452	502	51,076·14	39,395·65
1846	1,272	448	619	50,264·16	46,158·71
1847	1,531	553	572	63,111·19	41,878·35
1848	1,628	607	660	67,576·69	58,905·84
1849	1,955	595	1,070	80,752·78	77,716·44
1850	2,193	602	995	86,927·05	80,100·95
1851	2,258	760	869	95,738·61	86,916·93
1852	2,639	996	1,020	112,656·34	95,916·91
1853	2,673	901	958	121,527·45	132,869·83
1854	3,324	868	1,902	163,789·84	167,146·32
1855	4,435	906	2,024	216,459·35	179,540·33
1856	4,960	1,024	2,502	192,588·02	199,931·02
1857	4,771	1,010	2,910	196,132·01	211,582·09
1858	5,364	943	3,710	203,716·16	193,193·94
1859	6,225	1,097	4,538	245,942·15	210,278·41
1860	7,653	1,084	4,819	256,352·59	252,820·80
1861	4,643	700	3,340	137,354·44	221,491·91
1862	5,038	824	3,521	215,754·99	182,810·39
1863	6,014	787	4,170	195,593·29	189,414·14
1864	6,972	1,063	5,020	240,919·98	229,868·00
1865	10,664	1,937	6,616	348,791·84	274,199·34
1866	15,269	2,723	9,450	495,665·38	361,724·28
1867	21,276	3,597	13,015	646,581·92	639,263·32
1868	21,420	3,705	13,378	681,565·86	628,679·77
1869	19,271	3,624	13,986	693,145·81	486,430·78
1870	19,171	3,273	13,321	669,456·76	557,147·19

A subject-matter index of the patents issued during the year 1870, an alphabetical list of the patentees, with their places of residence, and a list of the patents extended during the year, have been prepared, and are submitted herewith as a part of this report.

Called upon to perform the duties of Commissioner of Patents, temporarily only, until the gentleman already appointed to fill the vacancy occasioned by the resignation of the late Commissioner shall assume the office, it would manifestly be improper that I should embrace the present opportunity to recommend measures, the advisability of which can in any respect be called in question. I shall refrain, therefore, from any general discussion of the affairs of the Patent Office, and confine myself to two or three matters which demand early attention, and about which it would seem that there can be but little difference of opinion.

By the joint resolution providing for publishing the specifications and drawings of the Patent Office, approved January 11, 1871, it is provided that the publication of the abstracts of specifications and of the engravings heretofore accompanying the annual report of the Commissioner of Patents, shall be discontinued after the middle of the year 1869, the mechanical illustrations for the first six months of that year having been already prepared; and that in lieu thereof the Commissioner is authorized to have printed, for gratuitous distribution, 150 copies of the complete specifications and drawings of each patent thereafter issued, which copies, duly certified under the hand of the Commissioner and the seal of the Patent Office, are to be placed for free public inspection in the various State and territorial capitals, and in the Clerks' offices of the district courts of the various judicial districts throughout the United States; and this officer is further authorized and directed to have printed such additional numbers of copies of specifications and drawings, certified as before provided, as may be warranted by the actual demand for the same, to be sold at a price not exceeding the contract price for such drawings. It is also provided that the copies of drawings shall be made upon contract, after due advertisement by the Superintendent of Public Printing, under the direction of the Joint Committee on Printing.

This discontinuance of the publication of the mechanical report is in conformity with the recommendation of the late Commissioner of Patents. I have always doubted somewhat the wisdom of such a step, knowing, as I do, the avidity with which inventors, in all parts of the country, seek for copies of the report, and believing also that the matter contained therein, though necessarily imperfect, is nevertheless full of suggestion, and peculiarly calculated to furnish food for the inventive mind.

The delay heretofore connected with the publication of that report could have been entirely obviated by promptness in making the necessary appropriations for the work, as by proper management the office could easily have had all the matter ready for press within one month after the end of the year. If it were found that the report under the system of distribution heretofore adopted failed to reach the quarters where it would confer the most benefit, this evil could easily have been remedied by providing, among other things, that each patentee of a given year should receive as a gratuity one copy of the report for that year, and that the rest of the edition be sold at a price not exceeding the prime cost thereof. And as to the printed copies, to be hereafter placed at central points, as provided by the joint resolution, it is feared that they will be of comparatively little service to the great mass of inventors, who are scattered widely through the sparsely settled portions of the country, and who, practically, will have but little opportunity of consulting them. As evidence in the courts, as aids to patent solicitors, and to professional experts, upon whom inventors largely rely, and as sources of information to all persons living near the places of deposit, they will of course prove valuable, as furnishing more exact and reliable knowledge than can be gained from any other source. For this reason, they would form a most valuable adjunct to the present report; and, in view of the great benefits which the patent system has already conferred upon the nation—single inventions, like the sewing machine, the harvester, the telegraph, or vulcanized rubber, having more enriched the country than the whole system has cost, from its inauguration to the present time—I believe that the expense of retaining the mechanical report in addition to the new publication would be fully justified. The annual income of the Patent Office, in excess of its expenditures, would more than pay the cost of the proposed additional work; and the balance of six hundred and forty thousand dollars in the Treasury to the credit of the patent fund, warrants the most liberal policy in support of the workings of this bureau. The Government ought not to seek to raise revenue by levying taxes upon the inventive genius of the people; but all the money received from inventors should be expended in such a way as to secure the largest and most beneficent development of the patent system.

[The Commissioner then proceeds to remark upon the subject of reproducing the drawings*, that this should be done in the Patent Office, and not by contract. In dealing with contractors the office is compelled to part temporarily with the custody of its original records. When done in the office, the copies prepared for gratuitous distribution can be made uniform in size with those now made for office use, and a saving of many thousands of dollars could be effected annually. If, under the contract system, a smaller size be adopted, a recomposition of the letter press would be necessitated, involving an annual expense of not less than sixty thousand dollars, while the saving in paper and binding would not be more than thirty thousand dollars. For these reasons the Commissioner favors the performance of the work in the Patent Office. He also recommends an advance in the price of single copies and the accompanying drawings, making the minimum price ten cents, and the maximum fifty cents, the price of uncertified printed copies between these limits, to be fixed by the determination of the Commissioner].

By Section 20 of the Patent Act, approved July 8, 1870, the Commissioner of Patents is authorized to print or cause to be printed copies of the claims of current issues of patents, and copies of such laws, decisions, rules, regulations, and circulars as may be necessary for the information of the public.

Under this provision of law, the Office has for some time past been issuing a weekly "List of Patents," which contains the number, title, and claim of each patent issued, together with the name and residence of the patentee.

This publication costs the Government about five thousand dollars per annum. It is sold to subscribers at five dollars a year; and the amount realized from this source during the last year, is thirty-three hundred and sixty-eight dollars. The amount paid for advertising applications for the extension of patents during the same time is twenty-nine hundred and twenty-three dollars.

I would respectfully recommend that the Commissioner of Patents be authorized to enlarge the scope of the periodical publication named, so as to make it an official gazette, in which all the advertisements pertaining to the business of the office shall be inserted, in lieu of all other advertising as now required by law. At present the law requires that the Commissioner shall publish a notice of every extension application in one newspaper in the City of Washington, and in such other papers, published in the section most interested adversely to the extension of the patent, as he may deem proper. Under this law the patronage of the Office is distributed among three of the Washington papers, and a second copy of the advertisement is usually sent to some paper in the vicinity of the residence of the patentee.

This is at best an imperfect system of accomplishing the work intended, as there is no one paper in the entire country which contains all the advertisements of the Office, and which, therefore, a person concerned, professionally or otherwise, in extension applications can take, and feel assurance that the very case for which he is watching may not escape his eye. By the proposed change in this regard, all uncertainty of this kind would disappear; the public, both inventors and attorneys, would be much better served, since in connection with the list of claims they would receive the official advertisements without further expense; and a considerable saving to the government would be effected, both by the cessation of further payments for advertising, and by the largely increased circulation which by this means would be secured for the publication already authorized by law.

By Section 63 of the Patent Act, it is provided that an application for the extension of a patent shall be filed "not more than six months nor less than ninety days before the expiration of the original term of the patent." Under this section, applications are generally delayed until the last moment; and then it frequently happens, if the case be an important one, in which opposition is entered, and the taking of a large amount of testimony, to be obtained in remote and widely separated sections of the country, becomes necessary, that the application cannot be prepared for hearing until so late a day as to cause the careful consideration of it prior to the expiration of the patent, seriously to interfere with the Commissioner's duties in relation to other matters. It frequently happens, too, that on the day of hearing, a fatal defect in the presentation of the case is developed, which, if there were further time at the disposal of the party, might be remedied. For these reasons, every such case, in my judgment, should be brought to a hearing at least four weeks before the date of the expiration of the patent. To this end, the application must be filed in the office at an earlier day than is now required by law. I would suggest that nine months be fixed as the maximum limit, and six as the minimum.

The business of the Patent Office for the past year is perhaps sufficiently exhibited by the tables already given, and does not call for any extended remark. I cannot, however, close this brief report without referring to the eminent service rendered by the late Commissioner, the Hon. Samuel S. Fisher, whose energy and ability in the discharge of his official duties have done so much to correct and systematize the practice of the office.

The periodical publication of the Commissioner's decisions, whereby the examiners, as well as attorneys, have received early information of the principles which controled the head of the office in deciding the cases brought to his personal attention, has proved a marked and most valuable feature of the late administration. Great care was also exercised in the filling of vacancies, the appointments being made with special reference to the merits of the persons receiving them, and in many instances after they had passed the ordeal of a severe competitive examination.

The manifest improvement thus effected, in the personnel of the Office, reflects credit upon the officer under whose administration it was brought about. The impress which he has left behind him will be lasting, and his official connection with the patent system will long be remembered with satisfaction and pleasure.

Respectfully submitted.

SAMUEL A. DUNCAN, Acting Commissioner.

* For economy of space, we have condensed that portion of the report relating to reproduction of drawings.—EDS

Business and Personal.

Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Answers to Correspondents.

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

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

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

PAINTING WHITEWASHED WALLS.—In answer to question No. 4, January 28th, I will say: If the cracks be in the plastering, and the wash be sound around the cracks, plaster of Paris is the best thing to fill them with, as it hardens quickly, does not shrink, and leaves the surface on a plane with the wall. If the plaster of Paris set before it can be worked, wet it with vinegar. The stronger the acid, the slower it will set. If cracks be filled with putty, and the wall be painted in gloss color, the streaks of putty are very apt to be flat (no gloss), and if painted in flat color, the streaks are quite sure to have a gloss. These streaks, of course, will spoil the beauty of the work, but do not affect its durability. When filled with plaster of Paris the reversion of gloss never appears, if done as I shall direct. If the cracks be only in the wash, the latter is loosening from the wall; and if it has not begun to scale, it soon will, and all attempts to fasten it on and paint it, will be total loss. If it be loose enough to scrape off, scrape the wall, taking care not to gouge into the original wall. If not loose enough, let it alone until it is. If the wash be thin, solid, and even, it can be painted to look and wear well. When the surface is lumpy, rub the lumps off with a sandstone, or a brick. After a wall has been prepared, as in either of above cases, or if a wall that has never been washed is to be painted, size it with two coats of glue size (3 ounces glue to one gallon water). Be sure the glue is all dissolved before using any of it. Let the first coat dry before the second coat is put on. When the second coat is dry, paint as follows: Mix the first coat of paint in the proportion of 1 gallon raw linseed oil to 15 pounds white lead, ground in oil, and 1 gill of dryer. Second coat: 1 gallon raw linseed oil, 25 pounds white lead ground in oil, and ½ gill dryer. (The lead should be the best.) Then finish either in gloss or flat color, the same as if it were wood work, with one good coat of priming on. Shade all the coats of paint, as near as you can, to the color you wish to finish in. Mix the third and fourth coats the same as the first, that is, about the same thickness for a gloss finish, and a little thinner for a flat finish.—E. H. G., of Ohio.

DECOMPOSING WATER BY ELECTRICITY, AND USING THE GASES AS A MOTIVE POWER.—Pumping water into a reservoir, and letting it run out to drive a wheel, would be nothing to the above application of electricity. The cost of a magneto-electric engine, or of a battery sufficiently powerful to decompose water in large quantities, would be one difficulty, and the certainty of blowing the engine out of the windows when the hydrogen and oxygen were fired, would be another. We advise our correspondent to read up in elementary chemistry and physics.

A CONSTANT BATTERY.—A correspondent uses a zinc and carbon battery and complains that it runs down in a few hours. His sulphuric acid may have been too strong, and thus dissolved the zinc, or the nitric acid may have been too weak. By coating the zinc well with mercury, and using weak sulphuric acid, and substituting a solution of bichromate of potash for the nitric acid, he ought to be able to keep up action long enough to satisfy anybody. Such a thing as a constant battery that never requires looking after, and will run forever, does not exist, and will probably be invented in the same year as the perpetual motion.

WIRE OF SOLDER.—Take a ladle and bore a few holes in the bottom in a line with one another, say six holes, about the size you want your wire. When you get ready to pour, have a strip of smooth iron or steel (a saw blade being very good), have your pierced ladle in your left hand, having previously heated it in the melted metal; then dip up some metal with an ordinary ladle with your right hand, and pour it through the pierced ladle, at the same time moving the two along the strip of iron, and a few inches above it. After you get the hang of it you can make very pretty wire, smaller or larger as you move fast or slow.—H. W. S., of Ohio.

POTATOES AS A REMEDY FOR INCRUSTATION IN BOILERS.—Let H. A. H. put into his boiler a peck of washed potatoes, boil with pressure ten hours, and then blow off. Repeat the process as often as necessary. Better use 25 pounds of potatoes than blow up the boiler, or stop to chisel off the scale. I answer for only lime deposits. I removed such an incrustation three sixteenths of an inch thick from a leg of a portable boiler by the use of potatoes in the manner directed.—C. E. G., of Conn.

