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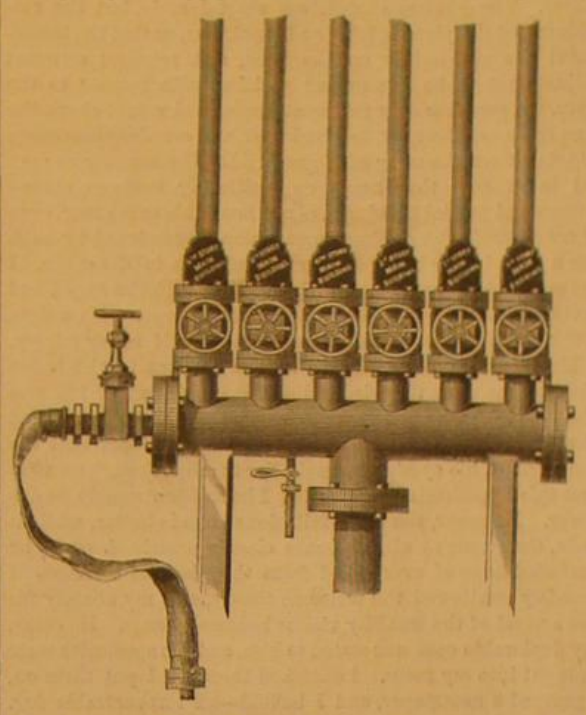
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Fire Extinguishing Apparatus.

In a recent number we published an article on the importance of extinguishing fires at their commencement, and we remarked in that article "that a very little water, judiciously employed, will extinguish a fire within five minutes of its ignition."

Since publishing the article above mentioned, our attention has been called to the system of sprinklers, as arranged by Hall Brothers, 36 Chardon street, Boston, which system seems exactly to meet the want spoken of, namely, the instant and judicious supply of water to fires the moment they are discovered. We present, for the benefit of our readers, a description ofthis admirable system.

The accompanying engraving, Fig. 2, represents their "Receiver,"—also shown in the larger engraving—which is placed in the counting room of a building or any other suitable place, where the valves can be got at readily. The large pipe, entering the bottom of the receiver, is to be used where there is a natural head of water. The hose at the left is to be connected with a hose from a force pump or steam fire engine. The pipes at the top are mains leading to each room in the building—each numbered like the room to which it leads—and cut off from the receiver by valves. These mains are watertight until they get to the rooms, where the perforated pipes or "sprinklers" commence; these perforated pipes run across a room, say a line every eight or ten feet. The perforations are small and frequent. Now, if a fire occurs in any room—say room No. 3—the valve of No. 3 leading pipe is turned, and in an instant a fine rain shower of spray fills that room. A few moments of this fine rain will suffice to extinguish almost any fire, and that without flooding or deluging the room with water. As soon as the fire is extinguished, the valve, upon being turned back, will immediately stop the supply of water, and as soon as the pressure



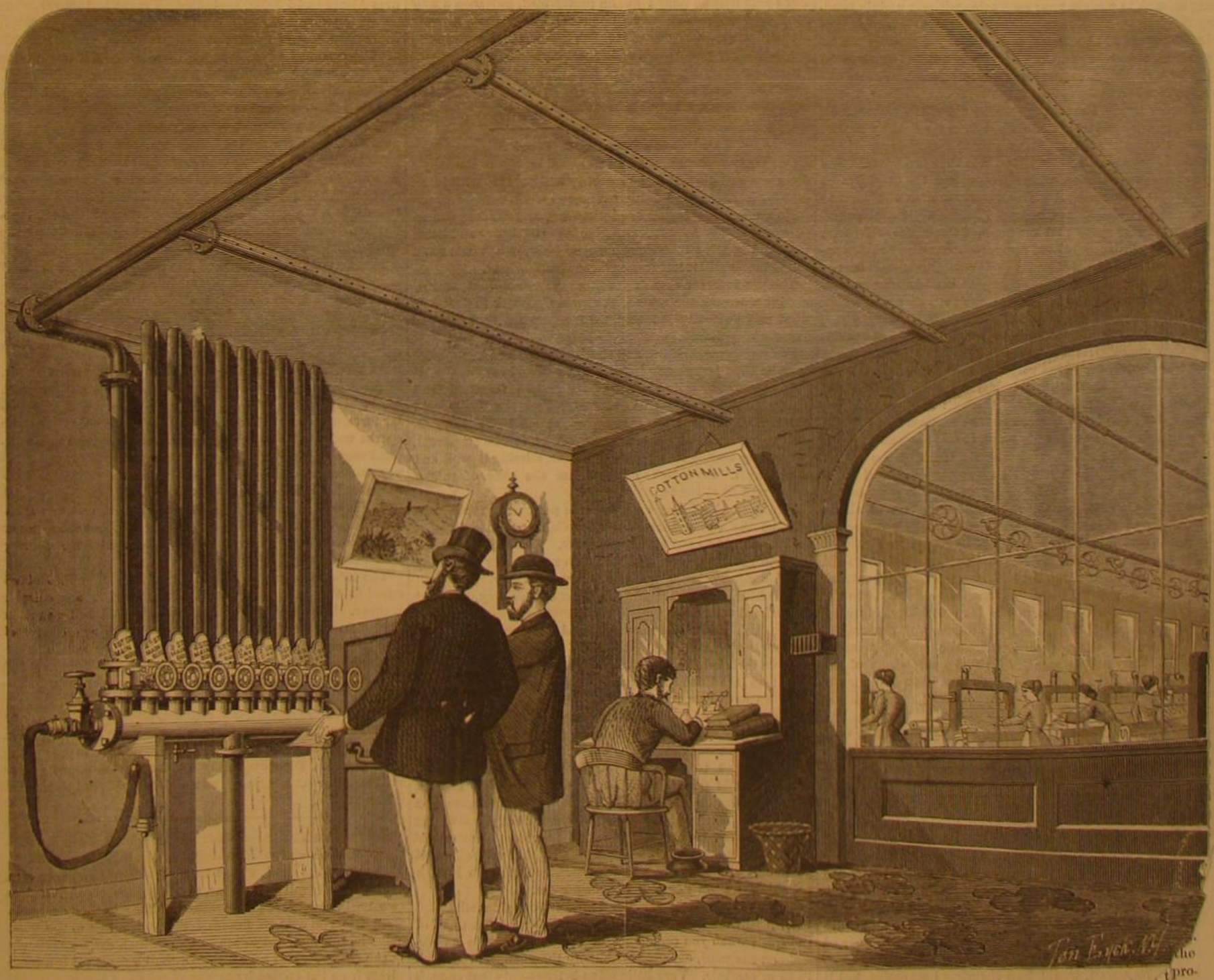
is turned from the receiver, the valve is again opened, and the water remaining in the pipes at once runs out through the small waste cock at the bottom of the receiver.

When a fire takes place, the excitement and confusion always existing is very unfavorable to efficient action, and while men are running amid the smoke with hand hose, portable engines, or extinguishers, the fire generally spreads beyond control. The opening of doors and windows, to get access, admits the air, and supplies the fire with oxygen; but the "sprinklers" are a fixture, always on the spot, and ready for instant action.

Perforated gas pipes have been, for several years, placed in certain portions of cotton and woolen mills, but the great objection to them has been, that in drilling the holes a ragged burr is left upon the inside, upon which are constantly collecting lint, dust, etc., so that, after a time, the hole becomes filled up so much that it cannot be used with any degree of certainty; we have even known of manufacturers, who had this kind of pipe, who were obliged to paste over every hole a piece of fine tissue paper. Messrs. Hall Brothers use a pipe made of galvanized sheet iron, and claim that they have the only machine in the world for making sheet metal pipe in long lengths. The holes are punched out on the sheets before forming them into pipes, thus leaving a clean smooth hole.

Another very important advantage they have is, that with this kind of pipe, it costs but half the sum to pipe a building that it does with the other kind.

In the short time their system has been before the public, they have already piped some of the largest factories and mills in the country, among which are the York Mills, Saco, Me., Fletcher Manufacturing Company, Providence, R. I., Glenham Company's Mills, Glenham, N. Y., Falls Company, Norwich, Conn., Washburn & Co., and Jewett & Pitcher's large planing mills, Boston, etc., etc.



HALL BROTHERS' FIRE EXTINGUISHING APPARATUS.

So highly is this system appreciated that several of our largest and most reliable insurance companies have, we understand, agreed to deduct twenty-five per cent from the insurance premium of extra hazardous risks, such as planing mills, furniture, box factories, etc.

THE LOSS OF MY SPECTACLES.

[Condensed from "All the Year Round."]

I have worn spectacles for nearly twenty years, and they have become to me a necessary of life, secondary only to food and clothing. I can indeed take my walks abroad with unarmed eyes, being fortunately able, without artificial assistance, to discern objects of comparatively large magnitude. But, if I would read even for a short time, my glasses become absolutely indispensable. A few lines, printed in exceptionally bold type, I can perhaps wade through, with the untrustworthy aid of guessing, by holding the paper at a distance from my face, my defect being the reverse of that endured by the shortsighted. But in a few minutes the annoyance of a process, which may be compared to the observation of stars through a fog, not quite dim enough to render them utterly invisible, amounts to physical torture. Hence, as reading constitutes the chief occupation of my life, I rarely lay my spectacles aside, but wear them even when they are not altogether needful. The consciousness of depriving myself of a power which I am accustomed almost perpetually to use, is repugnant to my habits. Satirical friends, who see me not engaged in study, affirm that I look over, not through my spectacles, and thus infer that I wear them through some species of affectation. Blest themselves with strong natural vision, they cannot realize the fact that the consciousness of a diminution of sense is intolerable.

Careless with respect to umbrellas and other articles, I am extremely careful of my spectacles. It is with a sort of nervous instinct that, whenever I am going out, I clap my hand hastily to my waistcoat pockets to ascertain that they are safe. And here let me lament, with w[illegible] placed grief, that the most convenient form of spectacle c[illegible]e has suddenly become obsolete. I refer to the thin, flat sheath, open at both ends, which glided into the waistcoat pocket without occupying any sensible room, and some years ago drove out of fashion the thick unwieldy case, which requires the side pocket of a coat for its abode, and, opening at one end, is closed with a tongue like a pocket book. Oddly enough, the useful innovation has of late disappeared, and the ancient mass of leather is restored to supremacy, without a single claim to public favor. Rarely can one of the closing cases be found long enough to contain your spectacles, without unduly bending the delicate arms of metal that press lightly on the temples; whereas in the neat, flat sheath, any spectacles can be inserted. Nevertheless, this sheath is not to be obtained save by a remarkable stroke of good fortune. To me its disappearance is a source of constant trouble. Disgusted with the clumsy article, I have given up the use of cases altogether, and carry my spectacles unsheathed in my waistcoat pocket. Under these circumstances, the normal transparency of the glasses is occasionally interrupted, and they are brought into a semi-opaque condition, which necessitates the employment of a pocket handkerchief. Now, the restoration of glasses to their proper transparency is by no means a pleasant operation. The foggy speck that has dimmed the center will often, after being skillfully rubbed away, reappear near the circumference, where it is less easily removed. Breathing on the glass, too, though sometimes successful, is a hazardous experiment, inasmuch as you may sometimes produce a mist which you will find yourself unable to dispel.

But whatever inconvenience may attend the use of spectacles, they are so great a blessing to those who require them, that, like health, their true value cannot be ascertained until they are lost. This truth was impressed upon me by bitter experience one Saturday night. At about half past eleven, when I was on my way home, a sudden instinct told me that my spectacles were gone. My hand, thrust successively into all my waistcoat pockets, confirmed the truth of the mysterious revelation, which was still further confirmed by a plunge into the breast pocket of my coat. The sense of my bereavement then began to force itself upon me in all its horror. The lost spectacles were the only pair I possessed in the world, and as all the shops would be very properly closed on the morrow, I should be in a state of semi-blindness till Monday. Moreover, I knew that, from circumstances which need not be narrated, I should be unable to leave home till the Sunday evening, and there was the possibility before me of dying for want of occupation. In a frenzy of desperation I thrust my hands into places where the missing treasure would certainly not be found. I rifled the pockets of my coat tail; I opened a letter case, likewise a book I commonly carried about me, and of course, as I expected, my search was without profit.

After awhile I bethought myself of the possession of a powerful magnifying glass, which I use to distinguish small words in maps, and in pocket dictionaries. And a very serviceable instrument it is when employed on rare occasions. But, as I soon found when I sought its aid to relieve me from my distress, it became, when employed for the purpose of continuous reading, an instrument of torture worthy the invention of an Oriental tyrant. The page before you is broken up into a number of circular lakes, which appear in certain succession—thickly studded, like Lake George in the United States, with islands, every island consisting of [illegible]ressive letters—islands which it is impossible to reduce to one uninterrupted surface. To take a long walk, and while to read Young's Night Thoughts chalked in huge [illegible]s on a wall, would be a cheerless occupation, but it probably be perfect bliss compared to the effort to read a book or a newspaper with one eye armed with a magnifying glass of high power.

My magnifier having proved a disastrous failure, and being cast fiercely on the floor, I was again thrust back into a state of internal contemplation, when it occurred to me that in some drawer or other I had an eye glass, made to be worn on a chain, and expanding, when required, into a spectacle form by means of a pivot. It is an old family treasure, not made for me, and, as it does not exactly suit my sight, I am not in the habit of wearing it. Nevertheless, my forlorn condition forced its image into my memory, and I recollected that on rare occasions I had used it for purposes not merely ornamental. So I rummaged the drawer, and, having found it, was delighted to perceive that it suited my sight much better than I expected. My joy was transient. I was not, indeed, hurled at once into despair, as by the magnifier, but I glided down on an inclined plane to the same undesirable abyss. The glasses themselves are tolerable, but the machinery of the pivot is loose and capricious, so that the instrument sits uncertainly on the nose, and requires constant adjustment to be in a proper position with respect to the eyes. A pen that only marks at haphazard would check the fine frenzy of the most inspired poet, and certainly was never plucked from the wing of Pegasus. In like manner an optical instrument that keeps on oscillating between chiaro-oscuro and partial blindness, is not favorable to reading, even if we set aside the galling inconvenience occasioned by holding a book in one hand, and something else in the other. I did not dash my eye glass to the ground with the fury I had lavished on the magnifier, but I laid it down with a sigh, and, folding my arms, calmly resigned myself to my misery.

Much time had not elapsed when a resident in the house cheered me with the glad tidings that a friend of his was about to call, who wore spectacles, and would no doubt lend them for an hour or so. There was a vague belief that the condition of his eyesight was similar to mine, though on what fact this hypothesis was founded I have been unable to discover. However, the most fallacious hope is better, while it lasts, than none at all, as Dante clearly perceived when he excluded hope of every kind from the place of torment. I greedily swallowed the welcome theory, and my anxiety for the arrival of the wealthy visitor became intense. He came, my deplorable case was stated to him, and the spectacles were brought into my room. I snatched them up, I put them on, I grasped a newspaper, and I beheld—an impenetrable fog. Still, I had suffered too much not to struggle a little with adverse destiny, and I found that by making the paper almost touch the tip of my nose, I could read with tolerable facility. For about half an hour I got on pretty well, but soon a new source of oppression came upon me. As I have already stated, I am naturally long sighted. Now, by the borrowed spectacles, my whole habit of life was reversed; I had become artificially short sighted, and I could not bear my changed condition. I sent down the newspaper and the spectacles with thanks, and relapsed into melancholy.

Polishing Veneered Work.

Our readers who have been interested in Mr. B. Barnaby's discussions of glueing and veneering will peruse with interest his directions for polishing veneered work.

No attempt at scraping, sand papering, or polishing veneered work must be made till the glue is perfectly dry and hard. It should be left twenty-four hours at least, in a warm room and is better still if left two or three times as long.

The processes for French polishing vary somewhat, according the nature of the wood. For common work in deal, the wood may be well sized first, then papered with fine glass paper, and polished.

For mahogany, walnut, and similar porous woods, the pore must be filled by rubbing in, on a roller of old carpet, a mixture of Russian tallow (that is, tallow free from salt) and plaster of Paris, well amalgamated, before the fire in cold weather. Russian tallow may be had, at most oil shops, generally pure enough; but if the presence of salt be suspected, refine it by boiling it in plenty of water, stirring it well and skimming it. Set it by to cool, and use the cake of tallow which will be at the top.

The more this filling up process is persevered in, the less will be the subsequent labor in polishing; quite a bright surface should be got up by this alone. The mixture of tallow and plaster may be darkened with red lead for mahogany or with other coloring matter according to fancy.

This filling is not necessary for boxwood, ebony, or other of the hard woods.

To polish a surface thus prepared, not being hard wood, and not in the lathe, take a ball of cotton wool saturated with methylated French polish; cover it with a fold of linen cloth; on the linen cover put, with the tip of the finger, a drop or two of raw refined linseed oil (not "boiled oil"); get on a good body of varnish by rubbing always one way with circular strokes; be very careful to go over all the ground each time you work round the surface; and do not go over the same spot twice before you have gone over all. The longer this is done the better. Never mind the smears, which, though they look queer, are the very appearance you want at this stage. Having got on a good body, leave your work and take to another piece. It is good to leave it, if convenient, even for a day or two. By the way, shut all doors and windows before you begin. You can't do French polishing in a draft or in a very cold room.

When you resume work, use a mixture of half methylated French polish and half methylated spirit, or less than half of the spirit when you commence, and put now as little as possible on the wool, covering with more than one fold of fine linen or cambric. Very little oil as before—only just enough to prevent the rubber from sticking to the work; go over it lightly, with an easy gentle touch, in circular strokes, all one way. Never mind the smears. When it comes to look something like a good result, which it soon will, you may take out the smears by rubbing up and down with a mere trace of spirit on wool well covered with the linen, but avoid going over the same place twice, and be very light and gentle, or you will remove your polish. Finally rub it well with a clean wash leather (carefully folded, so as to leave no hard crease which will scratch), or an old silk handkerchief, breathing on the work occasionally.

Boxwood, ebony, cocus, etc., may be rapidly polished in the lathe. At first get a body of polish, on and this can be done without using any oil. The work must not be turned around rapidly, but the pulley of the lathe moved slowly by hand; then use your rubber with a drop of oil, and finally, the polish thinned with spirit.

If either on flat or turned work you require a very superior polish, you may remove nearly all the first coat with fine glass paper, and put it on again which will not take long, the pores being all filled. Remember that throughout the oil is only used to prevent the rubber from sticking, and it has to be got out afterwards with the spirit; so never use more than necessary.

In the lathe, when you come to the wash leathers, the work may be driven rapidly. A bit of ebony can be polished in five or six minutes to such a surface that small print can easily read in it as in a mirror. Dont use your rubbers when they get hard and dry, but, nevertheless, stick to an old one as long as you can, and, if you have to put them by, keep them in a tin box tightly covered.

How the Recent War Affects the Iron Works of Alsace and Lorraine.

The annexation of Alsace and Lorraine, says a correspondent of *Engineering*, has imported into the industrial situation of France and of Germany a considerable perplexity, which just now occupies the attention of both countries. Out of 39 blast furnaces producing 281,000 tuns of iron, which Alsace Lorraine worked and, according to the statistics of 1867, 25 blast furnaces producing 205,000 tuns are left to France; and out of 28,500 acres of land producing 641,000 tuns of ore 22,500 acres become German, and represent a production of 500,000 tuns. We may add that the treaty of peace leaves to France 14 iron works, whose production amounts to 127,000 tuns, and 55,000 acres of coal lands, yielding 180,000 tuns of coal annually.

France possessed 6,800,000 cotton spindles, representing per annum 80,000.000 of kilogrammes of thread. In these figures Alsace had 1,600,000 spindles. France had 80,000 looms producing about 55,000,000 kilogrammes of cotton fabrics; the treaty leaves in Alsace 35,000 looms, and 22,000,000 of kilogrammes of fabrics, or more than a third of the total amount. Now after the 1st of September next, according to the treaty of peace, the annexed territories would be subjected to the duties and taxes of Germany, that is to say, they will be struck with imports equivalent to prohibition. Importation from Switzerland, Belgium, and England would have to fill the enormous void made in the consumption of iron and of fabrics. On the other hand this result would cause to the German producers a considerable disadvantage, because it represents a considerable portion of the total production. This subject forms matter for negotiation, since the two countries would have alike to suffer from the immediate application of the provisions of the treaty. It appears as if there must be established a transition state, granting sufficient delay in order that the material interests of the countries should not suffer.

Glynn's Spark Arrester.

An interesting improvement has just been patented by Mr. Michael A. Glynn, of Matanzas, Cuba, being an improvement in globular spark arresters. The spark receiver is of globular form, and placed in relation to the chimney so that the sparks will be discharged therein, while there will be a sufficient opening between the top or discharge end of the chimney and the receiver for the discharge of the smoke and uncondensed steam into the open air.

The invention may be applied to the top of a curved chimney, so as to discharge the sparks laterally; but the same or a similar result, may be produced with a receiver curving over the chimney.

The receiver is placed on the top of the funnel, and secured to the chimney by bands, clamps, or in any suitable manner. To the bottom of the funnel is attached a tube or cinder flue by which the sparks and cinders are conducted into the ash pit, or into a receptacle containing water for extinguishing the sparks. Where the spark arrester is applied to the smoke stack of a steam boat, the sparks may be discharged directly into the water.

By this improvement, it is claimed, all the sparks may be arrested by the receiver, will fall therefrom by their own gravity, and be discharged as above stated, thus preventing damage from fires caused by sparks from locomotives, as well as the great annoyance of cinders on railroad trains and steam vessels.

STEAM CAR BRAKE.—Steinard's steam brake is in use with much success on the Flushing and Northside Railroad, N. Y. On a recent trial, with a train of seven passenger cars, velocity thirty miles an hour, the stoppage was effected in twenty-six seconds; at forty miles per hour, in thirty seconds. Both trials on a down grade of thirty-five feet to the mile. The brake is attached to the bottom of each car, immediately in the center, which necessitates a double floor. It is worked irect from the engine by means of rods and levers. It does ot interfere with the old style of hand brake.

IMPORTANT PATENT DECISION.

In the matter of the application of David Eymon for letters patent for an improvement in machinery for the manufacture of spikes, appealed from the primary examiner, the Commissioner of Patents, Hon. M. D. Leggett, has rendered the following decision:

The invention in this case consists in such a combination of arrangement of the reducing rolls of a rolling mill, a machine for making spikes or bolts, and an intermediate furnace, as will admit of a bar of iron being so manipulated as to retain the heat it has when leaving the reducing rolls until made into spikes or bolts. The object of this arrangement is to save time and material, and to produce a better spike than can be made by permitting the bars of iron to cool after leaving the rolling mill, and then reheat them before going to the spike machine; it being a well known fact that iron deteriorates in quality by cooling and reheating. The applicant does not claim that the spike machine, the furnace, and the roll of the rolling mill have any connecting mechanism, nor that there is any automatic arrangement for transferring the bars of iron from the rolls by way of the furnace to the spike machine. He only claims that they be in such juxtaposition, such relation to each other, and the furnace so constructed, as will admit of the bar of iron being taken from the reducing rolls directly to the spike machine while still at a proper heat for working, and the rear end of the bar being so swung over the furnace as to retain its proper temperature, while the other end is being worked into spikes or bolts, thereby saving the time and waste of cutting into lengths, and the time and deteriorating effect of reheating. The applicant makes two claims:

First. The arrangement, substantially as described, of a furnace in respect to reducing rolls, and a spike or bolt machine.

Second. The combination of the furnace with its movable roof.

The examiner objects to the first claim, for the reasons that the distance of the reducing rolls from the spike machine is not stated, and that no mechanism is shown for conducting the nail rod to the spike machine or to the furnace, and refuses to examine the case upon its merits until applicant strikes out the first claim and all that relates to it. From this decision of the examiner, the applicant appeals to the Commissioner in person, under rule 44.

The substance of the examiner's objection seems to be that the different machines that enter into the combination or arrangement claimed in the first clause, and described in the body of the specification, have no connecting mechanism, and no automatic arrangement for conducting the bar of iron from the reducing rolls through the furnace to the spike machine. If there had been shown some machinery for doing this, and also such connection of the reducing rolls, spike machine, and furnace as to show that they all worked together by the same power in producing the improved result, I judge that the examiner's decision would have been different, and the patent granted. The question presented, then, is whether such an arrangement or combination as the applicant describes, even if new, and producing a new and useful effect in the manufacture, is a patentable combination.

The object of the patent law is to stimulate the inventive genius of men and induce the discovery of new and improved articles of manufacture, and new and improved modes of producing s ch articles, so that better articles may be made at the same expense, or the same article at less expense.

In the case in hand it is claimed that the applicant makes better spikes at less expense than could be produced by any means known before his invention. Hence, if this is true, he is one of the men that the patent laws were designed to reward. It is not, however, of unfrequent occurrence that the law falls short of doing all that the lawmakers intended.

In this case the examiner was evidently of the opinion that the law was not sufficiently comprehensive to include the invention described. Section twenty-four of the patent law provides: "That any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvement thereof . . . may obtain a patent therefor."

If the alleged invention is all that the applicant claims for it, it is certainly an improvement in the art of manufacturing spikes, and as such would be entitled to a patent. But the question raised between the examiner and the applicant in this case is as to whether the invention is of such a character as to be entitled to a patent as either a combination or arrangement.

I must confess that I am not entirely satisfied with the practice of granting patents on the "*arrangement*" of machinery.

A patent may be granted for an improvement in a useful art, an improvement in a machine, or an improvement in a manufactured article; but I find no law for granting a patent on the arrangement of different machines in reference to each other, unless it be done incidentally under a claim for an improvement in the art of manufacturing some article.

The courts have construed the work "machine," as used in the statute, to embrace not only single organizations of mechanical powers, but all such combinations of single machines as are essential to the production of certain and unitary results But I know of no case where they have con strued the statute to cover "arrangements," except in cases where they have held the word "arrangement" to be synonymous with "combination," hence I regard "*combination*" as the better word, and think the use of "*arrangement*" in its stead, in patent claims, should be discouraged.

Does the applicant's arrangement of the reducing rolls, the furnace, and the fuel rolls of the spike machine in reference to each other amount to a legitimate combination, so as to bring it under the term "machine" as used in the statute?

"A patent may be for a new combination of *machines* to produce certain effects, and this whether the machines constituting the combination be new or old."—(*Barrett* vs. *Hall*, 1 *Roff*, 235.)

"But in such case the patent being for the combination only, it is no infringement of the patent to use any of the machines separately if the whole combination be not used, for in such case the thing patented is not the separate machine, *but the combination of machines*. Where a patent is for a new combination of existing machinery or machines, and does not specify any improvement or invention except the combination, unless that combination is substantially violated, the patentee is not entitled to any remedy, although parts of the machinery are used by another, because the patent, by its terms, stands upon the combination only. In such case, proof that the machines, or any part of their structure, existed before, forms no objection to the patent, unless the combination has existed before, for the reason that the invention is limited to the combination." (*Ibid*, 318.)

The preceding extracts from decisions rendered by Judge Story, clearly show that he recognized the validity of combinations made of existing machines.

Such combinations, when formed, are, in view of the result attained, themselves machines, and thus come under the statutes. The term "machine" includes every mechanical device or combination of mechanical powers or devices to perform some function and produce a certain effect or result. —(*Corning* vs. *Burden*, 15 *Howard*.) "The word *machine* in the statute includes new combinations as well as new organizations of mechanism, and hence there may be a patent for new combinations of machinery to produce certain effects, whether the machines constituting the combination be new or old."—(*Wintermute* vs. *Redington*, *Laws Digest*, 472, *s*. 25.

"All the parts or devices of the combination claimed must co-act to produce a given result in order to form a legitimate combination."—(*Swift* vs. *Whisen*, 3 *Fish*, 357).

"When a certain particular combination of known mechanical power or principles produces a new and useful effect in a manufacture, that combination becomes the lawful subject of a patent."—(*Warner* vs. *Goodyear*, *App. Cus.*, *Cranch*, *Ch. J. D. C.*, 1846.

"Any new combination which is of substantial advantage in the arts comes within the policy and protection of the patent law."—*Tyler* vs. *Duval*, 1 *Code Rep.*, 31 *Sa.*, 1848).

"A combination to be patentable must effect a new result, or an old result by a new mode of action. There must be novelty either of product or process."—*Botten* vs. *Clayton*, 2 *Whart. Dig.*, 408.

"A new, or improved, or more economical effect, attributable to the changes made in the mode of operation of existing machinery, proves the change has introduced a new mode of operation, which is the subject matter of a patent."—(*Farbush* vs. *Cook*, 2 *Fish*, 672.

"To make a valid claim for a combination it is not necessary that the several elementary parts of the combination should act simultaneously. If these elementary parts are so arranged that the successive action of each contributes to produce some one practical result, which result, when attained, is the product of the simultaneous or successive action of all the elementary parts, viewed as one entire whole, a valid claim for thus combining those elementary parts may be made."—(*Ibid*. 669).

These quotations give correctly, I believe, the current doctrine of the courts on the subject of patentable combinations. A careful reading of them will show the only true method of determining whether or not a given arrangement of different mechanical devices constitutes a valid combination under the patent law. These learned jurists inquire: First. Is the effect or product of the alleged combinations a new effect or a materially better effect, or as good an effect, more economically attained? Second. Do all the separate devices claimed in the combination take part in producing said effect?

If the first question is answered affirmatively, then it is evident that there is in the alleged combination a patentable invention. If both questions can be answered in the affirmative, then the combination is patentable.

If the first question is answered in the negative, then it is a non-patentable arrangement.

If the first question is answered in the affirmative, and the latter in the negative, then the application contains a patentable invention, but not in the manner and form claimed.

Whoever attempts to determine whether or not a machine is patentable by first examining the machine itself is very liable to arrive at false conclusions.

The true method of examination is to first ascertain what is the effect, and second, what produces the effect.

Apply this test to the case in question.

The applicant alleges that he has invented an arrangement of machinery that will produce better spikes and bolts at less expense than could be done by any machinery before known.

If this be true, then he has a patentable invention, for the test of invention is the result attained.

If he can retain the bar of iron at or near the temperature it has when leaving the reducing rolls, until it is worked into spikes, and if this has not been done before, then he can make better spikes. If he can do this without first cutting the bar into "lengths," and then reheating them, then he can make better spikes at less expense. It being determined that he produces a better effect at less expense, it must be the result of new machinery or a new combination of old machinery.

We now turn to his device, and find the same old spike machine as heretofore. We also find the ordinary reducing rolls of a rolling mill. But he has placed his spike machine near the reducing rolls, and right between the spike machine and reducing rolls he has placed a peculiarly constructed furnace, so adjusted as to admit of one end of the bar being heated from the reducing rolls to the spike machine while hot, and the other end of the bar being swung over the furnace to retain its heat until the whole bar is worked into spikes. In this adjustment of these three machines we find the cause of the effect produced.

The specified arrangement of these machines in reference to each other is essential to the effect, and every device or machine in the arrangement acts an important part in producing this effect.

In view of the end to be attained, these three devices—the reducing rollers, the furnace, and the spike machine—become, by the decisions of the courts already quoted, a single machine, and as such is embraced in the statute defining the subject matter for patents.

The fact that the applicant was obliged to construct a new form of furnace for this machine, having a peculiarly shaped and adjustable roof, for which he makes a separate claim, obviates the charge that his combination is a mere mechanical expedient and without invention.

It is further claimed by the examiner that the reducing rolls, the furnace, and the spike machine do not *co-act* in producing the result. It is true, they do not all act upon the same spike at the same moment, but the term "co-act," as used by the courts, does not mean that all the devices in the combination shall absolutely act upon the result at the same instant of time.

It only means that each device shall fill a necessary office, and act a necessary part in producing the result. They may act simultaneously or successively, and in either case it would be co-action. Neither is it necessary that the parts of the combination shall be connected together by operating mechanism. Without such mechanism the effect is complete; hence it is doubtful whether, if such mechanism existed, it could properly be regarded as any part of the combination.

Neither is it necessary that there should be any automatic arrangement for conveying the bar of iron from the reducing rolls through the furnace to the spike machine. The improved effect is complete without such arrangement.

It is barely possible that some automatic process might be devised for this part of the work that would still further lessen the expense. If so, it is a legitimate field for further invention hereafter.

The doctrine that all the parts of a valid combination must necessarily be connected by operating mechanism, and that the product must be transferred from one device to another in the combination by automatic process, is illogical and pernicious.

It is true that such connecting mechanism and automatic arrangement will generally exist, but to say that it is absolutely essential is, I think, fallacious. I am clear in the opinion that the application presents a legitimate combination, and if the same is novel the applicant is entitled to a patent.

I should prefer, however, to see a combination claim substituted for the "arrangement" claim. With this change I see no such defect in the specifications or claims as should excuse the examiner from proceeding to the examination of the case upon its merits.

M. D. LEGGETT, Commissioner.

U. S. Patent Office, September 2, 1871.

The Electric Flash---Its Velocity and Measurement.

A correspondent of the New York *Evening Post* gives the following interesting description of the experiments of Professor Rood and others in the measurement of electrical velocities:

A wheel painted black and carrying a distinct white point on its circumference is provided with some means of giving it a uniform motion of rotation. If the wheel make one revolution in one sixth of a second, the white point will appear as a continuous circle; for any impression produced on the eye remains during one sixth of a second, therefore during one revolution of the wheel all the successive positions on the circumference occupied by the bright point remain impressed on the eye and hence the circle appears unbroken. Now, if a flash of light in the place of the white point should last one sixth of a second, the circle would appear complete; but if it lasted one twelfth or one twenty-fourth of a second, then would the point describe one half or one quarter of the whole circle. Thus, by this simple means—remembering that the smaller the arc of the circle the less the duration of the flash—we can readily measure, from the length of this arc, quite minute portions of time.

If, instead of having one white point on the wheel, we have one hundred or more radial white bands drawn with the space between them equal to their breadth: then, if the wheel makes ten turns in a second, any radial white band will advance into the position previously occupied by an adjoining black band in one thousandth of a second, and if the flash of light lasted one thousandth of a second all the white bands would, during that interval, have advanced into the position of the black bands, and *vice versâ*, and the disk would appear without bands and covered with an uniform gray tint. We can thus readily and accurately measure one thousandth of a second.

With the above apparatus Arago, about the year 1835, first showed that a flash of lightning lasted less than one thousandth of a second, but did not succeed in fixing the minimum limit to its duration. Professor Rood, however was more fortunate; for during the well remembered remarkable display of lightning, 1869, with an apparatus similar to the above (extemporized from a piece of paste board and a shawl pin), he succeeded in measuring one five hundredth of a second as the duration of those vivid and extensive flashes.

It was soon found that the velocity of the revolving disk fell far behind that of the spark of the Leyden jar, for its flash showed the revolving radial bars as absolutely at rest as when the disk was stationary. But Professor Wheatstone, of London, in 1834 substituted for the revolving disk a mirror turning on a horizontal axis, and instead of the white point or bars, he used the image of the spark reflected from the turning mirror. If the spark be instantaneous, then, will it appear in the rotating mirror just as it is seen when reflected from the mirror at rest; but, if the spark last during even an extremely minute fraction of a second, it will appear drawn into a line in the direction in which the mirror turns. Wheatstone thus measured the one-million-one-hundred-and fifty-thousandth of a second, and ascertained that the electricity from a Leyden jar goes over a copper wire at the rate of 288,000 miles in a second, exceeding light itself in velocity.

Professor Rood combined the two methods above given by viewing the appearance of stationary, parallel, and equidistant white and black bands reflected from the revolving mirror while the flash of the Leyden jar illuminated them. He has produced, by this simple combination, an instrument surpassing in minuteness and accuracy of determination all that has gone before; an accomplishment which cannot but reflect much renown upon American science. He has succeeded (with a mirror making three hundred and fifty turns in a second) in measuring accurately forty billionths of a second, and has shown that this is the duration of the flash of a Leyden jar having only eleven square inches of surface and one twenty-fifth of an inch striking distance—an interval of time just sufficient for a ray of light going at the rate of one hundred and ninety thousand miles in a second to travel over forty feet. The flash from a jar having one hundred and fourteen square inches of surface lasted four times as long as that of the smaller jar. Thus, for the range of electric flashes, we have measures from the one five hundredth to the forty billionth of a second.

ON the eastern slope of Clark mountain, Nevada, near its summit, there is a perpendicular cliff two hundred and fifty feet high. At about one hundred feet from the base of the cliff on its front are engraven the characters † I L D. The cross and letters are of immense size, being fully sixty feet in hight, and cut into the cliff two and a half feet deep—so that they can be plainly seen at a distance of five miles. This strange workmanship was done, it is supposed, by the Jesuit missionaries, many years ago.

Florida.

THE AGED PILGRIMS' ASYLUM.

The building of which we this week give an illustration, is being erected on a site adjoining the new Islington workhouse, at Hornsey Rise, England, by the Aged Pilgrims' Friend's Society, and is for an extension of operations now carried on at the society's present asylum, at Camberwell. It is intended for the reception of aged and comparatively destitute members of Christian churches of all denominations.

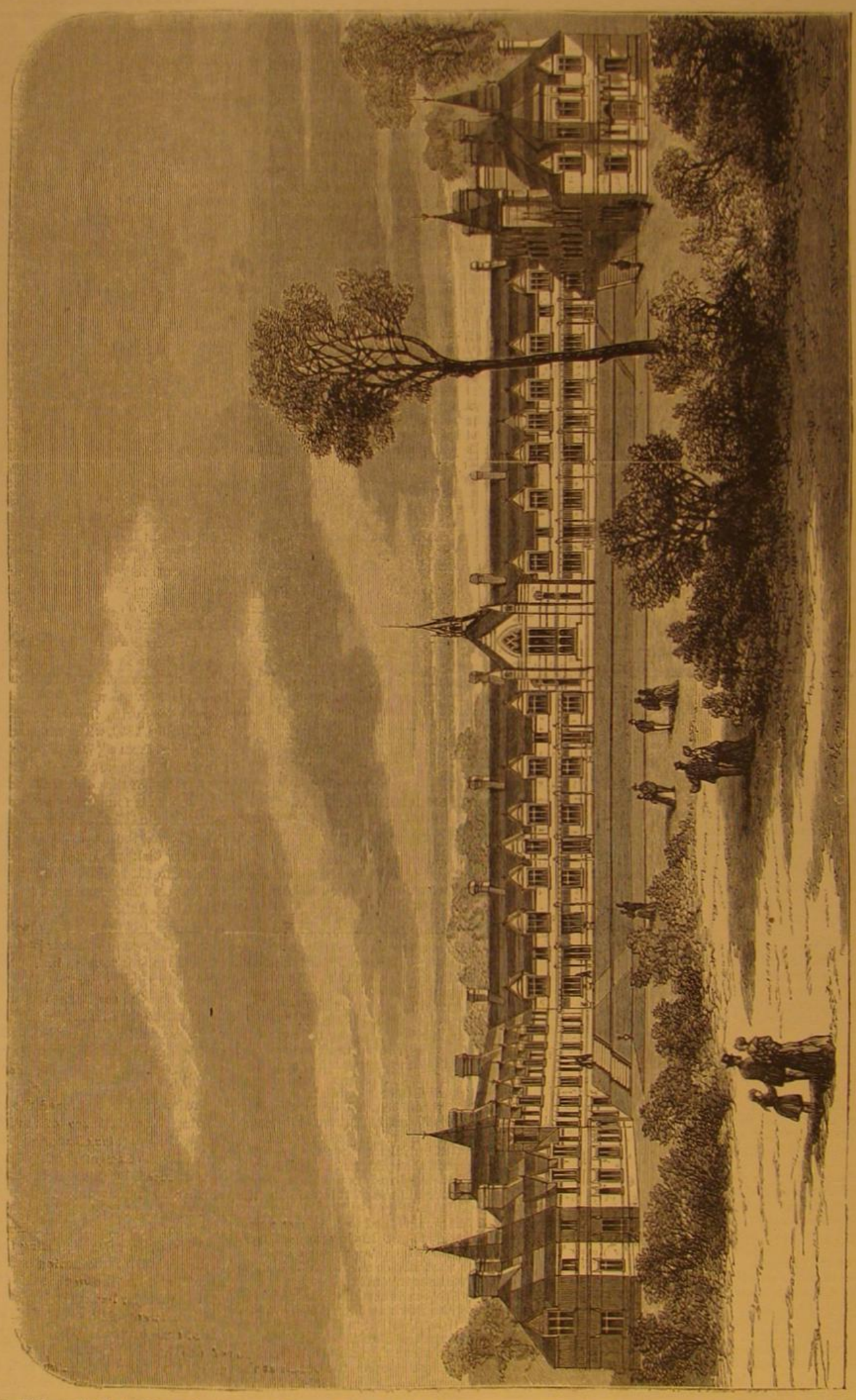
The nature of the site, it being on the side of a hill, suggested the terraces, which materially aid in giving whatever effect the building may have.

The new asylum provides accommodation for eighty pensioners, and has besides a chapel reached by covered ways, warden's and matron's apartments, committee, and other official rooms.

The design combines the corridor and cottage systems, the wings being devoted to the former. All the corridors and staircases are fireproof.

The materials employed are stock bricks, picked for the facings, with a struck joint, and with dressings of Box stone. The annexed block plan shows the general arrangements.

The contract has been taken for erecting this building for £9,345 sterling, by Messrs. Hill & Sons, of Islington, by whom the works are being carried out, under the personal superintendence of the architect, Mr. F. Boreham.



THE AGED PILGRIMS' HOME, HORNSEY RISE, ENGLAND

Queer and Vicious Fish.

Among the vast multitudes of living beings which inhabit the waters of the globe, there are things beautiful, things ludicrous, and things horrible and fearful, beyond the power of pen to describe. Among the latter class may be included the scorpion fish, which, upon the authority of Dr. Francis Day, is so much feared and dreaded, that fishermen will cut the meshes of their nets, and lose their entire catch, rather than risk a wound from it. The fish inflicts its injuries by its dorsal fin, which is serrated, and until this is broken by means of a club or stick, no one acquainted with the character of the fish will venture to touch it with the hand. Another fish, called the crocodile fish, also inflicts frightful wounds with its spines. A fish is said to infest the mouth of the Amazon, which, although scarcely larger than the minnow of our fresh water streamlets, is so ferocious in its attacks upon the human body that it is dreaded even more than the crocodiles. The name of this little fish fiend is "candirou," and when it seizes hold of the flesh, which it never fails to do when occasion offers, it holds on with such a tenacity that it cannot be removed without tearing out a mouthful of flesh. Another fish of South American rivers is the "payara," which carries in its lower jaw two fangs, by which it cuts a gash as smoothly as could be done by a razor. The "caribe" is the vampire of South American streams. It scents blood so keenly, that the least scratch on the person of the bather invites its fierce attacks. It has sharp triangular teeth of great power, and, though no larger than the perch, is an object of dread to all who know its ferocious character.

A

Under the impressive same term one
For full p[illegible], great things are done little by little. Atoms make ...ds. The greatest fortunes consist of farthings. Life is ...e up of moments.

Insect Destroyer.

Samuel Creighton, of Lithopolis, Ohio, has invented an improved trap for removing bugs and other insects from potato vines, which shall be simple in construction, effective in operation, and convenient in use; and it consists in the trap constructed as herein described. The back plate of the trap has the lower end bent or curved into semi-cylindrical form, so as to form, in connection with the side plates, a pocket to receive the bugs. The side plates are attached to the side edges of the plate, and are made wide at their lower ends, and taper to a point at their upper ends. The upper parts of the side plates are bent outward. In the lower part of one of the side plates is formed an opening, closed by a slide, for convenience in pouring out the bugs. To the upper end of the plate is attached a handle for convenience in holding the trap when in use. Another handle may be attached to the upper part of the rear side of the plate for convenience in carrying the trap. In using the trap it is placed at one side of the hill or hills of plants, with its top or upper end more or less inclined, according to the size of the plants. In this position the lower branches of the plants will overhang the forward edge of the back plate, and the flanges of the sides will embrace the second and third sides of the hill, leaving the fourth side exposed. The operator then holds the trap with one hand, and with a light, flat, and broad broom he strikes the exposed side of the plants, knocking the bugs into the trap. The bugs, as they are knocked into the trap, slide down the plates into the pocket. In the case of active bugs that might escape from the trap, water may be placed in the pocket into which they fall as they slide down the plates. In this case the opening should not be made in the lower part of the side plate.

Galvanic Action.

Although no two persons are constituted precisely alike, and that which produces a certain effect on one will produce a very different result on another, yet there are doubtless general laws which govern all actions of the animal organism. To appreciate and understand these laws is the difficulty. For instance, what will be the effect of two metals in one tooth? Cases come under my observation frequently where this state of things exists, but with very different testimony from the patients as to the effects—some complaining of a persistent metallic or coppery taste, and uneasy sensations in the tooth, while others appreciate no effect whatever. Not long since a lady called to have an examination of her teeth. They had nearly all been filled—some with gold, some with amalgam fillings, some with both. In one tooth I found two large amalgam fillings, and two smaller gold ones; no one of the fillings, however, in contact with another. They had all been in over twelve years, and the tooth was in a good state of preservation. This patient complained of a coppery taste in her mouth. Now, this was either the result of galvanic action, or caused by the secretions of the mouth acting on the amalgam fillings. If the latter hypothesis be correct, will not the digestive fluids be necessarily vitiated, and will not this ultimately impair the health?

But again. We see patients in the possession of excellent health whose teeth were filled with amalgam twenty years ago.

Can galvanic action be modified by temperament or condition? Or is there any galvanic action where the two metals do not touch each other? Or, if they do touch, will there be sufficient galvanic action in any case to produce unpleasant results?

My use of amalgam is limited to two classes of cases—where the tooth is too poor in substance or vitality to warrant a gold filling, or where the patient is too poor to pay for gold.

Latterly I have been experimenting with Guillois' cement as a substitute for amalgam in teeth which are too frail to bear the mechanical force required to insert a gold filling, and so far am pleased with the results. Where there is much vitality in the tooth, its non-conducting properties make it more desirable than amalgam. In some special cases which I have under observation, it has withstood the friction of mastication beyond my most sanguine expectations

A single remark, in closing, upon these cases of galvanic action, of which we hear. I apprehend the unpleasant taste ascribed to this cause is not unfrequently chargeable to an unhealthy saliva and want of cleanliness, and that the galvanic action would cease if these conditions were corrected. —*A. M. Hills, in Dental Cosmos.*

EVERY boiler should have its own safety valve.

Long's Patent Knock-down Chairs.

Our engraving illustrates a practical yet simple and very useful improvement in the class of chairs mentioned in the above heading, which greatly facilitates the packing, economizes space in transportation, and consequently saves expense for freight, cartage, etc., while, at the same time, nothing in convenience, stability, or durability in service, is sacrificed.

These chairs are especially adapted to localities where the cost of transportation is large, either by rail or water.

The front legs and rounds are put together and packed in the manufactory, as shown in Fig. 1.

Fig. 2 shows the method of packing the backs for shipment.

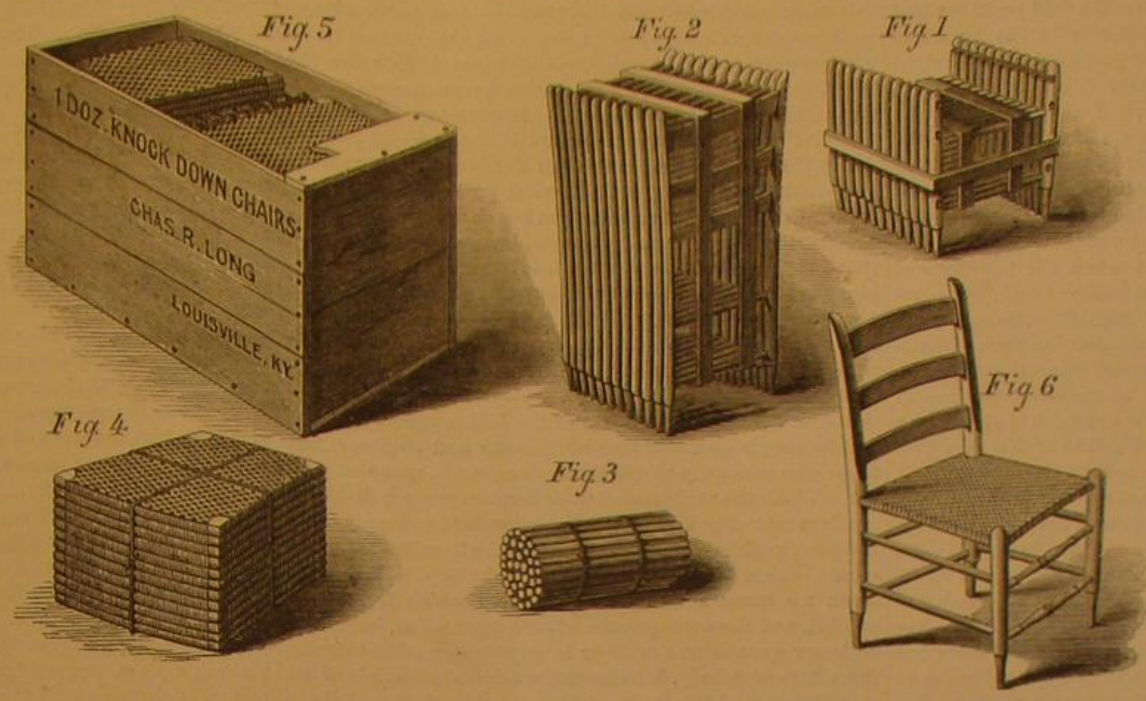
Fig. 3 represents the bundle of side rounds as packed for shipping.

Fig. 4 represents the seats, also packed for transportation, there being, in each bundle, pieces for one dozen chairs when set up as shown in Fig. 6.

The representations referred to show the method of packing in bundles.

Fig. 5 shows the compact manner in which one dozen chairs are packed in a box.

The improvement on chairs in this particular is the main point sought for by the patentee, while all of the advantages of a good, comfortable and durable chair are preserved for the use of the public, within the reach of all classes. This improved chair, by reason of its construction, can be shipped in the knock-down state by the dozen, boxed or in bundles, thereby, it is claimed, creating a saving of 300 per cent, in rate of freight, over chairs constructed in the ordinary way, as the seats are made detachable from the frame of the chair. In case of their wearing out, they can be readily detached and seated at small cost, and at a mere nominal cost of transportation. If the frame of the chair should get broken or made useless from any cause, the seat, if uninjured, can be easily detached and applied to another frame of the same manufacturer, causing economy in the general application and specific construction of this class over any other in the market. These chairs, in the knock-down state, can be easily put together by any unskilled person.



LONG & BROTHER'S DOUBLE BOTTOM RATTAN AND SPLIT SEAT KNOCK-DOWN CHAIRS.

In putting the chair together two long rounds are selected, and the two front posts are partially driven together, taking care to have the gains that are cut into the posts for the seats opposite or facing each other, and also to have the front post properly matched, with the two holes for the side rounds turned in the same direction. After partially driving the front of the chair together, the seat is inserted (the front part of which is the widest), into the gains that are cut into the posts; then the front of the chair is fully driven together. The front of the chair is then laid down on a solid bench, the side holes upward; then four short rounds, two for each side, are driven into the remaining holes of the front post, after which the chair is ready in its two parts (the back being already driven up), to be completely put together. The back of the chair is then laid down, holes upward, on a solid bench, and the front part which has been put together is connected to the back of the chair by driving the projecting ends of the side rounds into the holes of the back posts, commencing with the bottom round, guiding, at the same time, the upper rounds into the upper holes, and also the back part of the seat into the gains that are cut into the back posts, after which the chair is forced completely together, all of its parts making a perfect fit. The chair is then laid down on its side, and the seat fastened, by the use of screws, through the holes in the sides of the posts, forcing them full up, after which the heads of the screws are covered by filling with putty, colored to suit the finish or color of the chair.

Patented through the Scientific American Patent Agency, December 13, 1870, by Long Brothers, whom address for further information, 78 Main street, Louisville, Ky.

Dumping Car.

Solomon Rousculp, of Thornville, and Isaac B. Shambaugh, of Scio, Ohio, have invented an improved dumping car for use in ballasting railways, from which, by simply turning a shaft, and thereby opening hinged doors in the bottom, the load of gravel or other material may be discharged, the same shaft and connected mechanism being used for closing the bottom, and thus putting the car in position to receive another load. The invention consists in an arrangement of parts for performing this function.

The bottom is preferably partly hopper shaped or descending toward the center for facilitating the delivery of the load as near the center of the road as possible; but it has a level portion at the center, consisting of two boards hinged to the bottom of the descending part, so as to open downward and close upward, the said boards meeting together at the center of the car when closed. These boards are connected at the upper sides at each end or thereabout, by chains, to a chain or cord, attached to a pulley, on a shaft, extending along the center of the car from end to end, and supported in suitable bearings above it, so as to close the boards when turned in one direction; and the boards have also a cord attached to the lower side and extending around the outer edge of the car up to the said shaft, and attached to pulleys thereon, so as to wind up and draw the boards down when the other cords or chains are unwound, and to unwind and allow the boards to be closed when the shaft is turned in the direction to wind up the chains. For turning the shaft forward and backward, the pulleys are connected, by a cord or belt, to a vertical shaft, similar to a brake shaft, with a hand wheel at one side of the car, which being turned one way will open the bottom, and the other way will close it. This shaft is provided with ratchets and pawls, arranged to hold it from turning either way, by which the opening may be kept entirely closed or partially so, as may be preferred, for dumping the whole load at once, or allowing it to discharge gradually while the car is moving along. The shaft is turned by a hand crank applied to the ends or by any other competent means.

FARRELL'S IMPROVED LAMP WICK.



Lamp wicks are usually made either flat or round, and of a length to reach the oil or hydrocarbon liquid in the reservoir. Much of the wick is always wasted, because its length must always be sufficient to reach from the wick tube to the fluid when at the lowest level to which it is to be burned.

With coal oils, and other limpid hydrocarbon liquids, it is not necessary to have the wick itself extend down to the liquid, or be prolonged by a stationary wick of the same size as itself.

A capillary cord, extending from the lower end of the wick into the burning fluid, will supply enough of the fluid to the wick for the purposes of combustion.

The wick illustrated can be made much more cheaply than other wicks, because of the saving of the fibrous material.

The entire wick can be used as long as the body of the wick will extend from the end of the wick tube to the wick raising device in the burner, and the supply of the fluid, being through the capillary cords, will be uniform.

The engraving is an elevation of the improved wick, the upper part being either flat or circular, and the capillary cords, extending from the lower end of the wick, downward, as shown.

The inventor prefers to use two capillary cords, with a flat wick.

Patented, May 23, 1871, by John Farrell, who may be addressed for factory or State rights for manufacturing, at Post Office Box No. 110, Brooklyn, N. Y.

A REMARKABLE group of conical stone monuments, made of smooth and apparently hewn stones cemented together, and evidently the work of skilled builders, has been found near Death Valley, in Southern California. There are probably one hundred in all.

Improved Photo-Lithographic Process.

In the first place, a solution is prepared of bichromate of potash (chemically pure), one part, water, twenty parts; and upon this a carbon tissue is allowed to swim for a couple of minutes. It is dried in an airtight box, containing fused chloride of calcium, within the space of twenty-four hours, and may be preserved many weeks without losing its sensitiveness.

The negative should be absolutely clear and transparent in the lines, and otherwise as opaque as possible. The development is conducted, after brief exposure, with an ordinary iron developer, and the negative subsequently intensified with bichloride of mercury and sulphide of ammonium in the usual manner. The margin of the negative is covered with Indian ink, or with a paper mask fastened upon the reverse side of the plate. In this way the development of the picture is much improved, the pigment paper extending well beyond the unsolarized margin. The exposure varies from three quarters to one minute in the sun, and from four to ten minutes in diffused light.

For the development of the picture, an exceedingly smooth lithographic stone is employed, together with a sheet of fine filter paper, a squeegee, a dish of rain water, and a supply of hot water.

The print is first dipped into cold water, the air bubbles dissipated, and then placed face downwards on the stone. Without losing time, the filter paper is at once placed upon the tissue, and rubbed over well with the squeegee, a new supply of paper being subsequently applied in the same way, until the tissue is half dry. After waiting two or three minutes, the stone is put in a sloping position into a dish, and warm water allowed to flow over the whole surface; and under this treatment the unsolarized portions of the pigment paper begin to swell visibly under the paper in a very short time. The application of warm water is continued until the paper backing begins to leave the stone, and as soon as there is not much resistance to the operation one may proceed to draw it off. Upon the stone is seen a dark mass of black gelatine, which disappears as the washing goes on, until a sharply defined image is the result. Upon the picture itself the water must never be poured, but only allowed to stream over the surface, as the lines are easily injured, and for this reason the warm water is applied from the edge of the stone.

When the image stands out clear and free, the stone is immersed in cold water until it has become cool, which necessitates an interval of some minutes. It is then leaned against a wall, and allowed to dry spontaneously, when lines which, in a moist state, were soft and hazy, become sharp and defined.

The dry picture is now covered with a solution of gum, as in the case of an ordinary lithographic impression, and, after drying, again moistened, and the lithographic ink repeatedly applied. The stone may then be rolled up and printed from in the ordinary press.

GEORGE'S CLAMP PEN HOLDER.

The engravings accompanying this notice, illustrate Mr. A M. George's clamp penholder, manufactured at 137 Elm street, New York, and patented through the Scientific American Patent Agency, January 24, 1871.



The pen is held by a piece of swaged or stamped metal, so joined to the wood that the connection forms a spring which, when the piece is released from a clamping ring, throws the former away from the wood. When the ring is slid down upon the spring piece, the latter is forced toward the wood, and a pen placed under it is very firmly held, while, at the same time, there is an elasticity in the parts approximating to the agreeable elasticity of the quill pen.

The holder fits all sizes of pens, is durable, and has the further advantage that a pen is easily removed from it when worn out, not binding and sticking from rust, as in many other forms of holders.

Extensive arrangements for the manufacture of this penholder have been made, and a fair trade in them has already commenced. The article is one which will doubtless become popular, especially as it combines cheapness with great utility.

Two interesting agricultural enterprises are in progress—one the cultivation of oranges in California, and the other the establishment of an olive grove on St. John's River in Florida. For California it is claimed that fully twenty-five out of the fifty counties in the State are admirably adapted to the production of oranges.

Correspondence.

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

Another Marine Disaster from Criminal Neglect.—Had the Lodona a Governor?

To the Editor of the Scientific American:

"And all the firemen were ordered below to keep the fires up!"

It is probable that but few, even among readers of accredited general intelligence, have been properly impressed with the significance of the above words extracted from the plain report of the mess boy, Lewis Wolf, saved from the wreck of the steamer *Lodona;* yet those words afford positive proof that the ill fated *Lodona*—like steamers in the American service generally—was not as well prepared as she might have been for the dangers of the sea. These steamers are tossed and pitched about in a gale, and, at every lift of the screw propeller or paddle wheel from the water, its resistance being nearly all removed, away bounds the ponderous engine, and the steam after it, wasting at the perilous moment its invaluable power. A marine boiler is calculated to supply steam to drive the engine at a given speed and perform a given amount of labor, but when the resistance of that labor is suddenly removed, the engine must, when not supplied with automatic means of regulation, naturally increase its speed, which often reaches, under such circumstances, to two or three times its normal rate, exhausting the boiler so rapidly of its steam that at such times extraordinary exertions are made (but too often in vain) in feeding up to maintain a supply of power; and it is in such a case that "all the firemen are ordered below to keep the fires up." It is hardly to be supposed that a steamer would be sent to sea, without a supply of engine power to move her qui e equal to that of any gale; hence, if her engines, when in a rough sea, could but economize the steam so that every ounce of its force would be properly applied when most required, the ship would, when heading off a lee shore, at least keep her distance, or at worst, with the aid of an anchor, insure her safety; or, in other words, if the mechanical appliances to her engines were so complete as to prevent a waste of her steam power (when, by reason of pitching and tossing in a rough sea, the propeller becomes alternately more or less bare of resistance) and store it up at every lift of the screw for a more than average push as the latter becomes immersed, the ship could ride out the most terrific gale with safety.

A Cunard steamer can stem the most violent of gales with safety to the ship and machinery, and maintain at least one half her usual speed; had not many years' experience shown this, the last trip westwardly of the *Cuba*, during which a tornado headed her off for some hours, would have solved the problem.

But the Cunarders, like all foreign steamers, have their engines fitted with "marine governors," which prevent a gale from seriously affecting the machinery that drives them, and in no condition of foul sea or weather is it requisite to order "all the firemen below to keep the fires up," but on the contrary, no steam being wasted, when the propeller is pitched out of the water and becomes temporarily almost a useless appendage, fuel is saved, and generally at such times some of the furnace doors are opened, but always a full head of steam is maintained.

When but few steamships crossed the Atlantic, and before the introduction of marine governors, it was quite common for them to waste so much steam in contending with westerly gales as to make it necessary to call at Halifax for an extra supply of coals to enable them to reach New York. But with the great number of steamers now making their much more regular passages between Europe and America, such a case is rarely heard of, and when it is, the cause may be readily suspected.

In the SCIENTIFIC AMERICAN of July 19, 1856, is illustrated the first invention of the author of the marine governor, Mr. Thomas Silver, and its use was there strongly advocated. It had then been in successful operation on the Collins steamer *Atlantic*, whose popular commander, Captain West, never failed to speak in praise of its performance. Since that date it has become considered abroad an essential portion of a sea going engine, but through false notions of economy, or the perfect recklessness in regard to safety, with which characteristic our people are liberally accredited, its advantages seem to be little appreciated among American steamships. It is common with steamers not fitted with efficient marine governors, when in severe weather, to "lay to" and "weather out the gale." As an example of this resort, many will remember the report of Rear Admiral Poor, of the United States flagship *Severn*, when in a gale near Key West, in which he says: "The engines raced to such an extent, and the propeller struck the water so forcibly, that there was great danger of giving way, and the ship was hauled to under canvas." We hardly need say that the flagship *Severn* or any other steamer in want of proper appliances to meet such contingencies is liable to founder and go down, or, having to encounter a gale off the lee shore, run all the dangers of total destruction with many unfortunates besides the *Lodona*.

If a steamboat boiler explodes, and spreads death and maiming among scores of human victims, although an invisible flaw may have led to the disaster, a murderous criminality is charged upon those whose duty it was to have prevented the calamity. But when a steamer at sea becomes overpowered by the elements for want of a simple addition to her machinery, by which the powers that were allotted to her in her construction could be maintained in the worst of weather, the world must be content with the report of her sad fate, together with those on board, frequently embellished with a poetic description of how the noble ship behaved to the last plank above water. As before stated, all foreign sea going steam vessels are fitted with governors, and I will venture to state that an engineer who failed to keep the instrument in a proper condition would be promptly discharged.

If the *Lodona* were furnished with a governor, the ordering of "all the firemen below to keep up the fires" supplies sufficient evidence of the disorder of her machinery.

ENGINEER.

Boiler Explosions.

To the Editor of the Scientific American:

It is an established maxim, that the best judge of any science or art, is a person who has made that science or art his particular study. Therefore has the world looked to the practical engineer for an explanation of the causes of the frequent steam boiler explosions. But the recent examination of the so-called experts shows that the world (and, no doubt, the experts also) has been deceived. The examination would show that the mechanical portion of an engine is more studied by engineers than the chemical phenomena produced by the agents they are employing. They all agree that a steam boiler may be exploded; but, what is the combination of facts to produce this effect, is a question. Fortunately (without intending it, perhaps), language has pointed to the difficulty: "Explosion; the act of driving out anything with noise and violence." "Burst; to break suddenly." The bursting of a boiler, then, would seem to imply the sudden breaking of a segment of the boiler, escape of steam and boiling water, scalding of fireman and engineer, and those who carelessly placed themselves in the range of danger. While the explosion of a boiler, as we too well know, involves not only the lives of the careless, and very often ignorant, engineer, but also the lives of all entrusted to his care. We are too apt to say we know the nature of a body, when we know several of the uses to which it may be applied, and the consequences of such application, in greater or lesser quantities, simply or in combination; but to know the nature of a body, is to know the original materials of its constitution, and the mode of their combination; and those materials should be known in their primitive, or most simple state, and the knowledge of the combination should include all the intermediate changes, in all their details, from the primitive elements. Therefore, the engineer should not only study thoroughly his machinery, but also chemistry—at least, so far as it relates to those bodies which he is obliged to use. A committee of men thus educated would not be long in investigating and giving the true cause of steam boiler explosions.

We are gravely told, in some of our school books on natural philosophy, that experiments were made by a committee of the Franklin Institute of Philadelphia, at the suggestion and expense of the United States Treasury Department, showing that the generation of hydrogen gas, in steam boilers, however high their heat may be, never takes place: "After many trials, with the express design of forming hydrogen in a steam boiler, if possible, they never produced a trace of this gas, from the decomposition of water." Again: "Even if the gas in question were formed in overheated boilers, no damage could accrue from its presence, since hydrogen never explodes without being mixed with oxygen or common air, neither of which ever exists in a steam boiler when in use; besides, were these two gases in the steam boiler, ready for explosion, still no danger would exist, since they never take fire except from contact with flame. Hence, all danger from hydrogen in the boiler exists only in the imagination." We are told by some chemists (from the laboratory), that the spheroidal state of the water is the cause of the explosion; but we know that the spheroidal state of the water cannot exist unless the boiler be overheated; and if there be a sufficiency of water, and a safety valve, the boiler cannot be overheated; therefore, with a sufficiency of water in the boiler, and safety valve, we cannot have the spheroidal state of the water, nor an explosion of the boiler.

Let us now see what is the effect of an insufficiency of water in a boiler which is well heated: The flame, or heat, passing through a flue, or under a surface of a boiler not covered by water, soon causes it to become red hot; the steam necessarily comes in contact with this red hot iron. "Iron decomposes steam at all temperatures, from a dull red to a white heat, appropriating its oxygen." In this way it would take but a short time (according to the surface exposed) to convert the greater portion of the steam into its elements, hydrogen, which remains free in the boiler, and oxygen, which the heated iron appropriates to itself, forming oxide of iron. While the machinery is not in motion, or the steam not escaping freely, the hydrogen fills the upper portion of the boiler, and does not come in contact with the red hot iron, nor its oxide; but, any cause which may produce an expansion or disturbance of the gas, so as to bring it into contact with the "oxide of iron heated to the same temperature as will decompose steam," the gases will immediately become chemically combined, producing a most intense heat ("the most intense heat that can be produced is caused by the combustion of hydrogen gas"), and causing an explosion, at the same time the "oxide of iron will be reduced to its metallic state."—("Turner's Chemistry," 1846, by Rodgers, page 333.) The simple experiment of burning a mixture of the gases in what is termed an hydrogen gun, or experimenting with the eudiometer in a basin of water, will satisfy any scientific engineer, not only as to the cause of steam boiler explosions, but how they may be remedied.

JOHN LYNCH, M. D.,
Professor in South Carolina University.

Darwinism.

To the Editor of the Scientific American.

I have noticed going the rounds of the press, an article on "a new and hitherto unanswered objection to the theory of Darwin." The substance of it is an effort to prove that the most vigorous plants (I believe the writer does not speak of animals) are the least prolific, and the least able to propagate their kind; and the writer instances the fact that gardeners have the greatest difficulty in obtaining seed from their finest varieties, in fact, that these highly cultivated varieties show very little disposition to produce seed at all.

Now it strikes me that the ground for this objection is not well taken, and not only this, but it appears to me that the argument, instead of being a strong one against the theory of natural selection, is really only another confirmation of its truth.

For, the writer is evidently in error in calling such plants as he refers to, vigorous. They may be the most monstrous, or the oddest, or the most brilliant and varied in color, and may be the most pleasing to the genus *homo*, but these qualities are by no means signs of vigor. In fact, I should think them quite the reverse. Monstrosity is not strength, oddity is not power. Daniel Lambert, who was the heaviest man of whom we have any record, was not the most vigorous and healthy of his race. Yet I have *no* doubt that if there were another race of beings standing in the same relation to us as a gardener does to his plants, they would pick on precisely such monsters as choice specimens, and would neglect the ordinary members of our species, who are the really vigorous and powerful ones—the ones who get their own in the battle of life, and spread out and occupy the earth. That is, supposing they selected us as the horticulturist does his plants, for oddity or eccentricity. If we were selected for use, as a farmer raises his corn, I suppose the most vigorous would be selected. The farmer selects his corn and grain not by its oddity, but by its vigor; and I never hear him complain of a difficulty in getting seed from his corn or pumpkins.

In the course of natural selection, in the struggle for life with increasing numbers of its own and of other species, true vigor in a plant is pre-eminently required, and in such a contest what chance would the "vigorous" (or rather the most deformed) plants of the horticulturist have? Brought to the crucial test of vigor, they would be overcome and exterminated, unless in a few generations they rose to their naturally vigorous state, which advance the gardener would term a degeneration into the wild or uncultivated state.

I think the writer's fault is, that he regards those plants as the most vigorous which are the most vigorous in supplying man's whims; in other words, the most vigorous in becoming man's slave. This is docility and pliability, not vigor. We must take the plant's own view of it. Being an organized being, it is, like all other such, selfish, and looks entirely to its own comfort and interests, and does nothing whatever for any other being, except what the other takes perforce. As the most vigorous plant is that which is hardiest and most prolific, tenacious of its own life, and powerful in continuing its species, I think it may be found that these plants which have been the least cultivated will be found to be the most vigorous; such as the thistle, the innumerable class called weeds, the blackberry, etc. All of these are hardy in the extreme, difficult to exterminate, and grow under conditions which would be fatal to the gardener's pets.

The positions taken by Mr. Darwin have not yet been successfully assailed, for the reason that his conclusions are not the result of mere theorizing, but have been forced upon him by observation of nature's stubborn facts, to the collection and study of which he has devoted his life.

However, let his work stand upon its merits, and let every objection that can be offered be boldly made and fairly discussed.

ANDREW VAN BIBBER.

Cincinnati, Ohio.

Railroad Car Springs.

To the Editor of the Scientific American:

It has occurred to me that our railroad mechanics have in most cases overlooked the proper manner of applying springs te the trucks of cars and engines. The usual application is to place the center of the half elliptic spring so that the concussion acts on the center. This should be reversed, so that the center or heavy part of the spring should be uppermost, and the point down or towards the axle.

While at the Boston and Albany shops, in East Albany, a few weeks since, I observed some locomotives with springs arranged as they should be. I was told that these engines seldom came to the shop for repairs. To me the reason is obviously owing to the arrangement of the spring. There is nothing that tells more on a locomotive than the arrangement of the spring.

The proprietors of sleeping cars multiply the number of springs on their six wheel trucks to make easy riding cars. Now a six wheeled truck is just adapted to the theory I advocate, and two half elliptics on each side could be so adjusted that much cumbersome dead weight and machinery could be dispensed with, and the cars be made to ride infinitely more comfortable.

The new crystal cabs, lately introduced in New York, are pronounced a failure by many persons. The fault is in the arrangement of the spring, namely, the center of the half elliptic rests on the axle and the points attached to the body. I would suggest a remedy in this case, namely, place a cross spring under the back end of the body, and connect the joints to the back ends of the parallel spring. This could be easily done, and make a success, otherwise they may prove a failure for carrying single persons or light loads.

G.

Cincinnati, Ohio.

The Bois d'arc, or Osage Orange.

To the Editor of the Scientific American:

It may be interesting to note that the Bois d'arc mentioned by your Texan correspondent in your paper of Sept. 2d, as being a lumber of great value, is the Osage Orange, which for the last twenty years has been used as a hedge plant with constantly increasing favor. It grows well on the Western prairies, either in hedge or grove, and is now to be met with from six to ten inches in diameter. It seems to be subject to no disease, and is proof against all insects. The young plants in the hedge row sometimes winter kill, but the roots still survive and put forth vigorous shoots in the ensuing season. Nothing else has met with such universal favor in the West for a live fence, and in time it will be as prevalent there as the hawthorn is in England. Although the fruit matures in northern Illinois, the seed is still brought from Texas for the general supply. The wood is undoubtedly very indestructible, and it might be well to cultivate it also as a forest tree.

Ottowa, Ill. J. D. CATON.

The Science of Milk.

To the Editor of the Scientific American:

The editor of the London *Milk Journal* boasts of his chemical knowledge, and of his intention to do all in his power to have his subscribers supplied with pure milk. Yet in the August number of his journal he warns his readers not to put milk into their tea, lest the tannin of the tea unite with the albumen of the milk, and form leather.

If the milk with which he is supplied contains albumen, it must be badly Simpsoned (the London term for watering); if it does, the editor had better turn his attention to leather making. The chemist who can convert albumen into leather will certainly be able to reduce the price of that useful article if he cannot that of milk. E. S. S.

[For the Scientific American.]

ON THE PSYCHIC FORCE.

The report of the well known English chemist, William Crookes, F.R.S., editor of the *Quarterly Journal of Science*, etc., concerning some feats of David D. Home which he witnessed, and which were republished in the SCIENTIFIC AMERICAN of August 12th, have most forcibly called to my attention the usefulness of witnessing first class performances in the art called sleight of hand, or, in foreign languages, *léger-de-main, prestodigitation*, etc. The few feats there described are by no means more mysterious than those performed by Herrman, Robert Heller, Anderson, Harts, and others; the only difference is that the latter gentlemen only claim to be magicians, jugglers, ventriloquists, etc., in short, that they use concealed but natural means to accomplish apparently wonderful feats; while Mr. Home, not satisfied with this, takes advantage of the modern form of superstition, which believes in mediums, influenced by spirits of deceased persons or some other supernatural influences.