GEARING CIRCULAR SAW.—E. O. T. wants to know if he can run a circular saw 400 revolutions per minute with gears direct from engine shaft to the arbors. I answer from experience—no. There are many practical difficulties that need not be specified in this answer.—C. E. G., of Conn.

T. J. W., of N. J.—Your method of boring curved cylinders is not practicable. It is not possible by any means known to us to bend a mandrel in a true circle, and if it were, a long mandrel so bent would spring out of truth from a very slight cause.

J. G., of Nebraska.—An answer to your question would involve a metaphysical discussion foreign to the scope of our paper.

D. E., of N. C.—Oils are deodorized, on a large scale, by oil of vitriol and super-heated steam. If they be sufficiently liquid, they can be passed through bone black. Permanganate of potash could also be tried.

A. P. L., of Ill.—It requires great skill to fill a mercurial barometer; the way to do it is described in most works on Natural Philosophy.

J. H., of Ill.—The best paint for a smoke stack, is asphaltum from the gas works.

BLUEING SMALL STEEL ARTICLES.—Let J. W. K. give the pieces a bright fine polish, and lay them in a sheet-iron pan, with some slacked lime. Set the pan over a forge, or in any place where he can regulate the heat, and watch them carefully until they have the right color. If the steel be good, they will take on a bright vivid blue.—B. N. B.

J. L. I., of N. Y.—In computing the effective horse power of a steam engine, no allowance is made for loss by transmission through the crank other than that consumed by friction. Theoretically, the friction expressed in horse power is found by multiplying the weight in pounds of the rotating parts, into the distance in feet the bearing surfaces move over each other per minute, multiplying the product so found by the coefficient of friction for the peculiar materials of which the parts are made, and dividing the last product by 33,000. As, however, the above rule supposes perfection in construction, it will generally only approximate to the true friction. This is ascertained by the use of the steam engine indicator when the engine is running alone, or by the dynamometer when driving machinery. It is a mistake to suppose any loss arising from the *principle* of the crank. Both theory and practice show that there is no such loss.

J. E., of Texas.—The cause of the collapse of the steam pipe supplying steam to your shingle bolt steamer, was undoubtedly rapid condensation in the steam-box. As the steam is taken from the exhaust of a steam engine, it is evident that when no steam issues from the exhaust, such condensation would produce at least a partial vacuum in the pipe used, and it being of weak material (tin plate), the external pressure of the atmosphere crushed it.

J. H. C., of N. J.—The current of electricity produced by friction passed through a helix wound about a soft piece of iron, renders the soft iron electro-magnetic whenever the current is passed in either direction. The reversing of the direction of the flow reverses the polarity of the magnet, so that what is the north pole when the current flows in one direction will be the south pole when the current flows in the opposite direction.

W. D. S., of N. Y.—If the pressure of the atmosphere be excluded from the surface of water into which a pipe leading to a pump is inserted, no water can be drawn. We judge that this is the difficulty with your pump, but cannot say positively, as you do not state how you attach the pump to the pipe you have placed at the bottom of your well. The pipe being driven into the soft clay bottom, no air can reach the water through such material; so, if the pump be attached to the top of the pipe in such a manner as to prevent the ingress of air, no water can be drawn.

W. T. B., of Mo.—In our opinion electricity in any form has nothing whatever to do with boiler explosions. Our views on this subject ought to be well known to our readers, considering the amount we have published upon it. We call your attention to articles now in type in this office, and which will shortly appear. The views therein stated have our full concurrence.

J. B. E., of Pa.—The reason why 100° Centigrade do not equal 212° Fah., is that the zero on the Fahrenheit scale, is 32° below the freezing point of water, while the zero of the Centigrade scale is at the freezing point of water. 100° Cen. therefore equal 180° Fah., instead of 212° as you suppose.

J. H. D., of Mass.—Formerly indigo was used as "blueing" for laundry purposes. That now used is, however, for the most part, a soluble Prussian blue. Any good treatise on chemistry will give you the necessary formula for making this substance. You can buy it probably much cheaper than you can make it, unless you wish to use large quantities of it.

T. M., of Iowa.—The fatty acids (oil) cannot be profitably reclaimed from soap water.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—PAPIER MACHE.—I wish to know the way in which articles of papier mache are made, method of mixing the plastic material etc. Will some one give me full details of the process?—E. B.

2.—CHEAP BATTERY.—Will A. G. kindly give more particular directions how to make a cheap magnetic battery? I should very much like to make one, but cannot from his former directions. How are the conductors to be arranged, and what are they to be made of? Must an unusual amount of care be taken to prevent accidents to children?—L. D.

3.—POWER TO RUN CIRCULAR SAW.—What power will be necessary to run a 52-inch circular saw 700 revolutions per minute, with two inch feed?

4.—WOOD FILLING.—What is the best filling for black walnut and other woods—something that will dry quickly, work easily, and leave a nice level surface without raising the grain, transparent, so that the color of the wood will not be altered, and cheap?—M. W. B.

5.—RENOVATING ENGRAVINGS.—How can old copperplate and steel plate engravings be renovated, when soiled by grease and dirt, and yellow from age? Is there a work in any language that describes a method for cleaning and bleaching such prints?

6.—VARNISH FOR AXES.—What is the blue varnish used to cover the polished parts of axes and other edge tools? It resembles as nearly as possible the blue color caused by tempering.—E. T.

7.—CARE OF ENGINE.—What is the best substance to use for keeping the polished work of a steam engine bright?—C. H. C.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

APPLICATIONS FOR LETTERS PATENT.

69.—CASTING APPARATUS FOR IRON AND STEEL.—A. L. Holley, Brooklyn N. Y. January 11, 1871.

70.—BRICK-MOLDING MACHINE.—B. M. Gard, Urbana, Ohio, and E. R. Gard, Chicago, Ill. January 11, 1871.

85.—STEAM GENERATOR.—John F. Allen, New York city. January 12, 1871.

86.—COMBINED TILLER AND DIGGER.—J. P. Ross, Newark, N. J. January 12, 1871.

100.—APPARATUS FOR PROTECTING TROOPS UNDER FIRE.—W. S. Wetmore of United States, residing at 123 Chancery Lane, London, Eng.

103.—TRANSMITTING APPARATUS.—E Morris, Burlington, N. J. January 14, 1871.

124.—TICKET PUNCHING, ETC., APPARATUS.—J. H. Small, Buffalo, N. Y January 18, 1871.

125.—SHOT POUCH.—A. F. Allen, Providence, R. I. January 18, 1871.

126.—TABLE SPOONS.—Elise de Busson, Yonkers, N. Y. January 18, 1871.

141.—APPARATUS FOR REFINING LIQUORS.—S. H. Gilman, Galveston Texas. January 19, 1871.

142.—ELECTRIC TELEGRAPH CABLES.—P. S. Devlan, Jersey City, N. J., and Isaac Pennington Wendell and Stephen Paschall M. Tasker, both of Philadelphia, Pa. January 19, 1871.

164.—AIR AND GAS ENGINES.—A. K. Rider, New York city. January 21, 1871.

167.—MEANS FOR SECURING ARTIFICIAL TEETH.—B. J. Bing, of St. Mary's county, Md., now residing at 15 Finsbury Place South, London, England. January 23, 1871.

177.—CHEESEMAKING APPARATUS.—Artemus Holdredge, of West Burlington, and Benj. F. Harrington and H. H. Harrington of New Berlin, both in N. Y. January 23, 1871.

Recent American and Foreign Patents.

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

EXTENSION LADDER.—William Kean, Chicago, Ill.—This invention has or its object to furnish an improved ladder, which shall be so constructed hat a man upon the top of the ladder, when raised against the wall of a house, can raise and lower himself as he may wish, making it very convenient and useful for firemen, painters, etc., and which shall, at the same time, be simple in construction and conveniently operated.

THILL COUPLING.—W. B. Meloney, M. D., Smyrna, Del.—This invention has for its object to furnish an improved thill coupling, simple in construction, cheap in manufacture, safe in use, durable, and not liable to get out of order, or to be injured by water or mud, and which will admit of the application of a rubber anti-rattling attachment, without interfering with the convenient attachment and detachment of the thills.

WHEELS AND AXLES FOR RAILROAD CARS.—W. Hudgin, M. D., Athens, Ga.—This invention has for its object to furnish an improvement in the construction of wheels and axles for railroad cars, which will enable cars to be readily and quickly adjusted to run upon a wider or narrower track, as may be required.

FLOORING CLAMP.—David Nevin, Georgetown, Colorado Territory.—This nvention relates to a new implement for pressing boards together before nailing the same to the floor beams. The invention consists in a new construction of stock, which is made self-fastening to the beams, and in the connection therewith of a sliding spring clamp and operating lever.

ANIMAL TRAP.—James Caswell Parrish, Petersburgh, Va.—This invention consists mainly in a peculiar arrangement of a vertical rotary cylinder, provided with a coiled spring, the same being set each time an animal is entrapped, and the animal itself operating the cylinder by depressing or withdrawing a stop.

TRUSS BRIDGE.—John A. McKay, Auburn, Ind.—The object of this invention is to render truss bridges more firm under heavy pressure or concussion; and it is accomplished by the use of a metallic socket or cap of peculiar construction, which rests on the upper chords, and holds the ends of the cross counterbraces; and also in part by the construction of the side braces, and the attachment of their ends to the chords.

IRON ABUTMENT FOR BRIDGES.—Jacob S. Goshorn, Fort Wayne, Ind.—The object of this is to provide an improved method of constructing iron abutments or piers for bridges, by which they can be made substantial and durable, with less expenditure of time, labor, and money, than heretofore; and so that, when the plates are broken by ice or other cause, new plates can readily be inserted in place of the old ones, without the necessity of taking any part of the pier to pieces.

MACHINE FOR CUTTING CORN STALKS.—John Wood, Pilla, Iowa.—This invention consists in the combination, with a suitable frame, of two wheels, armed with radial blades, which, when the machine is drawn over a row of standing stalks, cuts off the same; and also in a drag to be placed beneath the wheels when the machine is moving over the highway.

BRAKE FOR RAILROAD CARS.—Charles W. Tierney, Altoona, Pa.—This invention relates to a new automatic mechanism for applying brakes to the wheels of railroad cars, and has for its object to make the apparatus self-acting in such reliable manner that the collisions of the cars produced by a slacking of the speed of a locomotive on a train in motion, will at once cause the application of all the brakes.

ÆOLIAN CHIME.—Heinrich Hermann, New York city.—This invention relates to a new chime, which is made of glass belts that are suspended from the branches of trees, or otherwise exposed to the air, provided with very tight clappers, that will be swung to and fro by the action of the wind. The bells are properly tuned, and will, when the clappers are moved by the air, produce a series of harmonious, but more or less indefinable sounds, very pleasant to the ear.

HYDRAULIC APPARATUS FOR SHIPS.—Edward A. Inglefield, 10 Grove End Road, St. John's Wood, England.—This invention has for its object to obtain occasional power from the inflow of external water, employing constantly a moderate power for removing, by bilge pumps or other convenient means, the water which has done its work in entering the vessel.

FAUCET FOR DRAWING BEER.—Theo. W. Bartholomew, New York city.—This invention consists in the application to faucets of conical rubber sleeves, which serve as linings for the faucets in the barrel heads. The rubber prevents the splitting of the barrel heads, and the bending of the faucet, by injudicious application of the latter.

FOUNTAIN BLACKING BRUSH.—Albert D. Pentz, New York city.—This invention relates to a new and useful improvement in brushes for blacking boots and shoes, and consists in a fountain or chamber in the back of the polishing brush from which the liquid blacking is expressed by means of a valve and pressure on the supply brush.

DENTAL PREPARATION.—Edward G. Kearsing and Leonzo Kearsing, Spring Valley, N. Y.—This invention relates to a new and useful improvement in metallic preparations for dentists' use in filling decayed teeth, and it consists in the use of platina covered with gold.

MACHINE FOR DEGERMINATING MALT.—Karl Sauter, New York city.—This invention has for its object to construct a machine whereby the germs sprouting from grain, during the conversion of the same into malt, can be conveniently broken off and separated from the grain, so that they will not enter the still during the process of brewing.

SELF-CLOSING COCK.—William Dalziel, New York city.—This invention has for its object to prevent the waste of water or other liquid, drawn from reservoirs or other limited supply. The invention consists in providing the cock, through which such liquid is drawn, with a self-acting apparatus, whereby, after a certain quantity of the liquid has been drawn, the cock will invariably be closed.

SCAFFOLD.—Samuel Hollabaugh and T. W. Letts, Mount Union, Pa.—This invention relates to improvements in builders' and painters' scaffolds, of that class whereon the workman raises himself and the platform while on it, and it consists in a long frame or platform, mounted at each end on a pole, to slide up and down on it, and having a crank and pinion at each end, gearing into a toothed rack on the pole, for raising it or letting it slide down. The poles are to be arranged at the upper ends for splicing on additional pieces, to extend them for high buildings, and the platform is made two stories high, with a ladder connecting one with the other, for enabling the workmen to work over a greater area of space without moving it than they could otherwise do.

CLOVER STRIPPER.—John M. Hull and Albert C. Stifler, Alquina, Ind.—This invention relates to improvements in machines for stripping and gathering the seeds from the clover standing in the field, and it consists in a combination with a large box suspended from a truck and provided with fingers at the front of the bottom, resembling, in some respects, the guard fingers of a mower, to project into the clover and gather the tops into the angles between them; of a cutter and rake arranged to cut the heads and rake them back into the box, said cutter and rake working close to the fingers when moving backward, but rising upward when moving forward, to pass over the clover heads. The invention also comprises an adjusting apparatus for raising or lowering the front of the case.