It is well known that for several years past Home has succeeded in deceiving, in this way, the rich classes in Europe, among which he finds the double advantage that they pay well and are incompetent judges in regard to such matters, as their education, if they have obtained any, is merely literary, they being total strangers to the domain of physics, in which the most fruitful resources are found for accomplishing apparently wonderful feats and practicing deceptions on the unwary and ignorant in these matters. It is also known that Mr. Home recently did not stand the scrutinizing conditions imposed by the Academy of Sciences of St. Petersburg, which he had requested to investigate his performances, but suddenly left the city on the eve of his exhibition; he probably remembered the fate of Dr. Deslon, a pupil of Mesmer in Paris, who some eighty years ago was interviewed by a committee of the French Academy, among which was our great American philosopher, Benjamin Franklin, and which committee declared the whole thing a deception and delusion.

Now Mr. Home has succeeded in finding a victim among the men of science, Mr. Crookes, who, evidently being no expert in this matter, perhaps never having seen performances of this kind, was easily deceived. But the most astonishing fact is, that not being satisfied that he had seen some tricks of *léger-de-main* and ventriloquism which *he* could not readily explain, he rushes into print with a new theory about the existence of a new force, which he calls "Psychic force," and which most absurdly he supposes to be under the private control of this individual Home.

As a partial excuse for Mr. Crookes' course in this matter, it must be acknowledged that he followed only the old orthodox method of the physicists, who, in order to explain the phenomena of oxidation and combustion, invented the "Phlogiston," and later, a caloric fluid. Newton even believed in a luminous fluid, while the majority of the present day still adhere to the absurd hypothesis of an electric fluid. Physiologists of the old school still believe in vital force, and very few have even abandoned the unnecessary hypothesis of an imponderable ether filling the whole universe. The acceptance of a new fluid or force, or even a mere name, is indeed the easiest way to give a *pseudo* explanation, and to cut short all further inquiry concerning new phenomena of which we do not at once understand the relations to the known laws of nature. It is a curious fact in regard to the constitution of some human minds that they are often satisfied with a mere word; and when, for instance, told that the cause of earthquakes, boiler explosions, or table tipping, is electricity, they acquiesce, and imagine they know all about it; and of course those who know least of electricity are the best satisfied with this supposed explanation; Mr. Crookes, knowing at least so much of electricity as to be satisfied that this would not do to explain Home's performances, invents a new force, or rather a mere word, "psychic."

No doubt but Mr. Crookes knows about this imaginary force absolutely nothing, and if he attempts to investigate its laws, as every one is able to do in regard to electric, magnetic, and other forces, it will disappear as the "fabric of a vision." Any special force or power claimed to be under personal control of any individual is not only spurious but totally imaginary. Mr. Crookes, in attempting to supplant the superstitious belief in mediums, one of which Mr. Home claims to be, by a new supernatural force, is instrumental in encouraging another form of the popular superstition, which causes the easy success of the so called mediums.

In regard to the experimental investigations of the new force, the playing and the motions of an accordion inside a kind of wire cage, I only remark that the imitation of the sound of an accordion is a very favorite performance of ventriloquists, who place, for this purpose, a very little contrivance in their mouths, and calling the attention of the audience to the supposed source of the sound, easily deceive them in regard to the place from which the sound proceeds, as is the case with all ventriloquism. The wire cage serves to hide incidental means of support, or motion of bodies placed inside, chiefly if placed under a table. A spring balance may be made to indicate an increased weight, by having a small electromagnet hidden inside, which by the simple contact of a metallic point, in the wooden lever, is brought into metallic connection with a hidden battery. There are, however, other means, which only can be divined when an expert in this line sees the actual performance; as in a mere description, the essential part which gives the key to the whole is usually left out, not being noticed by the reporter of the facts.

The experiments described by Mr. Crookes are a mere trifle if compared with the feats many have witnessed by first class jugglers, or prestodigitators, as they rather call themselves. So I saw Herrman, in the New York Academy of Music, not only imitate the accordion with his mouth, and the different voices of singing birds, as the canary, the nightingale, the lark, etc., but even cause these sounds apparently to proceed from the upper part of the hall, as if a lark was flying around. Some other feats of the same performer were, to those not initiated in the resources of *léger-de-main*, much more wonderful than those described by Mr. Crookes, and if he had seen them, he would, in order to be consistent, have to invent half a dozen other new forces, or rather, new names, which in reality, in his case, amounts to the same thing.

I bless my stars that my parents and tutors considered the witnessing of such performances as one of the best means to cultivate the acuteness of perception by the senses, of young persons, and a powerful antidote against future deceptions, and consequent superstition. They even provided me with a few books on natural magic, and a box with apparatus to perform tricks, and I am satisfied that some of my success in experimenting, manipulating, and investigating subjects pertaining to the physical sciences is due to this training, which at the same time has enabled me to expose many of the performances of so called mediums, for instance, the Davenport Brothers, which, in fact, were very course deceptions, even inferior in subtlety to Mr. Home's experiments.

P. H. VANDER WEYDE.

New York city, Sept. 13, 1871.

FAIR OF THE AMERICAN INSTITUTE.

A visit to this fair four days after its opening revealed the fact that only about two thirds of the articles to be shown were yet on the ground. The exhibit now made comprises various collections from stores in the city, and though pleasingly arranged, contains very little that is new or of much interest.

The machinery department is as yet very incomplete, but is daily receiving accession.

A pertinent question which we deem it proper to repeat is asked by exhibitors and others. Why do the managers not provide a suitable entrance on Second avenue? A large proportion of the visitors to the fair find that line the most direct route from the Brooklyn ferries to the Rink where the fair is held, but if they take it, they are obliged to walk around the block, or through a dismal cluttered array of rubbish to an open uncovered window to purchase tickets before entering the building. In the evening this becomes so disagreeable that people in general prefer to pay an extra car to bring them in connection with the Third avenue railway.

We were told that a suitable well lighted entrance on Second avenue would have been provided, had it not been for the settled opposition of one of the managers, who is largely interested in the Third avenue road. If the managers are controlled by personal interests, and are running their fair to line their own pockets, the public would like to know it.

Wringing Machine for Knit Tubular Goods.

This invention relates to improvements in machinery for wringing tubular knit or woven goods. It consists in a spreading device of novel construction to be used, in connection with a roller wringing machine, whether having one or more sets of rollers for expressing the water from the goods, to untwist and spread out the goods as they are fed or drawn in between the rollers. A long frame supports two pairs of expressing rollers, and one set of three rollers, also guiding plates for passing the goods through to wring out the water as they come from the washing machine. These tubular goods are frequently in long pieces, which become twisted in the washing, and have to be untwisted and spread out by hand as they are drawn along into the machine, or they will enter between the rollers in folds, knots, and lumps, which materially interfere with the well doing of the work. The untwisting and spreading device provided in this machine saves the expense and labor of an attendant. It is a broad plate, of zinc or other suitable material, with an oval end and and the yoke shaped guide rod at the front, which extends in advance of the first set of rollers nearly to the front of the table, while it extends the other way between the first set of rollers and nearly to the second set, and it is provided with a rib around the edges to prevent cutting the goods. In front of the first set it is provided with rollers—one on the upper and the other on the lower side—with inclines leading from the surface to the sides of the said rollers most distant from the plate. These rollers act against the expressing rollers, to prevent the dividing plate from being drawn through the latter while drawing the fabric in, the said fabric being opened at one end as it is presented to the spreader, and drawn along over it, one side passing over the upper side of the plate and the roller on the upper side, while the other passes under the plate and the lower roller. It is claimed that this improved attachment for wringing machines will untwist, spread open, and adjust the goods as well or better than it could be done by the hand of a person constantly attending for the purpose, thus saving a considerable item of expense. The construction of the spreader may be varied, of course, within certain limits without departing from the spirit of the invention. The inventor does not, therefore, limit himself to the precise construction described. The wringing machine may, of course, have one or more sets of rollers, according to the extent it is desired to express the water; but the application of the spreader will be the same. Mr. Whitley Denton, of Amsterdam, N. Y., is the inventor of this useful improvement.

Boiler Tenders.

Mr. A. P. Otis, of Holyoke, Mass., has remarked that boiler tenders, in the intervals of their work, frequently occupy their time in reading, and regrets that their attention is generally devoted to dime novels and other pernicious literature. He sends us a suggestion that employers would find it to their interest to provide mental food that would inform the men of the nature and qualities of steam, boilers, and engines, and flatteringly mentions the SCIENTIFIC AMERICAN as a periodical replete with information that would improve the minds, increase the knowledge, and elevate the tastes of a class of men who have much leisure time on their hands.

M. Constant Say.

M. Say, who died recently at the age of 55 years, has long been an eminent representative of French commercial enterprise. He was a sugar refiner of Paris, and his works, near the Boulevard de la Gare, were the most extensive in France, and capable of producing 200 tuns of refined sugar per day. He was highly respected for his public and private character; and his home, on the Place Vendôme, was well known to all Parisians and visitors to Paris. He suffered largely by the insensate pillage and destruction by the communists; and this may have brought to a premature end his energetic and useful life.

JOHNS' ASBESTOS ROOFING.—We would refer our readers to the advertisement of H. W. Johns, published in another column, in which he draws the attention of the public to his asbestos preparations for roofing, mending roofs, clothing boilers and steam pipes, etc. Mr. Johns has a large establishment for manufacturing, and is doing an extensive business in their sale. The roofing is a flexible, tenacious texture, which is not only claimed to shed water perfectly, but never to crack or crawl by variations in temperature during the change of seasons. A specimen of the roofing material which now lies on our table is in appearance an excellent preparation, and there is no doubt that it is a good article for the purposes for which it is recommended. In a pamphlet which the advertiser has printed for general circulation are the names of a large number of persons who have given the articles a practical test.

ENORMOUS FALL OF GRANITE.—At the Mount Sorrel quarry, England, a large blast of gunpowder was recently fired, attended with very remarkable results. The cliff, which may be seen from the Midland Railway between Barrow and Leicester standing boldly up 100 ft. in hight, and many hundreds of yards in length, was pierced about 40ft. from the ground by a deep bore hole, and 450lbs. of powder secured therein. When the blast was fired the whole face of the rock came away together, with scarcely any other sound than the crushing of the rock in its fall. The quantity thrown down is estimated at 20,000 tons, and is by far the largest weight of stone ever before moved by one blast at these granite quarries.

AN editor who doesn't know much about farming suggests that, for garden making, a cast iron back with a hinge in it would be an improvement on the spinal column now in use. —*Exchange.*

That editor ought to have a patent.

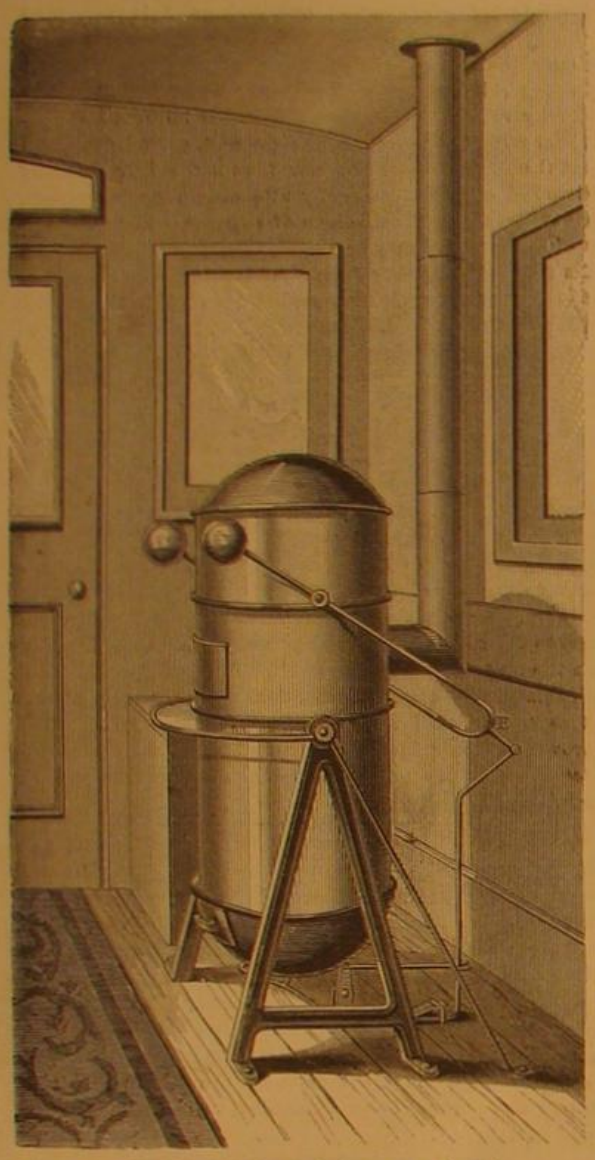
THE eruption of Mount Vesuvius, which has been more or less continuous during the past six months, and which has lately increased considerably in violence, is causing great apprehension as to the safety of the Italian observatory of Vesuvius. The lava has already partially submerged the hill of the Canteroni, on which the observatory stands; and the immediate erection of a strong dyke of scoria, so as to divert the stream of lava, is urgently asked for.

IF we would have powerful minds, we must think.

EVENS' SAFETY STOVE FOR RAILWAY CARS.

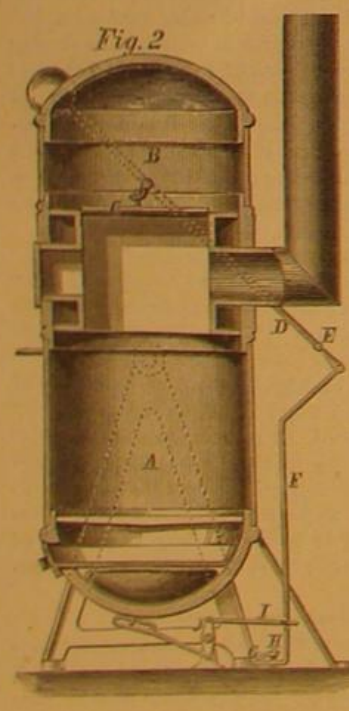
The awful catastrophes which have occurred by collisions, etc., on railways, during the last ten years, might have been robbed of half their terrors through the use of a device like that which we illustrate herewith. Humanity shrinks from the contemplation of maimed and disabled sufferers put to the torture of a slow death by fire, and we will not recall the fearful and heartrending spectacles, the accounts of which, every winter, thrill the entire civilized world with horror. It is pleasant to consider an invention calculated to prevent such catastrophes.

The attachment of a simple device which will at once extinguish the fires in railway stoves, is the feature of this invention, which is simple in its details.



The bottom of the stove is made heavy, so that it possesses great stability under ordinary circumstances; but the body of the stove is hung in a frame, on trunnions, so that when suddenly tilted, a tripping device opens a chamber above the fire box, discharging, upon the fuel, chemicals which at once extinguish the fire, the operation and construction of the parts being as described below.

Fig. 2



The stove is shown complete in perspective in Fig. 1, and a section is also given in Fig. 2, which shows a view of the interior.

A is the fire box. B is the chamber above the fire box and combustion chamber, where the chemicals are stored, these chemicals being any substance or mixture of substances found best adapted to the end in view.

The chamber, B, is separated from the fire box by two trap doors, C, connected by a short link and staple to the common shafts of weighted tilting bars, D, in such a way that when the balls on the bars, D, descend, the doors, C, will open, and the contents of the chamber, B, be discharged into the fire box.

The bars, D, are joined as shown at E, and there pivoted to a bent bar, F, which bar is recurved as shown at G, the recurved end forming a spring hook, being placed under a pin, H, and the bar being connected by a straight rod, I, to a pivoted lever, J, the lower end of which lever is connected by a link to the bottom of the stove.

It will be seen that the tilting of the stove would, by the weight of the heavy bottom, pull or push this hook out from under the pin. When this occurs, as would always be the case in a collision, the balls on the tilting bars, D, will fall, and, opening the chamber, B, at once extinguish the fire. This invention was patented through the Scientific American Patent Agency, July 18, 1871, by Julien T. Evens, assignor to himself, William H. Meyer, and Adolph Rederer, all of St. Louis, Mo., who are the present proprietors under the firm name of Evens, Meyer & Rederer, and from whom, or from Dr. G. W. Evens, General Agent, Independence, Mo., further information may be obtained.

Railroad Cars.

A correspondent who signs himself "Traveling Public" calls attention to the obvious incapability of railroad cars to sustain a collision, and the destruction of cars and passengers whenever an accident occurs. But he also sees an era of narrow gage roads approaching, and with it large reductions of the dead weight and consequently of the stability of railroad vehicles of all kinds. He suggests that directors of narrow gage roads should invite inventors to furnish plans for cars for such roads, designed especially for strength, that passengers may have some sense of the safety of the vehicle in which they travel; and, further, that iron is the material that combines the *minimum* of weight with the *maximum* of strength, and that a framework of iron pipes with a paneling or filling in of corrugated iron would probably fulfil all requirements.

SINCLAIR'S MILL PICK HOLDER.

This is one of those simple practical inventions that at once commend themselves to all practical minds. It seems a great improvement over the old form of pick holder.

Fig. 1

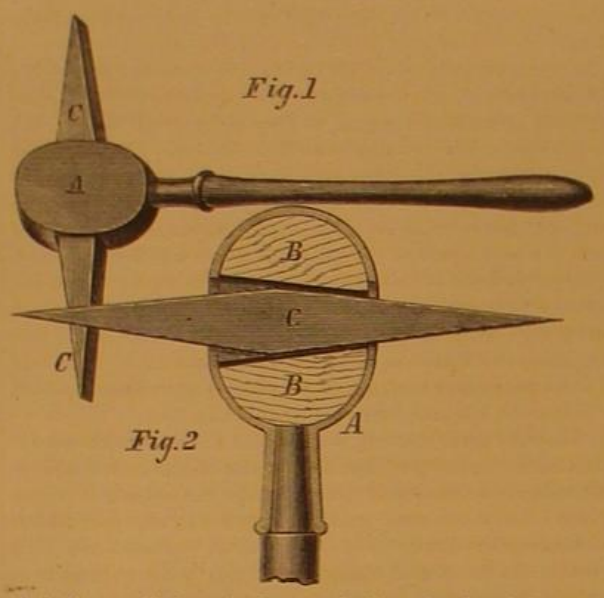


Fig. 2

A hollow cylinder, A, having both ends closed, is made slightly ovoid, the longer axis being in the direction of the handle. On one side of the shell of this cylinder is cast a suitable socket for the reception of the handle, and midway on the circumference, between the socket and the point opposite, are formed slots, for the reception of the pick, C, as shown, the upper one being smaller than the lower one, to correspond to the taper of the pick.

Before the pick is inserted, two semicircular blocks of wood, B, are put in through the lower slot. The blocks being left free to move, their inner straight faces accommodate themselves to the taper of the pick when the latter is inserted, and thus hold picks of various taper securely and firmly.

Patented through the Scientific American Patent Agency, Sept. 5, 1871, by James P. Sinclair, of Mottville, N. Y., whom address for further information.

BUTLER'S ADJUSTABLE WINDOW SASH.

The general advantages of a reversible window sash were set forth in a recent article in this journal. They may be recapitulated, however, in this connection.

In the first place they can be readily cleaned on both sides, while the person cleaning them stands on the floor of the apartment to which they belong, a very great convenience, and one that will be appreciated by all good housekeepers. The labor of cleaning is thus greatly lessened, and the exposure of the person to cold winds, while sitting upon window sills, is wholly obviated.

Second, broken glass may be replaced without taking out the sash, thus saving time and trouble. The sash may also be repainted whenever it is required, without removing it from the window frame.

The invention shown in the accompanying engravings secures the desired reversibility of the sash by means at once simple, ingenious, and effective. At the same time the window sash has nothing unsightly or clumsy attached to it—in fact, it presents, exteriorly, the appearance of an ordinary sash, finished to correspond with the finish of the casement, ornamentally or otherwise, as may be required.

Fig. 1 shows a portion of a window having sashes mounted as hereinafter described.

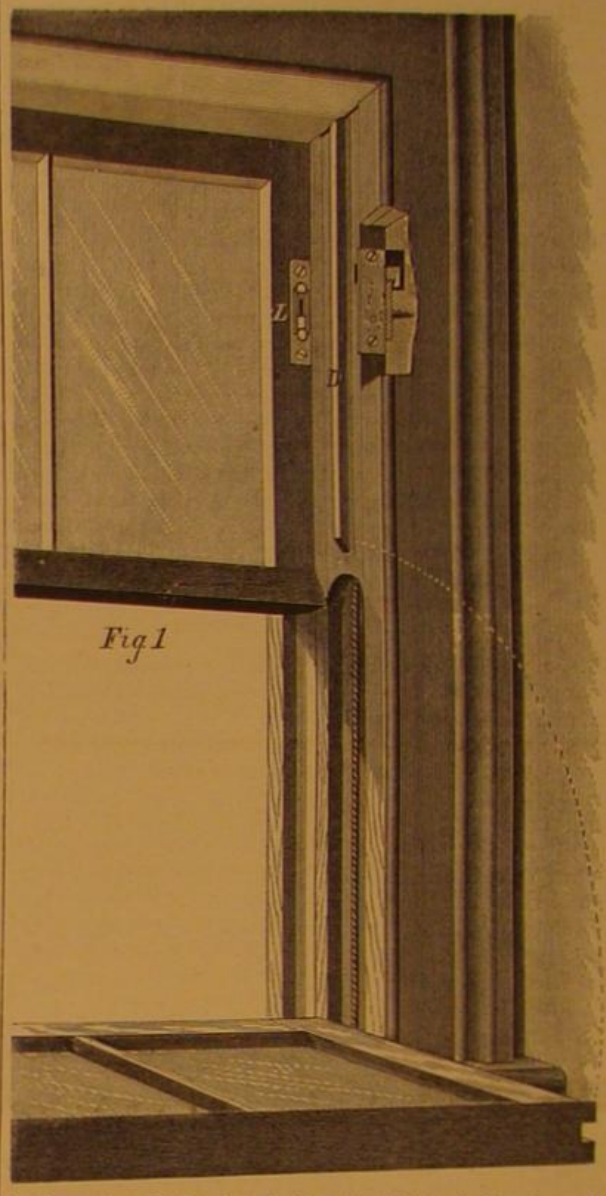
The sashes are usually hung on weights, but the improvement is equally applicable to common sashes having no weights. When weights are used, the cords hereinafter described are run in grooves in the backs of the strips, D, and are attached as shown at A, in Fig. 3, to pieces of metal screwed to the lower corners of the sash. This block of metal is cylindrical, and has formed upon it projections, B and C. The projections abut against a pin, shown in dotted outline, to hold the sash in a horizontal position when turned down. The projection, C, is merely a ledge to receive the pointed end of the strips, D, to avoid a sharp wedge point.

These metal blocks are placed in the groove of the casing, and the sash, being made so narrow that it may be turned forward, as shown in Fig. 1, turns on the blocks, as on pivots.

When the sash is turned up into the vertical position, it slides up and down on the strips, D, Figs. 1 and 2, these strips being so constructed that they may be locked either to the casing or to the sash. In Fig. 1 the strip is shown locked to the casing, in which position the sash is released from it and can then turn freely on the cylindrical blocks, A.

The method of locking the strip, to sash or casing, is shown in Fig. 2, in which E is the jamb of the casing, F the sash, and D the detachable strip rabbeted into the sash, as shown. When the hook, G, is in the position shown, and held there

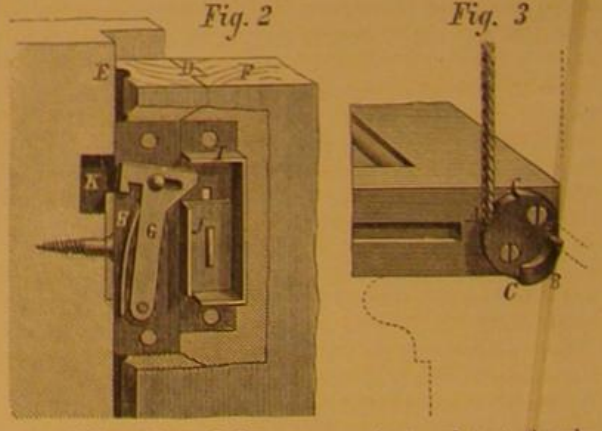
Fig 1



by the spring, H, the detachable strip, D, is locked to the sash, and slides up and down with it, the projection on the hook opposite the spring engaging with the plate, I, on the sash.

When the sliding plate, J, on the sash, is slid upward, it acts upon the inclined under surface of the projection on the hook, causes it to compress the spring, H, and enter the recess, K, in the stile, where the slightest downward movement of the sash hooks it fast, with the strip to which it is pivoted, as shown in Fig. 1. The sash will then slide down on the tongue of the strip D, until it passes it altogether, as shown in Fig. 1, in which figure the strip is shown locked to the sash, as described.

Fig. 2 *Fig. 3*



The sliding plate, J, has a convenient and tasty thumb piece, L, Fig. 1, attached, by which it is actuated.

When the window sash is turned up into the vertical position, slid upward, the thumb piece, L, which drops by its own weight on the descent of the sash, allows the spring, H, to force the hook back, and thus automatically locks the strip, D, to the sash, as described, the strip, D, being raised enough to release the hook, by the action of the cylindrical block, A.

This invention was patented through the Scientific American Patent Agency, August 29, 1871, by Jacob E. Butler, whose present address is 524 Fifth avenue, Brooklyn, N. Y., or Gavit & Butler, 21 Courtland street, New York.

THE largest works in the world for manufacturing paper from wood pulp are said to be located in Philadelphia. The buildings occupy a space of one thousand feet in length and three hundred and fifty feet in width, and cost six hundred thousand dollars.

Scientific American.

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THE PERILS OF GUN COTTON.

In our edition of September 9th, we laid before our readers the facts of a terrific explosion of gun cotton, at Stowmarket, England, in which some twenty-four persons were killed, and over seventy wounded. As is usual in such calamities, no one of the survivors could give any account of the cause of the ignition, and we are left to wonder and to speculate both as to the origin of such appalling disasters, and as to the means that are necessary to prevent their recurrence.

This material, more powerful than gunpowder, more portable, and, for many purposes, more convenient, was introduced to the world in the year 1846, by Professor Schönbein, and, after creating a nine days' wonder, was dismissed by nearly everybody as an explosive too untrustworthy and dangerous for ordinary use. The Austrian Government, however, caused further experiments and inquiry to be made, and the results were important discoveries as to the nature of the new explosive, and in the mode of its preparation. The Austrian process of Baron von Lenk is performed by winding the cotton in skeins, and then subjecting them to the nitric and sulphuric acids which give the dangerous explosive qualities to the fiber. These skeins are wound, as in spools of thread, to the required sizes for cartridges, etc. The success of Baron von Lenk recalled public attention in England to the matter, and the Royal Society, in the year 1862, revived the inquiry as to the feasibility of manufacturing gun cotton with a reasonable degree of safety. A commission was appointed by the British Government to investigate the whole matter, and, although its labors were brought to a premature end by some unexplained cause, it issued a report to the effect that gun cotton, as made by the Austrian method, was valuable in blasting operations, being superior to gunpowder in explosive force, but not fitted for small arms, as, probably from some peculiarity in its combustion, accurate shooting was not so attainable as with gunpowder; and that confinement in a strong chamber was indispensable to obtain the full force of gun cotton when ignited.

Mr. Abel, chemist to the War Department, Woolwich, England, made long and searching experiments, recorded in the "Transactions of the Royal Society" in 1866–67 and 1869, and from these, and from facts observed by other investigators, it was ascertained that gun cotton was liable to deterioration and decomposition, arising from impurities that could not be eliminated from the raw material; and that the loose fibrous nature of cotton insured the presence of atmospheric air in its substance, a most dangerous characteristic of an explosive material. Mr. Abel, in 1865, directed his attention to overcoming these objections, and produced a gun cotton, pressed into solid cakes, which could be ground into pellets or powder, and his invention had the undoubted advantage of exerting its full power without confinement in any chamber or vessel; and as it was damp throughout the whole process of manufacture, the danger of preparing it was reduced to a *minimum*. Means of producing a gun cotton in a medium state, neither loose fibers nor solid slabs, were devised by Mr. E. C. Prentice, of Stowmarket, England, a member of the firm whose premises and property have just been destroyed, and consisted in twisting the cotton into yarn, weaving cloth, etc., so as to make a textile material of the required density. To get rid of the damaging effect of atmospheric moisture, so deleterious to a rapid absorbent like cotton, paraffin, solutions of gum, gutta-percha, etc., have been used, the gun cotton being steeped therein, and then allowed to dry.

Of the value, in mining and other engineering, as well as in war, of this powerful destructive, many instances might be quoted, among the most prominent of which is the destruction of a solid mass of brick and stone masonry, the walls of a gallery 250 feet long, and 7 feet wide, being part of the old fortifications of Portsmouth, England. This building was demolished by firing 60 pounds of gun cotton, which was loosely hung on nails driven, at one extremity, into the roof. Its value for the construction of torpedoes, the invisible defenders of harbors and ports which are likely to play so important a part in the wars of the future, cannot be overrated; as the quantity of gun cotton required is so much less than that of gunpowder, that the torpedo will be an implement more deadly in power, and more manageable in size.

Such was the terrible agent in the Stowmarket explosion; and this occurrence has brought forward, as usual, a large amount of public comment, of a quality which causes us to wonder that such things do not happen daily, so intense is the ignorance and so vague are the ideas of the public on this and similar most important matters. The *Westfield* boiler did much to give the palm, for silly purposeless talk, to the United States; but England runs us hard, and one of her most prominent scientific journals, the *Engineer*, is not ashamed to hint that the weather has played some important, though as yet unexplained, part in the matter, and states unreservedly, on the subject, that "all accidents have occurred about the month of August." The English "schoolmaster" is probably "abroad" at this time of year; his presence at home is needed by some scientists, and the sooner he can tear himself away from his vacation rambles the better.

The fact that the whole of the gun cotton at Stowmarket was not destroyed is most important, as it will allow a searching analysis of its composition and chemical state, and so aid the enquiry now being prosecuted. The final result of the investigation cannot fail to be of the utmost interest to this country among others. The important railway and other works, now in course of construction all over the United States, consume large quantities of explosive preparations, and the use and handling of these are often left to ignorant and inexperienced men, many of whom are, moreover, from use and habit, reckless in all matters, even of life and death. We hope, therefore, that the utmost light will be thrown on the whole subject, for we are sure that the public will not be satisfied with less.

AMMONIA MOTIVE POWER FOR ORGANS.

There is great want of a simple and portable power for driving the bellows of large organs in our churches and music halls. Water, steam, caloric engines, heavy weights, and lastly, electricity, have been tried, and may succeed on occasions, but practically the exposure, danger from fire, and unwieldy character of the attachment, unless it is the electrical, stands in the way of universal application. The one man power is usually the last resort of musicians, and the man who blows the bellows is often a more important character than the organist himself. The inconvenience of having to send for a man or a boy every time the organist wishes to practice is a serious hindrance to that thorough study of the instrument which ought to be had by all who at empt to play upon it. In the case of the piano, this objection is removed, and there is no limit but fatigue to the amount of practice that can be indulged in. The fact that there is a man or boy around the corner, puffing and blowing, is enough to take away all the inspiration of the performer, and must seriously interfere with the calm frame of mind necessary to the composition of music. We do not know that a caloric engine would be much better, but that can be placed in the cellar. Our advice has been frequently asked in this matter, and in casting about for an answer, we have bethought ourselves of ammoniacal gas as a motive power worthy of careful experimental trial. It is now a good many years since this use of ammonia was proposed, and ammoniacal engines were applied to street cars and to pumps, and still they have not met with general acceptance, and few persons have even heard of them. The trial trip of the omnibus in Paris propelled by liquefied ammonia, confined in cylinders under the seat, was reported as perfectly successful, and a similar result has been arrived at on street cars in New Orleans.

Our knowledge of the force exerted by liquid ammonia at given temperatures is now well fixed, and the cost of liquefaction, the proper metal to employ, and all practical questions ought to have been thoroughly worked out long before this. As ammonia attacks copper and brass, the packing and mounting of the engines would have to be made of iron. The saponification of the ammonia with the lubricating oil is said to be no detriment, but rather to diminish friction. The plan of the company in Paris was to have a large central factory for compressing ammonia gas into iron cylinders, in the same way as water is charged with carbonic acid, and to deliver these receivers to customers in all parts of the city. The cylinder containing the liquid ammonia would be provided with couplings and screws ready to attach it to the stationary piston, and the company's agents would put it in position and remove the exhausted receiver, just as the soda fountain is kept in running order by large dealers. It would only require the opening of a stop cock to set the piston in motion, and it would run as long as the expansive force of the gas was sufficient to propel it. Such an arrangement as this ought to be feasible, and theoretically there would appear to be no difficulty in the way of its universal adoption. It would not only be applicable to organs but to pumps, sewing machines, and a wide range of other work. In addition to the profit which might be supposed to arise from the application of ammonia as a motive power, must not be forgotten the equally valuable property possessed by the gas of producing an intense cold. The employment of ammonia in the artificial production of ice appears to be a fixed fact, and the same company that manufactures the gas for this purpose could also deliver the cylinders to those who wished to employ it as a motive power. Ammonia is now an article of large and economical production. As an incidental product in the manufacture of gas, it can be made cheaply and in unlimited quantities. If the engines could be made so as to avoid leakage—and here is a prominent difficulty—the original supply of gas could be used any number of times, and there would only be the first cost of machinery, of the concentrated aqua ammonia, and of the fuel, to be taken into account.

The solvent properties of liquid ammonia upon various metals have been recently studied by Professor Seely, and some curious results have been obtained. It may be that iron is more or less attacked, so as to render tight joints very difficult to attain. Any leakage of ammonia would be highly objectionable, as the gas is suffocating in its effects upon the lungs, and too much of it would put out the fires. There is no doubt that ammoniacal gas as a motive power is in its infancy, requiring time and continued use, like steam, to develope its advantages. It would be marvellously convenient to have it for propelling small engines, and we trust that the owners of patents covering its use will not rest until they have secured its general introduction.

WHAT CONSTITUTES PATENTABLE NOVELTY?

It appears that some of the Examiners at the Patent Office have not yet been able to get into their heads what are the precise elements or requisites that go to make up a patentable invention, and have made some erroneous rejections.

The Commissioner of Patents, the Hon. M. D. Leggett, in a recent opinion reviewing and revising one of these erroneous decisions, places before the examining officers, and the public in general, some very interesting and instructive information upon the patentable novelty of inventions. The gist of the whole matter is tersely stated by the Commissioner in this one sentence, "*The test of invention is the result attained.*" In other words, if an improved result is produced, or if the public is supplied with a better article, or if the same article is produced in a cheaper, or quicker, or better manner, then patentable novelty exists, even though the devices are old by which the improved results are attained.

We publish the decision in another column. The Commissioner is evidently determined to give a broad and liberal interpretation to the patent laws during his administration, and in this good work he will be cordially seconded by every lover of real progress.

A DEFECT IN MARINE ENGINEERING.

Will any one tell us what other reason than a bigoted conservatism prevents the general use of steam governors on our American Marine?

The importance of this inquiry will be apparent upon the perusal of a letter in another column, entitled "Another Marine Disaster," in which the loss of the *Lodona* is charged to the want of a governor.

The steam marine of nearly the entire world, with the exception of that of this country, uses governors, by which a larger waste in fuel and increased immunity from breakage of machinery are secured, with the still more important advantage, that steam can be kept up during rough weather, and proper control of the vessel maintained.

It requires no great amount of discernment, to understand that in heavy seas, when propeller screws or paddles are constantly either losing entirely their hold upon the water, or so far losing it as to afford but little resistance to the steam in the cylinder, the increase of their motion must result in loss of steam, while their impact must be fearful when again suddenly plunged into the water. And yet in full view of these facts, and in face of the records of experiments which fully demonstrate the great utility of the governors, our engineers refuse to adopt them.

If there is any sound reason for this, it would be interesting, at the present time when the numerous catastrophes occurring to steam water craft are attracting general attention to have the reason publicly stated.

MR. HIGHTON AND THE NEW YORK TIMES.

This country is so much indebted to the New York *Times* for its recent exposure of gigantic frauds in our city government, that we cannot find it in our hearts to criticize that journal very severely when it deserts the realm of politics for that of science, and, to use a homely phrase, "puts its foot in it." The *Times* is an able champion when it arrays itself against corruption in high places, but its strength is wasted in endeavoring to champion the Rev. Mr. H. Highton against the supposed injustice of the British Association, in refusing to allow that gentleman to occupy its time by the reading of a paper before it.

The *Times*, if not versed in the science of electromagnetism, is sufficiently acquainted with the method of procedure adopted by scientific and literary associations to know that proper discrimination, as to the character of papers offered, is absolutely necessary to prevent the acceptance of absurd, and often worse than absurd essays, that would only expose their authors to ridicule, and bring disgrace upon any body of men that should consent to listen to them.

The writer of this article once addressed a paper to the *Times*, which was rejected, not because it was absurd or ridiculous (though it might have been both), but upon other good und satisfactory grounds. Had its author protested that it was the greatest piece of literary work ever produced since the days of Milton, that statement would probably not have

influenced the astute editor, who refused the paper, one particle. Yet, because Mr. Highton now avers that he believes he has made the greatest discovery in electric science that has been given to the world since the days of Volta, the *Times* protests against the suppression of his paper.

It is proper to suppose that there are men in the British Association competent to judge as to the value of Mr. Highton's alleged discovery, and as it has been for some time well known that the gentleman in question was lost in the pursuit of a perpetual motion or its equivalent, and that he stands on about the same footing as another gentleman who has been astounding the world on this side the Atlantic with unproved assertions, the British Association very properly refused to give its countenance to his absurd ideas.

Both Mr. Highton and Mr. Paine are trying to create something out of nothing, and if their assertions mean anything, they mean that they have accomplished this. But though they are loud in asserting, they are so slow and weak to prove anything, that the world, especially the scientific world, has tired of them, and wants to hear no more unbacked statements.

The *Times* seems to have been crammed with a quantity of bombastical statements regarding Mr. Highton's inventions, which are only a distorted account of a statement made by Mr. Highton himself, in a letter to the *Mechanics' Magazine* (London), the statement being made in regard to the Paine engine, instead of Mr. Highton's discovery. Having thus got the facts laughably mixed up, it cordially invites Mr. Highton to come to America—"Land of the free and home of the brave"—here to explain to receptive audiences that "which with scorn was put away" by the great British Association.

In giving this invitation and counsel, the *Times* has forgotten the immortal native born savant, Mr. Paine, who discovered all that Mr. Highton claims to have found out, before the latter gentleman had given up theology for science. If justice be the rule, why are Mr. Paine's claims so carefully neglected? Are we going to be so base as to allow the credit of this sublime discovery to be given to a foreigner, when we have the assertion of a man like Mr. Paine to show that it is American, and only American? The *Times* mistakes the temper of the American public if it supposes the people—the sovereign people—will ever consent to see Mr. Paine's claims ignored

THE STAFF OF LIFE---THE BREADMAKERS OF THE AMERICAN METROPOLIS.

The cities of New York, Brooklyn, and Jersey City, may be said to be practically one. Nearly the whole of the population in the two last named cities earn their bread from business or labor performed in warehouses, manufactories, and mercantile establishments of New York, or, if employed in establishments not located in New York, these, as a general rule, belong to New York proprietors. The combined population of these cities now reaches something over 1,400,000 inhabitants. This vast array of mouths and stomachs demand an amount of food and drink that foots up into something enormous. It consumes daily, at the least calculation, 933,332 lbs., of wheat bread, or about 1,733 barrels of flour per day.

To supply this bread—a portion of which is of course home made—the three cities named have 1,364 professional bakers. It will be seen that the trade is very much cut up, and that many of the bakers must do a very small business indeed. There are, however, a few large establishments. One of these is the aerated bread bakery in West Twentieth street, and another, the bakery of John Hecker, in Rutgers street, which last bakes 300 barrels of flour into bread, and 75 barrels into various kinds of crackers, per week, but has the capacity for double that amount. It also bakes a quantity of Indian corn bread, Graham bread, sweet and sour rye bread, unleavened bread, etc.

By far the greater portion of the bread used is fermented bread made of fine bolted wheat flour, mixed and kneaded by hand, and baked in brick ovens. The aerated bread has the advantage of superior cleanliness, as it is not touched by the hands from the time it is emptied as flour into the mixers till it issues from the ovens as bread. Only good flour can be used in its manufacture, as any mustiness, or deterioration in quality, is apparent in this kind of bread.

In making this bread, the flour is put into strong cast iron globes, with salt and water only. The globes have attached, on the interior, fixed horizontal arms, between which other horizontal arms, attached to a vertical shaft, revolve, working precisely on the principle of the pug mill in brick making. While the mixing is in progress, a quantity of pure carbonic acid gas, made in suitable generators, is allowed to pass into the mixers under immense pressure, where it permeates every portion of the dough. When the mixing is completed, a cock is opened at the bottom of the mixers, out of which the dough is forced with great violence by the pressure of the gas within. As it flows out it is caught in oblong tins, the cock being closed when enough dough has passed into the tin for a loaf. Another tin is then passed under, and the cock opened again, and so on, the operation proceeding with great rapidity till the dough is wholly discharged. The tins are then placed in what is known as a reel oven. This is a large chamber of masonry, in which a huge reel revolves, the arms of the reel supporting pendent shelves upon which the loaves are placed. The reel slowly revolves, each shelf, as its burden of loaves is removed, being again loaded with unbaked loaves, and so on, working continuously as long as desired.

The bread thus made is very sweet and wholesome, but it does not possess the peculiar flavor of fermented bread, which most people have been educated to like. It has, however, its fair share of patronage, and the number of those who use it is on the increase.

Large quantities of ships' bread and crackers of various kinds are manufactured, much of these products being consumed in the city, with the exception of ships' bread.

The Germans consume most of the rye bread made. This is of two kinds. The sweet rye bread is made in the ordinary way of making fermented bread. The sour rye bread is allowed to pass to the acetous fermentation before baking. It generally contains caraway seed.

The unleavened bread of the Jews is simply fine flour and water mixed into a stiff dough, rolled out very thin, cut into circular wafers about the size of a tea plate, and baked.

Indian corn bread is a fermented bread of mixed rye or wheat flour and corn meal; it is quite commonly called Indian bread. Its consumption is comparatively very small.

In a recent visit to a large number of bakeries in this city, we found the bakers, as a rule, entirely ignorant of the chemistry of bread making. They follow a routine blindly, yet it is one that is generally successful, or would be, were the best flour generally used by them. So far as we could ascertain, alum, sulphate of copper, etc., said to be used in Europe, for producing white bread from damaged flour, are not used here to any noticeable extent, and the quality of the bread averages as good as could be expected from the quality of flour used, the bulk of which, in the smaller bakeries, is of inferior grade. This opinion is confirmed by Mr. John F. Pinson, the intelligent foreman of Mr. Hecker's bakery, above mentioned, which place was the only one where we found machinery employed for mixing fermented bread. Even here the kneading machines were not used; the noise they make in ordinary use disturbing a religious institution near by, Mr. Hecker ordered them stopped. Machinery is used in all the cracker bakeries, both for mixing and kneading.

The mixing machines consist of a pan with fixed and revolving knives, into which the ferment, flour, water, etc., are placed, and thoroughly incorporated together.

The kneading machines consist, both for bread and crackers, of rollers, through which the dough is passed and repassed, until it is sufficiently kneaded. It is then passed through rollers, which reduce it to a sheet of the proper thickness, and as it passes out from these rollers, it is cut by suitable mechanism into loaves or wafers of the proper size for baking.

In the manufacture of fermented bread there are, so far as we can ascertain, no reel, or rotating ovens employed. The ovens preferred are the tile bottomed brick ovens, which, it is generally agreed, are the best for the purpose.

We have said the quality of the bread averages as good as could be expected from the average grade of flour used. In making this statement we did not take into account the great difference in the cleanliness of different bakeries, some of which we have found to be in a most filthy condition, overrun with mice, and swarming with flies, roaches, and croton bugs. The larger and most respectable establishments are, however, kept in a very clean state, and evident pains is taken to compel cleanly habits on the part of the workmen. Yet it must be impossible to avoid more or less contamination where bread is mixed by hand.

It is bad enough that we eat our bread in the sweat of our brows, but it is by no means pleasant to reflect that it is flavored by the perspiration of filthy workmen. The general introduction of machinery in the manufacture of bread would relieve the public of any anxiety these revelations may engender, but this will not be done till the business is concentrated in larger establishments which can afford the necessary outfit. Such is the tendency at present. During the war of the rebellion, the large establishments, were employed in supplying the United States troops quartered in and about the city, and in making the regular bread of the army ration, for shipment to troops in the field. The smaller establishments multiplied greatly to supply the home demand. Many of these are now scarcely able to live, and their business must inevitably be absorbed by the larger ones.

THE STATE OF THE MANUFACTURING TRADES.

The ingenuity, enterprise, and industry of the inhabitants of New England is proverbial, and these qualities have secured to the Eastern States a very large proportion of all our textile manufactures. Lowell, so long renowned as the Manchester of the United States, has now to look about her to maintain her pre eminence, Fall River having enlarged her boundaries with great rapidity. The population of the latter city has more than doubled in the last ten years, and the mills now erecting will add about 240,000 spindles to her producing capability, and are all to be completed by next April. Further preparation is being made for the building of mills to contain about 140,000 spindles, to be opened later in next year. A large mill for the manufacture of bagging is also being constructed. The Norway Plains Company, of Rochester, N. H., are now manufacturing blankets and flannel at the rate of about 100,000 pairs of the former and 600,000 yards of the latter annually; the company at Gonic in the same State makes flannels exclusively, and can produce 900,000 yards per annum. Mr. Goodall, of Sanford, Me., sends out 200,000 lap robes and horse blankets in a year. Messrs. Shattuck and Smith, of Springvale, Me., are producing 30,000 yards of printed cloth per week. The Pioneer Woolen Mills, Me., the Cocheco Woolen Manufacturing Company, N. H., and many others are in full employ, and show every indication of a prosperous and increasing business.

The leather and shoe trades at New Bedford and North Adams, Mass., at Brownfield, Me., and elsewhere are very busy, although the manufacturers are deploring the loss of their export trade. The paper mills at Springfield and South Holyoke, Mass., at Norway, Me., and at Rochester, N. H., are also well employed. The manilla paper produced by some of these mills has recently improved very much in quality, and the manufacture of wood pulp for paper making is now an important business.

A good idea of the extent of the consumption of some apparently trifling articles may be formed from the fact that awls and needles for shoe pegging machines are being produced by hundreds of thousands, a large firm, the Bay State Needle Company, of Worcester, Mass., being engaged in this particular branch of production. The lumber trade is brisk, and its satellites, the car building shops, are well occupied. The Wheeler and Wilson Sewing Machine Company, at Bridgeport, Conn., are sending away 500 machines a day, a business without precedent in the history of this universally required implement.

In New York, the Oswego Woolen Mills have 300 hands at work, and are paying $7,000 per month wages; and the Fulton works of Messrs. Hoyt, Sprague & Co., in the same line, are equally prosperous.

From other yarts of the Union, accounts are similarly encouraging. The mining operations of the West are progressing at a prodigious rate, and we hear daily of the erection of new furnaces in the iron, lead, and silver works, as well as of rolling mills and converters for wrought iron and steel. The Moline Plow Company, of Illinois, has made and sold 30,000 plows and 7,000 cultivators this season, and the Lehigh rolling mill, now the property of the Allentown Rolling Mill Company, of Pa., has a capacity of 500 tuns iron work per week.

A fair test of the activity of trade and the demand for improved appliances, as well as of sufficient business to justify the further investment of capital, may be found by perusing our list of American and foreign patents for this and the last few weeks. These columns of our paper have been unusually full, and exhibit new inventions in every department of mechanics and manufacturing industry.

Our readers will, no doubt, receive these few facts as evidences of a sound and steadily progressing trade, and will join us in the hope that this healthy condition of our most important interests will continue.

IMPORTANT TRADEMARK DECISION.

Justice Wylie, of the Equity Court of the District of Columbia, has recently rendered an important decision relative to the validity of trademarks. His ruling is to the effect that all trademarks, not enforced for a number of years against infringers, have by such neglect ceased to be the property of their originators, and may be appropriated by others.

The suit was instituted by Joseph Rodgers & Sons, cutlers, of Sheffield, England, *versus* Philip & Solomons, stationers, who have a contract for supplying the Treasury Department at Washington with "Rodgers & Sons" penknives, erasers, etc. The plaintiffs alleged that the defendants had sold cutlery bearing the counterfeit of their—the plaintiffs'—trademark. The defendants gave in answer that they had sold penknives, erasers, etc., bearing the trademark of Rogers & Sons, manufacturers of cutlery in Prussia, which mark is similar to that of Rodgers & Sons, of England, but has been in the American market undisputed for a number of years, having also protection by Royal licence from the Prussian government. The defendants furthermore contended that the plaintiffs cannot maintain suit, as they had not registered their trademark in the United States Patent Office, as provided by act of Congress of July 8, 1870. In consequence of these facts, which were properly substantiated, the Judge ruled that an injunction could not be granted to restrain defendants from the use of the trademark, on the ground that the English firm had, by their neglect for a series of years to enforce such rights as they were possessed of under the trademark law in this country, waived the right to call upon our courts for assistance.

New Preparations of Wheat.

We have received and tried in our own household several articles of food prepared from wheat by the Nutrio Manufacturing Co., corner of 13th and Mt. Vernon streets, and Ridge avenue, Philadelphia Pa., and find them very delicate, palatable, and nutricious. The articles are named "Nutrio," "Nutrina," Nutriette," "Phoda," and "Papoma," and are prepared by a peculiar treatment of the whole wheat, which renders them digestible and retains all the elements of nutrition wasted in the ordinary process of grinding. For infants, invalids, and for nice palates in search of real delicacies, we can recommend these preparations.

The American Diamond Drill Co.

Our readers will find in another column an advertisement of the above company, which sets forth the fact of an entire change in the proprietorship of the diamond drill, formerly owned by Severance & Holt, and states that important improvements have been made, which render it much more efficient than formerly. The company is a working company, purposing to manufacture and sell these drills, and to use them in prospecting mineral lands and quarries, and in the execution of railroad, mining, and engineering rockwork under contract.

THE ATLANTA AGRICULTURAL AND INDUSTRIAL ASSOCIATION announces a "Grand Fair and Exposition," to be held in Oglethorpe Park, Atlanta, on October 16, 17, 18, 19, and 20. The premiums are numerous and valuable, and the list of subjects in which competition is invited consists of all branches of the useful arts. Mr. Samuel A. Echols, of Atlanta, Ga., is the Secretary of the Association.

The Philadelphia *Scientific Journal* says that "Messrs. Geo. P. Rowell & Co., of New York, are so well and extensively known all over this continent, that to name them and explain the nature of their business would be superfluous. No Newspaper Advertising Agency has ever displayed more energy and skill in the transaction of this delicate and tact-requiring business."

"Whitcomb's Remedy for Asthma entirely relieved me."—W. *Bohlein, Urbana, Ohio.*

Business and Personal.

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

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin. $4 00 a year. Advertisements 17c. a line.

I want an Agent, who has had an extensive experience in selling patent rights, and who can furnish best of references as to character and ability, to sell State rights for a new and valuable invention. Address, for circular, P. O. Box 773, New York City.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

To Machinists—Wanted a man of experience and ability, to take the Superintendence of a large Machine Shop. Address Q., P. O. Box 2180, New York.

Cooper's Patent Mill for Rolling R. R. Car Axles is on exhibition at the Cincinnati Industrial Exposition.

For Sale — Screw Cutting Engine Lathe, 18 in. swing, and Iron Planer, 26 by 78 inches, but little used. Address A. & E. H. Sedgwick, Poughkeepsie, N. Y.

A Valuable Patent and Business given away—Shop and Tools to rent—fine location for Manufacturing Agricultural Implements. Address C. B. Morse, Rhinebeck, N. Y.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours. F. Sage, Cromwell, Conn.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter). Merchant & Co., 507 Market st., Philadelphia.

Patent English Roofing Felt, ready coat, thick, durable, and cheap. Merchant & Co., 507 Market street, Philadelphia.

See advertisement of Wilkinson's Combination Pocket Tool.

Send to E. & A. Betts, Wilmington, Del., for list of nice Machinists' Tools, on hand, and making.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y.

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 15 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Lord's Boiler Powder is only 15 cts. per pound by the bbl., and guaranteed to remove any scale that forms in steam boilers. Our Circular with terms and references, will satisfy all. Geo. W. Lord, 107 W. Girard ave., Philadelphia, Pa.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth st., Brooklyn, manufacture Presses and Dies. Send for Catalogue

Peck's Patent Drop Press. For circulars address the sole manufacturers. Milo, Peck & Co., New Haven, Ct.

Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau st., New York.

Railway Turn Tables—Greenleaf's Patent. Drawings sent on application. Greenleaf Machine Works, Indianapolis, Ind.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Aray, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Wanted—To invest $500 to $5,000 in a good paying Manufacturing or Mercantile Business. Address Box 571, Pittsburgh, Pa.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter. Merchant & Co., 507 Market st., Philadelphia.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Examples for the Ladies.

Mrs. Carrie S. Slater, Newark, N. J., has operated a Wheeler & Wilson Machine 18 years; for the last 13 years on her own account sewing in families, and earned in that time $11,000; married, borne two children, done her own sewing, and attended to other household duties.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

AERIAL NAVIGATION.—.———.
BIRDS' NESTS.—C. C.
EXPLOSIVE PROPERTIES OF WATER.—J. M.
GAS MADE FROM WATER.—J. G. S.
ISAIAH III, ETC.—J. M.
MENSURATION OF SURFACES AND SOLIDS.—R. S. M.
PLUMBAGO.—A. R.
PROPULSION ON CANALS.—C. W. H.
PSYCHIC FORCE.—F. H. S.—J. H. M.
QUADRATURE OF THE CIRCLE, ETC.—C. T.
RAILROAD ACCIDENTS.—J. M. C.
ROTARY MOTION.—J. E. H.
WATER METER.—J. L.
ANSWERS TO CORRESPONDENTS.—C. L. W.—F. C. D.
QUERIES.—J.—M. & L.—W. F. H.

Recent American and Foreign Patents.

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

RAILWAY CAR TRUCK.—John Clark, of London, England.—The object of this invention is to facilitate the traverse of railway carriages around curves, and thus to avoid the irregular and destructive action of the wheels upon the rails and remove the liability of the carriages running off the rails at such parts of the line. To attain these results the end axles of the carriages are caused to incline to the center of the curve of the rails in radial lines, which inclination is effected by allowing the center axle to move endwise with its bearings while a curve is being traversed. The invention consists in a novel mechanism for connecting and changing the relation of the axles.

BLIND SLAT OPERATOR.—Quinten M. Young's, of Utica, N. Y.—This invention relates to improvements in apparatus for operating the slats of window blinds for opening and closing them, and also for fastening them. It consists in a rod mounted in a sleeve having arms pivoted to the lower cross piece of the blind, connected by an arm to the bar, to which the slats are commonly connected, and connected also with a slotted slide arranged in one of the sides of the window frame for actuating the slats by raising or lowering the said bar from the inside without raising the window, said slide being actuated by a bell crank having a handle projecting from the front of the window frame, and having a rack bar and spring catch for holding it in any position.

COMMODE AND WASH STAND COMBINED.—Sampson P. Boone, of Americus, Ga.—A wash stand of any approved kind, has a chamber, opening into it from the front. A case fitted to slide into and out of said stand in the manner of a drawer, and adapted for the support of a vessel, suitable for the uses of commode, and provided with a cover, to be seated upon any suitable packing that will make a tight joint, and a spring is to be employed to hold it down. The vessel is intended to be fitted to the case so that it can be readily taken out for emptying and put back again. When the case is shoved in, its front has the appearance of an ordinary door in the wash stand. The base piece is made to draw out with the case for supporting it when sustaining the weight of the patient.

HEAD REST FOR COFFIN.—John P. Waugh, of South Scriba, N. Y.—A head rest of sheet metal or any other suitable material is made by shaping a plate, of suitable size, with a cavity in the upper side, and extending to one edge for the head of the corpse, and a flange, extending around three sides of the plate and upward from it, for nailing to the inner walls of the coffin. This makes a very simple and cheap head rest, which may be applied to the coffin after the latter has been made.

GUTTER FASTENING.—William L. Rogers, of Rochefort, Mo.—The invention consists in the use of a supporting bracket and saddle, the former being fastened to the building, the latter fitted around the trough or gutter and slipped upon the bracket. The gutter is thereby held without being pierced by nails, screws, or other fastening implements, which often rust through and cause it to drop.

SCAFFOLD.—John Redick, of Butler, Ohio.—This invention relates to a new builder's scaffold, which is so constructed as to be easily taken apart and conveyed from one building to another, put up in a short time, and constructed at a less cost than the ordinary scaffold now in use. The four posts or uprights are on the long sides of the scaffold, connected by braces which are secured by bolts or screws, and placed diagonally and crossing each other as shown. At the ends, the scaffold has braces which fit into grooved edges of the uprights and are fastened by means of pins. The uprights are grooved throughout their lengths and perforated at short intervals, so that the braces can be set higher or lower, as may be desired. For extending the scaffold vertically, the uprights are spliced. Cross bars are held in the uprights by pins at the ends of the scaffold, which do not pass through the bars. By means of vertical rods, the ends of the cross bars are connected with jointed levers which rest on pins across the ends of the scaffold. By swinging down the jointed middle portions of the levers, their ends will be elevated to raise the platform. In this manner they can be elevated by the persons on the platform.

MECHANICAL MOVEMENT.—John J. Kimball, of Naperville, Ill.—The object of this invention is to construct an anti-friction mechanical movement for converting rotary or oscillating into reciprocating motion, or *vice versa*. The invention consists in the application of friction wheels to a reciprocating slide, and in their combination with the crank of a rotary or oscillating shaft.

AXLE BOX.—Sennitt A. Wing and Ianthus G. Johnson, of Greenfield Center, N. Y.—This improved axle box consists in an arrangement of the axle bearing eccentrically in a large center box, which is arranged in the outer or pipe box fitted in the hub of the wheel so that it can be adjusted on its axis to carry the axle bearing forward of the center of motion of the wheel, whereby, it is thought, the gravity of the load will assist the draft.

LOG BINDER.—Walter L. Dean, of Dayton, N. Y.—This invention provides the carriage of a drag saw mill with a binding apparatus, whereby a suitable number of logs or poles can be secured and fed to the saw, to be cut at once. It consists in means for binding logs or poles effectually, whether a single large log or several small ones are being operated upon, as pointed out in the claim, which is for a combination with a movable truck, to which the logs or poles are fastened, a spiked roll, and roll provided with an intermediate chain.

MOUSE TRAP.—Charles A. Hotchkiss, of Bridgeport, Conn.—This is an improved mouse trap, so constructed that the mouse cannot reach the bait, but will spring the trap attempting to reach the bait. It will set itself when the spring loop that carries the catching loop is pulled down. It consists in a bait hook, coil, and catch, constructed and combined with other parts of the trap, so that when a mouse enters the hole, and attempts to reach the bait, it inserts its head in the recess of the coil, and, pushing against the coil, springs the trap, and is caught by the loop before reaching the bait.

ROTARY ICE SHAVER.—A series of devices is employed to rotate knives against which a block of ice is automatically fed, whereby the ice is shaved off and falls through a suitable chute into a glass or suitable receiver. Patented by Clement C. Clawson, of Raleigh, N. C.

RAG CUTTING ENGINE.—Edward Wilkinson, of Paterson, assignor to himself and William O. Davey & Sons, of Jersey City, N. J.—A metal box is fitted in the bed frame of the machine immediately under the cylinder, for holding the case in which the cutters are confined, the sides of said box being slightly wider apart at one end and bottom than at the other end and top, so that the case which is correspondingly fitted, will wedge in tight when shoved in snugly from one end. The cutters are fitted to bars placed in the bottom of case transversely, and having temper screws screwing through them down upon the bottom of the case to raise or lower them. The cutters are also confined between the cross bars which hold them to the work while being adjusted up or down. This arrangement admits of applying a set of cutters and removing them in the most ready manner, so that but little time need be lost, as in the case with the rude apparatus heretofore used, which requires many hours of laborious work to shift and adjust the cutters. Two or more cases and sets of knives will be used, so that when one set gets dull and is taken out, another can be readily put in. If the case be difficult to start when wedged in, a bar and screw may be employed for the purpose, the screw passing through the said bar, which is placed against the end of the box and screwing into case.

FENCE.—Patrick J. Hynes, of Stoughton, Wis.—The object of this invention is to furnish a convenient and durable portable fence for farm and other purposes. The panels of the fence are composed of posts and rails put together with nails or fastened in any substantial manner. These panels rest upon the ground, and the ends of the posts may penetrate the ground, so as to steady the fence if required. The distinguishing feature of this portable fence is the application of cross girders, a short one near the top of the fence, and a long one near the bottom. These girders are gained out on each side. These gains receive the posts, the girders being introduced between the panels. Keys or wedges are driven into the ends of the gains against the posts. Braces are fastened to the upper and the lower girders, and stand at an angle of about forty-five degrees, with their lower ends standing on or penetrating the ground. An iron band incloses the upper ends of the posts and holds the two panels firmly to the girder. Hook stakes are driven into the ground and hook on to the ends of the lower girders. By removing these stakes, the keys and the band of the fence are readily taken up, and may be set down in any other location with very little trouble. In fences of this description rough sawn lumber is used, and the wedges or keys are employed to compensate for difference in thickness of the posts. In passing over uneven ground the posts may be spread at top or bottom by means of wedges, or by cutting the gains in the girders and making the iron band with reference thereto.

WAGON REACH.—Thomas Laux, of Bucyrus, Ohio.—This invention has for its object to furnish an improved wagon reach, so constructed that it may be conveniently lengthened and shortened as required, and which will prevent the reach and hounds from being twisted or strained should one of the wheels drop into a hole or rise in passing over an obstruction. To the rear axle the rear ends of the rear hounds are attached in the ordinary manner. The forward ends of the rear hounds are connected by a metallic plate, attached to their upper sides, and by the forward end of a metallic plate attached to their under sides, thus forming a guide socket to receive the reach. The metallic plate extends back to and is secured in a hole in the axle, or between it and the bolster. The sides of the under plate are turned up, thus forming a channel to receive the reach. The edges of this plate are notched, to receive the ends or points of a catch, which extends across the upper side of the reach, and the ends of which are bent down upon the sides of the reach to enter the notches in the edges of the plate. The catch is secured in place, when adjusted, by a bolt which passes through a longitudinal slot in the plate, and through a hole in the reach, and has a hand nut screwed upon its upper end. By turning up the nut and raising the catch, the reach may be slid along in the channel plate to adjust it longer or shorter, as may be desired. In the forward part of the reach is formed a swiveled joint, which is formed by attaching metallic caps, connected by a swivel bolt to the adjacent ends of the parts of the reach. By this construction, should one of the wheels descend below or rise above the level of the others, the swivel joint in the reach will prevent the reach or hounds from being twisted or strained. In the forward end of the reach is formed a hole to receive the king bolt in the ordinary manner.

CHIMNEY STOP.—Charles H. Earle, of De Pere, Wis.—This invention relates to a new fastening attachment to a chimney stop or plate for holding the same in place so that it will effectually prevent sparks and fire from entering the room through the hole in the chimney. The invention consists in the application of an expansible elliptical spring to the inner side of the plate, which spring is enlarged after the plate is applied to fasten it to the chimney, by aid of a screw bolt passing through the center of the plate which, compressing the spring, elongates it and causes it to bear against the sides of the hole.

CHEESE VAT.—Augustus B. Armstrong, of Dorset, Vt.—This invention has for its object to equalize the heat under the water vat so that the curd will receive an even temperature throughout. The production of cheese from a given quantity of milk will thereby become more profitable on account of greater weight and better quality obtained. The invention consists in the application of mulching plates between the front portion of the furnace and the front part of the water vat, and in the placing of ashes or equivalent material upon such plate; also, in the arrangement of supporting rods or lugs within the water vat for holding the cheese vat, so that the water is higher under its front than in rear, all serving to so spread or equalize the heat, under the cheese vat, as to bring its contents to an uniform temperature throughout.

CHURN POWER.—Levi A. Haight, of Cairo, N. Y.—This invention consists in an arrangement of a foot treadle and hand lever with a crank shaft, and an arrangement of the crank shaft with the walking beam, having the dasher of a churn attached to each end. An operator working the treadle by the foot, whether sitting or standing, may take hold of it to add the power of his hands, and the work may be divided between the members and made less fatiguing to either, while it affords means for applying more power when required than can be done by the hands alone. For working the walking beam to which the churn dashers are attached, a crank is used with a slotted arm hanging from the said walking beam, at the joint wherein it is pivoted, and rigidly connected to it. The crank is provided with an anti-friction roller to work against the walls of the slot to reduce the friction. The whole apparatus is mounted on a platform, constituting a portable machine.

HARNESS SADDLE TREE.—Thomas George Moore, of Albia, Iowa.—This invention relates to a new construction of harness tree, to make it self adjusting to the animal's back, and easily put together. The invention consists in connecting the bridge and jockeys by means of tenons on the former and sockets on the latter, and applying the terrets to the last named sockets, so that they will close the same and help secure the bridge. From each jockey projects a socket or box, open on top and vertically slotted at the end nearest the bridge. Each end of the bridge is T shaped, that is, has projecting pins at both sides. The terrets have their shanks so formed as to fit into those parts of the socket that are not occupied by the bridge. The ends of the bridge are fitted within the sockets, so that its pins will be concealed therein, recesses being provided in the sides of the socket for the reception of the pins. The turrets are then, with their shanks, fitted into the sockets, and cover the same, locking also the pins within their recesses. Screws or pins are employed to lock the terrets. All parts are thus properly united and readily put together. The jockeys can swing on the pivots to be self adjusting, and cannot work loose, as they are firmly held in place by the terrets. The construction of the tree is quite simple. All parts can be cast in the form shown, so that no difficult manipulations are required.

MACHINE FOR TWISTING YARN.—John Henry Jackson, of Putnam, Conn.—The features of this invention are the use of spring thread guides to regulate the yarn as it is fed off the spools, and prevent its too rapid delivery and also to increase the tension of the same, as may be desired. Also the use of a continuous cord, which is passed over pulleys on the spindles in such a manner that they are simultaneously driven all in one direction.

SPIKE MACHINE.—Frederick J. Kimball, of Philadelphia, Pa.—This machine consists of two roller disks or die rolls, the dies being so formed in the perimeters of the disks that both the points and heads of the spikes are perfectly shaped, and the spikes cut off of the proper lengths in a single operation, the rod being fed in lengthwise between the rolls. The rolls are actuated by strong and simple mechanism, which need not be described.

MECHANICAL MOVEMENT.—Edward E. Young, of York, Me.—This invention has for its object to furnish an improved device for varying the rapidity of motion, simple in construction, effective in operation, and easily adjusted. To the main driving shaft is attached a crank wheel, the crank pin of which is attached to a dovetailed slide, which works in a dovetailed groove in the side of the wheel, and which may be held in place when adjusted by a catch, or which may be adjusted and held by a swiveled crank screw working in teeth formed in the said slide. By this construction the crank pin may be moved toward or from the center of the wheel, thus adjusting the length of the crank, and consequently the motion communicated from said crank. To the crank pin is pivoted the end of a connecting rod, the other end of which is pivoted to the end of a working beam. The middle part of the beam is slotted longitudinally, to receive a pin, attached to the standard or frame work, to which the said beam is pivoted. Upon the under side of the beam are formed teeth which mesh into teeth of a small gear wheel, the journals of which work in bearings in the standard or frame. To the projecting end of one of the journals of the small gear wheel is attached a hand crank or screw wheel. In the latter case the wheel is turned by a swiveled crank screw connected with the standard or frame. By this construction, by turning this wheel in one or the other direction, the relative lengths of the two arms of the working beam, and consequently the motion communicated from said beam, may be adjusted at will. To the other or working end of the beam are pivoted the upper ends of two connecting rods, the lower ends of which are pivoted to the outer parts of two bars or plates, riding upon and pivoted to the driven shaft upon opposite sides of a ratchet wheel rigidly attached to said shaft, the lower end of the rods being arranged upon opposite sides of the shaft. To the inner side of the outer part of the plates or bars are pivoted spring pawls, in such positions that their engaging ends may take hold of the teeth of the opposite sides of the ratchet wheel. By this construction the shaft driven will be moved by one of the pawls as the end of the beam moves downward, and moved in the same direction by the other pawl as the said end of the beam moves upward. By this construction the throw of the working end of the beam may be adjusted to give a greater or lesser movement to the driven shaft as may be desired.

PISTON PACKING.—John Clark, Harrisburgh, Pa.—This invention relates to an improvement on the piston packing for which letters patent No. 103,140 were issued same party, bearing date May 17, 1870. In this invention set screws are dispensed with, and spiral springs are employed instead. The springs are placed within recesses formed in the annular wedge, and bear against the follower so that, when the latter is moved inward, the springs force the wedge into the enclosing ring, with the same effect as the set screws of the former invention. The invention also aims at reducing friction by forming ribs on the ring that encloses the annular wedge.

AUGER.—Hiram Pitcher, of Fond du Lac, Wis., assignor to himself and H. & G. O. Trowbridge, of same place.—This invention is an improved combined auger, reamer, and core auger, so constructed and arranged that the two parts may be used together or separately, as may be desired, or as circumstances may require. The shank of the auger works in bearings and guides, and is driven in the ordinary manner. The stem or shank is made with a spiral thread in the ordinary manner. The forward end of the auger is reamed out, or has recesses formed in it to form a spur edge upon its periphery, for a guide to the auger while boring, and to prevent the auger from turning to one side. The spaces between the lips are also filled up with metal, leaving the space, for the chips to pass through, small, to prevent the chips from coming off when the auger is being withdrawn. The metal also provides a seat for the spur cutters, which can thus be placed forward of and quite close to the cutting lips. The reamer is made hollow, and of such a size as to fit upon the auger. The reamer may be driven by a pulley independently of the auger, or it may be so connected with said auger as to be carried with it in its revolution. The hollow cylinder of the reamer is made with any desired number of spur cutters around the inner edge of its forward end, to serve as a guide to the tool when used as a reamer, and to separate the central core from the surrounding wood when used as a core auger. The forward end of the reamer is also provided with any number of cutting lips. The spaces between the lips are filled with metal, to make the spaces for the chips to pass through, small, to form a greater bearing surface upon the periphery of the reamer, and also to form a seat for the cutting spur cutters, which can thus be placed forward of and close to the cutting lips. The spurs are secured in their seats by set screws, so that they may be set to cut forward to any desired distance. The reamer is provided upon its outer surface with a spiral thread in the usual manner. By this construction the inner auger may be used alone or in connection with the outer auger or reamer. The outer auger may be used alone to ream a hole, or as a core auger; or it may be used in connection with the inner auger to ream a hole as it is bored.

POST HOLE DIGGER.—Mr. Edward R. Sumner, of Freeport, Ill., has invented an improved post hole digger, which has many advantages over the old style of tool for this purpose. From the handle of the instrument project arms, to which the blade of the digger is attached. The blade is made of thin elastic metal, in the form of a circular sheet, the edges of which are brought together with an inclined or diagonal joint or opening. The ordinary diggers have a straight or vertical opening, within which roots or other obstructions are apt to enter, on the descent of the digger, and become jammed or lodged in the joint, preventing the proper operation of the tool. By making the joint inclined or diagonal, as in this improvement, this difficulty is overcome, as the obstructions cannot enter the opening, but are cut off or pushed downward by the descent of the blade. The lower portion or cutting edge of the digger blade is provided with a series of diagonal or serrated cutting teeth, having sharpened edges. These teeth, by their pointed and wedge shaped form, easily enter and cut through the soil, also through turf, roots, etc. A digger provided with cutting teeth of the above form will have obvious advantages for working in almost any kind of ground, but especially in thick or tenacious soils, or those containing turf or roots. The usual form of the cutting edge is horizontal or straight, but by the use of serrated teeth, the extent of the cutting surface is much increased, the efficiency of the tool improved, and its operations rendered easier and quicker. The serrated teeth, by their flexibility or elasticity, will bind on the earth contained within the digger, and thus hold the earth securely while the digger and its load are being raised. The arms rise vertically for a short distance above the blade, and then converge into the handle. This vertical rise of the arms affords free opportunity for the blade to sink in the earth and permit the soil or turf to rise above the top of the blade, where the turf or soil will be slightly pressed and held during the removal of the tool with its load from the ground.

EGG BEATER.—Erastus B. Kunkle, of Fort Wayne, Ind., assignor to himself and Emanuel Bostwick, of the same place, has invented a novel egg beating device, the peculiar feature of which is, that by means of self acting valves working in perforated disks, the egg to be beaten is caused to circulate up and down in a direction opposite to that of the disks, which together with a suitable stem constitute a vertically acting dasher.