WELL MOUSE, OR DEVICE FOR ENLARGING WELLS.—Thomas Donnelly, Pittsburgh, Pa.—This invention consists in a series of notched or serrated vertical bars, hinged at their upper ends to the head of a stem or stock. When put into a well, the bars may be forced outward by a collar which slides on the stem, thus enlarging the bore.

HAY AND COTTON PRESS.—Jacob L. White, Hernando, Miss.—This invention relates to a press in which the follower moves upward in the box, in order to compress the bale, and consists chiefly in the arrangement of toggles at the ends of the press box, in combination with a horizontal frame loosely inclosing said box.

PRINTING PRESS ATTACHMENT.—Alexander L. Bevans, Flushing, N. Y.—This invention relates to improvements in printing presses, and consists in an improved card guide and holding and discharging attachment, applicable to the Gordon card printing press.

CANCELING STAMP.—Gotlieb Rost, Union Hill, N. J.—This invention relates to improvements in the construction and arrangement of self-inking and revolving hand canceling stamps, for stamping letters, bills, notes, and the like.

TANNING.—W. C. Stone, Derby Line, Vt.—This invention relates to an improved process for tanning hides and skins.

APPLICATIONS FOR EXTENSION OF PATENTS.

MACHINE FOR SPLITTING WOOD.—William L. Williams, New York city, has petitioned for an extension of the above patent. Day of hearing, March 29, 1871.

BIT STOCKS.—Lydia Moore, Wilmington, Vt., has petitioned for an extension of the above patent. Day of hearing, March 27, 1871.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING FEB. 7, 1871.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT FEES

On each Caveat	$10
On each Trade-Mark	$25
On filing each application for a Patent, (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On an application for Design (three and a half years)	$10
On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30
For Copy of Claim of any Patent issued within 30 years	$1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from	$1
The full Specification of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them	$1·25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case, may be had by addressing

MUNN & CO.,
Patent Solicitors, 37 Park Row, New York.

111,505.—COFFEE-POT.—Niven Agnew, Delaware, Canada.
111,506.—ADJUSTABLE SHUTTLE BINDER.—N. J. Allen and James C. Moody, Brunswick, Me.
111,507.—SPARK ARRESTER.—T. A. Andrews, Jr., Philadelphia, Pa.
111,508.—FENCE.—Hugh M. Barber, Franklin Station, Ohio.
111,509.—FAUCET.—Thomas W. Bartholomew, New York city.
111,510.—CORN PLANTER.—Leander Becker, Jackson Township, Pa.
111,511.—APPARATUS FOR OILING FELLIES, SPOKES, ETC.—P. E. Bomby, Espy, Pa.
111,512.—LAMP FOR COAL-OIL STOVES.—John Bowles (assignor to himself and Samuel Bard), Augusta, Ga.
111,513.—OSCILLATING BALANCE STEAM VALVE.—John C. Bromley, Rock Island, Ill.
111,514.—PAPER-COLLAR BOX.—Lee Churchill, Troy, N. Y.
111,515.—HINGE FOR GATES.—Charles B. Clark, Buffalo, N. Y.
111,516.—BROILER.—Levi H. Colborne and David H. Lowe, New York city.
111,517.—COOKING STOVE.—John B. Crowley and Addis E. Chamberlain (assignors to Chamberlain & Co.), Cincinnati, Ohio.
111,518.—SELF-CLOSING COCK.—William Dalziel, New York city.
111,519.—CLOTHES DRIER.—Alfred Day, Skowhegan, assignor of one half his right to Francis Lyford, Augusta, Me.
111,520.—ASPHALT CEMENT FOR PAVEMENTS, DRAIN PIPES, ETC.—E. J. De Smedt, New York city.
111,521.—MAIL BAG FASTENING.—D. F. Dodge, Lowville, N.Y. Antedated January 28, 1871.
111,522.—CARRIAGE CURTAIN KNOB.—W. B. Douglass, Newark, N. J., assignor to Frederick Baumgartner, Brooklyn, N. Y.
111,523.—MACHINE FOR WARPING YARN.—George Draper, Hopedale, Mass.
111,524.—SASH HOLDER.—Henry W. Drott, Cumberland, Md.
111,525.—FUNNEL.—L. P. Edwards, Hamilton, Pa.
111,526.—WATER HEATER FOR STEAM BOILERS.—David. C. G. Field, Lowell, Mass.
111,527.—STEAM GENERATOR.—Loyal C. Field, Galesburg, Ill.
111,528.—BEDSTEAD FASTENING.—Sebastian Goetz, Reed's Mills, Ohio. Antedated January 25, 1871.
111,529.—INVERTIBLE TROUGH.—Francis J. Goldsmith, Concord, assignor of one half his right to Peter F. Young, Painesville, Ohio.
111,530.—FEED GRINDER.—Myron Gore, Ottawa, Ill.
111,531.—LAMP.—F. T. Grimes, Liberty, Mo.
111,532.—MACHINE FOR BORING POSTS.—Jesse R. Group, Idaville, Pa.
111,533.—LEATHER-PUNCHING AND CUTTING MACHINE.—E. E. Hardy and Napoleon Dubrul, Joliet, Ill.
111,534.—CARTRIDGE SHELL EJECTOR FOR REVOLVING FIREARMS.—G. H. Harrington, Worcester, Mass.
111,535.—WATER-PROOF PIANO COVER.—H. F. Herkner, New York, and Jared W. Post, Brooklyn, N. Y.
111,536.—HYDRAULIC APPARATUS.—George H. Herring, Durand, Ill.
111,537.—ÆOLIAN CHIMING BELL.—Heinrich Herrmann, New York city.
111,538.—DOUBLE-ACTING ROTARY ENGINE.—J. P. Herron Atlanta, Ga. Antedated January 30, 1871.
111,539.—APPARATUS FOR TRANSMITTING POWER AND CHANGING THE SPEED.—Spencer Hiatt, Clayton, Ind. Antedated February 1, 1871.
111,540.—SCAFFOLD.—Samuel Hollabaugh and T. W. Letts, Mount Union, Pa.
111,541.—SHOES FOR THRASHERS.—D. W. Hollihan, San Francisco, Cal. Antedated January 26, 1871.
111,542.—AUTOMATIC STEAM WATER ELEVATOR.—Charles Houghton, Roxbury, Boston, Mass.
111,543.—WHEEL AND AXLE FOR RAILWAY CARS.—Wescom Hudgin, Athens, Ga.
111,544.—CLOVER HARVESTER.—John W. Hull and Albert G. Stiffler, Alquina, Ind.
111,545.—FLOUR SIFTER.—Curtis Huntley, Lowell, Mass.
111,546.—STEERING APPARATUS.—E. A. Inglefield, 10 Groves End Road, St. John's Wood, England.
111,547.—MODE OF FASTENING HUB BAND, ETC.—James Ives, Mount Carmel, Conn.
111,548.—BATTER POT.—E. A. Jeffery, New York city.
111,549.—MANUFACTURE OF RUBBER FLOOR CLOTH, ETC.—H. W. Joslin, Jersey City, N. J.
111,550.—COUPLING FOR SHAFTS FOR MILLS.—William Kean, Chicago, Ill.
111,551.—PREPARATION OF PLATINUM FOR FILLING TEETH.—E. G. Kearsing and Leonzo Kearsing, Spring Valley, N. Y.
111,552.—BOILER TUBE PLUG.—Thos. La Blanc, Philadelphia, Pa.
111,553.—CARPENTER'S WORK BENCH.—Robert C. Love, Augusta, Me.
111,554.—SPRING BED.—Nicholas Mason, Lincoln, Mass.
111,555.—CHURN.—James McBride, Ithaca, N. Y.
111,556.—THILL COUPLING.—W. B. Meloney, Smyrna, Del.
111,557.—HARVESTER.—James Moran, Auburn, N. Y., and C. D. Wallace, Corry, Pa., assignors to themselves and H. K. Needham, St. Louis, Mo.
111,558.—TONGUE FOR CHILD'S CARRIAGE.—E. A. Morse, Rutland, Vt.
111,559.—MAT.—P. W. Neefus, New York city.
111,560.—FLOOR CLAMP.—David Nevin, Georgetown, Colorado Territory.
111,561.—INVALID BEDSTEAD.—J. H. Oerter, New York city
111,562.—CHURN.—William Parks, Meadville, Pa.
111,563.—CLOTHES DRYER.—A. H. Patch, Hamilton, Mass.
111,564.—RATCHET COUPLING FOR BARGES, ETC.—W. W Patterson and Edmund Bishop, Pittsburg, Pa.
111,565.—ARTIFICIAL FUEL.—B. F. Penny, Rochester, N. Y assignor to T. B. Curtis, New York city.
111,566.—FOUNTAIN BLACKING BRUSH.—A. D. Pentz, New York city.
111,567.—LATCH LOCK.—Nicholas Petré, New York city.
111,568.—WINE SIRUP AND BEVERAGE.—A. D. Puffer, Boston, Mass.
111,569.—KILN FOR DRYING MALT.—J. A. Remer (assignor to himself and Henry Assenheimer), New York city.
111,570.—PORTABLE SWING.—D. M. Reynolds, Chicago, Ill.
111,571.—POTATO DIGGER.—R. B. Robbins, Adrian, Mich Antedated Jan. 23, 1871.
111,572.—MACHINE FOR THREADING SCREWS.—D. M. Robertson, East Boston, and J. A. Bidwell, Boston, Mass.
111,573.—FERRULE.—W. H. Rodden, Toronto, Canada.
111,574.—THILL COUPLING.—L. S. Rowe, Derby Line, Vt., assignor to himself and U. T. Sheafe.
111,575.—RIVETING MACHINE.—William Sellers, Philadelphia, Pa.
111,576.—FEATHER RENOVATOR.—J. T. Seldon, Chicopee Mass.
111,577.—PORTABLE BOOK HOLDER.—C. W. Sherwood, Chicago, Ill.
111,578.—PORTABLE FENCE.—Hector Sinclair, New York city.
111,579.—PAPER FOR USE IN THE BOTTOMS OF BIRD CAGES. J. H. Singer, New York city.
111,580.—BOILER FURNACE.—Le Grand Skinner, Chittenango, N. Y.
111,581.—PRINTING PRESS.—E. H. Smith, Bergen, N. J.
111,582.—PULLEY.—S. A. Smith (assignor to Cresson & Smith), Philadelphia, Pa.
111,583.—TANNING.—W. C. Stone, Derby Line, Vt., assignor to himself and W. S. Foster.
111,584.—BRAKE FOR RAILWAY CARS.—C. W. Tierney, Altoona, Pa.
111,585.—WASH BOARD.—Westley Todd. Allegheny, Pa.
111,586.—PRISON LOCK.—H. R. Towne, Stamford, Conn.
111,587.—PERMUTATION LOCK.—H. R. Towne, Stamford, Conn.
111,588.—FLUTING MACHINE.—T. M. Tucker, Newark, N. J.
111,589.—STOVE DRUM.—Willard Twitchell, Syracuse, N. Y.
111,590.—LUBRICATOR FOR LOOSE PULLEYS.—Stephen Ustick, Philadelphia, Pa. Antedated Jan. 26, 1871.
111,591.—RAILWAY CAR BRAKE.—J. E. Weaver, Lancaster, Pa. Antedated Feb 4, 1871.
111,592.—CANDY-CUTTING MACHINE.—Christopher Wentz, Albert Green, and O. P. Connor, Trenton, N. J.
111,593.—APPARATUS FOR DELIVERING GRAIN, ORES, ETC., INTO GRINDING MILLS.—J. D. Whelpley and J. J. Storer, Boston, Mass.
111,594.—FEED CUTTER.—J. R. Whittemore, Chicopee Falls, Mass.
111,595.—LOOM-PICKING MOTION.—H. A. Whitten and E. D. Gove, Holyoke, Mass.
111,596.—DROP TUBE STEAM GENERATOR.—S. L. Wiegand Philadelphia, Pa. Antedated Jan. 23, 1871.
111,597.—VELOCIPEDE.—W. L. Williams, New York city Antedated Jan. 25, 1871.
111,598.—STEAM HEATER.—J. L. Winslow, Portland, Me.
111,599.—VESSEL FOR HOLDING OIL.—A. T. Woodward, New York city.
111,600.—HYDRAULIC TURNPIPE.—Samuel Adams, Michigan Bluff, Cal.
111,601.—WATER WHEEL.—J. P. Allen, Springfield, Ohio.
111,602.—COATING BRICK, WOOD, AND OTHER SURFACES ON WALLS, ETC.—E. E. Alvord, Salt River, Mich.
111,603.—DRIVING POWER FOR LOCOMOTIVES.—W. D. Arnett, Denver, Colorado Territory.
111,604.—SAND SIFTER.—William Bailey, Friendship, N. Y
111,605.—SCOOP AND SIFTER.—Joseph Baker, Trenton, Canada.
111,606.—FEATHER RENOVATOR.—James A. Bell (assignor to himself and Henry Z. Stetler), Tyrone, Pa.
111,607.—FRUIT JAR.—Mellville R. Bissell, Kalamazoo, Mich., assignor to Salmon B. Rowley, Philadelphia, Pa.
111,608.—FLOWER STAND.—Elijah D. Castelow, Meriden, Conn.
111,609.—ALCOHOL STILL.—George Clarkson (assignor to himself, Samuel D. Wilder, and Albert Sherwin, Elgin, Ill.
111,610.—STAIRWAY.—Charles Saunders Close, Philadelphia, Pa.
111,611.—MANUFACTURE OF STRAW-BOARD FOR THE CONSTRUCTION OF BUILDINGS.—Judd M. Cobb, Beloit, Wis.
111,612.—APPARATUS FOR CLEANING SULPHURETS AND OTHER ORES.—Charles C. Coleman, San Francisco, Cal.
111,613.—BOOT JACK.—Ezra Coleman, San Francisco, Cal.
111,614.—APPARATUS FOR FEEDING PULVERIZED FUEL TO FURNACES.—Thomas Russell Crampton, Westminster, London, Great Britain.
111,615.—APPARATUS FOR DISTRIBUTING AND FEEDING POWDERED FUEL TO FURNACES.—T. R. Crampton, Westminster, London, Great Britain.
111,616.—FURNACE FOR BURNING PULVERIZED FUEL.—T. R. Crampton, Westminster, London, Great Britain.
111,617.—SUSPENDER.—John W. Dayton, Waterbury, Conn.
111,618.—HAND VISE.—James W. Devlin, Yonkers, N. Y.
111,619.—SAW.—Henry Disston and Thomas Oates Hill (assignor to Henry Disston & Son), Philadelphia, Pa.
111,620.—DEVICE FOR ENLARGING WELLS.—Thomas Donnelly, Pittsburgh, Pa.
111,621.—VALVE AND COCK.—Isidore Dreyfus, New York city.
111,622.—HEATING STOVE.—S. H. Emery, Jr., and C. H. Castle, Quincy, Ill.
111,623.—SIFTER AND STRAINER.—Lyman Fay, Fall River Mass.
111,624.—WATER METER.—Thomas B. Fogarty, Brooklyn N. Y.
111,625.—BOOT AND SHOE FASTENING.—F. D. Ford, New Bedford, Mass.
111,626.—GATE LATCH.—Wm. Fosket (assignor to Charles Parker), Meriden, Conn.
111,627.—WALKING CULTIVATOR.—Andrew Friberg, Moline, Ill.
111,628.—SAFETY DEVICE FOR HATCHWAYS.—Alexander Fries, Cincinnati, Ohio.
111,629.—BRICK MACHINE.—Benjamin M. Gard, Urbana, Ohio, and Emery R. Gard, Chicago, assignors to United States Brick-Machine Company, Chicago, Ill.
111,630.—WATER WHEEL.—James Gardner, South Lee Mass.
111,631.—CLOD FENDER.—Robert T. Gillespie, Millport, Ohio.
111,632.—PLANING MACHINE.—James Goodrich and Henry J. Colburn, Fitchburg, Mass.
111,633.—HARVESTER.—William F. Goodwin, Metuchen N. J.
111,634.—HORSE POWER.—William F. Goodwin, Metuchen N. J.
111,635.—HAIRPIN.—Charles M. Gormly, Pittsburgh, Pa.
111,636.—IRON ABUTMENT FOR BRIDGES.—Jacob S. Goshorn, Fort Wayne, Ind.
111,637.—DEVICE FOR SECURING CORKS IN BOTTLES.—S. L. Gouverneur, Frederick City, Md.
111,638.—APPARATUS FOR THE MANUFACTURE OF CONFECTIONERY.—William F. Goward, Boston, Mass.
111,639.—SECTIONAL STEAM BOILER.—James S. Griffith and Charles E. Emery, New York city.
111,640.—WINE AND CIDER PRESS.—Thomas W. Grinter Russelsville, Ky., assignor to James L. Haven, Cincinnati, Ohio.
111,641.—BRIDGE FOR SUPPORTING SHAFT-DRILLING MACHINES.—Joseph P. Griscom, Port Carbon, and John Fritz, Mahanoy Plane, Pa
111,642.—EXPLOSIVE COMPOUND.—Joseph Hafenegger, San Francisco, Cal.
111,643.—CAM FOR QUARTZ MILLS.—Oliver P. Hart, Logtown Cal.