WATER WHEEL.—David Craik, of Church Mills, N. Y.—The peculiarities of this wheel, which is a turbine, are the arrangement of buckets, the arrangement of the chutes, the mode of opening and closing the chutes, and the combination of the several parts whereby, it is claimed, very superior results are obtained, as verified by practical experiments, in comparison with other wheels of its class.

BRICK MACHINE.—Frank Alsip, of North McGregor, Iowa.—This is a combination of a pug mill of peculiar construction, having force paddles at the bottom of the shaft to force out the mixed and tempered clay into a press, which is automatically operated to form the bricks, with various details of mechanism which cannot be well described in this notice. The machine is constructed on sound principles, and will compare favorably with other inventions in this field.

CANCELING AND SEVERING REVENUE STAMPS.—Patrick Wilkie Brown and Joseph Delarue, of Richmond, Va.—This invention consists of mechanism combining a shaft with arms, and one or more ink rollers operating in connection with an ink plate and a knife, the types being held in a suitable box affixed to the knife, so that one movement cancels the stamp and severs it. The mechanism by which this is accomplished is very ingenious, and the whole forms a compact and convenient implement for the purpose specified.

WAGON BRAKE.—William T. Hamilton, of Luthersburg, Pa.—The prominent feature of this invention is the use of a rack and toothed segment for transmitting the power of the foot lever to the brake shoes. A ratchet and pawl movement with a detaching lever are used to hold the brake to the wheels and release it when desired.

CORN SHAVING MACHINE.—This invention relates to a new machine for shaving green corn, so as to separate from the cobs the grains and juice useful for canning. The invention consists in such an arrangement of parts that the shaving process can be carried on by steam or other powerful agent, and performed thoroughly and with rapidity. The machine is adapted to the wants of large canning establishments, and is evidently a very efficient device. The inventor is Elias Watts, of Keyport, N. J.

CHURN.—A vertical revolving dasher, which throws the cream or milk out against vertical ribs, is made to make several turns in one direction, and then several in the other direction, by means of a rack and pinion movement, the rack being impelled by a pivoted lever, working in a vertical plane. The inventor is Mr. Eli Wilcox, of Hamburg, Iowa.

FERTILIZER DROPPER AND SEED DROPPER.—This is a combination of various well known devices, the method of combining and operating the parts being claimed to secure effective working, and the full purposes for which the invention is designed. It is the invention of Edward P. Hamish, of Felton, Del.

SULKY CULTIVATOR.—Nicholas Whitehall, of Newtown, Ind.—The peculiar feature of this invention is a connection of each of the tooth bars with a foot bar in a novel manner, whereby the operator is enabled to guide the teeth or shovel plows around any obstacle which would otherwise impede its progress, or perhaps break the machine, unless thus guided or stopped. The cultivator is intended for cultivation of corn, but may be used for other crops planted in rows.

DOOR FOR RAILWAY FREIGHT CARS.—Horace L. Clark, of Rahway, N. J.—This is a good practical invention. The doors of grain cars have, commonly, a small opening through them near the bottom for discharging the grain by shoveling. In this operation the grain scatters and flies in all directions, causing waste and inconvenience. The inventor obviates this by attaching a flexible spout of cloth, leather, etc., to the opening in such a way as to permit its being folded and allow the aperture to be closed, the spout being folded into the same plane as that of the door. He also makes use of a system of slides, rods, etc., by which the door may be turned up and supported against the ceiling. Stud pins at the bottom, and guides and pawls at the top, are used to hold the door firmly in position when closed.

MACHINE FOR EXAMINING AND REPACKING CIGARS.—Joseph Levy, of Wolcottville, Conn.—This consists of a box open upon one side, four of the other sides being formed of sliding plates. The fifth plate being placed upon the cigars in a box of which the cover has been removed, the four other plates are slid into the cigar box between its walls and the cigars; the whole is then inverted and the cigar box removed. Then the two side plates being slipped away, the cigars are exposed to examination without disturbing their arrangement. After the inspection, the cigar box is again slipped over the cigars, the machine inverted, and the cigars repacked in precisely the order they were found. This obviates the labor and expense of re-arranging them by hand.

TRANSMITTING MOTION OR MECHANICAL MOVEMENT.—Samuel S. Rembert, of Memphis, Tenn.—A wheel having a zigzag groove cut in its perimeter in such a way that the ends of the angles formed by the adjacent inclined portions of the groove run out at one side of the wheel, leaving openings, engages with a trundle wheel or pinion having four or more teeth, the teeth entering the groove through the breaks, and being acted upon by the inclined surfaces of the groove. Two of the teeth are always meshed into the groove, so that the motion is positive, and the number of revolutions of the pinion may be multiplied more rapidly than can be done by the ordinary system of gearing.

MACHINE FOR ELEVATING HAY OR GRAIN, IN STACKING, OR REMOVING IT FROM A STACK.—Edmund Harrison, of Mountain View, Cal.—A receiver formed of a rope or wire netting of peculiar construction is spread over the rack of the wagon, and this receiver is so constructed that, in connection with a proper derrick, the whole load may be elevated. The construction of the derrick, the peculiar construction of the jointed bars which support the netting, and the receiver formed of the netting and jointed bars, are the claims granted in the patent.

WASHING MACHINE.—William C. Marr, Joseph S. Maughlin, and George A. Davis, of Onawa, Iowa.—This invention relates particularly to an improvement on a washing machine patented by Lull and Bowen, July 21, 1868. Two standards enter a recess or socket in a cleat or block attached to the bottom of the tub, which may be an ordinary wash tub. A large fluted roller revolves in stationary bearings in the lower part of the standards. One journal of the roller projects upon the outer side of its standard, and to its projecting end is attached a gear wheel, into the teeth of which mesh the teeth of a gear wheel pivoted to the upper part of the standard, and to which is attached a crank by which the machine is operated. Small rollers are placed above the large fluted roller. Three or more are used, and their journals revolve in blocks placed in recesses formed in the inner sides of the upper part of the standards. These rollers are held down with proper force upon the clothes by coiled springs. The journal blocks rock to allow the rollers to adjust themselves to the varying thickness of the clothes passing between them and the large fluted roller. The arrangement of the large roller below the small rollers instead of above them leaves a greater available space in the tub for washing the clothes by hand, or for access to them for other reasons; fringes and frills of garments are less liable to be caught or to be torn; the large roller carries up the water to a greater extent; and it also sits lower in the tub than the small rolls in Lull and Bowen's patent.

SHANK AND TOE LASTERS FOR BOOTS AND SHOES.—Charles Leonard Graves, of Osage, Iowa.—This invention consists in a combination of parts forming a simple, easily operated tool, designed for use by workmen in holding and stretching the leather in the desired manner while lasting boots and shoes. A series of levers, all terminating in hooks, except two which have serrated edges, are all arranged in a semicircle, so that the serrated ones are diametrically opposite each other. These levers pass through a plate and are inclined outwardly, so that the longitudinal adjustment of said plate will cause all the levers to swing in or out simultaneously and in radial directions. This movement of the plate is derived from a screw and nut. The implement is used for stretching the toe by applying the hooks to the leather, and then turning the screw so as to contract them, thereby properly drawing the leather over the end of the last. For stretching the shank of the boot, the machine is inclined so that the serrated arms will take hold of the leather, the hooks remaining quite free.

SEWING MACHINE.—Carlos Stebbins, of Pike, N. Y.—This invention consists in an arrangement with the cam plate for working the thread take-up of a device for automatically varying the width of the slot, as the cam plate which is attached to the presser bar varies by the varying thickness of the cloth, for regulating the action of the take up more effectually to meet the requirements of cloth of varying thickness than can be done by the present arrangement. Also, in a novel arrangement of the joint of the vibrating arm for preserving oil and lessening friction. The vibrating needle arm joint consists of round headed bolts, supports therefor, and an inverted concave arm on the end of the needle arm, the said bolts being fitted in sockets adapted for them in the bottom of oil cavities, being inclined either toward each other, or in the opposite direction, so that they cannot draw out of the sockets, which are designed to be under cut so as only to admit the heads or allow them to be taken out by movements in the direction in which they are inclined. This kind of oscillating joint is applicable to other machinery as well as to sewing machines.

WASTE PIPE FOR SINKS.—James L. Oliver, of Boston, Mass.—This invention relates to an improved safety waste pipe for sinks and the like, to prevent the escape being stopped and the overflow resulting therefrom; and it consists in a perforated extension of the waste pipe above the bottom of the sink, and a stopper in the top, which will float off in case the perforations which afford the escape for the water ordinarily become stopped, and open an escape for the water so large as not to be stopped by the small particles likely to stop the smaller holes.

WRENCH.—Hiram M. Smade, of Manistee, Mich.—This invention relates to a new pipe wrench of the kind where the movable jaw is pivoted to a sliding sleeve; and it consists particularly in the mode of fastening the stationary jaws. The handle, main shank, and the stationary jaw holder may be made in one piece, or united from separate sections. The jaw holder is like a hook on the shank with a double in lined inner edge, upon which are secured two fixed jaws, or plates, made of steel or other hard material, with roughened or corrugated inner faces. They rest on shoulders formed on the hook, and meet at their upper ends. A movable sleeve sliding on the stem is operated by a screw, swiveled in a projecting ear of the handle. A movable jaw is pivoted to the upper part of the sleeve. The pivot pin of this jaw may be made in form of a screw, so that said jaw can be clamped fast in any desired position after having once been adjusted for a certain size of pipe. By the arrangement of the jaws shown, the pipe is clamped on three sides, and thus securely held. This is a very compact, and, apparently, efficient tool.

CULTIVATOR.—Jacob S. Fleming, of Island Creek, Ohio.—This invention consists of a coulter formed solid upon the forward end of the center beam of a cultivator by bending the forward end of the beam downward. It is scarcely necessary to add that this refers to cultivators made with rim beams, or having a center beam of iron.

DIAPER PIN.—William H. Hockensmith, of Bridgeport, Conn.—This pin is formed, as certain others have been, from a single wire, but, unlike them, the wire is formed into a long and a short spiral coil, the one forming the elastic and extensible back or body of the pin, the other an eye or socket for reception of the sharp point of the pin proper. Thus a large number of thicknesses of cloth can be secured by this pin, since the back will readily yield outward from the pin proper, and at the same time its tension will be increased so that the point socket or eye will be drawn yet closer against the cloth. And since the coils run in the same direction as the pin proper, when it is desired to disconnect the latter, the extension or drawing out of the coils for the purpose is an easy operation, and no bend being given to the wire, no injury is done to it, such as would cause the back of a pin otherwise formed from wire to quickly break asunder. The form of socket is likewise calculated to protect the pin point better than is the case in other pins, since it entirely surrounds it.

HARROW.—Josee L. Willoughby, of Bowling Green, Ky.—The frame of an ordinary V-shaped harrow is made in the ordinary manner, having harrow teeth, the upper ends or shanks of which pass up through the frame and are secured by nuts. The lower or working parts of the teeth are made with an edge upon their forward sides, the lower part of said edge being inclined to the rearward, so that the said teeth may slide over instead of catching upon the roots or other obstructions they may encounter. To the rear end of the frame is attached a roller, to the convex surface of which are attached teeth, by which the ground, as it is rolled level by the roller, will be loosened and stirred up so as to be left mellow and light. Bars, the ends of which are pivoted to the rear part of the side bars of the frame, are bent upward at right angles, extend upward to a suitable hight above the roller, and are bent inward at right angles so as to be above and parallel with the rear part of the said roller. To the upper or horizontal part of these bars are attached teeth, which project downward along the rear side of the roller so as to clean off any sods or dirt that may adhere to it or to the teeth. Handles, which are pivoted to the opposite sides of the central bar of the harrow frame, pass back through keepers attached, at suitable distances apart, to the upper or horizontal part of the bars supporting the roller journals. By this construction the toothed roller can rise to pass over obstructions without interfering with the operation of the harrow, and by bearing down upon the handles the harrow can be raised from the ground for convenience in turning, and for avoiding stumps and other obstructions.

WATER WHEEL.—Charles M. Miles, of Milford, Del., assignor to himself and Solomon Matthews, of same place.—The water wheel has buckets of suitable shape and arrangement. A guide chute is arranged within the wheel; and a vertically adjustable gate within the chute. The wheel and chute are both divided into two or more stories or sections, one above the other, by means of horizontal partitions. The gate can be lowered to open only one story, or two or more, according to the head of water at disposal, and in each case the chutes and wheel will operate as one perfect apparatus, the upper parts thrown out of action not interfering the least with the lower in action. The same invention is applicable to wheels having the chutes and gates, or either, on the outside.

ARCHED TRUSS FOR BRIDGES.—Peter L. Weimer, of Lebanon, Pa., assignor to himself, J. A. Weimer, and L. E. Weimer, of same place.—This invention is an improvement in bow string bridges. An arch truss has lattice work connecting the arch and the chord. The arch is formed of a series of cast iron flanged segments. A broad plate of boiler or wrought iron is firmly riveted over the top of the segments and to the ends of the chord. Another broad wrought iron plate is secured to the under sides of the segments, and also to the chord, by rivets. The chord is thus firmly connected with the ends of the arch. The chord plate may be broader than the arch plates, and all the plates may be broader in the middle than at the ends. These broad plates (especially the broad chord) allow the bridge or truss to resist lateral pressure, and add materially to the strength of the structure. The lattice slats pass through mortices in the lower flanges of the segments and the lower plate, and are securely riveted or bolted to the segments. The lower ends of these slats pass through mortises in the chord, beneath which they are confined by keys, or in any other suitable manner. The lattice slats are riveted together where they intersect each other. This arched truss is more particularly designed to be employed in bridge building, but is not necessarily confined thereto, as it may be used for various other purposes.

WATER WHEEL.—Alexander C. Lesner, of Fonda, N. Y., assignor to himself and Abram V. Davis, of New York city.—This invention is a new manner of arranging the gates of a turbine water wheel in their annular supports, making them independently adjustable in the supports, and slightly yielding to the varying degrees of pressure by the water. The chutes are set concentric, and have their inner faces so curved that the buckets of the wheel will always be in contact with them, except where the perforations are made for the admission of water. By this arrangement the power of the water is concentrated before admitting it to the buckets. The gates are secured in and between rings which constitute the annular frame of the gates, and are placed around the chutes. A pinion meshes into a toothed portion of the edge of a lower ring, and is used for turning said ring and thereby adjusting the position of the gates in the desired manner. Each gate has projecting tenons at the ends, which enter slotted or grooved sockets provided for their reception in the rings. These sockets are somewhat longer than the tenons, so that the gates will have slight play in the rings. The gates can thus yield to the force of influx of water or change of current, and avoid a considerable amount of friction. More power is thus gained The gates are made L shaped. Their longer arms are curved to fit against the circular circumference of the chutes; the short arms project from the long at an angle of about one hundred and thirty-five degrees, and have their working faces quite straight and smooth, while the backs may be rounded. In this manner the gates, with their projections, serve as actual extensions of the chutes, and permit the use of a narrow chute ring.

PULLEY.—Matthew Ward, of Mount Carmel, Pa.—This invention has for its object to furnish an improved pulley, designed especially for carrying wire ropes upon inclined planes, so constructed that it will begin to revolve as soon as the rope touches it, thus preventing the rope from cutting the wood, as it is liable to do with pulleys made of wood in the ordinary manner. The body of the pulley is made of wood, and in two parts, to receive a gum elastic piece, and to prevent said gum elastic piece from coming in contact with the pulley shaft. The outer edges of the inner sides of the parts are bevelled or rounded off to form the flanges of the pulley. The gum elastic is made in the form of a flat ring, placed between the parts of the pulley, and secured in place by forcing the said parts toward each other, the shoulders of said parts being narrower than the thickness of the ring. The shaft passes through the parts of the pulley. Upon the shaft at one side of the pulley, is formed a collar, and upon it, at the other side of the pulley, is formed a screw thread, upon which is screwed a nut, so that the parts of the pulley may be secured to each other by screwing up the nut. Metallic disks or washers are used, one of which is interposed between the collar and the side of the adjacent part of the pulley, and the other part is interposed between the side of the other part of the pulley and the nut.

WATER WHEEL.—Daniel A. Flummerfelt, of Bridgeville, N. J.—This invention relates to several improvements in the parts used in connection with a turbine water wheel, and in the arrangement of the wheel itself; and has for its object to provide means for more fully utilizing the force of the water than could be done by the appliances hitherto in use. The invention consists chiefly in a new arrangement of the central discharge chamber, which is provided with convex discharge plates, whereby the water is rapidly conducted away so that it cannot clog the wheel. The invention also consists n a new arrangement of certain other parts, as described in the specification, the details being of a character requiring diagrams for the clear exposition.

LIFTING MACHINE.—Francis B. O'Connor, of New York city.—This invention is an improved machine, intended to develop the powers of the human subject. It consists in a small platform of suitable dimensions for the operator to stand on, with two strong India rubber or other springs attached to it, one on or near each of two opposite sides, and made of suitable length, and provided with handles at the upper end, adapted for the operator to expend his strength on the springs by pulling them upward.

MEDICAL COMPOUND.—George W. Chambers, of Talladega, Ala.—An improved medical compound or blood purifier for the cure of debility, enlargement and ulceration of glands, ulcers, eruptions of the skin, syphilitic diseases, affection of the kidneys, etc., consists in a complex mixture of vegetable tinctures with iodide of potassium.

STEAM GENERATOR.—Rus W. Dugan, of Covington, Ky., and Benjamin F. Clark, of Cairo, Ill.—This steam generator consists in a combination of heating coils and a cylinder, calculated to provide a simple and efficient generator, by which steam can be rapidly and economically made, with no danger of explosion, and with but little wear or injury to the parts, the cylinder being placed outside of the furnace, inclosing the coils in which the steam is generated.

PRUNING SHEARS.—William F. Clemmer and George H. Clemmer, of Alexandria, Ohio.—This pruning shears is arranged to bring the fulcrum close to the cutting edge, giving great power to the shears. To effect this, two grooves and a brace plate, arranged in connection with the rivets and blades of the shears, are employed, by which greater strength is gained to meet the increased strain of the greater leverage, and also the cutting edges are made to cut in the proper planes to cut clearly and with greatest effect.

SPECULUM ATTACHMENT.—Jerome D. Bruce, of Newberry, S. C.—This is an improvement in the well known surgical instrument or appliance known as the speculum, for the examination of the uterus or neck of the womb; and consists in an attachment to the speculum of an elastic tube, so arranged that the tube may be distended after the speculum has been inserted into the vagina, thereby distending the parts and greatly facilitating the examination of the uterus. By means of this tube the operator forces, with his mouth or otherwise, air or liquid into the tube, after the speculum has been inserted into the vagina. By thus distending the vagina and the parts connected with the neck of the uterus, the examination of the latter organ is rendered much more perfect and satisfactory than it has been heretofore.

SHAFTS FOR SLEIGHS.—Charles Bock and Daniel Bock, of Drum's, Pa.—The object of this invention is to so construct the shafts or thills of one horse sleighs or "cutters" that they will allow the horse to travel directly forward in the left hand path of the snow track, while the runners of the sleigh run free in the track and the body of the sleigh keeps in its proper position. It consists of shafts, a double crossbar, draft bar, and curved bar, constructed and arranged together to secure the purposes described.

EARTH CABINET.—Wm. H. Bliss, of Newport, R. I.—This invention provides an earth closet or cabinet, claimed to be an improvement upon others which have preceded it, in that it is more convenient in use, cleanly, and effective in preventing any escape of offensive odors. It consists in a combination of various parts—some of which are similar in character to those already in use—with others, the form and use of which are varied the better to secure the desired results.

GRADING AND DITCHING MACHINE.—Joseph W. Fawkes, of Maroa, Ill.—This is an improved apparatus for grading and ditching, of the class in which a common or any approved plow is mounted on a truck frame, on which is arranged a table provided with carriers for taking the earth turned up by the plow and depositing the said earth on a grade or bank or road bed. The invention consists in the arrangement of a carrier, the said carrier being hinged to a rotary wheel or disk, and provided with tripping and resetting apparatus for causing it to be dumped and reset automatically.

COFFEE AND GRAIN CLEANER AND SEPARATOR.—Richard Frisby, of Cleveland, Ohio.—This machine is intended to be used in connection with a hulling or scouring mill to dust and separate the grain, or by itself for separating different grades of coffee and cleaning it of all foreign matter, which is intended to be blown out through a spout and discharge, while any grains blown through the spout will be arrested by a screen, and fall through the spout into a receptacle below. A screen separates all coarse matters, which may be removed by hand. A valve is arranged in the mouth of the air conductor for regulating the draft. The air is blown across the screens, by which a much longer screen can be used than when the air is blown lengthwise of it.

EXTENSION CLOTHES POLE.—James Denton and Whitley Denton, of Amsterdam, N. Y.—To the lower part of a clothes pole is attached a metallic shoe, the opposite ends of which are turned downward, to enable it to take a firm hold upon the ground and prevent it from slipping, however much the clothes line may be swung about by the wind. To the upper end of the lower part is attached a band, which is extended upon one side to form a guide and keeper to receive the upper part of the clothes pole and hold it close to the lower part. To the lower end of the upper part is attached a band, one side of which is extended to form a guide and keeper to receive the lower part and keep the two parts of the pole close together at all times. To lugs formed upon the upper band or keeper are pivoted the ends of a loop or stirrup, through which the upper part of the pole passes, and which catches upon the rack teeth or notches formed upon the outer side of the upper part to support it, however much or little it may be extended. The upper end of the upper part of the clothes pole is notched to receive the clothes line, and to the opposite sides of said notched upper end are attached he lower ends of two spring bars, the upper parts of which are bent inward, and their upper ends are bent outward. By this construction the upper end can be conveniently applied to the clothes line, and when applied will hold the line securely, so that it cannot be blown out, however much it may be blown about by the wind.

MACHINE FOR BENDING WOOD.—Augustus F. Marshall, of Black River, N. Y., has patented a novel machine for bending wood for chairs, etc. It consists in a new arrangement of devices with a former, a metal spring band, and attachments for confining the band to the bar of wood to be bent. The machine is undoubtedly a good one, very strong and compact, and one likely to meet with favor on the part of manufacturers of wooden articles of various kinds.

LOW WATER DETECTOR.—Mr. Gideon B. Massey, of New York, who has devoted much time to the invention of various appliances calculated to insure greater safety in the use of steam, has lately patented an improvement upon his invention for which letters patent were granted August 23, 1870. The nature of the improvement cannot be rendered clear without diagrams, but we can assure our readers that the instrument, as now constructed, is an effective device for the purpose intended, sounding an alarm whistle, as soon as the low water limit is reached. We need not say that we believe these or similar instruments should be placed on every boiler. Our opinions upon this subject are already known to our readers.

BUNG SPOUT.—John Marvin and William T. Hulse, of Port Jefferson, N. Y.—This invention is intended to supersede the primitive leather spouts now generally attached to barrel bungs wherever faucets are not to be used. It consists of a spout pivoted to a forked frame, which has a hook for catching under and a screw, key, or lever for bearing upon the staves. The instrument is applied by passing the hook through the bung hole, making it catch over the edge of the stave, and then turning the screw against the barrel until the packed end of the spout bears firmly against the barrel. The latter can then be turned to discharge through the bung hole. In place of the screw a lever or key may be employed.

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FOR THE WEEK ENDING SEPTEMBER 12, 1871.

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118,777.—BRICK MACHINE.—A. Anderson, Peekskill, N. Y.
118,778.—CASE.—W. Bayley, A. P. Crowell, Wilmington, Del.
118,779.—HEATER.—A. G. Bearup, P. Carraher, Jr., N. Y. city.
118,780.—BLANK, ETC.—H. M. Beecher, Plantsville, Conn.
118,781.—FASTENER.—H. Binder, St. Louis, Mo.
118,782.—SEAT.—J. W. Blakeney, New York city.
118,783.—ELEVATOR.—W. Boswell, Pontiac, Mich.
118,784.—SNOW PLOW.—T. S. Brown, Greenfield, Mich.
118,785.—BELT FASTENING.—G. A. Brown, Reading, Mich.
118,786.—STEAM TRAP.—N. H. Bundy, New York city.
118,787.—ACETATE OF LIME.—C. J. T. Burcey, Black Rock, Conn.
118,788.—ACETIC ACID.—C. J. T. Burcey, Black Rock, Conn.
118,789.—INDICATOR.—W. Butterfield, Madison, Wis.
118,790.—WASHING MITT.—M. Cadwell, Lansing, Mich.
118,791.—ELEVATOR.—F. Calvert, Wabash City, Ind.
118,792.—WHEEL PLOW.—W. J. Connor, Benton, Ill.
118,793.—EXCAVATOR.—J. P. T. Davis, New Trenton, Ind.
118,794.—WHITE LEAD.—W. Davison, Baltimore, Md.
118,795.—EARTH CLOSET.—M. E. Doolittle, Hartford, Conn.
118,796.—SCROLL SAW.—N. T. Edson, New Orleans, La.
118,797.—THRASHER, ETC.—S. Filby, Lewiston, N. Y.
118,798.—PADLOCK.—L. H. Gano, New York city.
118,799.—BOILER.—Azel Gay, Rochester, N. Y.
118,800.—SAW.—G. B. Green, Staffordshire, Eng.
118,801.—HEAD BLOCK.—W. A. Greenleaf, Indianapolis, Ind.
118,802.—SEAT.—A. G. Hawkes, Baltimore, Md.
118,803.—COLLAR.—S. F. Hilton, Providence, R. I.
118,804.—BED BOTTOM.—S. Hobbs, Wilmot, Ohio.
118,805.—BRUSH AND BOX.—H. S. Kerr, Philadelphia, Pa.
118,806.—AUGER.—R. M. Lafferty, E. P. Smith, Three Rivers, Mich.
118,807.—COAL SCUTTLE.—E. Mather, Chicago, Ill.
118,808.—MULE.—P. McGovern, Lawrence, Mass.
118,809.—BOOTJACK, ETC.—J. M. McMaster, Rochester, N. Y.
118,810.—HAY TEDDER.—W. H. Mickle, Utica, N. Y.
118,811.—VENT BUNG.—C. H. Miller, W. Ascough, Buffalo, N. Y.
118,812.—MEDICAL COMPOUND.—D. Nixon, Philadelphia, Pa.
118,813.—SOLUTION.—O. Oldberg, Washington, D. C.
118,814.—SHADE.—J. J. Phares, Whitestown, Ind.
118,815.—WHEEL.—J. Priest, Detroit, Mich.
118,816.—SLATE CUTTER.—W. H. Rayner, Springfield, Mass.
118,817.—STEAM VALVE.—M. C. Rer ell, Clinton, Ark.
118,818.—PLUG HOLDER.—J. Ritchie, Detroit, Mich.
118,819.—PUTTING UP POWDERS.—H. Sawyer, Chelsea, Mass.
118,820.—WHIP SOCKET.—F. Selle, Detroit, Mich.
118,821.—SEED DRILL.—R. B. Sheldon, Canastota, N. Y.
118,822.—BEE HIVE.—W. P. Shortridge, Easton, Mo.
118,823.—EXTRACTING PACKING.—H. N. Smade, Manistee, Mich.
118,824.—COUPLING.—O. L. Smith, J. F. Utton, Providence, R. I.
118,826.—CHURN.—G. Spayd, Alma, Mich.
118,827.—BEE HIVE.—S. D. Stearns, G. Ellsworth, Weston, Ohio.
118,828.—DOOR LOCK.—C. I. Stewart, Baltimore, Md.
118,829.—PRESS.—C. R. Taylor, Iona, Mich.
118,830.—SAFE LOCK.—M. G. Tousley, Mendota, Ill.
118,831.—BOB SLED.—A. H. Walrath, Pamelia, N. Y.
118,832.—FAN.—L. A. Walton, Byhalia, Miss.
118,833.—FENCE.—P. C. Yost, Carthage, Ill.
118,834.—BED.—P. Agger, Cincinnati, Ohio.
118,835.—PRINTING PRESS.—F. L. Bailey, Boston, Mass.
118,836.—COUPLING.—J. D. Barnard, Frostburg, Md.
118,837.—HARVESTER.—O. Billings, Elyria, Ohio.
118,838.—PACKING.—G. F. Blake, Boston, Mass.
118,839.—BOOT HEEL.—M. Bray, Newton, Mass.
118,840.—STEAM ENGINE.—G. W. Briggs, M. H. Densmore, Shickshinny, Pa.
118,841.—WAGON.—J. and M. Broderick, Louisville, Ky.
118,842.—VARNISH.—C. Brumby, Rochester, N. Y.
118,843.—PACKING.—J. Clark, Harrisburgh, Pa.
118,844.—FLOWER STAND.—E. T. Cobb, Conway, Mass.
118,845.—TYING MACHINE.—J. W. Congdon, Marietta, Ohio.
118,846.—TIRE.—W. H. Davis, Lexington, Ind.
118,847.—BENDING TUBES.—H. W. Doe, Springfield, Ohio.
118,848.—PLOW.—J. Duff, Peoria, Ill., G. D. Nourse, St. Louis, Mo.
118,849.—CARTRIDGE LOADER.—G. H. Ferriss, Utica, N. Y.
118,850.—ROOFING.—C. L. Fowler, Baltimore, Md.
118,851.—SHANK.—G. Goodyear, New York city.
118,852.—FLY TRAP.—L. Grim, Fort Branch, Ind.
118,853.—TOY COVERING.—H. C. Grube, New York city.
118,854.—SAD IRON, ETC.—J. K. Gulihur, Montana, Iowa.
118,855.—TOY LOOP.—A. M. Hill, New Haven, Conn.
118,856.—BED.—P. Hill, Millport, N. Y.
118,857.—STEAM ENGINE.—H. T., T. Jennings, London, Eng.
118,858.—FERRULE.—S. E. Jeralds, H. A. Nettleton, E. R. Lawton, West Cheshire, Conn.
118,859.—PUMP.—J. Jonson, Baltimore, Md.
118,860.—OIL CAN.—L. W. Kent, Cleveland, Ohio.
118,861.—STILTS.—L. A. Kimberly, New Haven, Conn.
118,862.—STEELYARD.—H. Kirkwood, Americus, Miss.
118,863.—WATER WHEEL.—D. K. Kraatz, Ephrata, Pa.
118,864.—BENDING WOOD.—E. Lacey, Chicago, Ill.
118,865.—COMPOSITION.—P. B. Laird, St. Johnsbury, Vt.
118,866.—MUFF BOX.—H. Manneck, New York city.
118,867.—LIQUID METER.—H. W. Mather, New York city.
118,868.—HUB CLAMP.—J. McClelland, Geneva, N. Y.
118,869.—AXLE.—N. Mead, Oil City, Pa.
118,870.—FAN, ETC.—H. Mee, Crown Point, Ind.
118,871.—BRUSH.—J. Minetree, Petersburgh, Va.
118,872.—PLASTER.—G. E. Mitchell, Lowell, Mass.
118,873.—CUT OFF.—J. Montfort, Newburgh, N. Y.
118,874.—GRATE.—G. R. Moore, Phila., Pa.
118,875.—REFINING SUGAR.—J. A. Morrell, New York city.
118,876.—FOUNTAIN.—E. B. Myers, Handsborough, Miss.
118,877.—HALTER.—I. P. Osborn, W. A. Bayhan, Wilmington, O
118,878.—TABLE.—P. O'Thayne, New York city.
118,879.—DIE.—E. H. Plant, Plantsville, Conn.
118,880.—DRAIN PIPE.—G. Richardson, Milwaukee, Wis.
118,881.—STRIPPER.—F. Roux, Stryker, Ohio.
118,882.—STEEL.—E. Savage, West Meriden, Conn.
118,883.—SMOKE STACK.—B. F. Smith, New Orleans, La.
118,884.—FURNACE.—B. F. Smith, New Orleans, La.
118,885.—ESCAPE PIPE.—B. F. Smith, New Orleans, La.
118,886.—AIR PISTOL.—G. H. Snow, New Haven, Conn., E. H. Hawley, Kalamazoo, Mich.
118,887.—MILK CAN.—S. Stroock, New York city.
118,888.—FENCE.—R. M. Weider, J. Meals, Carthage, Ill.
118,889.—RICE CLEANER.—J. N. White, New Orleans, La.
118,890.—PLOW.—A. H. Whittick, Clarksville, Ind.
118,891.—WRENCH.—W. S. Wilcox, Hartford, J. A. Wilcox, Rocky Hill, Conn.
118,892.—MATTRESSES, ETC.—E. L. Wright, Sterling, Ill.
118,893.—HORSE POWER.—J. M. Albertson, New London, Ct
118,894.—BEE HIVE.—R. Arnold, Suffolk, Va.
118,895.—POTATO DIGGER, J. B. Baker, Syracuse, N. Y.
118,896.—POT COVER.—W. H. Barker, Windsor, Canada.
118,897.—BAG HOLDER.—O. Barrett, A. D. Brooks, Dartford, Wis
118,898.—JAR.—J. S. Batchelder, Fort Wayne, Ind.
118,899.—CAN.—J. S. Batchelder, Fort Wayne, Ind.
118,900.—BRIDLE BIT.—S. C. Boughton, Waterford, N. Y.
118,901.—BEER, ETC.—H. L. Bowker, Boston, Mass.
118,902.—PANTOGRAPH.—L. F. Bruce, N. J. Wolcott, Springfield, Mass.
118,903.—HYDROCARBONS.—J. K. Caldwell, Philadelphia, Pa
118,904.—CAN.—O. S. Camp, Grand Rapids, Mich.
118,905.—FURNACE.—I. B. B. Case, Toledo, Ohio.
118,906.—SPRING.—H. Chandler, Bennington, Vt.
118,907.—CUTTER HEAD.—M. W. Clark, Worcester, Mass.
118,908.—BED.—W. F. Clark, Mt. Pleasant, Iowa.
118,909.—SPRING LOCK.—M. Claver, New York city.
118,910.—YARN BEAM.—A. W. Cole, West Killingly, Conn.
118,911.—WINE PRESS.—J. H. Crandell, Upper Marlboro', Md.
118,912.—CUTTING BLOCK.—A. Davis, Oxford, Mass.
118,913.—SEWING MACHINE.—F. E. Decker, Newark, N. J.
118,914.—HAT.—D. Dennis, Barre, Mass.
118,915.—STEAM ENGINE.—F. O. Deschamps, Philadelphia, Pa.
118,916.—MAGAZINE.—W. H. Elliott, New York city.
118,917.—BOTTLE WASHER.—C. Euler, Evansville, Ind.
118,918.—PORTABLE CRADLE.—W. R. Evans, Phila., Pa.
118,919.—WAGON SEAT.—J. B. Foote, Hamden, N. Y.
118,920.—BENDING MACHINE.—J. Forbes, Halifax, Canada.
118,921.—SPRING LOCK.—A. Freutal, New York city.
118,922.—WINDOW SCREEN.—O. F. Frost, Monmouth, Me.
118,923.—STEERING APPARATUS.—J. Gardner, New York city.
118,924.—BLACKING BOX.—E. M. Gates, Watertown, N. Y.
118,925.—TREE BOX.—J. Gibson, Jr., Albany, N. Y.
118,926.—STRAW CUTTER.—B. F. Grimes, Memphis, Tenn.
118,927.—FARE BOX.—B. F. Grimes, Memphis, Tenn.
118,928.—SEWING MACHINE.—F. E. Hahn, Philadelphia, Pa.
118,929.—SHOE.—G. B. Hall, Rising Sun, Ind.
118,930.—LOCK.—W. N. Hall, Springfield, Tex.
118,931.—CUTTER HEAD.—E. P. Halsted, Worcester, Mass.
118,932.—PLOW.—J. Hapgood, Shrewsbury, Mass.
118,933.—ORDNANCE.—S. F. Hawley, Constableville, N. Y.
118,934.—WHEEL.—C. W. Hermance, Schuylersville, N. Y.
118,935.—TURNING LEAVES.—C. Heyer, Racine, Wis.
118,936.—GAS RETORT.—J. D. Higgins, Rome, N. Y.
118,937.—MAIL BAG.—G. W. Hildreth, Lockport, N. Y.
118,938.—LATHE.—H. R. Hill, N. W. Twiss, New Haven, Conn.
118,939.—ALARM.—M. A. Holland, Passaic, N. J.
118,940.—ALARM.—M. A. Holland, Passaic, N. J.
118,941.—SIGNAL LIGHT.—A. M. Holmes, Morrisville, N. Y.
118,942.—DOOR FASTENER.—W. A. Howard, Dugway, N. Y.
118,943.—EVAPORATOR.—W. E. Jacobs, Columbus, Ohio.
118,944.—SLICER.—R. James, Lockport, N. Y., J. W. Currier Springfield, Mass.
118,945.—PLOW.—R. Johnson, Lawrence, Kan.
118,946.—CULTIVATOR.—E. P. Jones, J. L. Harrell, Hertford, N. C
118,947.—FURNACE.—J. Jordan, Liverpool, England.
118,948.—COLUMN.—J. P. Kennedy, New York city.
118,949.—BLOWER.—L. J. Knowles, Worcester, Mass.
118,950.—DRILL.—G. Koch, Cass, Pa.
118,951.—CHOPPER, ETC.—A. Leonhard, Columbia, Tenn.
118,952.—SLAT MATTING, ETC.—S. Lewis, Williamsburg, N. Y
118,953.—HEATER.—A. Marriott, St. Louis, Mo.
118,954.—DRYER.—A. W. J. Mason, New Orleans, La.
118,955.—JACK.—T. Maxon, Springfield, Ohio.
118,956.—EXTRACT.—W. Maynard, Salem, Mass.
118,957.—COUPLING.—De L. McComas, Calhoun, Mo.
118,958.—CUT OFF.—J. E. McKay, New York city.
118,959.—CAR.—T. McVay, Braddock's Field, Pa.
118,960.—WATCH CHAIN, ETC.—C. W. Mehrer, New York city.
118,961.—TRUCK.—J. R. Mestier, Galveston, Tex.
118,962.—GRATE BAR.—J. A. Miller, Providence, R. I.
118,963.—WOOD SPLITTER.—D. Milliken, New York city.
118,964.—PICKET POINTER.—J. W. Minor, Middleboro', Mass.
118,965.—JACK.—D. Moritz, Buffalo, N. Y.
118,966.—SOFA BED.—A. Morris, New York city.
118,967.—GAS.—R. Morton, London, England.
118,968.—CASE.—R. L. Newton, Warren, Ill.
118,969.—LOOM.—O. Plummer, Worcester, Mass.
118,970.—TOWEL RACK.—O. Plummer, Worcester, Mass.
118,971.—TREADLE.—G. K. Proctor, Salem, Mass.
118,972.—BEE HIVE.—E. D. Pugh, Fort Plain, Iowa.
118,973.—HARROW.—W. Rennyson, Norristown, Pa.
118,974.—SASH.—S. P. Rogers, Belmont, Ohio.
118,975.—GRAIN BINDER.—O. B. Ross, Bowen's Prairie, Iowa
118,976.—OZONE.—P. A. Royce, Suspension Bridge, N. Y.
118,977.—TOY.—W. Sellers, New York city.
118,978.—NUMBERER.—C. L. Sholes, Milwaukee, Wis.
118,979.—LIGHTING.—A. M. Silber, F. White, London, Eng
118,980.—BENCH.—F. Starke, Dayton, Ohio.
118,981.—STUMP EXTRACTOR.—J. S. Swann, Kanawha, W. Va.
118,982.—MOTIVE POWER.—J. S. Swann, Kanawha, W. Va.
118,983.—CARBURETER, ETC.—H. C. Terry, Brooklyn, N. Y
118,984.—HARVESTER.—M. Thorp, Waterloo, Iowa.
118,985.—PAPER TRIMMER.—H. L. Todd, Corning, N. Y.
118,986.—LOCK.—H. R. Towne, Stamford, Conn.
118,987.—FERTILIZER.—U. S. Treat, Eastport, Me.
118,988.—FURNACE.—W. H. Turner, Indianapolis, Ind.
118,989.—OIL CAN.—C. O. Twining, St. Louis, Mo.
118,990.—IRONING TABLE, ETC.—J. N. Valley, North East, Pa
118,991.—TABLE, ETC.—J. S. Welch, A. A. Wheeler, Boston, Ms
118,992.—PRINTING, ETC.—J. L. Wells, Philadelphia, Pa.
118,993.—ENGINE.—W. P. Wentworth, Seneca Falls, N. Y.
118,994.—SOFA BED.—J. Werner, New York city.
118,995.—BOX.—G. H. Wetjen, New York city.
118,996.—HARVESTER.—W. N. Whiteley, Springfield, Ohio.
118,997.—PIPE WRENCH.—H. Wilson, Tarr Farm, Pa.
118,998.—WASHING MACHINE.—J. C. Wimer, Doylestown, Pa.
118,999.—VISE.—J. A. Younce, G. W. Smith, Hartford, Ind.

REISSUES.

4,545.—BINDER.—G. W. Emerson, Chicago, Ill.—Patent No. 79,500, dated July 7, 1868.

4,546.—GRAIN SEPARATOR.—S. Howes, A. and N. Babcock, and C. Ewell, Silver Creek, N. Y.—Patent No. 23,099, dated Feb. 22, 1859; reissue No. 2,098, dated Oct 21, 1865.

4,547.—INSOLE.—M. A. Johnson, Lowell, Mass.—Patent No. 61,742, dated Feb. 5, 1867.

4,548.—WOOD BENDER.—H. McDonald, Shortsville, N. Y.—Patent No. 31,182, dated Jan. 22, 1861.

4,549.—Division A.—DEPILATING HIDES.—J. E. Siebel, Chicago, Ill.—Patent No. 116,638, dated July 4, 1871.

4,550.—Division B.—PRESERVING WOOD.—J. E. Siebel, Chicago, Ill.—Patent No. 116,638, dated July 4, 1871.

4,551.—HEAD BLOCK.—E. H. Stearns, Erie, Pa.—Patent No. 14,700, dated April 15, 1856; extended seven years.

4,552.—SPOKE TENON, ETC.—J. Deming, Salem, Ohio.—Patent No. 103,187, dated May 17, 1870.

4,553.—WOOD BENDER.—S. Kingsland, Council Bluffs, Iowa. Patent No. 35,983, dated July 22, 1862.

4,554.—FIRE ALARM.—J. O. Fowler, Jr., Hudson, Wis.—Patent No. 35,050, dated April 22, 1862.

4,555.—BUR.—M. Van Auken, Amsterdam, N. Y.—Patent No. 38,997, dated June 23, 1863; antedated Feb. 16, 1863.

DESIGNS.

5,256.—CARPET.—J. H. Bromley, Philadelphia, Pa.
5,257.—MATCH SAFE, ETC.—G. W. Brown, Louisville, Ky.
5,258.—CARPET.—B. Crabtree, Jr., Philadelphia, Pa.
5,259.—SCHOOL DESK.—T. A. Galt and G. S. Tracy, Sterling, Ill.
5,260.—HAME LOOP.—J. Letchworth, Buffalo, N. Y.
5,261.—GLASSWARE.—J. E. Miller, Birmingham, Pa.
5,262.—HOOK.—J. B. Sargent, New Haven, Conn.
5,263.—STOVE.—W. A. Spicer, Providence, R. I.
5,264.—LETTER BOX.—G. F. Topliff, Boston, Mass.
5,265.—GRATE FRONT.—C. Zeuner, Cincinnati, Ohio.
5,266.—BUSTLE.—A. W. Thomas, Philadelphia, Pa.

TRADE-MARKS.

439.—ENGINE OIL.—Harmon, Merrick & Co., Cleveland, Ohio.
440.—INSTRUMENTS.—Heller & Brightly, Philadelphia, Pa.
441.—LEATHER.—G. F. and C. T. Page, Franklin, N. H.

APPLICATIONS FOR EXTENSION OF PATENTS.

MOWING MACHINE.—Ephraim Ball, Canton, Ohio, has petitioned for an extension of the above patent. Day of hearing, November 15, 1871.

DRAWING KNIFE.—Richard N. Watrous, Elmira, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

HYDRANT.—Washburn Race, Fulton, N. Y., and S. R. C. Mathews, Philadelphia, Pa., have petitioned for an extention of the above patent. Day of hearing, January 10, 1872.

COTTON AND HAY PRESS.—George W. Penniston, North Vernon, Ind. has petitioned for an extension of the above patent. Day of hearing, November 15, 1871.

MACHINE FOR SPREADING LIME AND OTHER FERTILIZERS.—Pierpont Seymour, East Bloomfield, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 15, 1871.

MACHINE FOR THREADING BOLTS.—William Sellers, Philadelphia, Pa., has petitioned for an extension of the above patent. Day of hearing, November 15, 1871.

SHINGLE MACHINE.—Robert Law, Toledo, Ohio, has petitioned for an extension of the above patent. Day of hearing, December 20, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

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Inventions Patented in England by Americans.

August 22 to August 26, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal].

BATTERY AND LIQUID.—E. Prevost, V. Barjon, New York city.
BUTTON HOLE AND SEAM.—C. McK. Talcott, Hartford, Conn., residing at City Road, Finsbury, Eng.
CONVERTING GUNS.—H. Berdan, New York city.
FEED WATER HEATER, ETC.—R. Berryman, Hartford, Conn.
FLAX SPREADER.—J. Good, Brooklyn, N. Y.
LEVER.—W. H. Chase, of New York city, residing at 8 Southampton Buildings, London, Eng.
LOOM.—J. Gates, Lowell, Mass.
SKYLIGHT, ETC.—G. Hayes, New York city.
WHEEL FOR TRACTION ENGINES.—A. Campbell, R. Clark, Sacramento, Cal.

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How Can I Obtain a Patent?

Is the closing inquiry in nearly every letter, describing some invention, which comes to this office. A *positive* answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

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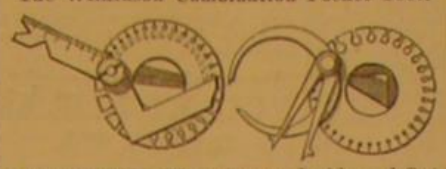
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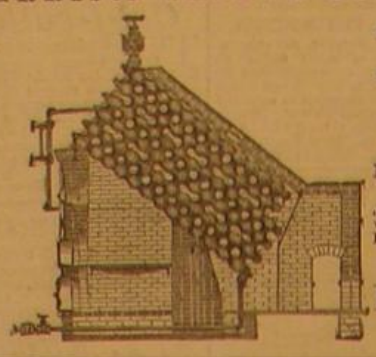
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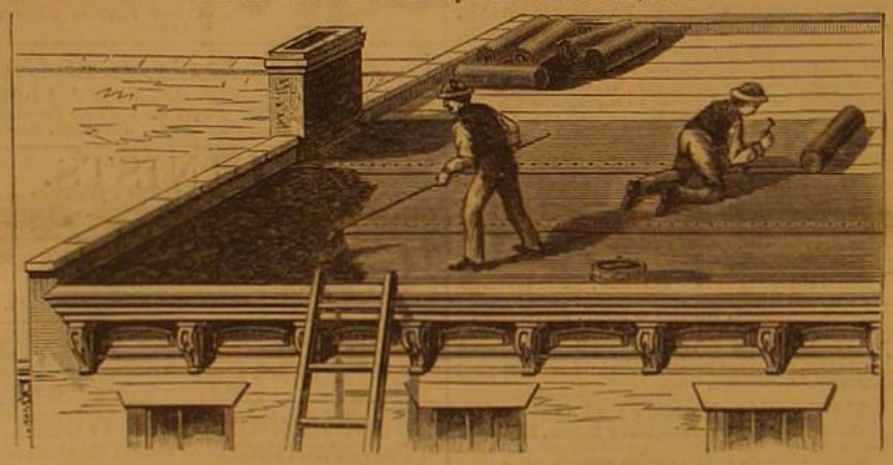
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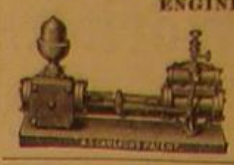
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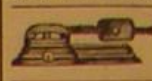
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A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XXV.--No. 14. [NEW SERIES.] NEW YORK, SEPTEMBER 30, 1871. $3 per Annum. [IN ADVANCE.]

Timpe's Improved Elevators.

The accompanying engravings illustrate improvements in elevators, for which three patents, one bearing date Nov. 15, 1870, and two, August 22, 1871, have been obtained by Gustavus C. Timpe, of New Orleans, La., through the Scientific American Patent Agency.

There are several important and valuable features in these improvements, which relate particularly to elevators designed for use in stores and warehouses.

Fig. 1 represents an elevator called the "Differential Gear Elevator," which appellation indicates an important feature of its construction. The power is applied to it either by a rope passing over a grooved pulley, A, or by means of a belt running upon a suitable pulley, B, with a loose pulley and shifting gear. Upon the inner end of the shaft of the hoisting pulley, A, is a pinion, C, meshing into an internally toothed gear, D, which gear is cast with and forms part of the hoisting drum.

Fig. 1

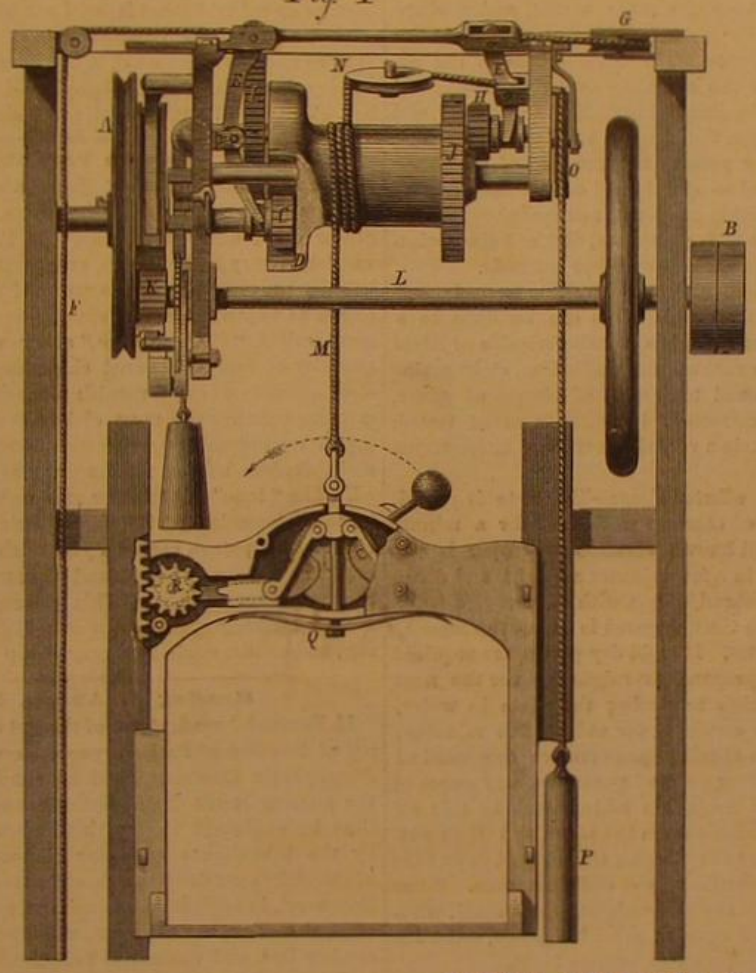
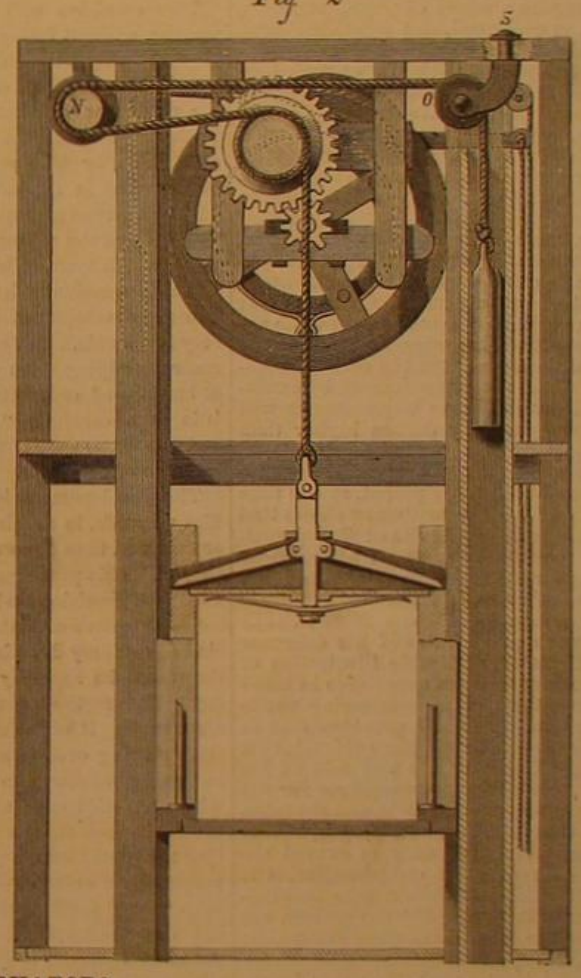


Fig. 2



TIMPE'S IMPROVED ELEVATORS.

In the position shown, the power is transmitted to the drum, through A, C, and D, but the pinion, C, is feathered upon its shaft, and may be shifted by the shifting apparatus, E E, this apparatus being operated from below by the rope, F, which passes around the pulley, G, and down over a pulley, not shown, for reversing the motion of the shifting apparatus, E. In throwing the pinion, C, out of gear with D, it is thrown into gear with the gear, I, and the pinion, H, is also thrown into gear with the gear, J. The power would then be transmitted through A, C, I, H, and J, to the hoisting drum, greatly increasing the purchase. An internal gear on the brake wheel of the hoisting pulley, A, meshes into the pinion, K, on the fly wheel shaft, L. The use of this fly wheel is, that when the hoisting pulley is employed, the power is applied while the hand is shifting its position on the rope, so that weights may be elevated conveniently by the use of one hand, if desired.

When the power is applied by belt to the pulley, B, it is transmitted to the hoisting drum either through K, C, and D, or by the routes indicated by the letters K, C, I, H, J, the latter combination being exceedingly powerful.

The hoisting rope, M, is not directly attached to the drum, but makes three turns about the latter, passing thence to and around an idler, N, and thence to a grooved pulley, O, thence down a well or channel in the frame work, being drawn down by a weight, P.

This weight is made enough heavier than the platform and its attachments to counterbalance their weight and run them up without the application of any other power, but still light enough that the weight of a man or parcel on the platform will cause it to descend.

The friction of the rope upon the drum is ample to raise any weight the strength of the rope will sustain.

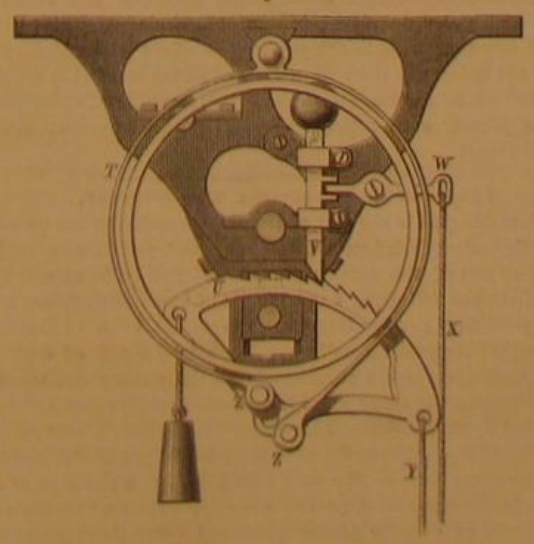
A safety apparatus is used to avoid accidents in case of breakage. When from any cause the connection of the rope with the platform should be broken, the spring, Q, will act upon a series of knee jointed levers, causing pawls to engage with ratchet teeth—shown in dotted outline—on spur wheels, R. Ordinarily these wheels play loosely on their pivots, but when held by the pawls, so that they cannot turn, they hold fast to the racks, and so prevent the fall of the platform. When racks are not used, the apparatus is modified so that the pawls engage directly with the wooden slide ways, being made chisel-pointed for that purpose, as shown in Fig. 2.

Fig. 2 shows a simpler form involving the same general principles, but without gear for increasing the purchase. To avoid too great angles and to keep the rope in the center of the drum when manilla rope is used, the idler, N, is placed at considerable distance from the drum, and the sheave, I, is made to turn on a pivot, S.

Fig. 3 shows an improved strap brake, used to check the downward movement of the platform. It consists of a metallic band or strap, T, a toothed sector, U, a weighted pawl, V, a lever, W, and ropes, X and Y. The strap, T, is pivoted to the toothed sector at Z. When the rope, Y, is pulled, the strap is drawn taut upon the perimeter of the brake wheel attached to the inner side of the hoisting wheel, A, Fig. 1. The weighted pawl then holds the segment in the same position, and keeps the strap uniformly tightened until the pawl is raised by pulling the rope, X.

We are informed that these elevators meet with much favor where they have been recently introduced, combining, as they do, many advantages with cheapness of construction. The smaller one, shown in Fig. 2, will meet the wants of small establishments, it is thought, much more completely than is

Fig. 3



the case with other elevators of equal cost hitherto placed on the market. Address, for further information, G. C. Timpe, 300 Camp street, New Orleans, La.

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Mechanism for Adjusting the Rollers of Carding Machines.

This invention pertains to an improved construction and arrangement of parts, whereby the position of the bearings of rollers working in combination with the main cylinder of a carding engine or of other rollers, may be adjusted or regulated with facility and accuracy.

In applying the invention to the working and clearing rollers of carding engines, the roller bearing fits between ribs cast on the outer side of a plate, the inner part of which fits between ribs cast on the bend of the carding engine, the bearing, the plate, and the bend being secured together by a bolt and nut. The roller is adjusted by a right and left handed regulating screw, one part of which is screwed into a projection from the bearing, and the other part is screwed into the plate; consequently, when the regulating screw is turned partly around, the bearing is moved to and fro in the plate. The bearing of the working roller is regulated laterally, in addition to its motion to and from the center of the main cylinder, by nuts on a segmental screw, one end of which is screwed into the plate of the bearing of the roller, the other end passing through a recess in the corresponding plate of the bearing of the roller.

The regulating screw for the bearing of the working roller is made partly with a coarse thread and partly with a fine thread. When this regulating screw is turned partly around, the motion to or from the center of the main cylinder, imparted to the bearing, is equal to the difference between the two pitches of the threads. By this arrangement, the utmost delicacy of adjustment is secured. Mr. Edward Lord, of Todmorden, England, has recently patented this improvement in the United States.

The East River Bridge, New York.

The caisson for the Western or New York end of this colossal undertaking was launched four months since, and was towed to the foot of Roosevelt street, on Tuesday, September 12, and the sinking of it will be proceeded with immediately. The dimensions of this formidable construction are: Length, 172 feet, width, 102 feet, and hight, 21½ feet, and it draws 12 feet of water. Its total weight is estimated at 6,200 tuns; and timber (yellow pine) is chiefly used in its construction, lined with iron plate. Captain Murphy, New York pilot, had the task of towing the caisson from the Atlantic basin, which was successfully accomplished, by the use of six tug boats, in the short space of four hours.

Two shafts for the passage of workmen to and from the interior are provided, and two each for water and air. The water shafts are for the lifting of all the dug out soil from the bottom of the caisson. Four air compressors, each of twenty five horse power, are already at work, as the slipping of some planks in the temporary bottom has occasioned a leak. Twelve of such compressors will be employed at once. Colonel Roebling, the engineer entrusted with the entire work, expects that the foundations of the New York tower will be completed by December 1st.; and if it can be done, Colonel Roebling will see that it is.

The completion of the various railroads in Maine is adding rapidly to the value of the enormous lumber tracts in that State. Logs are now cut 250 miles from any water communication. The spruce timber of Maine is equal to any that is exported from Christiania, Riga, Revel, or any other port in Europe; and its consumption is worldwide, and the demand for it constantly increasing.

EXTENSION OF SARVIN'S CARRIAGE WHEEL PATENT.

In the matter of the application of James D. Sarvin for an extension of letters patent for improvement in carriage wheels, granted June 9, 1853, reissued August 11, 1868, and again reissued September 6, 1870.

LEGGETT, Commissioner:

The invention embraced in this patent consists of an improvement in wheels for vehicles, and it relates to the peculiar construction of a wooden hub, of the hub end of the spokes, of metallic flanges fitted to the hub and against the spokes, and especially to a combination of two or more of these parts.

The real gist of the invention consists in such construction and formation of the hub end of the spokes to form a solid belt entirely around the hub, to be reënforced by the strength of all the others in resisting direct strains, and in such an arrangement of metallic flanges as to unite the strength of all the spokes against strain in a lateral direction. The extension is stubbornly opposed on the grounds, first, that the device was not novel when originally patented. Second, that the reissued patents embraced new matter, enlarging the scope of the patent, and are therefore void. Third, that the patentee has been fully remunerated for all time, ingenuity, and expense bestowed upon it.

The remonstrants have made reference to some nine or ten patents issued at an earlier date in the United States, England, and France; but, upon careful examination, I am satisfied that no one of these, nor all of them together, constitute sufficient reference upon which to reject this application. One of them presents a wheel having many points of resemblance to the Sarvin wheel, but the hub is of iron, and consequently does not furnish a sufficient reference for a claim, the very object of which is to get rid of the rigidity of iron, yet retain symmetrical form and lightness, with great strength and durability.

Whether justly or unjustly, much prejudice has existed against iron hubs, and to secure a wheel of proper strength, with wooden hub, small, symmetrical, and light, has been the study of many in this branch of manufacturing.

In comparing the reissued patent with the orignal, I do not find such changes or additions as would warrant me in declaring the reissued patent void. I have doubts as to the second clause in the claim, but the doubts are not of such a character as to induce unfavorable action, especially in view of the fact that the reissued patent is now before the courts, and I prefer leaving the question of validity of this claim to that jurisdiction.

The utility of this invention, and its value to the public, are not only thoroughly established by the testimony of applicant, but also by that of the contestants. Its usefulness is attested by the great and growing demand for the wheel embodying it, and its value and importance to the public are evinced by the great superiority of the wheel when subjected to rough usage. Several witnesses engaged in carriage making testify to the great value of the improvement by swearing that carriages embracing the Sarvin improvement will sell in the market from twenty to fifty dollars higher than carriages having other wheels.

The applicant's statement of account gives the entire amount of remuneration received for his patent, at the time of his application, as $61,534.55. The testimony shows that during the first eight or ten years of the life of this patent, he spent almost his entire time and devoted all his energies in almost a fruitless effort to induce carriage makers to adopt his invention. It is only within the last four or five years that he has received any substantial income from it. His efforts at introducing it were persistent, and his diligence remarkable. The case affords an admirable illustration of the difficulty which inventors sometimes experience in introducing the most useful inventions, or in overcoming prejudices against their introduction. The law provides that in case the Commissioner is satisfied, by proper evidence, that the patentee has not received from the use and sale of his invention or discovery a reasonable remuneration for the time, ingenuity, and expense bestowed upon it, and the introduction of it into use, and that it is just and proper, having due regard for public interest, it is his duty to extend the patent. Under the head of reasonable compensation, it is just and proper that the Commissioner should take into consideration what the patentee has done for the public, not only in producing the invention, but in inducing the public to appreciate and accept it.

It is a fact in the history of almost every valuable invention that has been given to the world, that moneyed monopolies, and interested persons whose capital is invested in the manufacture of articles that will be rendered less valuable by the introduction of an improved article of the same class, have always conjoined their efforts to prevent the introduction of such improvements; and such will always be the case: consequently, it frequently happens that a large proportion of the life of valuable patents must be wasted in so bringing their merits before the public as to create a demand for them, despite the opposition of parties adversely interested. There is but little doubt that the improvement covered by applicant's patent is one of the most valuable ever introduced into road carriages. It not only gives more strength and durability to the wheels, but secures greater safety to life and limb.

The actual value of a patent in dollars and cents is very difficult to estimate, and I have but little confidence in the usual mode of ascertaining such values for Office use in extension cases; but I am satisfied that the value of Sarvin's invention is far beyond all he has received for it. Whether his invention is fully secured to him by his patent, I leave for the courts to determine. The extension is granted.

Steel Rails.

On the London and Northwestern, the largest and most important railway corporation in England, there is, near London, a narrow throat in the line, from which converges the whole system of rails employed in the London termini of this great railway. Here all passenger, goods and coal traffic has to pass; here, too, the making up of trains and shifting of carriages is continually going on. Mr. Henry Bessemer says: At this particular spot two steel rails were fixed on May 2d, 1862, on one side of this line, and two new iron rails were on the same day placed precisely opposite to them, so that no engine or carriage could pass over the iron rails without passing over the steel ones also. When the iron rails became too much worn to be any longer safe for the passage of trains they were turned the other way upwards, and when the second side of the iron rails was worn as far as the safety of the traffic would allow, the worn out rail was replaced by a new iron one—the same process being repeated as often as was found necessary. Thus we find, at the date of the last report March 1, 1865, that seven rails had been entirely worn out on both faces. Since then another rail has been worn out up to July. The endurance, under this severe test, of steel rails, over iron was as one to sixteen. The testimony is conclusive and irrefutable. This crucial experiment is cited by various writers, and is well known. When finally the steel rails were removed, they were found to be worn down to a thin blade, but preserved their form and tenacity uncrushed to the last!

An Account of a New Photographic Dry Process.

[Paper read by Thomas Sutton, B.A., before the British Association.]

The process which I am about briefly to describe, under the title of the "Driest of Dry Processes, appears to be the simplest and most satisfactory solution of a problem which for twenty years has occupied the attention of many leading photographers, namely, that of the preparation of dry plates.

Hitherto the invariable custom has been to prepare dry plates at home ready for use on a tour, to pack them very carefully, so as to exclude the access of air and moisture, and to trust to their good keeping qualities. By the method about to be described this trouble and risk are avoided, and the tourist can prepare his plates *en route*, on the morning of the day on which they are to be exposed, by simply pouring upon them a sensitive collodion emulsion, an operation which might be conducted at the rate of one plate prepared per minute, after which they can be put at once into the dark slides, ready for exposure, without being washed or any preservative applied to them.

This emulsion will keep for many weeks, and perhaps months, without losing its good qualities, or varying in the slightest perceptible degree. The development of the exposed plate is effected on the same day as the exposure, and is a very cleanly operation, requiring no nitrate of silver, and producing no stains upon the fingers, articles of furniture, etc. Thus, by this new process the practice of landscape photography is rendered so simple and certain that any intelligent person may quickly master it, and realize much success without the amount of fag, expense, dirt, and disappointment, which more or less accompany other methods.

It only remains to describe how the emulsion is made, and how the development is effected. This can be done in a very few words. The emulsion is a collodio-bromide of silver made by adding to an ounce of plain collodion, eight grains of bromide of cadmium and ten grains of nitrate of silver. It is then carefully "corrected," by which is meant tested, and treated so as to contain a very slight trace of unconverted bromide of cadmium.

The developement is effected thus:—The plate is placed, film upwards, in a dish of common well water for a minute or two, and then the well known alkaline developer is employed. This produces in a few minutes a bright and dense negative, requiring no intensification with silver.

The sensitive of plates thus prepared is about the same as that of ordinary dry plates. If rapid dry plates are required they must be specially prepared overnight for use the next day. The method consists in placing the plate in water, after coating it with the emulsion, for at least five minutes; then pouring over it an alkaline preservative composed of one part of albumen to four parts of water, to every ounce of which ten minims of ammonia are added, washing this off after it has remained a minute upon the plate, and then putting the plate into a box to dry during the night. Plates thus prepared are quite as sensitive as wet collodion ones. It has been proved possible to make an emulsion which shall, without this treatment, yield equally sensitive plates, but I am not able at present to give an exact formula for it.

Plates washed and treated as above described with an alkaline preservative may be used wet, and are equally sensitive. Thus a new wet collodion process is originated, without a nitrate bath, a bath of water being substituted for one of silver. The many advantages of such a process will be obvious to intelligent photographers, the principle one being that there is no free nitrate upon the film to attack the alkaloid salt of silver, or crystallize on drying. A wet film, prepared as described, might be exposed under water, or in a camera filled with water, a suitable lens, of course, being employed.

The key to success in the process described will consist in there not being any trace of nitrate of silver left in the emulsion, nor too large a trace of unconverted bromide of cadmium. In the former case fog, in the latter case insensitiveness, would result.

Interesting Electrical Experiment.

Astonishing as is the fact of the concentration of the power of a lightning-flash into a minute interval, yet as wonderful is the extent of the earth's surface affected by it, as will be seen from the following experiments of the writer, never before published: A galvanometer consists of a delicately suspended magnetic needle surrounded by a coil of copper wire, through which a current of electricity can pass; whenever this passage takes place the needle rapidly turns around its point of suspension. This being understood, I connected the wire of a galvanometer with the water pipes of Baltimore, and the other end of the coil was joined to a gas pipe of a house in the southwest part of the city. Thus a vast metallic system of electric nerves stretched away three miles to the northwest, to the reservoir, and about as many to the east and southeast over the city. A thunder storm was raging at the time, at so great a distance in the north that only the illumination of the clouds told when a flash occurred. Yet, whenever that flash took place, the needle was instantly deflected through ten or twenty degrees. The two occurrences were simultaneous, apparently, for I could detect no difference in the instant of their manifestation. Indeed, so sure an indicator of the flash was the galvanometer, that when I shut myself up in a dark room, signalling to an observer of the storm whenever the needle moved, and receiving a signal from him when a flash occurred, our signals were always simultaneous. The next day it was ascertained that the storm was over twelve miles distant; therefore, at least five hundred square miles of the earth's surface were affected (inductively) at each flash of the lightning.—A. M. M., in the *Evening Post*.

Wooden Nails.

In these days of millions of iron, copper, and zinc nails, tacks, and brads, of lightning, self feeding, and almost automatic nail machines, it is wonderful to find wooden nails coming into use. Wooden pegs made by the same machines as shoe pegs, are now largely used for fastening boxes, and manufacturers receive large orders from the West, for inch pegs for this purpose. In China, Japan, and Hindostan, pegs of bamboo have been always used in fastening tea chests and wooden packages. In this age, however, it looks like retrogression to use wood for purposes for which iron seems so much better adapted. As one of the curious freaks of the habit, so inherent in human nature, to return to former customs under the impression that they are novelties, the above is noteworthy; but we do not anticipate a fall in cut nails from this cause. The idea of using wooden nails seems to us a good one. The treenails used in ship building are an example of the value of such wooden nails. The rusting of nails exerts a very destructive action on timber, and this will be avoided by the use of wooden pins. Moreover, it is almost certain that before many years pass away, wood will become so valuable that it will not pay to use the material of packing boxes for firewood, as is at present done. Now, so long as iron nails are used, it becomes a difficult matter, and one involving the rapid destruction of tools, to use old lumber. The use of wooden nails will obviate this difficulty.

Green Varnish.

There is, says the *Cabinet Maker*, a most beautiful transparent green varnish employed to give a fine glittering color to gilt or other decorated works. As the preparation of this varnish is very little known, an account of it may in all probability prove of interest to many of our readers. The process is as follows: Grind a small quantity of a peculiar pigment, called "Chinese blue," along with about double the quantity of finely powdered chromate of potash, and a sufficient quantity of copal varnish thinned with turpentine. The mixture requires the most elaborate grinding or incorporating of its ingredients, otherwise it will not be transparent, and therefore useless for the purpose for which it is intended. The "tone" of the color may be varied by an alteration in the proportion of the ingredients: a preponderance of chromate of potash causes a yellowish shade in the green, as might have been expected, and *vice versâ* with the blue under the same circumstances. This colored varnish will produce a very striking effect in japanned goods, paper hangings, etc., and can be made at a very cheap rate.

Roaring of Aurora Borealis.

M. Becquerel read, at one of the last meetings of the Academy of Sciences of Paris, a paper on the Celestial Origin of Atmospheric Electricity, and he concluded by stating that the auroras result from discharges of this electricity, and thus he explained the roaring, more or less loud, heard by the inhabitants of polar regions. The greatest part of scientific men deny the occurrence of these sounds, but M. Becquerel, in support of his opinion, quoted the observations of Paul Rollier, the aeronaut, who started from Paris in December last, and descended fourteen hours after in Norway, on Mount Ide, at an elevation of 4,000 feet: "I saw through a thinner fog the moving of the brilliant rays of an aurora borealis, spreading all over its strange light. Soon after an incomprehensible and loud roaring was heard, which, when it ceased completely, was followed by a strong smell of sulphur, almost suffocating.

The Mammoth Cave.

A research into the recesses of this remarkable formation has recently been made by a party of scientific gentlemen and ladies, who made an excursion from Indianapolis, after the recent meeting of the American Association for the Advancement of Science. The party numbered one hundred and ninety persons, and some additions, of a most interesting nature, were made to our knowledge of the wonderful cave.

Professor Cope collected fourteen specimens of various animals living in the cave—among others, fish, crickets, centipedes, crawfish, etc. There are, in the waters of the cave, both fish and crustacea without the power of sight. Having lost this sense by having no use for it, their sense of hearing has developed to an unusual quickness, and it is exceedingly difficult to catch them. The geological feature of the cave, as is well known, belong to the secondary formations; and the crystals of gypsum, stalagmites, stalactites, and saltpeter, are to be seen here in enormous abundance. We hope soon to receive a formal report of this visit to one of the greatest wonders of the American Continent.

The Fish Crow.

A species of fish crow (*Corvus caurinus*) is very abundant in Oregon and Washington territories, where it is troublesome to the Indians, stealing their dried fish and other provisions. It is never killed by them, from superstitious feelings, but is driven away by children set to watch for that purpose. It is cunning, but very tame and impudent, allowing a very near approach, and when closely pursued retiring but a short distance. Like some species of gull, this bird is in the habit of carrying clams high in the air and then dropping them, in order to break the shell.