111,644.—STEAM ROAD WAGON.—Charles W. Hermance, Schuylerville, N. Y.
111,645.—PUMP.—Oliver Higgins, Napoleon, Ohio.
111,646.—SPRING BED BOTTOM.—E. B. Hill, Grand Rapids, Mich.
111,647.—TAP WRENCH.—George W. Huntoon and Edwin Simonds, Lowell, Mass.
111,648.—AUGER.—William A. Ives, New Haven, Conn.
111,649.—BIT BRACE.—William A. Ives, New Haven, Conn.
111,650.—FEED-WATER APPARATUS.—James Kindel, Wilmington, Ohio.
111,651.—PLOW.—Sampson B. King, Starkville, Ga. Antedated February 8, 1871.
111,652.—ICE CRUSHER.—Oliver B. Kinsey, Newark, N. J. Antedated January 28, 1871.
111,653.—PORTABLE STALL.—D. P. Leach and W. F. Leach, Franklin, Ind.
111,654.—DYEING AND PRINTING TEXTILE FABRICS.—John Lightfoot, Lowerhouse, near Burnley, England.
111,655.—MEDICAL COMPOUND.—Henry Lister, Houston, Texas.
111,656.—POTATO DIGGER.—George C. Love, English Center, Pa.
111,657.—COOKING STOVE.—Peter Low, Cleveland, Ohio.
111,658.—APPARATUS FOR EXTRACTING OIL FROM BONE DUST.—William W. Lucas, Cleveland, Ohio.
111,659.—FAUCET.—John R. Mackay, Meriden, Conn. Antedated January 28, 1871.
111,660.—SCAFFOLD.—Nicholas Martz, Lykens, Pa.
111,661.—MANUFACTURE OF PAPER, CORDAGE, TWINE, ETC.—James H. McConnell, Springfield, Ill.
111,662.—TRUSS BRIDGE.—John A. McKay, Auburn, Ind.
111,663.—TYPE HOLDER.—Wm. McNaughton (assignor of one half his right to John H. Trumbull), Chicago, Ill.
111,664.—VENT PLUG.—Charles H. Miller and Wm. Ascough, Buffalo, N. Y.
111,665.—WAGON.—Alexander Moffitt, Washington, D. C.
111,666.—VAPOR BURNER.—Thomas Moore, Bloomington, and James O'Donald, Clinton, Ill.
111,667.—DENTAL ENGINE.—James B. Morrison, St. Louis, Mo.
111,668.—DIE FOR FORGING, TRIMMING, AND SHAPING SPRING CLIPS FOR CARRIAGES.—Francis B. Morse (assignor to H. D. Smith & Co.), Plantsville, Conn.
111,669.—FEEDING QUICKSILVER TO STAMPS AND AMALGAMATORS.—George C. Munson, Empire City, Colorado Territory.
111,670.—MEAT CUTTER.—Hugh B. Murphy, Allegheny City, Pa.
111,671.—ANIMAL HOISTING APPARATUS.—Jason Newton, Marengo Township, Mich.
111,672.—CLOCK-PENDULUM ROD.—Russell W. Norton, New Haven, Conn.
111,673.—ANIMAL TRAP.—James C. Parrish, Petersburgh, Va.
111,674.—FEEDING DEVICE FOR CARDING AND OTHER PREPARING MACHINES.—Edwin Pettitt, Manchester, England.
111,675.—COMBINED GRAIN DRILL AND CORN CULTIVATOR.—David B. Platt, Jeffersonville, Ind.
111,676.—GATE.—John Pool, Elizabeth City, N. C.
111,677.—GOVERNOR FOR STEAM ENGINES.—George F. Pottle, Boston, assignor to himself and Reuben K. Huntoon, Wakefield, Mass.
111,678.—SHUTTLE FOR SEWING MACHINES.—George M. Pratt, Middletown, Conn.
111,679.—CAST-IRON BARREL.—Abel Putnam, Jr., Saratoga Springs, N. Y.
111,680.—WATER COOLER.—Abel Putnam, Jr., Saratoga Springs New York.
111,681.—PROPELLING APPARATUS FOR BOATS.—Joseph Repetti, Philadelphia, Pa. Antedated February 4, 1871.
111,682.—MEDICATED PLASTER.—Albert D. Richards (assignor to Tufts, Grosvenor & Co.), Somerville. Mass.
111,683.—PEN HOLDER.—Henry Roth, Virginia City, Nevada.
111,684.—BOX FOR PACKING AND TRANSPORTING SHEET-METAL CANS.—Charles E. Russ, Boston, Mass.
111,685.—FERTILIZER DISTRIBUTER.—Christopher Salvo (assignor to himself, Joseph C. Brewer, and Robert W. Milford), Columbus, Ga.
111,686.—MACHINE FOR DEGERMINATING MALT.—Charles Sauter, New York city, assignor to himself and G. Schütz, Jersey City, N. J.
111,687.—CORN PLANTER.—Levi Scofield, Watertown, Wis.
111,688.—ELECTROTYPE DIE OR MOLD FOR MOLDING PLASTIC MATERIALS.—David Scrymgeour, Foxborough, Mass.
111,689.—ROCK DRILL.—Jacob Shelley, Mahanoy Township, Pa.
111,690.—SHIRT.—Solomon Sibley, Boston, Mass.
111,691.—HOT-BLAST STOVE FOR HEATING AIR, STEAM, ETC.—Charles William Siemens and Edward Alfred Cowper, Westminster, and Charles Cochrane, Ellowes Upper Gornal, England; said Siemens and Cochrane assign their right to said Cowper.
111,692.—RAILROAD TICKET.—Joseph T. Smith, Louisville, Ky. Antedated February 4, 1871.
111,693.—SPRING BOLT.—Wm. E. Sparks (assignor to Sargent & Co.), New Haven, Conn.
111,694.—DEVICE FOR REEFING AND FURLING SAILS.—Wm. Spear, Cape Elizabeth, Me. Antedated February 4, 1871.
111,695.—CAR COUPLING.—Laroy S. Starrett, Athol, Mass.
111,696.—BEE HIVE.—Monroe J. Stearns, Galesville, Wis.
111,697.—FOUNTAIN.—Joseph Storer, Hammersmith, England.
111,698.—COOKING STOVE.—David Stuart, Philadelphia, Pa.
111,699.—COMBINED REMOVABLE COCK AND FIXED SOCKET.—Cornelius Sullivan, Boston, Mass.
111,700.—SAND OR EMERY PAPER.—George C. Taft, Worcester, Mass., assignor to himself and Augustus B. Davis, Philadelphia, Pa.
111,701.—FILTER FOR CISTERN.—Robert W. Thompson, Mansfield, Ohio.
111,702.—PAPER-CUTTING MACHINE.—Wm. H. Topham, New York city. Antedated February 1, 1871.
111,703.—HUB FOR WHEELS.—James L. Van Wert, Tolland, Mass.
111,704.—MILL-STONE BAIL AND DRIVER.—Albert G. Waldo, Milwaukee, Wis.
111,705.—FURNACE FOR BURNING PULVERIZED FUEL UNDER STEAM BOILERS, EVAPORATORS, ETC.—James D. Whelpley and Jacob J. Storer, Boston, Mass.
111,706.—HAY AND COTTON PRESS.—Jacob Lewis White, Hernando, Miss. Antedated Jan. 28, 1871.
111,707.—ELECTRO MAGNETIC ALARM BELL.—Charles Williams, Jr., Somerville, and Jerome Redding, Charlestown, Mass.
111,708.—WHEEL FOR WHEELBARROWS.—George Withington, Ione City, Cal.
111,709.—MACHINE FOR CUTTING CORNSTALKS.—John Wood, Pella, Iowa.
111,710.—HARNESS SNAP.—Alonzo P. Woodard, Alfred Center, N. Y., and William Bruen, Newark, N. J.; said Bruen assigns his right to said Woodard. Antedated Jan. 28, 1871.
111,711.—MEDICATED SMOKING TOBACCO.—Wesley A. Wright, Lynchburg, Va.
111,712.—TREATING SMOKING TOBACCO.—Wesley A. Wright, Lynchburg, Va.
111,713.—DEVICE FOR SAVING GOLD AMALGAM AND QUICKSILVER.—Oliver H. Young and Daniel J. Vaughn, Wisconsin Hill, Cal.
111,462.—PROPULSION OF CANAL BOATS.—Thomas Main, Green Point, N.Y. Dated Jan. 31, 1871.

REISSUES.

4,252.—CULTIVATOR.—Augustus Adams, Sandwich, Ill., assignee of William A. Dryden and Cyrus E. Dryden. Patent No. 67,173; dated July 30, 1867.
4,253.—MANUFACTURE OF ENAMELED BRACELETS.—Abiel Codding, Jr., North Attleborough, Mass. Patent No. 91,604; dated June 22, 1869.
4,254.—COOKING STOVE.—Charles P. Geissenhainer, Pittsburgh, Pa., assignor to Esek Bussey and Charles A. McLeod, Troy, N. Y. Patent No. 32,764; dated July 9, 1861.
4,255.—VENTILATOR.—Melville E. Mead, Darien Depot, Conn. Patent No. 90,180; dated May 18, 1869.
4,256.—SHAFT COUPLING.—Silas C. Schofield, Chicago, Ill. Patent No. 63,182; dated March 26, 1867.
4,257.—OVERSHOE.—Henry G. Tyer, Andover, Mass. Patent No. 68,398; dated September 3, 1867. Reissue No. 2,830; dated December 24, 1867.

DESIGNS.

4,623.—HEATER FOR MILK, ETC.—George Sumner Albee, Hopkinton, Mass.
4,624.—CARPET PATTERN.—John H. Bromley (assignor to John Bromley & Sons), Philadelphia, Pa.
4,625.—LIQUOR HOLDER.—James A. Dunworth and Frank Dunworth, New York, assignors to "Vidvard and Sheehan," Utica, N. Y.
4,626.—TYPE.—Heinrich Flinsch, Frankfort, Prussia.
4,627.—TYPE.—Andrew Gilbert, Boston, Mass.
4,628.—SHOW CASE.—Winfield S. Grove (assignor to himself and Abraham B. Grove), Philadelphia, Pa.
4,629.—SHOW CARD.—Charles S. Hall, Rochester, N. Y.
4,630.—MATCH SAFE.—Albert D. Judd, New Haven, Conn.
4,631.—DOVETAIL.—J. Dwight Kellogg, Jr., Northampton, Mass.
4,632 and 4,633.—CARPET PATTERN.—Hugh S. Kerr (assignor to Israel Foster), Philadelphia, Pa. Two patents.
4,634 and 4,635.—CHAIR.—Anton Kimbel, New York city. Two Patents.
4,636.—CARPET PATTERNS.—Christian J. Koch (assignor to John Bromley & Sons), Philadelphia, Pa.
4,637.—SIEVE.—Robert J. Mann, Dallas City, Ill.
4,638.—DRAWER PULL.—Julius E. Merriman (assignor to Foster, Merriam & Co.), West Meriden, Conn.
4,639.—OIL CLOTH PATTERN.—James Patterson, (assignor to Thomas Potter, Son & Co.) Elizabeth, N.J.
4,640 and 4,641.—MOLD FOR LAGER BIER GLASSES.—John P. Pears, Pittsburgh, Pa. Two patents.
4,642.—LEAD PENCIL.—Joseph Reckendorfer and Teile H. Müller, New York city, assignors to Joseph Reckendorfer.
4,643 and 4,644.—BRACELET.—Theron I. Smith, North Attleborough, Mass. Two patents.
4,645.—STOVE PLATE.—Nicholas S. Vedder and Francis Ritchie (assignor to Hicks & Wolfe), Troy, N.Y.

TRADE MARKS.

148.—COMPOSITION OIL.—Butler & Haynes, Bangor, Me.
149.—SHOES, BROGANS, AND BOOTS.—Edward Francis Jones, Farmington, N.H.
150.—SUGAR, SIRUP, AND MOLASSES.—William Moller & Sons, New York city.
151.—MACHINERY OIL.—Charles L. Morehouse, Cleveland, Ohio.
152.—ILLUMINATING OIL.—Charles L. Morehouse, Cleveland, Ohio.
153.—LUBRICATING OIL.—Charles L. Morehouse, Cleveland, Ohio.
154.—FACTORY OIL.—Charles L. Morehouse, Cleveland, Ohio.

EXTENSIONS.

MACHINE FOR PARING AND SLICING APPLES.—D. H. Whittemore, Worcester, Mass. Letters Patent No. 16,417; dated January 13, 1857.
PLATFORM SCALES.—Thaddeus Fairbanks, St. Johnsbury, Vt. Letters Patent No. 16,381; dated January 13, 1857. Reissue No. 445; dated March 31, 1857.
PLATFORM SCALES.—Francis M. Strong and Thomas Ross, Vergennes, Vt. Letters Patent No. 14,119; dated January 15, 1856.
SEWING MACHINE.—Albert F. Johnson, Parkville, N. Y. Letters Patent No. 16,387; dated January 13 1857.

Advertisements.

The value of the SCIENTIFIC AMERICAN *as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading-rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth $2.50 per line to advertise in one of thirty thousand.*

RATES OF ADVERTISING.

Back Page - - - - 1·00 a line,
Inside Page - - - 75 cents a line,
for each insertion.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

NEW YORK DEPOT

Ames Manufacturing Co.,

25 PARK PLACE.

E. V. HAUGHWOUT & CO., GENERAL AGENTS.

MACHINERY, MACHINISTS' TOOLS, Steam Engines and Steam Pumps, Turbine Water Wheels, Bronze Cannon and Statuary, Military and Masonic Swords, German Silver and Plated Goods, of all kinds, on the most favorable terms.

—ALSO—

NEW YORK DEPOT OF THE

Genuine Chester Emery Co.

BOULT'S

Carver, Paneler and Molder.

THE simplest, best, and cheapest Wood Ornamenting Machine made. See Illustrations of Dec. 3, 1870. E. P. HAMPSON, Agent, 38 Courtland st., N. Y. BURNHAM & HYDE, Manufacturer, Battle Creek, Mich.

A SPLENDID WATER POWER FOR SALE.—100 rods from railroad, 1 mile from the incorporated village of Manlius, 10 miles from Syracuse per railroad: upon which is at present a plaster and lime mill, a saw mill, cider mill, etc. The owner wishes to dispose of it on account of ill health.
For particulars address or apply to THEO. D. HADLEY, Manlius, Onondaga Co., N.Y.

PRIZE MEDAL SCROLL SAW.—THOS. L. CORNELL, Derby, Conn.

SOMETHING NEW.—Agents guaranteed $3,000 a year to introduce an article that sells in every house. Address, with stamp, S. GILLILAND, Pittsburgh, Pa.

DOUBLE-ACTION BRACE, Manufactured by the American Suspender Co., Waterbury, Conn. Office 7 Mercer st., New York. The latest improvement and best Suspender made.

GEAR'S VARIETY MOLDING MACHINE. The Machine does all that you claim for it. I consider it a valuable acquisition to our wood-working machinery, and could hardly do without it now.
E. B. GIBBS, Master Mechanic, St. Louis and Iron Mountain R. R. Co., St. Louis, Mo.

SOMETHING WORTH KNOWING.—A new, quick, simple, and cheap process for annealing Steel—worth a hundred times its cost. Every mechanic cutting, turning, or filing steel, should have it. Every person sending me one dollar shall have the receipt at once. Address E. B. GIBBUD, 62 Williamsburgh, L. I.

MINERALINE

Is the Great Novelty Lubricating Composition for all kinds of Machinery. It saves your oil seventy-five per cent, your Machinery from wear, and your labor of oiling, as one application answers for many days. It is now well tested, and for efficiency leaves nothing to be desired, as a thorough preventive of friction. It is now in use in more than five thousand manufactories, including the U.S. Navy Yards and the principal Steam Car Cos. Solely manufactured and invented by JAMES MANES & SONS, Practical Chemists, Cambridgeport, Mass., and Glasgow, Scotland. Also, manufactures Boiler Composition, Engine Polish, Patent Wheel Grease, and all kinds of Bleaching Composition. For information, send for Circular to the above address.
J. MANES & SONS can give recipes in Chemistry for all Manufacturing purposes known, with drawings of apparatus required. Following are a few of their Recipes:
1st. A new plan of Tinning and Galvanizing Wrought and Cast Iron.
2d. To Flux Iron free from Phosphate and Sulphur, and all Impurities.
3d. The wonderful Water-proof Cement, for all kinds of Machine Belts, ready for use in a few minutes.
4th. New plans for Plating, Copperizing, Water Gilding, etc., etc.
Mr. MANES can produce thousands of vouchers and testimonials from the principal manufacturers in the United States. Beware of Imitators.

MACHINISTS' TOOLS.

WE have a full supply of Machinists' Tools on hand, ready for immediate delivery. For cuts and prices address STEPTOE, McFARLAN & CO., No. 222 West 2d st., Cincinnati, O.

Vertical & Horizontal CORN MILLS.

30-inch grinds 30 bus. per hour, and 20-in. 15. Price $280 and $140. EDWARD HARRISON, New Haven, Conn.

ON TRIAL.—To give our readers a taste of its quality, that first-class pictorial $3 magazine, the PHRENOLOGICAL JOURNAL, will be sent in clubs of twenty copies or more, half a year, at 75 cents each; clubs of ten, at 80 cents each; clubs of five, at 90 cents each; a single copy, six months, $1. Sample copies FREE. No deviation. This offer good for three months. Address S. R. WELLS, 389 Broadway, N. Y.

STAR SPANGLED BANNER.

"IT STILL WAVES." Rich, Rare and Racy as ever. 8 large pages, Ledger size, 40 columns of charming Tales, Sketches, Wit, Humor, Fun, Quacks, Humbugs and Swindles exposed, "20 Swindlers 'ventilated'" in 1870. It is a paper for LIVE people. It "swears" for all. Established 1863. It is NOT a NEW paper. It belongs to no sect or party. It is reliable, fearless, and truthful—a paper for ALL. There is nothing like it. EVERY subscriber will receive mounted on roller and prepaid, the NEW and superb engraving, "PIONEERS OF AMERICA," one-and-a-half feet by two feet in size, and costing $1000 to engrave. NOW IS THE TIME. We guarantee satisfaction or money refunded. Only 75 cents secures this paper a whole year, and $1 engraving free gratis and prepaid. Specimens for stamp. Address, "Star Spangled Banner," Hinsdale, N. H.

HUNTING, TRAPPING, AND FISHING MADE EASY. New, reliable, and gives more matter than any dollar book, double the amount of any 25 ct. book, including preparation and use of bait, traps, etc., all modes of preserving and preparing skins and furs, and much other practical and valuable information—just what is wanted. Price lower than any other; none (even at $2 or 5$) more reliable; not at less than $1 as reliable and complete. Examine at any bookstore and prove. Only **20 cts.** of bookseller or by mail.
JESSE HANEY & CO., 119 Nassau st., N. Y.

$15. TUDER'S PAT. SAW SHARPENER and GUMMER. Manufactured by JOS. O. COLLADAY, Philadelphia. Wood Working Machinery of all kinds on hand.

FIRST PREMIUM awarded by Am. Inst., 1870. MICROSCOPES, MAGIC LANTERNS, } Illustrated price list and catalogues free to any address. T. H. McALLISTER, Optician, 49 Nassau st., N. Y.

INTERNATIONAL PATENT AGENCIES.

PATENTS SOLD ON COMMISSION in the UNITED STATES and in EUROPE. Address, E. H. GIBBS & CO., Proprietors and Managers, 98 B'dway, N. Y. MONTGOMERY GIBBS (late Agent of the U. S. Treasury in Europe), Manager of London office, 17 Henrietta st., Covent Garden, London, England.
REFERENCES:—A. W. Dimock, Esq., President Atlantic Mail S.S. Co., 5 Bowling Green, N. Y.; J. C. Winans Esq., President Hamilton Fire Ins. Co., 11 Wall st., New York

Gear's Variety Molding

Machine is the best in the world. Send for Circular.
A. S. & J. Gear & Co., Boston, Mass.
☞CAUTION.—It is an infringement to use the N. Y. V. Machine anywhere except in New York. Take Notice. We mean business.

LECOUNT'S PATENT HOLLOW LATHE DOGS AND CLAMPS.—A set of 8 Dogs from ⅜ to 2-in., inclusive, $8. A set of 12 from ⅜ to 4-in., $17·30. Five sizes Machinists' Clamps, from 2 to 6-in., inclusive, $11. Send for Circular.
C. W. LECOUNT, South Norwalk Conn.

DANIEL'S PLANERS.

THE demand on us for this valuable planer has made it necessary to make suitable additions to our works for turning them out. For cuts of this and other wood-working machinery, address STEPTOE, McFARLAN & CO., Nos. 216 to 222, West 2d st., Cincinnati, O.

FOR SALE.

2.50 H. P. 15 in. by 36 double slide valve Engines, with flue Boilers, 42 in. by 35 feet, and fixtures complete, in perfect order. Apply to WM. WRIGHT & CO., Newburgh, N. Y.

TO THE WORKING CLASS.—We are now prepared to furnish all classes with constant employment at home, the whole of the time or for the spare moments. Business new, light and profitable. Persons of either sex easily earn from 50c. to $5 per evening, and a proportional sum by devoting their whole time to the business. Boys and girls earn nearly as much as men. That all who see this notice may send their address, and test the business, we make this unparalleled offer: To such as are not well satisfied, we will send $1 to pay for the trouble of writing. Full particulars, a valuable sample which will do to commence work on, and a copy of *The People's Literary Companion*—one of the largest and best family newspapers published—all sent free by mail. Reader, if you want permanent, profitable work, address E. C. ALLEN & CO., AUGUSTA, MAINE.

BENT, GOODNOW & CO., Boston, Mass., Publishers of "PATENT STAR," sell Patent Rights and goods of all kinds. Orders solicited. AGENTS WANTED.
☞Send stamp for copy.

MACHINISTS.

Illustrated Catalogue and Price List of all kinds of small Tools and Materials sent free to any address. GOODNOW & WIGHTMAN, 23 Cornhill, Boston, Mass.

DIALOGUES, SPEAKERS, etc., etc. Do you want "Speaking books?" we have ten kinds, 100 pages in each, 10 cents each; Dialogues, eight kinds, 10 cts. each; ten Speakers, etc. (all different), at 30 cts. each; others at all prices. We supply Medical, Masonic, Law, Theological, and Scientific Books, and send them by mail prepaid. We have made this our specialty for ten years. Sheet Music, Instruments, Notions, Novelties, etc., in fact, *anything you want*, you can get by sending stamp for catalogue, etc., to HUNTER & CO., Booksellers, Hinsdale, N. H.

WANTED.—FOUNDERYMAN—of extensive experience in conducting a large foundery and mixing wheel irons in Western car-wheel works, is desired. None but first-class men, industrious and temperate, need apply. All applications must be accompanied by references. The position will be made desirable to a suitable man. Address P. O. Box 48, Louisville, Ky.

P. BLAISDELL & CO.

MANUFACTURERS of the "BLAISDELL" PATENT DRILL PRESSES, with quick return motion, Agricultural Drills, Improved Engine Lathes, from 12 in. to 28 in. swing, Planers, Gear Cutters, Boring Mills, Hand Lathes, and other first-class Machinists' Tools. Jackson st., Worcester, Mass.

Universal Wood Worker.

FOR Agricultural, Railroad, Car, Carriage, and Wagon Works, Planing Mill, Sash, Door and Blind, Bedstead, Cabinet and Furniture Factories. McBETH, BENTEL & MARGEDANT, Hamilton, O.

GENUINE NORWAY OATS, CHESTER CO. MAMMOTH CORN and ALISKE CLOVER. Sample package SENT FREE to all farmers; also a copy of the AMERICAN STOCK JOURNAL, by inclosing stamp to N. P. BOYER & CO., Parkesburg, Chester Co., Pa.

WANTED.—A THOROUGHLY-COMPETENT MACHINIST to fill the position of Superintendent of our Spike, Bolt, and Nut Works. One who has had experience, and can give good references, can secure a permanent situation. Address CLEVELAND ROLLING MILL CO., Cleveland, O.