How Salt is Manufactured at Turk's Island.

From an article in the *Overland Monthly*, describing sights and scenes there, we cull the following description of salt making: The island bearing this familiar name has been conspicuous for its production of salt, of which millions of bushels find their way into the markets of the world, our own country receiving about half a million bushels annually. Salt is obtained from sea water, by either extreme cold or heat; here it is made by solar evaporation. Lying under the intense rays of a tropical sun, the sea soon gives up its water and leaves its salt behind; and were it not for the influx of the mighty rivers of the tropics, and the general system of currents and tides, the ocean lying near the equator would soon become one vast sea of salt. For centuries, advantage has been taken of this natural process, and in the dry seasons, over a thousand natives are at work, in the different stages of the preparation of salt for the market. The sea water is let into the basins, or "pans," by a canal, cut through the beach, which separates the sea from the interior lagoons and affords a good foundation for the town proper.

This beach is a few rods—perhaps ten or fifteen—in width and back of this, extending toward the bluffs about a quarter of a mile, was originally a marsh, which has been converted into salt tanks. These tanks are shallow, with a varying depth of from eight to eighteen inches, the bottom made of stiff marl or clay, and they cover several hundred acres of this evaporating ground, divided into a great many compartments, varying from a quarter of an acre to two or three acres in size. These are separated from each other by low stone walls, which serve also as walks. In the middle of these is an impervious clay, which prevents the passage of water from one tank to another, unless by the little gateways or sluices, through which the supply is regulated. The water in these is found in all stages of evaporation. In some, you see the clear limpid water of the ocean; in others it has a roiled appearance, and, when far advanced in the process, it assumes a beautiful pink color. The first pond allows the subsidence of mud and other physical impurities, and is, consequently, the deepest. As the fluid runs from tank to tank, it gradually becomes thicker, giving up its water and becoming more and more concentrated, until it reaches the last and shallowest pan, where crystals begin to appear on its surface. These first crystals are purest, and are raked off with an iron hoe. Exposed for a still longer time, more crystals form, but these mostly collect on the bottom and sides, and are scraped off when the "mother liquor" is drawn away. They are then hauled in carts to the beach, where piles, like great, white snow banks, may be seen from the ship's deck.

This salt is more or less impure—the chief impurity being chloride of magnesium—and, to get rid of this, the heaps are covered with straw and hay; the chloride of magnesium, being deliquescent, absorbs moisture from the atmosphere and drains off, leaving the pure chloride of sodium—common salt—behind. To produce the same result, sometimes slaked lime is placed in the last tanks. The making of salt by solar evaporation depends greatly upon the absence of rain; and Turk's Island has this advantage, as well as extreme heat in summer. In addition, the trade winds constantly agitate the surface of the ponds, and thus facilitate vaporization.

Ex-Commissioner Mason on Patent Laws.

The chairman of the recent meeting of London Patent Agents—Mr. George Haseltine, M.A.,—has received from the Hon. Charles Mason, Ex-Commissioner of the United States Patents, to whom were submitted the resolutions on "Patent Law Reform," reported by us last month, the following interesting letter. Judge Mason was a most able and popular Commissioner, and is a gentleman of the highest legal and social position.

"Your favor reached me at a distance of a thousand miles from the city of Washington. In reply, I have the honor to say that an experience of twenty years has enabled me to form opinions, in some degree satisfactory to myself, on most of the topics therein presented. These I will now briefly state.

"I have never had any serious doubt of the wisdom of a judicious system of patent laws. If they create a monopoly and thereby limit the rights of others, they do nothing more than is inseparable from the institution of property of any and every kind. The owner of a horse or of a tract of land enjoys the same monopoly as the patentee, except that it is perpetual. It is difficult to find a reason for the protection of property in the one case, which would not apply with equal force in the other. Who can more justly claim the exclusive use of anything whatever, than he who has brought it into being? And what reflecting mind can doubt that the public welfare will in the main be best promoted by inspiring individual effort in respect to invention, through the same motive of private advantage as that which can alone excite it to the needed intensity in all the other walks of human life? It is sometimes replied that an inventor is entitled to the machine which he has invented and constructed, and to nothing more. But this does not present the true analogy. The subject matter of an invention is not the material body, but the living spirit and principle which may animate an indefinite number of bodies of the same general character, though all varied in mere form or the materials of which they are composed. Mechanical labor and skill can produce the one, inventive genius can alone create the other. Each is equally entitled to the favor of a just Government.

"The system of examination which has been adopted here is manifestly productive of much advantage to the public, as to the meritorious class for whose benefit the law is more immediately intended. I have doubts, however, as to the wisdom of lodging in the Patent office a power of rejection as unlimited as that which it now exercises. If the action of the examiners were merely advisory and adjuvant, leaving to the applicant the ultimate right to take his patent at his own risk after an adverse report, some of the chief objections to our system would be removed. I am inclined to believe that some such modification would be an improvement.

"By all means the patent fees should be small—barely sufficient to defray the expenses of the office. No other class of men does so much to promote the welfare of mankind as does that of inventors, and there is none that on the average is so poorly compensated for what it has done. To require inventors to pay a tax for the general support of the Government, over and above that which is imposed upon any other class, is calculated to discourage their efforts, and to check the progress of civilization in this most important particular. This not seem sound policy.

"Our American experience leads me to the conclusion that fourteen years is too short a limit for the lifetime of a patent. In most cases of real merit the old fourteen year patents are extended by the Office to twenty-one years, and often by special acts of Congress to twenty-eight years. The new law fixes a seventeen year limit, and withholds from the Patent Office the power of extending the same. I have little doubt, however, that many of these seventeen year patents will hereafter be extended by Congressional action. I do not think that twenty-one years is too long a period for their general continuance.

"I like the British system better than ours in one particular. Your fees are paid in instalments, leaving the inventor the right to keep the patent alive or not, at his option. If that plan were in operation here, a considerable portion of our patents would terminate their existence shortly after their birth. This would remove out of their way many useless patents which now act the part of the dog in the manger, and will never be heard from during the whole seventeen years, unless some subsequent inventor shall make some improvement thereon, which will make useful what would otherwise be worthless. Nothing is more common in our experience than after some highly useful invention has gone into successful operation, to find some unexpired patent which is worthless in itself, all at once revived and amended through a re-issue in such a way as to render the really meritorious invention subordinate. The courts often hold such useless patents invalid, but this does not protect the subsequent patentee against being greatly harassed and annoyed. As far as practicable, it would be desirable to prevent difficulties of this nature from presenting themselves. The French plan of annual payments is carrying the matter rather too far. I like the British system in this respect better than either the French or the American, and believe that nothing is wanting therein but a diminished rate of fees.

"In relation to experts, they are often very useful, but those who are professional are looked upon with much suspicion, and their opinions have little weight with either court or jury. In this way what might otherwise be a great evil carries with itself, to a great extent, its own remedy. And as to jurors, their interposition is generally avoided by proceedingsin Chancery to obtain in junctionswhich are the most usual remedies for infringements with us."—*Engineering.*

Spiritualism.

Professor Allen Thomson, President of Section D, British Association, in his opening address, concluded as follows:

"I cannot conclude without adverting to one aspect in which it might be thought that the appreciation of biological science has taken a retrograded rather than an advanced position. In this, I do not mean to refer to the special cultivators of biology in its scientific acceptation, but to the fact that there appears to have taken place of late a considerable increase in the number of persons who believe, or who imagine that they believe, in the class of phenomena which are now called spiritual, but which have been known since the exhibitions of Mesmer, and, indeed, long before his time, under the most varied forms, as liable to occur in persons of an imaginative turn of mind and peculiar nervous susceptibility. It is still more to be regretted that many persons devote a large share of their time to the practice—for it does not deserve the name of study or investigation—of the alleged phenomena, and that a few men of acknowledged reputation in some departments of science have lent their names, and surrendered their judgment, to the countenance and attempted authentication of the foolish dreams of the practitioners of spiritualism, and similar chimerical hypotheses. The natural tendency to a belief in the marvelous is sufficient to explain the ready acceptance of such views by the ignorant; and it is not improbable that a higher species of similar credulity may frequently act with persons of greater cultivation, should their scientific information and training have been of a partial kind. It must be admitted, further, that extremely curious and rare, and to those who are not acquainted with nervous phenomena, apparently marvelous phenomena, present themselves in peculiar states of the nervous system—some of which states may be induced through the mind, and may be made more and more liable to recur, and are greatly exaggerated by frequent repetition. But making the fullest allowance for all these conditions, it is still surprising that persons, otherwise appearing to be within the bounds of sanity, should entertain a confirmed belief in the possibility of phenomena, which, while they are at variance with the best established physical laws, have never been brought under proof by the evidences of the senses, and are opposed to the dictates of sound judgment. It is so far satisfactory in the interests of true biological science that no man of note can be named from the long list of thoroughly well informed anatomists and physiologists, who has not treated the belief in the separate existence of powers of animal magnetism and spiritualism as wild speculations, devoid of all foundation in the carefully tested observation of facts. It has been the habit of the votaries of the systems to which I have referred to assert that scientific men have neglected or declined to investigate the phenomena with attention and candor; but nothing can be further from the truth than this statement. Not to mention the admirable reports of the early French academicians, giving the account of the negative result of an examination of the earlier mesmeric phenomena by men in every way qualified to pronounce judgment on their nature, I am aware that from time to time men of eminence, and fully competent, by their knowledge of biological phenomena, and their skill and accuracy in conducting scientific investigation, have made the most patient and careful examination of the evidence placed before them by the professional believers and practitioners of so-called magnetic, phrenomagnetic, electrobiological, and spiritualistic phenomena; and the result has been uniformly the same in all cases, when they were permitted to secure conditions by which the reality of the phenomena, or the justice of their interpretation, could be tested, namely, either that the experiments signally failed to educe the results professed, or that the experimenters were detected in the most shameless and determined impostures. I have myself been fully convinced of this by repeated examinations. But were any guarantee required for the care, soundness, and efficiency of the judgment of men of science on these phenomena and views, I have only to mention, in the first place, the revered name of Faraday, and in the next, that of my life-long friend, Dr. Sharpey, whose ability and candor none will dispute, and who, I am happy to think, is here among us, ready from his past experience of such exhibitions, to bear his testimony against all classes of *levitation*, or the like, which may be the last wonder of the day among the mesmeric or spiritual pseudo-physiologists. The phenomena to which I have at present referred are in great part dependent upon natural principles of the human mind, placed, as it would appear, in dangerous alliance with certain tendencies of the nervous system. They ought not to be worked upon without the greatest caution, and they can only be fully understood by the accomplished physiologist who is also conversant with healthy and morbid psychology. The experience of the last hundred years tends to show that while there are always to be found persons peculiarly liable to exhibit the phenomena in question, there will also exist a certain number of minds prone to adopt a belief in the marvelous and striking in preference to that which is easily understood and patent to the senses; but it may be confidently expected that the diffusion of a fuller and more accurate knowledge of vital phenomena among the non-scientific classes of the community may lead to a juster appreciation of the phenomena in question, and a reduction of the number among them who are believers in scientific impossibilities."

Marble Quarrying in Italy.

Nearly one third of the entire mining and quarrying production of Italy is derived from its renowned marble quarries, of which those at Carrara, Massa, and Seravezza are most celebrated. The two latter have only been worked since about thirty years, while Carrara furnished its snowy rocks to the Roman artists in the days of Cæsar and his successors. Of the six million francs now paid each year for Italian marble nearly one half is drawn from the United States. We have therefore an interest in the economical management of the quarries, and should see that our money does not go towards sustaining old fashioned indolence. Such is, however, the case. A cubic meter of ordinary Carrara marble, whose value at the quarry is about 100 lira (a lire nearly nineteen cents) costs more than double that sum when delivered on board ship—no more than a mile or two from where it was cut. The extra amount is absorbed by antediluvian tolls and means of transportation. A railroad is much desired, and would greatly reduce expenses, but there is too little native enterprise to warrant a speedy realization of this wish. Although 685 separate quarries have been established in Carrara alone, there does not appear to be any competition amongst their managers or proprietors. The *dolce far niente* system appears to suit them far better than the industry of enterprise. The consequence is that they have nearly lost the entire trade of Northern Europe, which has been gained by the active and energetic people of Belgium, whose marbles, though not as perfect, are only second to those of Italy, in Europe.

Oxy-Hydrogen Gas Lights.

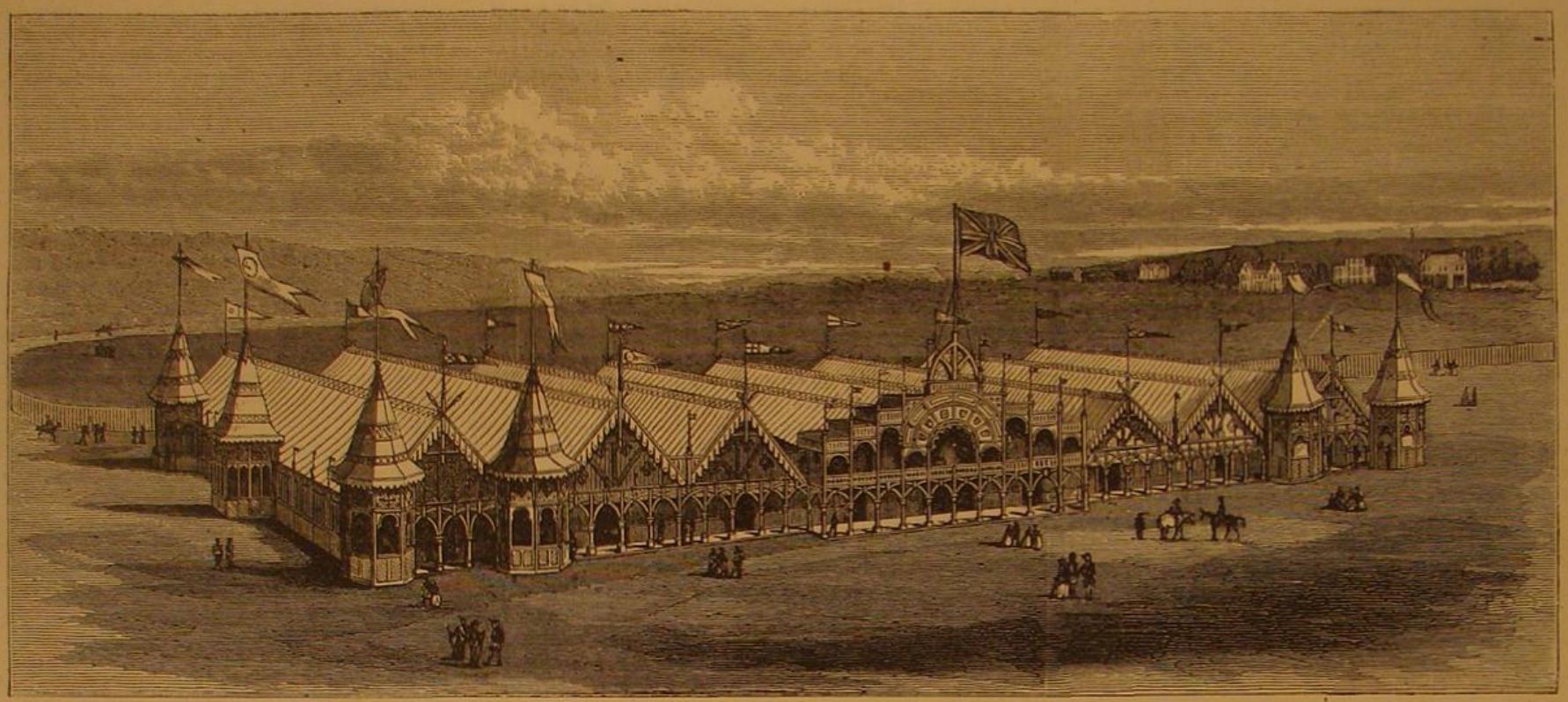
The *Building News* says: A company is being formed for the purpose of lighting the cities and towns of the United Kingdom with the application of oxygen gas, as a considerable portion of New York has been for some time, and as Paris, Vienna, and Brussels are about to be. When common highly carbureted hydrogen is properly burnt with oxygen it gives a white light so pure that it may be seen for twenty or thirty miles; and by supplying this sustainer of combustion direct to the flame, the present vitiation of the air will be entirely done away with. The value and importance of oxygen is, indeed, generally known, but hitherto the cost has been prohibitory. The promoters of the company are in possession of a discovery by which oxygen can be obtained at one third the expense of ordinary coal gas, and a complete and very desirable revolution is on the verge of being made in the illumination of our streets and houses. The parties connected with the movement are said to be substantial, and the capital to be subscribed one million. [We wish the *Building News* had pointed out the considerable (or any) portion" of New York lighted by oxy-hydrogen gas lights; it would have been interesting information to New Yorkers.—EDS. SCI. AM.]

THE NEW RESTAURANT AT WIMBLEDON CAMP.

Wimbledon Common, in the suburbs of London, has been long a favorite resort for the volunteer rifle associations of England. Large numbers congregate there on various occasions to shoot for prizes, many of the latter being of a character and value which excites great competition. These Schuetzenfeste, as the Germans would call them, having necessitated the provision of more ample accommodations for the refection of the members of the associations and the large numbers of spectators that flock to the Common to see the shooting, the National Rifle Association has caused to be erected the new restaurant pavilion, of which the accompanying engraving is a representation, and which is now considered one of the most attractive features of the camp.

It covers an area of upwards of 40,000 superficial feet, and contains a bar 200 feet long by 40 feet wide, a second class dining room capable of dining 600 persons, a first class dining room for more than half that number, besides waiting and retiring rooms, bakehouse, kitchen, stores, etc. A canteen about 80 feet by 20 feet forms a separate pavilion; along the front runs a verandah about 200 feet long, constructed with semicircular interlacing ribs sprung from upright posts. As the buildings have to be taken down at the close of the camp meeting and be re-erected each succeeding year, the method of construction is adapted to facilitate this necessity. The walls are made in sections of a uniform size, and are put together with bolts, and the parts as a rule are interchangeable. Internally, all the work is stained and varnished but the outside is painted blue and white to harmonize with the entrance and offices.

Our readers will agree with us that this design combines great beauty with convenience, and it could easily be modified in its interior arrangements to adopt it to the wants of agricultural and mechanical associations, for holding the annual fairs which have now become so universal throughout the country.



THE NEW RESTAURANT AT WIMBLEDON CAMP, ON WIMBLEDON COMMON, LONDON.

Improvements in the Manufacture of Wire.

Messrs. Hill and Ward, Newport Wire Mills, Middlesborough, Eng., have recently patented, in conjunction with Mr. Claus, certain improvements in the manufacture of wire, which appear to be of a valuable character, judging from the samples which we have seen of wire made by this process. In the ordinary process of manufacturing wire, it is usual to heat the rod from which it is made, or the wire itself, to a bright red heat, and to allow it to cool down slowly, in order to reduce the metal to the necessary degree of softness or ductility which will allow it to be drawn to a less diameter. This operation is termed annealing, and is carried on in covered or closed cast iron tubes or pots or furnaces in which the rods or wire are or is placed, and to which heat is applied externally. Although covered or closed receptacles are employed for this purpose, access of air cannot be entirely prevented, and a consequence of this process of annealing is that the rod or wire becomes coated with a thin skin of scale or oxide which prevents the possibility of its being, in that condition, drawn out into finer wire. In order to obviate this difficulty, it is necessary to remove the scale or oxide, which is usually done by dissolving the same by means of a diluted acid, diluted sulphuric arid, or diluted hydrochloric acid being commonly employed for this purpose. It should be observed that the application of the acid at this stage has the effect of rendering the metal brittle or "rotten," which is especially the case with steel or iron wire. The rods or wire having been thus cleaned with diluted acid, and afterwards washed in water, steeped in lime water, and dried, are or is ready for being drawn to a finer diameter by the well known means adopted for that purpose. In practice, it is found that after having passed through two, or at most three holes, the metal of which the wire is made has, by the operation of drawing, become so hardened that it is impossible, without risk of breaking it, to draw it any further. The process of annealing or softening has then to be resorted to again, and a fresh coating of scale or oxide is formed, which has to be removed as before. The finer the wire is required to be, the oftener these operations have of course to be repeated, and the finer the wire becomes, the more detrimental is the action of the acid upon its quality.

The object of the said invention is to avoid some of these disadvantages, and particularly to prevent the access of air and consequent formation of scale or oxide during the annealing process, and to dispense with the necessity of cleansing the wire with acid, thereby avoiding the consequence of rendering brittle or rotten, and further to effect the annealing in very much less time than by the processes at present employed. These objects are accomplished by annealing or softening the wire or other metallic articles by immersing the same in a bath of flux heated to the temperature necessary for that purpose. In this bath, the wire or other articles are allowed to remain until they have acquired the temperature of the same, and until they have become annealed, when they are withdrawn in a red hot state. A portion of the flux will necessarily adhere to the wire, forming a coating which will continue to protect the metal from oxidation until it is cold. When cold, the coating of flux is removed from the annealed wire by means of hot or cold water. The flux or fluxes which are employed for this purpose may be composed of one or more substances or of mixtures of various substances, their other qualities and composition being immaterial, so long as they have, firstly, the property of being non-volatile or only slightly volatile; secondly, of having no destructive action upon the wire or other articles; thirdly, of fusing into a thin mass at a red heat; and fourthly, of being soluble in water after fusion. Of the substances which have these properties, it is preferred to use chloride of calcium, hydrate of soda, and silicate of soda, as being the cheapest and most suitable, but hydrate of potash, borate of soda, borate of potash, silicate of potash, carbonate of potash, carborate of soda, chloride of sodium, or other substances of similar properties, and fulfilling the above mentioned conditions, may also be used.—*The Engineer.*

The Cause of Typhoid Fever.

Dr. E. M. Snow, of Providence, R. I., in the *Medical and Surgical Reporter*, says: There are several diseases prevalent in New England, the causes of which are mysterious, and seem thus far to baffle all investigation. Among them are typhoid fever and diphtheria. It is very common, in the voluminous reports of some "Health Departments," to ascribe these diseases to foul air from sewers, and one eminent physician, well known throughout the land, in an elaborate essay, gives the use of ice as the chief cause of diphtheria.

A sufficient answer to these theorists is the fact that both typhoid fever and diphtheria prevail tenfold more in the most rural districts of New England, where sewers and the use of ice are almost unknown, than in cities. We have long been satisfied that the cause of typhoid fever is of vegetable origin, while the cause of typhus or ship fever is undoubtedly of animal origin.

A recent report of a local outbreak of typhoid fever, in Islington, England, which we find in the *British Medical Journal* of November 26, 1870, is extremely interesting and valuable in illustration of this subject.

It seems that in July and August, 1870, there was a severe outbreak of typhoid fever in the parish of Islington, which it was impossible to account for on any theory of local miasm, bad drainage, or poor water supply, as none of these causes existed there. Besides this most of the cases of fever were in the houses of the wealthy, which were free from the commonly reputed causes of this disease.

Within less than a semicircle of a quarter of a mile radius, 168 cases of typhoid fever occurred within ten weeks, and thirty persons died.

Many causes for the sickness were named, all of which were easily shown to be groundless, until, at last, some one suggested a connection between the disease and the distribution of milk from a particular dairy. As the investigation progressed, the evidence became entirely convincing that this was the true explanation of the disease. Out of 140 families supplied with milk from this dairy, 70 suffered from typhoid fever. The disease picked out the customers of this dairy in separate streets and squares, leaving other houses immediately adjoining. It attacked females and children, the largest consumers of the milk, out of all proportion to male adults, and in several instances the only persons who had the fever in several families were those who used this particular milk.

The fact seemed to be established that the milk from this dairy was the cause of the fever, and the next step was to ascertain how the milk became contaminated.

An investigation showed that the water supply at this dairy was from an old underground tank. This water tank was built of wood, and was much decayed, and in part had fallen away. The probability seemed to be that the mixture of water from this tank with the milk was the cause of the fever. The owner of the dairy suggested that as the milk cans were washed with this water, possibly enough might remain in them to poison the milk.

The case is quite interesting, as affording a possible clue to the discovery of the causes of this mysterious and fatal disease.

A few months since in this city, there were several cases of typhoid fever, the origin of which was mysterious, and the suggestion was made that it was connected with the supply of milk. In that case, the family from which the milk came had the fever, and some persons thought the spread of the disease was due to contagion. The case we have related from England may suggest a possible cause for the disease in this city without a resort to the doctrine of personal contagion, which the best authorities do not ascribe to typhoid fever.

Weights and Measures.

WEIGHTS.—One milligramme is equal to $\frac{1}{64}$ grain nearly; one centigramme is equal to $\frac{1}{6}$ grain nearly; one decigramme is equal to $1\frac{1}{2}$ grains nearly; one gramme is equal to $15\frac{1}{2}$ grains nearly; one decagramme is equal to 154 grains nearly; one hectogramme is equal to 1,543 grains nearly; one kilogramme is equal to 15,432 grains nearly.

MEASURES OF CAPACITY.—One millilitre is equal to $15\frac{1}{2}$ grain measures of water; one centilitre is equal to 154 grain measures, or 3 fluid drachms nearly; one decilitre is equal to 1,540 grain measures, or $3\frac{1}{2}$ fluid ounces nearly; one litre is equal to 15,406 grain measures, or $2\frac{1}{10}$ pints nearly; one cubic centimetre of water at its maximum density weighs $15\frac{1}{2}$ grains nearly, and is $\frac{2}{3}$ths of a fluid dram nearly.

MEASURES OF LENGTH.—One millimetre is equal to $\frac{1}{25}$th inch nearly; one centimeter is equal to $\frac{2}{3}$ths inch nearly; one decimetre is equal to $3\frac{8}{10}$ths inches nearly; one metre is equal to $39\frac{1}{3}$ inches nearly; $\frac{9}{10}\frac{1}{0}$ths metre is equal to 36 inches or one yard, nearly.—*Photographic News.*

IMMENSE quantities of cast iron nails are manufactured in Staffordshire, England. Over a thousand tuns of iron are annually consumed for this particular industry. The appliances for casting are so well perfected that one hand can produce 750,000 nails of the smallest size in a day, while 52,000 of the larger size can be made in the same period. The molds contain large numbers of connected forms for the nails, and the latter hang together when removed therefrom, and are broken apart. They are subsequently tempered in oxide of iron and made malleable.

Improved Model for Canal Boats.

Among the many devices invented and suggested to avoid side swells in navigating canal boats, the one of which the accompanying engraving is an illustration claims attention.

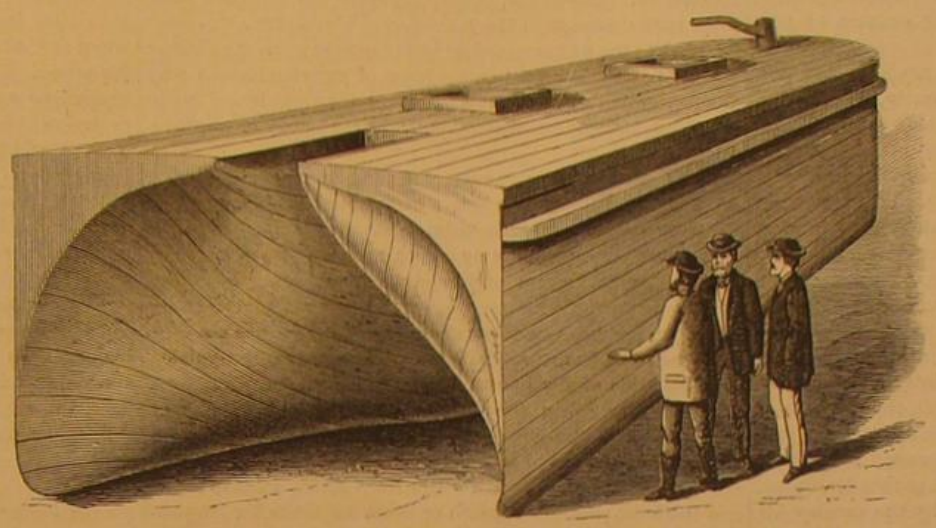
It has long been held by many conversant with the subject of canal navigation, that scarcely any advance in the speed of canal boats, as at present constructed, is possible, unless both the water ways and locks be enlarged, in which case the necessity for adherence to the present model would be obviated. As there is no probability that such enlargement will soon be made, inventors are very properly turning their attention to such changes in model as will obviate the washing of banks without reducing the carrying capacity of boats to any considerable degree.

To this end false bows, propellers, and paddle wheels placed in the bow, wings at the bow, longitudinal channels under the bottom, and many other inventions, have been made, some of them really accomplishing the end sought, as demonstrated by actual experiment.

We are not aware that the inventor of the plan under consideration has experimented upon so large a scale as to demonstrate the correctness of his theory, but he reasons that, as the usual blunt rounded bow tends to throw out the water from the center of the channel toward the bank, that any construction which will reverse this action will prevent the lateral swells, and allow an increase of speed to the desired limit.

The engraving shows the form of the bow of a boat, the lines of which are the converse of those of ordinary boats. The bow is introverted, forming a recess for the introduction of a paddle wheel or screw. By this construction the water will be thrown under the bottom of the boat and the displacement will be longitudinal instead of to a great degree lateral, as is at present the case with ordinary boats.

The stern may be similarly constructed if desired, so that the boat may run in either direction equally well.



HOOPER'S IMPROVED CANAL BOAT.

The invention was patented through the Scientific American Patent Agency, July 25, 1871, by Robert Hooper, of Baltimore, Md., whom address, for further information, at 20 South street.

Railways at $5,000 a Mile.

A wooden railway on the 4 feet 8½ inches gage is being constructed from the town of Sorel, at the confluence of the Richelieu river with the St. Lawrence, through Drummondville, to Arthabaska, P. Q., by Mr. L. A. Senecal, contractor. The Montreal *Herald* gives a long account of a recent trip on the line. Upwards of 2,000 men were at work, and the rails are laid on a large portion of the road. An experimental trip was made, the train going at the rate of 25 miles per hour, and running with remarkable smoothness. The journal quoted furnishes the following interesting particulars:

The ties, which are of hemlock and tamarac, are now brought down on trucks from the woods through which the railway runs; they are put on a rollway, run up to most ingenious circular saws, so gaged that at one operation they are morticed the proper depth and distance, not the difference of a hair breadth being found between one and another. As fast as they are cut, and the operation is very fast indeed, the prepared ties are rolled over to a different siding from that on which they were received, an ordinary circular saw sides them, and they are loaded up to be run out to the place where they are wanted. The wedges for keying up the rails are also prepared here. The rails are of maple, four by seven inches, and fourteen feet long, the gage of the line being four feet eight and a half inches. The cost of the line, in which cost are included stations, (nine in number), car and locomotive depot, engine and repairing shops, engine and tender, two passenger cars, eight grain cars, and twenty-five wood cars, is $5,000 a mile, in full for all but the Yamaska Bridge which cost $35,000. It should be mentioned that land damages, fences, etc., are included also in this amount. In payment it was agreed municipal and Government debentures should be taken at par, and nothing was to be paid except as work to the extent of $10,000 was finished.

The advocates of the uncomfortable narrow gage railways which they claim are so cheap will do well to take lessons from the foregoing.

The "Psychic Force."

As inquiries multiply, regarding the meaning of this new "dissonant consonant" term in scientific literature, we attempt a reply, which may quiet some inquisitive souls. To us it clearly implies that force by which jugglers or "prestidigitateurs" (by some called mountebanks) amuse the children. We must now, however, designate these gentleman Psychists, Professors of Psychism, and so on. The new term means, literally, Soul force. "What's in a name?"

It is already projected, by a reliable gentleman of scientific status, to establish a new society devoted to the study and practice of these arts. We protest against this new society, as we fear that, like all the rest of the romance of our childhood, the mystery, and therefore the charm, of the eggs fried in the hat, of the chicken hatched out in the "Professor's" mouth, and all that sort of miraculous and delightful thing, will in this way soon be sent in the track of most other mystic things of eld, and be reduced to mere stupid science, *if not* psychism. About these things we don't want to be enlightened. Even telephonic music, on an *accordion* or any other instrument, would please us more if we did'nt know how it was done.

We must ask, however, while on the subject, and whereas "animal magnetism" will be classed under this head, why the term "odic" force, of the celebrated Reichenbach, is not entitled to precedence. By the way, it seems to us that if this *be* thus, there is probably a peculiar, perhaps a lower, form or "mode" of this force, such as we may suppose exerted by fortune tellers, "seventh daughters of seventh daughters," advertised in the *Sunday Mercury*, and so on, which, by an application of principles of chemical nomenclature, we may designate as an *odious* force. However, we do not urge this latter discovery of *ours;* in fact, we withdraw it altogether, out of regard to the memory of the discoverer of paraffin, who, whatever his faults, doubtless possessed the *animus* and honor of a true scientist. *Semel insanivimus omnes.*

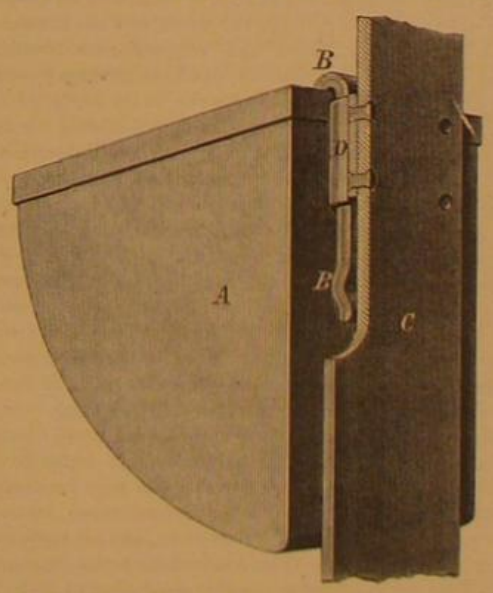
One more notion, and we have done with the new "force," we hope forever. "Clairvoyance" will be found to be "psychic" in its nature. We would respectfully submit to the new society (*in posse*) whether some astonishing cases of almost simultaneous publication, even in almost the same phraseology, of scientific discoveries and inventions, in two distant countries, have been due to "psychic" power or action? Some readers will acquit the present writer of absurdity in asking this question.—*Gas Light Journal.*

VITT'S IMPROVED ELEVATOR CUP.

A very simple but useful improvement is illustrated by the accompanying engraving. Its advantages will be apparent to all practical millers.

While the cup is made detachable, it is at the same time held with sufficient firmness, and the interior presents a perfectly smooth surface, having no rivet heads, nuts, or other projections which tend to produce clogging.

Referring to the engraving, A is the body of the cup from



the back side of which projects a bent strap or hook, B, formed by bending double a portion of the metal plate forming the cup, and then bending the doubled part downward and backward, and corrugating it near the extremity. The hook thus formed is slipped into a loop, D, made of metal plate attached by screws or rivets to the belt, C, as shown.

The corrugation near the extremity of the hook serves to prevent the cup from dropping out of the loop, D, when descending.

This improvement was patented through the Scientific American Patent Agency, August 15, 1871, by A. A. Vitt, whom address at Union, Mo.

An English exchange gives a description of a new sanitary glove, to be worn by surgeons to prevent contagion during operations. It is stated to be especially useful in midwifery cases, wherein, as is well known, the hands frequently produce irritation by coming in contact with the mucous membrane of the patient. The possibility of making such a glove cannot be denied; but when the inventor claims, as the present one, Mr. J. R. Liston, does, that it will "leave the sense of touch unimpaired," he excites the wonder of his readers as to the material of which it is made.

Hall's Apparatus for Punching Paper for the Transmission of Telegraphic Messages.

It has been a desideratum in the transmission of telegraphic messages by means of punched paper, to secure some means by which the paper could be prepared accurately, easily, and rapidly. The invention of Mr. Isaac Hall, of New York (assignor to himself and George B. Walter, also of New York) is claimed to supply the needed facilities for this purpose.

In transmitting messages upon this system, which is the most rapid mode of transmission yet devised, a long narrow strip of paper is punched with small square or rectangular apertures of various lengths, the squares representing the dots in the Morse alphabet, the rectangles the dashes, and the unpunched spaces, between the apertures, the intervals between the dots and dashes as they occur in telegraphic writing. This paper being passed between the ends of the wires forming part of the circuit, or between devices of various kinds connected with the wires, allows the circuit to be made whenever the apertures coincide in position with the ends of the wires, and breaks the circuit when the unpunched portions separate the wires. Suitable mechanism is employed to move the paper at uniform speed, and the impulses are thus transmitted to the recording instrument at the station to which the message is desired to be sent.

The difficulty in preparing the paper has been one of the obstacles this system has met with, but Mr. Hall claims it is entirely removed by the use of his machine, which was patented, through the Scientific American Patent Agency, August 8, 1871.