Trade-Mark Patents.

MUNN & CO. desire to call the attention of manufacturers and business men generally, to the importance of the law of patents, as applied to trade-marks for business purposes.
Any person, firm, or corporation, domiciled in the United States, or in any foreign country affording similar privileges to citizens of the United States, can obtain the right to the exclusive use, for THIRTY YEARS, of any TRADE-MARK, consisting of any new figure, or design, or any new word, or new combination of words, letters, or figures, upon their manufactures.
This protection extends to trade-marks already in use or any length of time, or about to be adopted.
Full information on this important subject can be obtained by addressing
MUNN & CO.
37 Park Row, New York.

$10,000. Will sell to a party competent to manage and introduce, half interest in a valuable invention, worth ten times the price asked. Utility and importance fully proved. Moneyless parties need not answer. AUSTIN J. STURGEON, Phila.

Patent
BEDSTEAD FASTENING.
The **Best, Cheapest, and Strongest FASTENING** ever invented. Rights for States and Territories for sale. Address JOHN DOMINGOS and BENJAMIN ESSIG, Sacramento, Cal.

"VENTRILOQUISTS' GUIDE," a new, complete and sure guide by which any one may become a perfect Ventriloquist. It is the best and largest work on the subject ever published. Written by a retired Ventriloquist of forty years experience. Ventriloquism is not a "natural gift," but an ART easily learned by any one with proper instructions. This unique and wonderful book tells how to make and use the Magic Whistle. How to perfectly imitate every animal; the various Birds; to imitate bees, flies, &c., &c. It gives instructions for ALL the wonderful Ventriloquial performances of Germans, Houdin, Heller, Blitz, and Harrington; also of the "Mocking Bird," and other imitations as given by various Minstrels. It is the only ORIGINAL book of the kind ever published in America, and while a scientific treatise, it is written in plain English, easily understood by any boy. It contains numerous scenes in Ventriloquism, etc. A new and neat volume. Price 50 Cents, six for $1, post free. Address, HUNTER & CO., Publishers, Hinsdale, N. H.

VENTRILOQUISM

Patents on Designs.

Citizens and aliens can now secure design patents for three and a half, seven, and fourteen years. The law on this subject is very liberal. Foreigners, designers, and manufacturers, who send goods to this country, may secure patents here upon their new patterns, and thus prevent other makers from selling similar goods in this market.
These patents cover all novelties of form or configuration of articles of manufacture.
For further information address
MUNN & CO.,
No. 37 Park Row, New York.

Buy Barber's Bit Brace.

AUCTION SALES.

FUTURE DAYS.

By Leigh Bros. & Phelps, Auctioneers, 4 Commercial Row.

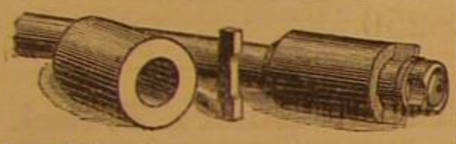
PEREMPTORY SALE OF THE ATLANTIC IRON WORKS, VALUABLE MACHINERY, MARINE RAILWAY, ETC., SITUATED ON THE ELIZABETH RIVER, ADJOINING THE CITY OF NORFOLK, VIRGINIA. AT AUCTION.

Pursuant to an order of the Stockholders of the Atlantic Iron Works and Dock Company, I will sell at public auction, to the highest bidder, on the premises, on WEDNESDAY, the 8th day of March, at 12 o'clock M., that valuable and well known property,

THE ATLANTIC IRON WORKS!

situated on the Elizabeth river, adjoining the corporate limits of the city of Norfolk, Va., viz:
Four and one half (4½) ACRES OF LAND, with a water front of four hundred and twenty-five (425) feet, and all improvements thereon, consisting of
FOUNDERY, MACHINE SHOPS,
BLACKSMITH SHOPS, BOILER SHOP,
SAW MILL, MARINE RAILWAY AND DOCKS,
together with all the valuable
MACHINERY, STEAM ENGINES,
TOOLS, PATTERNS, ETC.,
all of which are in perfect order (many of them having but recently been purchased), and are of the most approved manufacture, embracing everything necessary for the successful carrying on of the Iron Works and Ship Building business, in all its various branches, on an extensive scale.
Also, the right to manufacture Railroad Car Wheels by Cochran's Patent Annealing Process.
The Works have the capacity to turn out fifty (50) Wheels per day. Some four thousand Car Wheels made at this establishment are now in successful operation on the railroads in this vicinity.
TERMS OF SALE: One third of the purchase money in cash. For the balance, a credit of six and twelve months will be given. Approved negotiable paper required for the deferred payments, and the title retained.
The attention of capitalists and manufacturers is particularly called to this sale, as presenting an opportunity for profitable investment seldom offered through the medium of an auction.
For full particulars and descriptive catalogue address T. J. CORPREW, President of the Atlantic Iron Works and Dock Company, or the Auctioneers,
LEIGH BROS. & PHELPS,
Norfolk, Virginia.

C. C. STRONG'S
PATENT BORING BAR.



For particulars address
KETTENRING, STRONG & LAUSTER,
Defiance, Ohio.

Intercolonial Railway of Canada.

Tenders for Iron Bridge Superstructures.

THE Commissioners for the construction of the Intercolonial Railway are prepared to receive Tenders for TWENTY-ONE SPANS OF IRON BRIDGE SUPERSTRUCTURE of one hundred feet for each span; and also for SIXTEEN SPANS of two hundred feet for each span.

Printed specifications showing the tests which each span will be required to bear; information as to the location of the different bridges; and forms of tender, can be obtained at the offices of the Commissioners, or at those of the Chief Engineer, at Ottawa, Canada; or at the Banking House of Messrs. Morton, Rose & Co., Bartholomew Lane, E.C., London, England.

Parties tendering must submit their own plans of the mode in which they propose to construct the Bridges, and must state the price of each span f. o. b., at the place of shipment; and also the price of each span completed in place.

Tenders for additional plans of one hundred feet, and for spans of eighty feet, will also be received at the same time.

Specifications are being prepared, and can be had within a few days, on application at the places above named.

Tenders marked "Tenders for Bridges," and addressed to the Commissioners, at Ottawa, will be received up to SIX O'CLOCK P. M. of THURSDAY, the 6th day of APRIL, 1871.

The Commissioners will not be bound to accept the lowest or any tender.

A. WALSH,
ED. B. CHANDLER,
C. J. BRYDGES,
A. W. McLELAN, } Commissioners.

Intercolonial Railway,
Commissioners' Office,
Ottawa, 19th January, 1871.

AGENTS WANTED—($225 A MONTH) by the AMERICAN KNITTING MACHINE CO. Boston, Mass., or St. Louis, Mo.

L. & J. W. FEUCHTWANGER, 55 Cedar st., New York, Chemists, Manufacturers, and Importers of Specialities, Silicates, Soda and Potash, Chloride Calcium, Peroxide Manganese, Hydrofluoric Acid, Metallic Oxides, Steel and Glass Makers' and Potters' Articles, Publishers of Treatise on "Soluble Glass," "Gems," and "Fermented Liquors."

Mill Owners!! Facts!!

THE Complicated, Fine-cut Turbines now give vast trouble. While Low Water, Skim and Slush Ice stop them most of the time, Our Staunch, Reliable Reynold's Turbines run steadily, to the confusion of all Croakers. While other Builders are disputing over "Scientific Tests," Our Turbines are quietly doing the work. GEO. TALLCOT, New York.

SHINGLE AND HEADING MACHINE—Law's Patent with Trevor & Co.'s Improvements. The Simplest and Best in use. Also, Shingle, Heading and Stave Jointers, Equalizers, Heading Turners, Planers etc. Address TREVOR & CO., Lockport, N. Y.

STEAM Gages, large assortment, self-testing, [illegible]

THE PERFECT LUBRICATOR
A sure preventive of and cure for hot journals. Has ten times the lubricating quality of any oil. 400° F., 50° below zero, acids or gases do not affect or change its wonderful, unique nature. Forms on bearing surfaces a glaze of unequaled smoothness, which economizes power 20 per ct.; reduces friction to a minimum, and prevents heat, wear, strain, and repairs of machinery. Send for envelope sample and circular to
24 CLIFF AMERICAN GRAPHITE CO. NEW-YORK

NOT TOO LATE
TO SUBSCRIBE FOR

The Little Corporal

FOR 1871.

Enlarged, Improved, Illustrated.

An original Magazine for Boys and Girls, and older people who have young hearts.

EMILY HUNTINGTON MILLER, Editor.

THE LITTLE CORPORAL'S writers are unsurpassed for freshness, life, and vigor, or for purity of thought and style. The magazine does not fear to live up to its beautiful motto, "Fighting against Wrong, and for the Good, the True, and the Beautiful;" seeking not only to entertain its readers, but to make them wiser, nobler, and better. While doing this it seeks to throw around every thing a charm of freshness and light that wins the hearts of both old and young.

TERMS: One dollar and a half a year; $7.50 for six copies; single copy 15 cents, or free to any one who will try to raise a club. Beautiful Premiums for Clubs. Back numbers can always be sent. Address

JOHN E. MILLER,
Publisher, Chicago, Ill.
Late ALFRED L. SEWELL & Co., and SEWELL & MILLER

Canadian Inventors,

Under the new Patent Law, can obtain patents on the same terms as citizens.
For full particulars address
MUNN & CO.,
37 Park Row, New York.

Hinkley Knitting Machine.

THE simplest, cheapest, and best in use! Has but one needle! A child can run it!
Agents Wanted in Every Town.
Send for Circular and Sample Stocking to
HINKLEY KNITTING MACHINE CO., Bath, Me.

Reynolds'
TURBINE WATER WHEELS.
The Oldest and Newest. All others, only imitations of each other in their strife after complications to confuse the public. We do not boast but quietly excel them all in staunch reliable, economical power. Beautiful pamphlet free. GEO. TALLCOT, 96 Liberty st., New York.
Gearing, Shafting.

CREDIT & CAPITAL.

McKILLOP, SPRAGUE & CO.,

Will issue about the 1st of January, 1871, their new volume of

The Commercial Agency Register.

It will be the most COMPLETE AND VALUABLE work of its kind ever published. This is the only REFERENCE GUIDE giving, by their NEW KEY, a *CLOSE* estimate of the CAPITAL of each firm, in connection with their CREDIT ratings.

This Agency was established in 1842, and THE COMMERCIAL REGISTER has become a STANDARD WORK, and invaluable to dispensers of credit.

Two Editions are issued—January and July.

LAMB KNITTING MACHINE

THE ONLY FAMILY KNITTER MADE that fills the bill. Send for circulars and samples to LAMB KNITTING MACHINE MANUFACTURING CO., Chicopee Falls, Mass., and No. 2 Clinton Place, New York

BRICKS. THE HOTCHKISS Brick Machine makes 20,000 bricks a day, which can be hacked immediately. It is simple, cheap, and durable. For making DRAIN TILE it is unrivaled. Can be seen working at Company's yard, Ridgefield, N. J. State, County, and Yard Rights for sale. Address FERRY FARM BRICK WORKS, (Room 7) No. 19, Cliff st., New York.

CALDWELL'S DRYER
DRIES Brick, Tile, Peat, Whiting, Clays, Lumber, etc., most perfectly and rapidly. Highly recommended by those using them.
J. K. CALDWELL, 1844 Master st., Philadelphia.

THEA NECTAR
IS A PURE
BLACK TEA!
WITH THE
Green-Tea Flavor.
Warranted
TO SUIT ALL TASTES.

LATHE CHUCKS—HORTON'S PATENT from 4 to 36 inches. Also for car wheels. Address E. HORTON & SON, Windsor Locks, Conn.

MACHINERY, NEW and 2d-HAND.—Send for Circular. CHAS. PLACE & CO., 60 Vesey st., New York.

1826 USE THE VEGETABLE PULMONARY BALSAM. 1870
The old standard remedy for Coughs, Colds, Consumption. "Nothing Better." CUTLER BROS. & CO., Boston.

ROBERT McCALVEY, Manufacturer of HOISTING MACHINES AND DUMB WAITERS. 602 Cherry street, Philadelphia, Pa.

WATER POWER for Rent or Sale.—The Ousatonic Water Co. offer fine Mill Sites, permanent Water Power, and unsurpassed facilities to manufacturers; only 3 hours from New York, with rail and water communication. Address Ousatonic Water Co., Derby, Ct.

PATENT RIGHTS SOLD ON COMMISSION.

By E. E. ROBERTS & CO., Consulting Engineers, 15 Wall St., N. Y. Send Stamp for Circular.

IMPORTANT

TO MACHINISTS.—The Best Metal for all Machine Uses is the MARTIN STEEL, made by THE NEW JERSEY STEEL AND IRON CO., Trenton, N. J. This steel is made by an entirely different process from any other, and is tougher than wrought iron. It can be turned without annealing, being entirely free from hard spots. Every one who uses it pronounces it just what they have long wanted, for a multitude of uses, such as Crank Pins, Lathe Spindles and Screws, Cotton Machinery Rollers, Saw and Fan Spindles, etc., etc. Also, particularly adapted for Firebox Plates. Prices low. Send for further information, or a sample, stating use to which it is to be applied.

OTIS' SAFETY HOISTING **Machinery.**
OTIS, BROS. & CO.
No. 309 BROADWAY, NEW YORK.

HOWARD, THORNDIKE & Co. BELFAST. MAINE
ADDRESS HOWARD'S IMPROVED ADJUSTABLE MITRE MACHINES

Union Emery Wheels.

Solid and with Stone Center.
UNION STONE CO., Boston, Mass.
Branch Office, 93 Liberty st., N. Y.
General Agents for the Am. Twist Drill Co.'s Superior Grinder and other Emery Wheel Machinery and Tools. Send for Circular.

WOODBURY'S PATENT
Planing and Matching
and Molding Machines, Gray & Wood's Planers, Self-oiling Saw Arbors, and other wood working machinery.
S. A. WOODS, { 91 Liberty street, N. Y.;
Send for Circulars. { 67 Sudbury street, Boston.

RICHARDSON, MERIAM & CO., Manufacturers of the latest improved Patent Daniels' and Woodworth Planing Machines, Matching, Sash, and molding, Tenoning, Mortising, Boring, Shaping, Vertical, and Circular Re-sawing Machines, Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufactory, Worcester, Mass. Warehouse, 107 Liberty st., New York. 17 1

Niagara Steam Pump.
CHAS. B. HARDICK,
Adams st., Brooklyn, N. Y.

WROUGHT IRON BEAMS & GIRDERS

THE Union Iron Mills, Pittsburgh, Pa. The attention of Engineers and Architects is called to our improved Wrought-iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided, we are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph address the Union Iron Mills, Pittsburgh, Pa.

MODELS, PATTERNS, EXPERIMENTAL, and other machinery, Models for the Patent Office, built to order by HOLSKE MACHINE CO., Nos. 528, 530, and 532 Water st., near Jefferson. Refer to SCIENTIFIC AMERICAN office. 14 tf

1832. SCHENCK'S PATENT. 1870.
Woodworth Planers.
And Re-Sawing Machines, Wood and Iron Working Machinery, Engines, Boilers, etc. JOHN B. SCHENCK & SON, Matteawan, N. Y., and 118 Liberty st., New York.

WANTED—AGENTS, $20 PER DAY, TO sell the celebrated HOME SHUTTLE SEWING MACHINE. Has the under-feed, makes the "lock stitch" alike on both sides, and is fully licensed. The best and cheapest Family Sewing Machine in the market. Address
JOHNSON, CLARK & CO.,
Boston, Mass.; Pittsburgh, Pa.; Chicago, Ill., or St. Louis, Mo.

To Electro-Platers.

BATTERIES, CHEMICALS, AND MATERIALS, in sets or single, with books of instruction, manufactured and sold by THOMAS HALL, Manufacturing Electrician, 19 Bromfield street, Boston, Mass. Illustrated catalogue sent free on application.

Milling Machine,

INDEX, STANDARD, UNIVERSAL, AND HORIZONTAL.—The largest variety to be found in the country, on hand and finishing. Workmanship, Material, and Design unsurpassed. Machines on exhibition at Fair of American Institute. UNION VISE CO. OF BOSTON. Office 80 Milk st. Works at Hyde Park, Mass.

Andrew's Patents.

Noiseless, Friction Grooved, Portable, and Warehouse Hoisters.
Friction or Geared Mining & Quarry Hoisters.
Smoke-Burning Safety Boilers.
Oscillating Engines, Double and Single, 1-2 to 100-Horse power.
Centrifugal Pumps, 100 to 100,000 Gallons per Minute, Best Pumps in the World, pass Mud, Sand, Gravel, Coal, Grain, etc., without injury.
All Light, Simple, Durable, and Economical.
Send for Circulars.
WM. D. ANDREWS & BRO.,
414 Water street, New York.

$150 A MONTH! EMPLOYMENT! EXTRA INDUCEMENTS! A premium HORSE and WAGON for Agents. We desire to employ agents for a term of seven years, to sell the Buckeye $20.00 Shuttle Sewing Machine. It makes a stitch alike on both sides, and is the best low-priced licensed machine in the world. W. A. HENDERSON & CO., Cleveland, Ohio, or St. Louis, Mo.

SILICATE OF SODA, IN ITS VARIOUS forms, manufactured as a specialty, by Philadelphia Quartz Co., 783 South 2d st. Philadelphia, Pa.

FOR MALLEABLE IRON CASTINGS, and Patterns for same, address McCONWAY, TORLEY & CO., 809 Liberty st., Pittsburgh, Pa.

ALLCOTT'S LATHES, for Broom, Hoe, and Rake Handles, for sale by L. W. POND, 98 Liberty st., New York.

UNRIVALLED Hand Saw Mill, Self-feeding, with ease. Rip 3-in. lumber; guaranteed do work of 3 men. The only hand saw machine known, does as represented. Thousands in use. Send for circular. WM. H. HOAG, Sole Manufacturer, 214 Pearl st. N. Y.

U. S. PIANO CO. N. Y. Best in the World—$290. [illegible] cut and terms in Scientific American. Oct. 1st, 1870.

THE CELEBRATED
Cold-rolled Shafting.

THIS Shafting is in every particular superior to any turned Shafting ever made. It is the most ECONOMICAL SHAFTING to buy, being so very much stronger than turned Shafting. Less diameter answers every purpose, causing a great saving in coupling, pulleys and hangers. It is perfectly round, and made to Whitworth Gage. All who give it a trial continue to use it exclusively. We have it in large quantities. Call and examine it, or send for price list.
Address GEORGE PLACE & CO.,
126 and 128 Chambers st., New York.

N. Y. Machinery Depot.

GEORGE PLACE & CO., Manufacturers and Dealers in Wood and Iron Working Machinery, of every description, Stationary and Portable Engines and Boilers, Leather and Rubber Belting, and all articles needful in Machine or Railroad Repair Shops. 126 and 128 Chamber st., New York.

Sturtevant Blowers.

THESE are in every particular the best and most perfect Blower ever made. A full assortment of every size on hand, ready to deliver.
Address GEORGE PLACE & CO.,
126 and 128 Chamber st., New York.

THE NEW WILSON
Under-Feed Shuttle
SEWING MACHINES!

$25 cheaper than any other!
For Simplicity, Durability and Beauty they stand *unrivalled!* For STITCHING, HEMMING, TUCKING, FELLING, Quilting, CORDING, BINDING, BRAIDING, GATHERING, Gathering & sewing on gathers, *they are unexcelled!*
For particulars address
Wilson Sewing Machine Co.,
CLEVELAND, O. or
ST. LOUIS, MO.
AGENTS WANTED.

Newspaper Advertising.

A Book of 125 closely printed pages, lately issued, contains a list of the best American Advertising Mediums giving the names, circulations, and full particulars concerning the leading Daily and Weekly Political and Family Newspapers, together with all those having large circulations, published in the interest of Religion, Agriculture, Literature, etc., etc. Every Advertiser, and every person who contemplates becoming such, will find this book of great value. Mailed free to any address on receipt of 25c.

GEO. P. ROWELL & CO.,
Publishers, No. 40 Park Row, New York.

The Pittsburgh (Pa.) Leader, in its issue of May 29, 1870, says:

"The firm of G. P. Rowell & Co., which issues this interesting and valuable book, is the largest and best Advertising Agency in the United States, and we can cheerfully recommend it to the attention of those who desire to advertise their business SCIENTIFICALLY and SYSTEMATICALLY in such a way: that is, so as to secure the largest amount of publicity for the least expenditure of money."

THE WOODWARD STEAM-PUMP MANUFACTURING COMPANY, Manufacturers of the Woodward Pat. Improved Safety Steam Pump and Fire Engine, Steam, Water, and Gas Fittings of all kinds. Also Dealers in Wrought-iron Pipe, Boiler Tubes, etc. Hotels, Churches, Factories, & Public Buildings heated by Steam, Low Pressure. Woodward Building, 76 and 78 Center st., cor. of Worth st. (formerly of 77 Beekman st., N. Y. All parties are hereby cautioned against infringing the Pat. Right of the above Pump. G. M. WOODWARD, Pres't.

Dr. J. ARMSTRONG'S
(Patent)
Improved Heater, Filter, Lime Extractor, and Condenser Combined,
For Steam Boilers.
MANUFACTURED BY
Armstrong & Starr,
Toledo, Ohio.
Send for Circulars.
Formerly Armstrong & Welsh.

BUERK'S WATCHMAN'S TIME DETECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat. Send for a Circular. J. E. BUERK,
P. O. Box 1,057 Boston, Mass.
N. B.—This detector is covered by two U. S. Patents. Parties using or selling these instruments without authority from me will be dealt with according to law.

PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than 750 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address
J. C. HOADLEY & CO., Lawrence, Mass.
46, Cortlandt st., New York.

$5 TO $10 PER DAY. MEN, WOMEN, BOYS and GIRLS who engage in our new business make from **$5 to $10 per day** in their own localities. Full particulars and instructions sent free by mail. Those in need of permanent, profitable work, should address at once. GEORGE STINSON & CO., Portland, Maine.

PATENT BANDSAW MACHINES of the most improved kinds, of various sizes, to saw bevel as well as square, without inclining the table, by FIRST & PRYIBIL, 452-456 Tenth ave., New York. Price, $250 $275, $350, and $400. At present, Oct. 16, there are in operation, in this city alone, 88 of our machines. Send for Circular. Manufacture also, an improved saw-filing apparatus, price, $30. Have also on hand a large stock of best French Bandsaw Blades.

WOOD-WORKING MACHINERY GENERALLY. Specialties, Woodworth Planers and Richardson's Patent Improved Tenon Machines. Nos. 24 and 26 Central, corner Union st., Worcester, Mass. Warerooms 42 Cortlandt st., New York.
WITHERBY RUGG, & RICHARDSON.

CINCINNATI BRASS WORKS.—Engineers and Steam Fitters' Brass Work, Best Quality at very Low Prices. F. LUNKENHEIMER, Prop'r.

EVERY MAN HIS OWN PRINTER.
With one of our presses, and the material accompanying it, every man can do his own printing, thus saving much time and expense. Circulars containing full information about these presses, prices, recommendations, &c., mailed free on application. Specimen books of types, cuts, borders, &c., &c., 10 cents. ADAMS PRESS CO. 53 Murray street, New York.

City Subscribers.—The SCIENTIFIC AMERICAN will be delivered in every part of the city at $3·50 a year. Single copies for sale at the News-stands in this city, Brooklyn, Jersey City, and Williamsburgh, and by most of the News Dealers in the United States.

Subscribers—Who wish to have their volumes bound, can send them to this office. The charge for binding is $1·50 per volume. The amount should be remitted in advance, and the volumes will be sent as soon as they are bound.

Advertisements.

Advertisements will be admitted on this page at the rate of **$1·00** *per line for each insertion. Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.*

Messrs. Howard & Co., 865 Broadway, New York:
Please send me your New Illustrated Price List of Waltham Watches, as per advertisement in the "Scientific American."

(Sign name and address in full.)

HOWARD & CO.,

Having on the 1st of February reduced the price of Waltham Watches, request the thousands of persons who have had their former price lists to send for the New Edition. All persons desiring to have one, and especially those who contemplate purchasing a watch, can receive a copy postpaid by sending their address as above.

It should be borne in mind that we send these Watches by Express to any part of the country, and allow the purchaser to open the package and examine the watch before taking it, and if it is not perfectly satisfactory, it can be returned at our expense.

WALTHAM WATCHES

Still maintain their superiority over all others, and a new size for boys has just been introduced, which will give universal satisfaction.

HOWARD & CO.,

865 Broadway, New York.

DOUBLE  **CARPET POINTED TACKS,**

For putting down CARPETS, MATTING, OIL CLOTH, etc. Manufactured by the DOUBLE POINTED TACK CO., 62 Duane st., New York.

Occasionally an inventor brings to light some improvement which is of great value to the housewife, and of such it is always our pleasure to speak. This is the case with P. Miles's Double Pointed Steel Tacks, which we have thoroughly tested, and found them to be as represented—a saving of labor, annoyance, time, material, and money. They consist of a bent, flattened wire, similar in shape to a common staple, with two sharp points like the common tack, having no heads to break off in taking out; hence they are easily removed, and may be used repeatedly. Being very strong, they hold the carpet firm and never tear it.

For putting down matting, or oil cloth, they are unequaled, as well as for carpets, without sewing the breadths together.

Mr. Miles has also patented a machine for driving these tacks and stretching the carpet. It is so arranged that it stretches the carpet and holds and drives the tack at the same time.—*N. Y. Tribune.*

THE FIFTH GRAND STATE FAIR
OF THE
Mechanics and Agricultural State Association of Louisiana

WILL be held on the Fair Grounds of the Association, in the city of New Orleans, commencing SATURDAY, APRIL 8, 1871, and continuing nine days. Exhibitors are invited from every section of America. Railroads, steamships, and other transportation lines, as named in the Premium Catalogues, will carry exhibitors and their wares two and from the Fair at one half the usual rates. For further information see Premium Catalogue, which will be sent to any address free of charge.

LUTHER HOMES, Secretary and Treasurer,
New Orleans, La.

BUILDING PAPER

OF THREE GRADES.

SHEATHING BOARD,

For outside of Studding, under Clapboards. A non-conductor of cold, heat, and dampness.

PREPARED PLASTERINGBOARD

a cheap and perfect substitute for lath and plaster; makes a smooth, substantial wall, at less than half the usual cost.

DOUBLE THICK ROOFING

Made entirely of Wool Felt, a cheap and perfect article.

Sample and Circulars sent free, by
ROCK RIVER PAPER CO.,
Chicago; or,
B. E. HALE,
22 & 24 Frankfort street, N. Y.

FOR SALE OR TO RENT,
THE MANUFACTURING PROPERTY
OF THE LATE
Niagara Manufacturing Co, Lockport, N.Y.

THE MANUFACTORY is 340 ft. front, and 120 ft. deep, and occupies all the ground between Market street and the Erie Canal. Has Furnace, Machine Shop, and storerooms; also, a never-failing Water Power. It is only about 20 rods from the N.Y.C.R.R. For further particulars apply to E. S. DEWING, 524 Broadway, New York, or ORIGEN STORRS, Lockport, N.Y.

PATENT BAND SAW MACHINES, with valuable improvements, acknowledged superior. Chair Machinery made to order. Address C. PURDY, Bedford, Cuyahoga county, Ohio.

"Dooley's Yeast Powder."

THE superiority of this Baking Powder has long been demonstrated by every housekeeper who has used it, and from the steadily increasing demand for a reliable article. The universal expression is that it is the best in the market, and its perfect purity and freedom from deleterious substances warrants the assertion. To those who have never used it, we say give it a trial, and your testimony to its worth will be added to the many thousands of others. Sold by Grocers generally. DOOLEY & BROTHER, 69 New st., New York, Manufacturers.

RUMPFF & LUTZ,

IMPORTERS and Manufacturers of Aniline Colors and Dyestuffs, Colors for Paperhangers and Stainers. Reliable recipes for Dyeing and Printing on Silk, Wool, and Cotton. All new improvements in the art of Dyeing, and new Colors are transmitted to us by our friends in Europe, as soon as they appear.
42 Beaver street, New York.

No
LIVE MECHANIC
Can afford to be without some of
BAIRD'S BOOKS
FOR PRACTICAL MEN.

My new and enlarged Catalogue of PRACTICAL AND SCIENTIFIC BOOKS, 82 pages, 8vo., will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut St.,
PHILADELPHIA.

Swain Turbine.

"Our Low-Water Wheel from this on"

WILL DO TEN PER CENT MORE WORK on small streams, in a dry season, than any wheel ever invented. Gave the best results, in every respect, at the Lowell Tests.

For Report of tests at Lowell, with Diagrams and Tables of Power, address

THE SWAIN TURBINE CO.,
North Chelmsford, Mass.

SECOND-HAND MACHINERY FOR SALE CHEAP.

1 25 Horse Power Engine and Boiler, Price		$1,300.
1 6 " " "	"	125.
1 Wood-turning Lathe,	"	60.
2 3-ft. Planers,	"	230.

All nearly new, and in good condition.
H. B. BIGELOW & CO., New Haven, Conn.

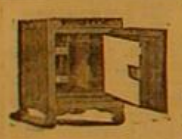
REYNOLDS' WATER WHEELS, good as new, for sale low. One 5 feet, one 3 feet. Also one 18-inch Tyler Wheel, second-hand. Address HOLYOKE MACHINE CO., Holyoke, Mass., Manufacturers of the American Turbine Water Wheel, Shafting, and Mill Work generally.

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of superior quality, on hand, and finishing. For sale low. For Description and Price address NEW HAVEN MANUFACTURING CO New Haven Conn.

TREASURER'S OFFICE,
ST. JOSEPH & DENVER CITY RAILROAD COMPANY,
ST. JOSEPH, MO., January 28, 1871.

THE INTEREST AND COUPONS DUE February 15th, 1871, on the First Mortgage Eight Per Cent (8 per cent) Gold Bonds of the St. Joseph and Denver City Railroad Company, will be paid at the office of the Farmers' Loan and Trust Company, in the City of New York, upon presentation and application, on and after that date, free of Government Tax.

THOS. E. TOOLE,
Treasurer.



WATSON'S IMPROVED
INSIDE DOOR
Fireproof Safe.
Cheapest and best. Send for price list.
J. WATSON & SON,
No. 53 South 4th st., Philadelphia.
ESTABLISHED 1841.

UNION
Spoke Works.

SPOKES, RIMS, AND PLOW HANDLES. All goods warranted seasoned, and of the best quality. JOHN G. DAVIS & SON,
Southwest cor. of Leonard and Otter sts., Philadelphia.

IRON STEAMSHIP BUILDERS.
NEAFIE & LEVY,
PENN WORKS,
MARINE ENGINES, BOILERS, ETC.,
PHILADELPHIA, PA.

DRILLS
DIAMOND POINTED
STEAM DRILLS.

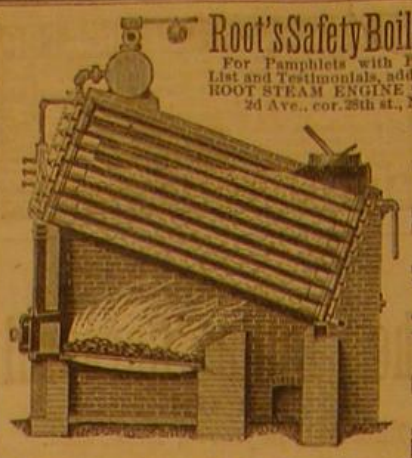
FOR ALL KINDS OF ROCK DRILLING, Mining, Quarrying, Tunneling, Railroad Grading, Well Boring, Prospecting, etc. Fifty to Seventy-five per cent of cost and time of hand labor saved. "Test Cores," in form of solid cylinders of rock or mineral taken out of mines from any depth not exceeding one thousand feet, showing true value, stratification, etc. No percussion. Never require sharpening. FIRST PREMIUMS awarded in both American and Europe. Illustrated Circulars sent on application. Beware of infringements.

SEVERANCE & HOLT,
Proprietors and Manufacturers,
Office 16 Wall st., New York.

SCHLENKER'S PATENT
BOLT CUTTER
NEW INVENTION. ADDRESS,
HOWARD IRON WORKS, BUFFALO, N.Y.

McNAB & HARLAN, Manufacturers of Wrought Iron Pipe and Fittings, Brass Cocks, Valves, Gage Cocks, Whistles, Water Gages, and Oil Cups, Harlin's Patent Lubricator, Plumber's Brass Work, Getty's Patent Pipe Cutter, Getty's Patent Proving Pump and Gage. No. 86 John st., New York.

PAT. SOLID EMERY WHEELS AND OIL STONES, for Brass and Iron Work, Saw Mills, and Edge Tools. Northampton Emery Wheel Co., Leeds, Mass.



Root's Safety Boiler.
The Best in the Market.

For Pamphlets with Price List and Testimonials, address ROOT STEAM ENGINE CO., 2d Ave., cor. 28th st., N. Y.

HARDWOOD
Boards and Veneers.

Especial attention is called to our
HUNGARIAN ASH, FRENCH BLACK WALNUT, AMBOINE, THUYA, AND TULIP WOOD,
Just to hand and unusually choice.
Also on hand, our usual complete assortment of
PLANKS, BOARDS, AND VENEERS.
GEO. W. READ & CO.,
Nos. 168, 170 and 172 Center st., New York.
Factory, Nos. 291 Monroe st., and 398 Madison st.
Send for catalogue and price list.

WIRE ROPE.
JOHN A. ROEBLING'S SONS,
MANUFACTURERS, TRENTON, N. J.

FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays, or Guys on Derricks & Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information. Send for pamphlet on Transmission of Power by Wire Ropes. A large stock constantly on hand at New York Warehouse, No. 117 Liberty street.

American Saw Co., Manufacturers of

And Perforated Circular and Long Saws. Also Solid Saws of all kinds. No. 1 Ferry st., cor. Gold street, New York. Branch Office for Pacific Coast, No. 606 Front street, San Francisco, Cal.

THE
Allen Engine Works.
THE ALLEN ENGINE.

Fourth avenue and 130th and 131st sts., New York City. Manufacturers of

Porter's Governor,
The Allen Boiler, and
Standard Straight Edges, Surface Plates, and Angle Plates.

Four first premiums were awarded to us at the Fair of the American Institute, 1870.
Send for our illustrated circular.

PATENT COLD ROLLED SHAFTING.

The fact that this Shafting has 75 per cent greater strength, a finer finish, and is truer to gage, than any other in use, renders it undoubtedly the most economical. We are also the sole manufacturers of the CELEBRATED COLLINS PAT. COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price Lists mailed on application to
JONES & LAUGHLINS,
120 Water street, Pittsburgh, Pa.
☞ Stocks of this Shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass.
GEO. PLACE & CO., 126 Chambers street, N. Y.

BEST DAMPER REGULATOR for Steam Boiler. Send for Circulars. Agents wanted. MURRILL & KEIZER, Baltimore, Md.

WATER-PROOF
BUILDING PAPER
(No Tar), for Roofing, Sheathing, Ceilings, Oil-cloths, Shoe Stiffenings, Tags, Trunks, Cartridges, Blasting, Pass-book Covers, Grain and Flour Bins, etc., for sale by
J. HUNTER, Jr.,
Paper Warehouse, 59 Duane st., New York.

London.....48 Cannon street.
H. KOHNSTAMM,
MANUFACTURER OF
ULTRAMARINE,
And Importer of English, French, and German Colors, Paints, and Artists' Materials, Bronzes, and Metals. No. 100 Chambers st. bet. Broadway and Church st., N. Y.

FOR CIRCULAR ILLUSTRATING A NEW and greatly improved TURBINE WHEEL, believed to be the best and cheapest in the market, apply to
PUSEY JONES & CO.,
Wilmington Delaware.

A. S. & J. GEAR & CO., Boston, furnish every description of Wood and Iron Working Machinery and Supplies. The best in use, regardless of maker, at lowest possible rates.

HORRIBLE! I suffered with CATARRH thirty years, and was cured in six weeks by a simple remedy. The receipt will be sent, postage free, to all afflicted. Address REV. T. J. MEAD, Drawer 176, Syracuse, New York.

$15 A DAY made with Hoster's Silver-Plating Fluid. Enclose stamp. W. F. HOSTER, Seneca Falls, N. Y.

SECOND-HAND ENGINES AND BOILERS for sale 8 to 12 H. P. Address
C. A. DURFEY Titusville Pa.

STOVES. Carpenter, Advertising Agent. Address hereafter, Box 773, New York city.

Harrison *Safety Boiler.*

First-class Medal, World's Fair, London, 1862. And American Institute Fair, New York, 1869.
Over 1,000 Boilers in Use.

Weston's Patent Differential
PULLEY BLOCKS.
75,000 IN USE.

Address
HARRISON BOILER WORKS,
Philadelphia, Pa.
or, **JOHN A. COLEMAN,** Agent,
110 Broadway, New York, and 129 Federal st., Boston.

DOYLE'S
PATENT DIFFERENTIAL
Pulley Blocks.

The celebrated **Doyle Blocks** have taken premiums over the differential Blocks of all other makers at every Fair where they have been exhibited at the same time. WHEN YOU BUY, SEE THAT THE BLOCKS ARE MARKED J. J. DOYLE. Pat. Jan. 8, 1861. All others are infringements.
SAMUEL HALL'S SON & CO.,
SOLE MANUFACTURERS.
229 West 10th street, New York.

HEAVY CASTINGS
For Forge and Mill Work. The M. & T. SAULT CO.
Steam Engine Builders & Founders, New Haven, Conn.

L. L. SMITH, 6 Howard st., New York.
Nickel Plater.

First Premium at the Fair of the American Institute, 1869. Licenses (under the Adams Patents), granted by the U. N. Co., 17 Warren st., New York.

EMPLOYMENT.
$250 A MONTH with Stencil Dies. Samples free. Address
S. M. SPENCER Brattleboro Vt.

THE
Tanite Emery Wheel.
Does not Glaze, Gum, Heat, or Smell. Address
THE TANITE CO.,
Stroudsburg, Monroe Co., Pa.

FOR CIRCULAR OF TREMPER'S PATENT VARIABLE CUT-OFF, for high and low pressure Steam Engines, address
PUSEY JONES & CO., Wilmington Delaware.

Working Models
And Experimental Machinery, Metal, or Wood, made to order, by J. F. WERNER 62 Center st. N.Y.

SELECTED Sperm Oil.—Warranted strictly Pure. For Sewing Machines and all fine machinery in bottles, cans, bbls., casks. W. F. Nye, New Bedford, Mass

WOOD'S HOUSEHOLD MAGAZINE contains in every number one complete prize story valued at $100. Forty pages Yearly $1. Sold by news dealers at 10 cents per copy. Splendid Premiums. $500 cash to be awarded for prize clubs. Specimen copy free. Address S. S. WOOD, Newburgh, N. Y.

L. W. Pond---New Tools.
EXTRA HEAVY AND IMPROVED PATTERNS.

LATHES, PLANERS, DRILLS, of all sizes; Vertical Boring Mills, ten feet swing, and under; Milling Machines, Gear and Bolt Cutters; Hand Punches and Shears for Iron.
Office and Warerooms, 98 Liberty st., New York; Works at Worcester, Mass.
A. C. STEBBINS, New York, Agent.

SAW MILLS.
MORRISON & HARMS' IMPROVED MULEY Saw Hangings are the best in the world.
MORRISON & HARMS, Allegheny City, Pa.

Scientific American
For 1871.
TWENTY-SIXTH YEAR.

EVERY NUMBER is printed on fine paper and elegantly illustrated with original engravings representing

New Inventions, Novelties in Mechanics Manufactures, Chemistry, Photography, Architecture, Agriculture, Engineering, Science, and Art.

Farmers, Mechanics, Inventors, Engineers, Chemists Manufacturers, and People of all Professions or Trades will find the

SCIENTIFIC AMERICAN

of great value and interest.

The Editors are assisted by many of the ablest American and European Writers, and having access to all the leading Scientific and Mechanical Journals of the world, the columns of the SCIENTIFIC AMERICAN are constantly enriched with the choicest Information.

An Official List of all the Patents Issued is published Weekly.

The Yearly Numbers of the SCIENTIFIC AMERICAN make two splendid Volumes of nearly ONE THOUSAND PAGES, equivalent in size to FOUR THOUSAND ordinary book pages.

SPECIMEN COPIES SENT FREE.

TERMS—$3·00 a year; $1·50 half year; Clubs of Ten Copies for one year, at $2·50 each, $25·00,

With a SPLENDID PREMIUM to the person who forms the Club, consisting of a copy of the celebrated Steel Plate Engraving, "Men of Progress."

Address
MUNN & CO.,
PUBLISHERS OF THE SCIENTIFIC AMERICAN.
37 Park Row, New York.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK, Tenth and Lombard sts. Philadelphia, and 59 Gold st. New York