As we cannot without drawings give the details of its construction, we will state merely that the machine, instead of punching each aperture separately, punches several at once, thus operating, it is claimed, about three times as fast as the method hitherto used. It is worked by keys, the punching not being performed by the power of the hand, but by machinery under the control of the keys, which latter are stated to act with nearly the lightness of the ordinary telegraphic signal key, so that the operator is not fatigued by continued work, as in other machines used for the same pur- pose.

It is greatly to be desired that the system of telegraphing referred to should ultimately surmount the difficulties it has encountered, and Mr. Hall's invention seems likely to prove useful in hastening this consummation.

A Race for Life.

The Lindsay (Canada) *Post* gives the following graphic account of a swamp fire: Though a swamp fire is not so bad as a prairie fire, it is yet formidable enough, as some Canadian gentlemen who were laying out the line of a railroad recently found. In the prosecution of their labors, they had penetrated the Long swamp about half a mile, when suddenly the attention of Mr. Tate, one of the party, was attracted by a loud roaring, as of the approach of a hurricane. On looking in the direction whence the sound proceeded, to his horror he observed fire rushing toward them at a rapid rate, licking up everything in its way and felling large trees in every direction. Mr. Tate ordered a stampede at once, and then began a race. At the start, the fire was fully 300 yards off; away rushed the whole party, white men and Indians, scrambling over logs, through brush heaps, tumbling headlong into holes, barking shins, spraining ankles, scratching hands and tearing clothes, but not a word was spoken, no stopping to look back, or asking for companions in the rear, but each one struggling to reach the clearing. Owing to the denseness of the swamp, though every muscle was strained, progress was like a walk compared to the rapid march of the fire. Fortunately, they reached the clearing in safety, but not a moment too soon, for the fire was but ten feet behind them when they emerged from the woods; had they delayed a minute longer before starting the probability is that they would have lost their lives.

Model Railway Management.

On the Michigan Central road, for over sixteen years past, not a drop of blood has been drawn from man, woman or child inside the cars, and just now the *modus operandi* is especially important. At all hours of the day and night there sits an operator in the Kalamazoo station (midway of the line), who receives telegrams from each train on the road the instant it enters or leaves a station, so that he holds or starts it at will. His eye is literally on the entire line continually making a collision next to an impossibility, and the immense single track quite equivalent, so far is safety is concerned, to the double track roads. The twelve and sixteen wheel coaches, admitting of the breaking of almost any one of the wheels without disabling the truck, constitute also a no small item in this aggregate of immunity from peril.—*Railway Times.*

In the third paragraph from the end of our article in issue of September 16, describing Parrot and McCauley's filter, the letter G should be substituted for H, in describing the outflow in cleansing the filter. In the third paragraph, the partition M is once referred to as the partition B, but this will lead to no misunderstanding as to the working of the filter.

Correspondence.

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

Proposal for a Paine Fund.

To the Editor of the Scientific American:

My late silence in regard to the alleged invention, or rather discovery, of Mr. Paine, was only caused by the fact that my mind was occupied with the subjects I intended to bring before the meeting of the American Association for the Advancement of Science, in Indianapolis, and my absence from New York, but by no means by any intention to drop the subject, or any thought that Mr. Paine's reply could be considered sufficient or satisfactory. To the contrary, it is evident, from these replies, that Mr. Paine dodges the main points, and only gives a weak answer to some side issues, not essential to the grand controversy, which is: 1. That the world knows nothing in regard to the mechanical power of zinc under combustion in a battery; and 2. That Mr. Paine's electromotor recently on exhibition in Newark, was a *bonâ fide* electromagnetic engine, producing the power displayed, solely by the consumption of the trifling amount of zinc mentioned.

I consider the proposition of Mr. Smith, made in the SCIENTIFIC AMERICAN of September 16, namely, to give Mr. Paine $500 if he proves these points, a most excellent plan to settle this matter, which, by the course adopted by Mr. Paine, is now degenerating into a mere pen and ink controversy, which can do no good to the progress of science, but only serve the selfish ends of stock speculators. Therefore I join Mr. Smith, and as a former unsuccessful seeker after economical electromagnetic motive power, I consider the matter important enough to contribute my mite. I therefore offer another $500 to Mr. Paine if he proves his assertions satisfactorily; and I invite all those who are or ever were searchers in the same field, or who take interest enough in the advancement of theoretical science, or in the progress of industry, or in the preservation of human life secured by a safe substitute for the steam boiler, to come forward and follow our example. Let each of those offer $500, so that Mr. Paine, if he really has done science and humanity the service his alleged discovery imports, be properly remunerated. I, for one, will not regret my money, because if the discovery be genuine, Mr. Paine deserves fully the fund of $50,000, which would be soon brought together, if only one hundred persons joined in this way.

I hope that this, my proposition, will find many followers, also, for a national and patriotic motive. The readers of the SCIENTIFIC AMERICAN have seen in the last number, page 199, that an Englishman, the Rev. Mr. H. Highton, makes the same assertions as Mr. Paine, and is snubbed by the British Association, who refuse to hear his paper; and now the New York *Times* comes forward and invites Mr. Highton to come to America "to explain to receptive audiences, that what with scorn was put away by the great British Association."

No doubt but Mr. Highton can find here, as well as in England, promiscuous audiences of incompetent hearers, who listen to his papers, as well as Mr. Paine finds readers for his articles on electromagnetism; it is, however, very doubtful if the American Association would be more willing than the British, to have its time occupied with such papers—at least, the committee of three for the adoption of papers to be read before the recent convention in Indianapolis, of which committee I was a member, refused about a dozen papers, and surely would have refused papers such as Mr. Paine or Mr. Highton would offer.

We do not want to lose time by having papers read or articles printed, containing unproved assertions, at variance with and in contradiction to physical laws established by experiment; but we are each willing to give $500 to the man who proves that the laws, which we thus far have considered well established, are erroneous or misunderstood; we do not want talk, but facts.

In some of the latest articles of Mr. Paine, he complains of persecution, as if he were a second Galileo; he wants to be let alone, like the Southern Confederation during the latter part of our civil war. But this will not do, Mr. Paine; the matter is too important. We will not let you alone; you must prove practically that you are the great discoverer you pretend to be, and cut out that Englishman, before he accepts the invitation of the New York *Times*, and comes this way; then you will receive the $50,000, perhaps $500,000, you would deserve so well; and we will have the honor of compensating American genius.

No more promises of what you are going to do, or may demonstrate, will be accepted; you must either practically prove your point, and receive your money, or keep still and —— not bother us any more. P. H. VANDER WEYDE.

New York city, Sept. 17, 1871.

Strength of Boilers.

To the Editor of the Scientific American:

In order to show tangibly what pressure a boiler may bear under some circumstances, I enclose you a piece taken from a boiler at the works of the Otter Creek Coal Company, where the water is of the worst quality—*corrosive*. The boiler had been carrying a pressure of from 20 to 30 pounds until within four days of the bursting, and had a pressure of not less than twenty pounds when it gave way, gradually and without explosion.

Another case I have to mention is of a boiler in Pittsburgh, Pa., which gave out quietly under a pressure of 90 pounds. Upon examination, the mud drum was found to be literally eaten up with rust, and was not thicker than brown paper in places. I could (and did) punch a file tang through it with one hand, yet that boiler did not explode.

How then shall we account for the *Westfield* explosion on any other theory than the instantaneous generation of steam, which theory is generally only understood by experts? Why then should the ferry company and engineer be accountable, who may (in all probability) never have heard of this theory?

Brazil, Ind. C. W. CRAWFORD.

[Since the above letter arrived, Mr. Crawford has informed us that the boiler in question was about 36 inches in diameter, and 24 feet in length. The specimen he sent was taken from the patch which had been put on the boiler about four months before the bursting, and is a piece of much corroded iron, in places not more than one thirtieth of an inch in thickness. Mr. Crawford attributes the corrosion to the water, which is drainage from a mine, and may be impregnated with sulphur. —EDS.

Canal Navigation---Its Difficulties.

To the Editor of the Scientific American:

I have not been an uninterested reader of the several articles published by you from time to time relative to canal navigation. Indeed the subject occupied my attention long prior to the passage of the law offering a prize for a "device" adapted to the purpose, and an improvement upon the present method; and allow me to state some of my conclusions why the navigation of our canals at more than moderate horse speed has become impracticable, and the remedy or improvement.

They are arbitrary causes: 1st. The dimension of locks. 2d. The necessity of carrying a certain amount of freight to pay expenses, increased in order to afford a business profit to to the carrier. 4th. Volume (depth and surface) of water in the canal, with present build and model of boats preventing propulsion or towing exceeding one and a half to two miles miles per hour. Now these are physical difficulties not easy to be got over, by theoretical ideas as to manner of propulsion or application of any known motor or power.

As to books, ask a scientific and practical ship builder or marine architect what are the principles of that art in modelling a craft or boat for speed and easy propulsion, and the answer will be, length with water lines giving a sharp prow, and the least possible breadth or beam requisite for buoyancy. If for burden, what then? Increase of breadth or beam. Thus it is, to attain burden, confined to dimension of locks, the present canal craft has been built or modeled entirely for burden, and disregarding every principle of marine architecture or science, until they have become boxes 96x17, 8 feet deep, corners rounded; and the next thing is to load down this big box within one foot of the canal bottom, in a body of water confined within a bench wall to forty-two feet surface, and attempt to propel or drag 245 tuns cargo through this body of water up to a speed of three or more miles per hour: which is another physical impossibility, from the fact of insufficient depth of water and the bad shape of boat carrying the burden, forcing the body of water forward, and the greater speed attained, the larger the volume of water forced, the result grounding the boat on the bottom This is simply the effect of natural causes, to wit, the resistance and density of water. What, then, is the remedy, or how shall we produce a craft to avoid the resistance of water and attain the desired end? Ask a ship builder if he can model a craft, irrespective of lock dimension, that can carry 245 tuns, and be propelled five or even ten miles through the water, and the answer will be: *Certainly!* give length and proportionate breadth as wanted, and it will be produced; and herein comes a solution of the difficulty. Return to or observe, in the model of canal boats, the recognized principles of ship building or naval architecture, and the craft is produced. Model with a due regard for speed as well as burden, and all difficulties as to towing or propelling boats five to ten miles vanish, provided power be furnished commensurate with the burden borne and resistance to be overcome. But just here come up expense and remuneration, demanding or requiring that the cargo or burden be carried, or canal navigation is impracticable or nonpaying. Well, the locks are too small. Yes, but they are as they are; *ergo*, speed must be sacrificed for burden; model of boat disregarded, for every inch of floating surface is required, and the result is a floating box, carrying sufficient burden to pay expense and some profit; but the model of the boat such as, with the depth of water to float one and a half to two miles towage can only be attained. Now all attempts to get over or around these facts and known principles are futile. They exist, and all theories for overcoming or obviating them are visionary and impracticable, so long as confined to present dimension of locks and build of boats, and an arbitrary or fixed amount of freight to be carried; but give length to present boats, and it becomes practicable.

A recent writer, upon the subject of propelling boats, in your paper asks this pertinent question: "Why not use steam?" and I ask, what better or more efficient motor power have we than steam? But there is difficulty in its proper application, to which, with your permission, I will allude. The present application of steam power is with the submerged propeller wheel, in very many respects, no doubt, the best propelling contrivance known, and only one objection can be urged against its use on the canal, and that is this: The action of a propeller wheel with its required velocity of revolution, attached to a boat loaded and drawing six sevenths of the water of the canal, is to paw (if I may so speak in this connection) away the water from the stern, while the shape or model of the boat (stern being full) has a tendency to drag water, and the action of the wheel, to displace it from the stern and let it settle, and thus the boat grounds. The greater the power applied to the propeller wheel to increase speed, the greater the displacement of water by increased revolution of wheel, and the result is as before stated. Another seeming objection to the use of a propeller wheel on the canal is that it is submerged, and its action on the water is at the bottom, whereas in canal navigation the propelling power must be exerted on the surface or top of the water, like the common steamboat wheel, without its disturbance of the water, if possible, as I think it is.

Thus much for propelling agent and motor power. I turn now to the form or model of the boat carrying the burden. Unless some device be brought out restoring the form of boat to conform to true principles of naval architecture in the model, and combining speed and burden, under whatever system of towage, increase of speed on the canal will be a failure, and it is true the present model of boats is only adapted for horse power towing.

A writer in your journal speaks of an "adjustable bow," but pronounces it "impracticable," and herein he is mistaken. That device is the only thing which overcomes the difficulties, for it restores the form or model of the boat back to true and scientific principles of ship building, and allows the burden part of the boat to remain as at present, filling the entire capacity of the locks when passing through, and when out, adding or affording the requisite form necessary for speed. This with steam power applied by a wheel or propelling agent, exerted on the surface half of the water, or proportionate, as the burden carried requires, or the speed desired, and there will be no more difficulty in carrying 245 tuns burden (for that is the *maximum* amount with suitable build of boat that can be floated upon a surface of water 96x17 and 6 feet draft of water) and attaining five to seven miles speed per hour than there now is by horse power one and a half miles.

The question of damage to canal structures and banks I consider disposed of, and not to be taken into consideration, inasmuch as by recent declaration of the canal commissioners, that is not to be regarded in the competition for the offered reward. E. C. BANCROFT.

Syracuse, N. Y.

The Psychic Force.

To the Editor of the Scientific American:

As I read your interesting paper with much regularity, I am well acquainted with the attainments and reputation of Dr. Vander Weyde; and my knowledge of his fairness and candor has caused me much surprise at his letter in your issue of last week. Of the ingenuity of Mr. D. D. Home, we are all aware, and some people call him very strong names; and Dr. Vander Weyde's remarks on *léger-de-main* and jugglery are all to the point. But when he asserts that the "wire cage serves to hide incidental means of support," and that "a spring balance may be made to indicate an increased weight, by having a small electromagnet hidden inside, which, by the simple contact of a metallic point, in the wooden lever, is brought into metallic connection with a hidden battery," I think he is attributing, to Mr. Crookes and the two other gentlemen, an amount of obtuseness that is no characteristic of either of them.

Mr. Crookes distinctly says (and he is trustworthy) that he called for Mr. Home, and saw him change his dress, and can state positively that no machinery was secreted about his person. Moreover the apparatus was constructed and arranged without Mr. Home's supervision, and that "medium" was not aware of the object of some parts of it when he sat down to exhibit his powers. The object of the cage was obviously to prevent Mr. Home from touching the accordion with his feet.

Dr. Vander Weyde's theory of *léger-de-main* may be the true explanation of these singular feats which have deluded Messrs. Crookes, Higgins, and Cox: but I think Mr. Crookes' statement that he prepared the apparatus without Home's knowledge is entitled to credence. If jugglery underlies these manifestations, by all means let it be unearthed; but if this be done, it will be by plowing far deeper than Dr. Vander Weyde has done in his letter of August 12. B. D.

Jersey City.

A Simple Alarm Clock---A Boy's Invention.

To the Editor of the Scientific American:

I send you a description of a simple contrivance, which may be useful to some of your many readers, especially since it has to do with the all important subject of "early rising." Take a common weight clock, and have a small hole in each of the boards that support the works inside, in any convenient place near the hammer. Having attached a small wire or string to the wire that makes the clock strike, in regulating, pass it through the holes and under the time weight, through another hole in the case to the outside, where, having secured it, you have an alarm clock that was never intended as such. The time weight, in descending, will press on the string, and make the hammer strike until the other weight runs down. To set the alarm the time weight must be gaged in winding, as it descends about ¼ inch in three quarters of an hour. This is a boy's invention. It will wake a person without frightening him, which some other alarms will not do.

Randolph, Mass. PUER.

The importance of petroleum to the commerce of the United States may be judged from the fact that it is now exported to a greater value than any other product, with the exceptions of bread stuffs and cotton. The value of the exported petroleum in the year 1870 was nearly $36,000,000.

IT is estimated that America, when her productive power is fully developed, will be able to feed four times as many persons as there are now on the face of the earth.

Testing Boilers by Hydrostatic Pressure.

OFFICE OF U. S. LOCAL INSPECTOR OF STEAMERS,
No. 23 Pine St., New York, Sept. 15, 1871.

To the Editor of the Scientific American:

My attention has been directed to an article in the edition of your paper of Sept. 2nd, signed by a Joseph A. Miller, of Boston, Mass., headed "Steam Boiler Inspection," in which he refers to a report of a Commission appointed by the Parliament of Great Britain, in reference to the responsibility of owners of steam boilers. He also alludes to the *Westfield* case and the testimony of the Government Inspector (which is a matter of record) finally concluding with the question (using his own language): Can a boiler be tested, as stated in the testimony of the Government Inspector?

I would state for the information of the above named individual, that it is not only possible but entirely practicable to test a boiler to any given pressure,—no matter what the pressure of the fountain head may be, whether it be sixty, one hundred, or two hundred pounds to the square inch.

In the first place, the boiler is filled, the safety valve being open; when full, the water is shut off. The valve is then lowered to its seat, the water is then turned on slowly, and when the pressure required is indicated by the gage, it is shut off instantly.

In the second place, there is a safety valve attached to all boilers which can be raised, and so relieve the boiler, when the pressure has reached the proper point.

In the third place, all boilers have blow cocks attached to them (where men are stationed), which can be opened when the pressure has reached the required limit, and so relieve the boiler from any undue pressure.

In the fourth place, the main valves of the engine can be lifted from their seats, thereby relieving the pressure on the boiler.

If Mr. Miller was a practical engineer, or was possessed of a fair share of common sense, this explanation would not have been necessary. I therefore conclude that he belongs to a numerous class, who voluntarily rush before coroners' juries to give testimony, in order that their names may appear in the newspapers, thereby advertising themselves and those who employ them, even at the risk of exposing their ignorance.

But it is to be feared that knaves and fools will exist with the human race.

JOHN K. MATHEWS,
U. S. Local Inspector, New York.

Uniformity in Rails.

To the Editor of the Scientific American:

At the annual reunion of the Car Builder's Association, held this year at Richmond, no subject received more serious discussion than that pertaining to an adoption of a basis of uniformity in respect to the construction of cars and the manufacturing of rails.

Regarding this latter subject, I have an idea to advance, which, if carried into practice, I sincerely believe will result in much good to both manufacturer and purchaser.

No one but a person initiated in the mysteries of the manufacturing of rails can conceive of the multitudinous number of shapes, forms, and varieties which the market calls for.

Now if the bevel under the head of the rail and the bevel on the flange were the same, so that the fish bar would fit the rail either side up, this great variety of forms and shapes might very readily be dispensed with, and an uniformity adopted, which would prove greatly advantageous to manufacturer and purchaser, and in turn to the general public.

Of course there will be different hights to rails, but this matters very little. I also feel confident that if the above plan be generally adopted, the fish bar will be rendered much more effective.

JOHN H. SNYDER.
Richmond, Va. Supt. Tredegar Iron Works.

Up a Mountain by Rail.

The London *Daily News* prints the following interesting description of the railway up the Rigi:

"I have been up the Rigi Railroad. This morning, at eight A. M., I embarked in a boat for Viznau. On my arrival there, I and about two hundred fellow passengers found ourselves standing before a small station, with the mountain towering above us. A notice stated that only sixty passengers could be forwarded by each train, and that first come would be first served. Behind a small window sat a Swiss maiden. For about a quarter of an hour the window was closed, and we had an opportunity to contemplate her features through a pane of glass; then it opened, and she proceeded to give out tickets. Anything more slow and methodical than that maiden it is impossible to conceive. The issue of each ticket was a labor of several minutes. As soon as sixty were issued the window was closed, a train was started, and then, after an interval of about ten minutes, the maiden reappeared, and commenced slowly dealing out a second sixty. I got a ticket for the third train, and soon afterward found myself seated in a carriage containing nine benches, each of which accommodated six passengers. For an hour and a half we proceeded almost, as it appeared to me, perpendicularly up hill, at the rate of about three miles an hour. The motion was not more uncomfortable than is usual with railroads.

"The railroad is not yet completed to the summit of the mountain. At a place called Staffelhohe the passengers have to get out and pursue their expedition on foot. As this does not occupy above half an hour, it is not very fatiguing. By four P. M. I was back in Lucerne, having breakfasted and passed three hours gazing with deep interest at the wonderful panorama beneath my feet, which consisted of a mist. The Rigi Bahn Company must be making a good thing of their speculation, to judge by the number of passengers which they convey. There has been, I am told, during the season a daily average of about five hundred; and I can vouch for it, that the boats to and from Viznau are so crowded that it is almost impossible to find a place to sit down on them."

Vegetable Cutter.

This is an ingenious machine for slicing and cutting vegetables, apples, etc. It consists in an adjustable rotating disk wheel, carrying adjustable knives or cutters, and an inclined hopper, in connection with the wheel.

This machine is ordinarily attached to the projecting edge of a table or other fixture by means of a set screw. A disk wheel is rigidly attached to a shaft, which revolves on a point or step through a bucket or arm of the frame. The point is made adjustable by means of a screw, by which the shaft is raised or lowered for the purpose of adjusting the knives to the cutter plate or bit on the bottom of the hopper. The knives are adjustable in slots through the wheel by means of screws (one or more) in each blade, the screw or screws passing through a slot or slots in the blade. A straight edged cutter takes a smooth slice from the potato, apple, or vegetable. Vertical cutters pass through holes in the wheel and cut slits in the vegetable, so that the knife which follows in the rotation of the wheel will slice off and leave the vegetable in narrow strips, when such a form is desired, for soups, etc. The knives or cutters are readily removed, so that a greater or less number may be used.

The apples, potatoes, or other vegetables, are fed into the hopper with one hand, while the wheel is revolved with the other, almost any form or thickness of slice being produced in the most perfect and rapid manner. The machines may be constructed on a larger scale, and driven by steam or other motive power, for cutting vegetables, as turnips, carrots, etc., for feeding stock. In the great saving of time and in the accuracy with which its varied operations are performed, this vegetable cutter is believed to be unrivaled. Gideon B. Massey, of New York city, is the inventor.

Epergnes for Fruits and Flowers.

This invention consists in a mode of connecting the stand and bowl, also the bouquet holder, which are made in separate pieces by molding or pressing, by means of thimbles, a screw bolt, and elastic washer or cushion, in such a manner that the several parts are detachable from each other, thereby saving labor in the manufacture, and saving vastly in the labor and space occupied in packing for transportation; also, securing a degree of elasticity which lessens the risk of breaking. If any part should be broken, it can be replaced by another, while in the ordinary way of making them a fracture of either the leg or the bowl destroys the whole.

Heretofore glass épergnes have invariably been blown or hand made, owing to the great difficulty, if not impossibility, of successfully making them by pressing, and attaching the bowl and leg together permanently, with a hole down through the center for connection of the bouquet holder, and, if drilled after being attached, in ordinary bowls the glass is liable to fly either during or subsequent to the process of drilling, while either the leg or bowl can be safely pressed separately with a hole in each, or the hole may be afterward drilled through each separately with safety, and the two attached. They can thus, it is claimed, be made very much cheaper by pressing separately and connecting afterward than by the hand process.

In the case of these articles being made with two bowls, one above another, as they often are, the joint of the upper one with its stand, which rests on the lower bowl, will be made in like manner, one long bolt answering for both, passing up entirely through the stand of the upper bowl.

When they are made without the bouquet holder, the bolt, having a broad flat head, is put down through from the top, a nut screwing on to it in the bottom of a socket.

Samuel S. Barrie, of Green Point, N. Y., is the inventor of this improvement.

Spread of Small Pox by Contagion.

In London recently, an officer appointed to take charge of the effects of a poor man who had died of small pox, pawned the clothes and sold the ticket to a man who redeemed the pledge, and took the garments. His wife caught the disorder and died a few days after.

It is no uncommon thing for poor people to dispose of infected clothing and bedding; they dare not keep it, and cannot afford to throw it away. It has been suggested that sanitary regulations should provide for the reimbursement for the loss of clothes, etc., of such persons, whose poverty makes them, in sickness, a source of great danger to their neighbors.

CUNDURANGO—the new plant—whose extract or decoction is said to effect such wonderful cures in cases of cancer, has been analyzed by Dr. Antisell, chemist to the Agricultural Bureau at Washington. The doctor finds the ratio of the wood to the bark to be as 50·28 to 49·72. The centesimal composition of the bark was as follows: Moisture expelled at 212 Fah., 8; ash matters or mineral salts, 12; vegetable substances, 80. The vegetable matters were separated and found to be composed as follows: Fatty matters, soluble in ether and partly in strong alcohol, 0·7; yellow resin, soluble in alcohol, 2·7; gum and glucose from starch, 0·5; tannin, yellow and brown coloring matters (extracted), 12·6; cellulose, lignin, etc., 63·5; total, 80. No crystalline alkaloid could be detected, and, according to the above results, the therapeutic position of the plant must be among the aromatic bitters.

INAUGURATION OF THE MONT CENIS TUNNEL.

This enterprise, remarkable even among the many engineering triumphs of the present day, was formally opened by a grand ceremonial, on Sunday, September 17th. We have taken pains to keep our readers informed as to the progress of the work and the details of its construction, and therefore need not recapitulate the ingenuity and perseverance of the engineers, and the difficulties they so courageously overcame.

The immediate effect of throwing open the tunnel is to bring Turin within 18 hours travel of Paris, and to relieve the journey of the long, wearisome, and often perilous ride by diligence over the mountain. But, as with other great undertakings, there will be many accessory and collateral advantages to the commerce of the world, which time alone can develope, and of which the most obvious is the establishment of Brindisi, on the eastern coast of the Italian peninsular, as the chief European port for the commerce of the East. There will soon be unbroken lines of railroad from Paris and the channel ports, Havre, Calais, and Boulogne, to Brindisi; and the traffic to the East Indies and China, viâ the Suez Canal and the Euphrates Valley Railroad will, no doubt shortly quit Marseilles for the more approximate Italian port. In view of this fact, the French authorities are supposed by some critics to have looked somewhat coldly on the tunnel, and they have not yet completed the railroad leading to it. This important link in the chain of communication will, it is expected, be open in November next. The journey from Calais to Brindisi will then take only sixty hours time, and that from London, about sixty-four. The railroad approaches to the tunnel on the Italian side have long been complete.

The solidity of the work, and the perfect ventilation of the enormous excavation, elicited expressions of admiration and surprise from the large party who attended the opening ceremony, which included many of the most distinguished men from both countries. On Tuesday the 19th, the municipality of Turin gave a grand banquet in honor of the occasion. Two names, which would have been prominent in the list of visitors, must have been remembered with pain by every one present. The great statesman of United Italy, Count Camille Cavour, gave all the weight of his talents and influence to the furtherance of the work; and to Germano Sommellier is due the credit of originating the idea, of fighting for it against all obstacles for twenty years, and of finally completing it, to the satisfaction and wonder of the world. Both these men are gone; but they have left us an enduring monument of their far-seeing wisdom, and indomitable courage and genius.

Trains are now running regularly through the tunnel, the subterranean transit occupying twenty minutes.

In alluding to some rumors of accidents in this work, *Engineering* states that there has never been one stone displaced from the finished arch of the Alpine tunnel, the work of which is so solidly constructed that it is well nigh as durable as the rocks themselves. The only circumstance which served as a formation for these absurd reports was the falling in of eighteen or twenty feet of work, which happened in the last days of June, at the Bardonneche end, in consequence of the falling of some scaffolding broken by the explosion of a blasting charge.

The total cost of the tunnel is represented to be some $13,000,000, or 65,000,000 francs; of these 20,000,000 francs are to be contributed by the Victor Emmanuel Railway, or Railway of Northern Italy. This sum is to be paid on or before the opening of the tunnel. The French government was to pay 19,000,000 francs if the work was accomplished within twenty years, reckoning from 1862. But if the work was accomplished at an earlier date, France bound herself to pay 500,000 francs more for every year gained upon the stipulated time. As there have been eleven years thus gained, France will have to pay 5,500,000 francs besides the 20,000,000 of the original stipulation. She has besides to pay 5 per cent interest on the money due for the work as it proceeded from year to year. Thus Italy will pay something less than 20,000,000 francs. Had the construction of the tunnel continued beyond the stipulated term of twenty years, Italy would have lost 500,000 francs for every year in excess of that period.

DEATH OF PROFESSOR D. H. MAHAN.

We regret to announce the death, by suicide, at the age of 70, of the distinguished professor of military and civil engineering at West Point Military Academy. He had been visited by a long period of mental depression, and was on his way to New York to seek medical aid, when a sudden frenzy impelled him to leap from the steamboat and drown himself in the Hudson. This sad act deprives the country of a most valuable officer, who has long been the animating spirit of one of her most important institutions. It is stated that the recommendation of the West Point Board of Visitors, that he should be placed on the retired list, had contributed to the affliction which drove him to end prematurely his useful and honored life.

THE "OCEAN WAVE" DISASTER.—We hear from Mobile, Alabama, that Coroner Paine has caused the arrest not only of the owners of the ill fated boat *Ocean Wave* but also of the United States Inspector of Boilers, E. P. Sprague. If a verdict can be obtained against, and due punishment meted out to, a few delinquent officials appointed by the Federal Government, there is hope in the future that responsibility of an office holder is not a myth, and that nothing but a proper administration of laws already in existence is required to defend the lives of the public from the recklessness and ignorance of boiler owners, and of the functionaries who are set to be a check upon them.

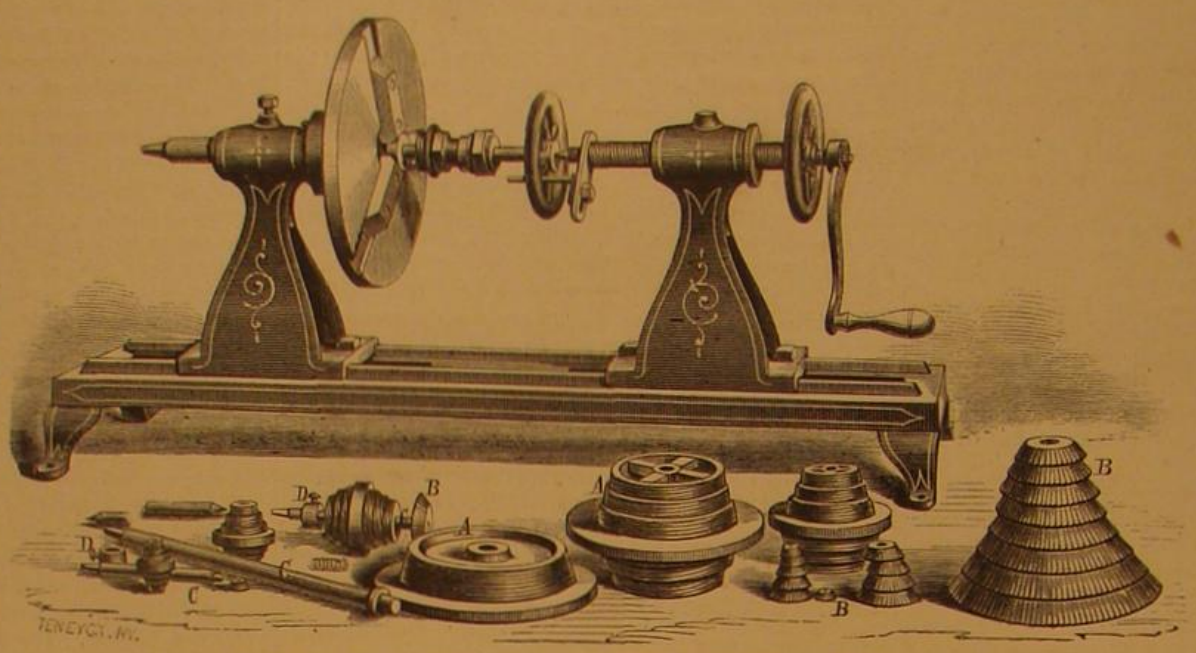
Improved Valve Fitting Machine.

One of the most practical and useful improvements we have lately had the pleasure of presenting to our readers, is that shown in the engraving which accompanies this article. By it steam valves can be refitted without taking them to a machine shop, and their seats may be fitted without removal from the pipes to which they are attached. Both operations are performed easily, rapidly, and accurately, by any person possessing only slight mechanical skill; and it is safe to say that the machine will pay for itself in a single year in any establishment where a large number of valves is in constant use.

The portion of the apparatus intended for refitting valves is a small lathe, having a bed plate with guide rails, upon which the heads slide, in their adjustment, to and from each other. The head at the left of the engraving carries a hollow spindle to which a face plate is attached, as shown. In the center of this plate is a steel center pin which rests against a coiled spring in the hollow spindle, its use being simply to center the valve previous to cutting it.

The face plate carries these cutters, as shown. These cutters are beveled alike at each end, but have each only one cutting end. Only one at a time is used as a cutter, the smooth ends of the other two being presented to and caused to bear against the valve in cutting, to steady it while the cutting proceeds.

Various lengths of centers are used in the hollow spindle in fitting winged valves, etc., a circular piece in the center of the face plate being removable to admit the wings or spindles of such valves, and allow their bearing faces to meet the cutters.



HALL'S MACHINE FOR FITTING STEAM VALVES.

The centers, resting on a coiled spring in the hollow spindle, retreat as the valve is fed up to the cutter, but hold the valve accurately to center while the cutters are brought down upon the valve, where they are fixed by set screws.

At the opposite end of the lathe is a spindle with feed screw, the spindle carrying a center which centers the valve stem. A dog screws on to the end of the spindle and engages with an arm of the hand wheel on the valve stem. The spindle is turned by a winch.

The valve being placed in the lathe, and the parts adjusted as described, five or six turns of the winch, with the proper feeding up, will dress the valve to a true bevel. The center in the hollow spindle is then held from retreating further by a set screw, and a few turns more burnishes the valve upon the smooth ends of the two reversed cutters.

In fitting the seats of globe valves, screw guides, A, are used; each—except the largest—having six different threads to suit various sizes of stuffing boxes, and there being enough of these guides to fit all the threads in use, from six inches down. Burrs, B, of various sizes are screwed on to a stem, C, which stem passes through one or other of the guides, as the case may require. The stem is turned by an ordinary bit stock, or a ratchet drill stock, or, in case of very large valves, by a press drill stock.

When the cutting is done, a collar, D, is slipped on to the stem, C, and slid almost up to the screw guide, leaving a very slight space for further advance of the stem. A few more turns then burnishes the surface of the seat, leaving a perfect finish.

Its merits are at once seen upon inspection, and it has been purchased and is now used in hotels, manufactories, large stores, and, in short, in all kinds of establishments where steam is used either to heat the buildings themselves or as a conveyer of heat to liquids, as in dyeing, tanning, etc.

The machine illustrated is the largest size; smaller ones of less capacity and much cheaper in price, are manufactured.

This machine is covered by Letters Patent bearing date Aug. 1, 1865, Dec. 10, 1867, and March 8, 1870; reissues, July 7, 1868, and Sept. 28, 1869.

It is now on exhibition at the Fair of the American Institute, and may be seen at the office of C. F. Hall & Son, 21 Murray street, New York, whom address for further information.

Improved Pulverizer.

Experience has shown that the best time to cultivate the soil is before the seed is put in the ground. The surface soil is usually the most fertile. Hence, in pulverizing the earth, it is not desirable to invert the soil, as is done in the common operation of plowing, but rather to stir up and mix the soils to the desired depth. To this is due the great superiority of the digging process in the production of crops.

The machine herewith illustrated is intended to dig up and thoroughly pulverize the soil, and prepare it for the reception of seeds of every kind. It consists of two cylinders, supported by suitable framework, and carrying wheels, so geared and combined that the revolution of the foremost cylinder imparts a rapid revolution to the rearward one. The foremost cylinder is armed with teeth, which enter the ground be the weight of the machine, and, as it revolves, dig up the earth. The rearward cylinder is armed with cutting teeth, which play between the beforementioned teeth and knock out and pulverize the earth presented to them.

The teeth of the foremost cylinders are of the bayonet form, but of such a peculiar curve that, as the cylinder moves forward, and as the teeth penetrate the soil, they continue to coincide with the first point of penetration until the entire tooth has penetrated, or as much of it as is necessary to dig any required depth.

It will be seen that, as the teeth penetrate the soil, there is no drag on the latter, the teeth, in passing, entering precisely as does an ordinary spade in the hands of a gardener. The effect upon the soil, as it leaves the teeth, differs entirely from their action in penetrating the soil, for, after the penetration of the teeth to the required depth, and on the continued forward movement of the cylinder, the teeth immediately commence to raise the soil abruptly, as the gardener raises the soil with his spade.

The exact curve of the teeth depends on their length and the diameter of the cylinder to which they are attached, and is described by a point in a plane rolling on a cylinder. The form of the teeth and the method of attaching them to the cylinder are both covered by a patent. This is really the best use to which bayonets have ever been put.

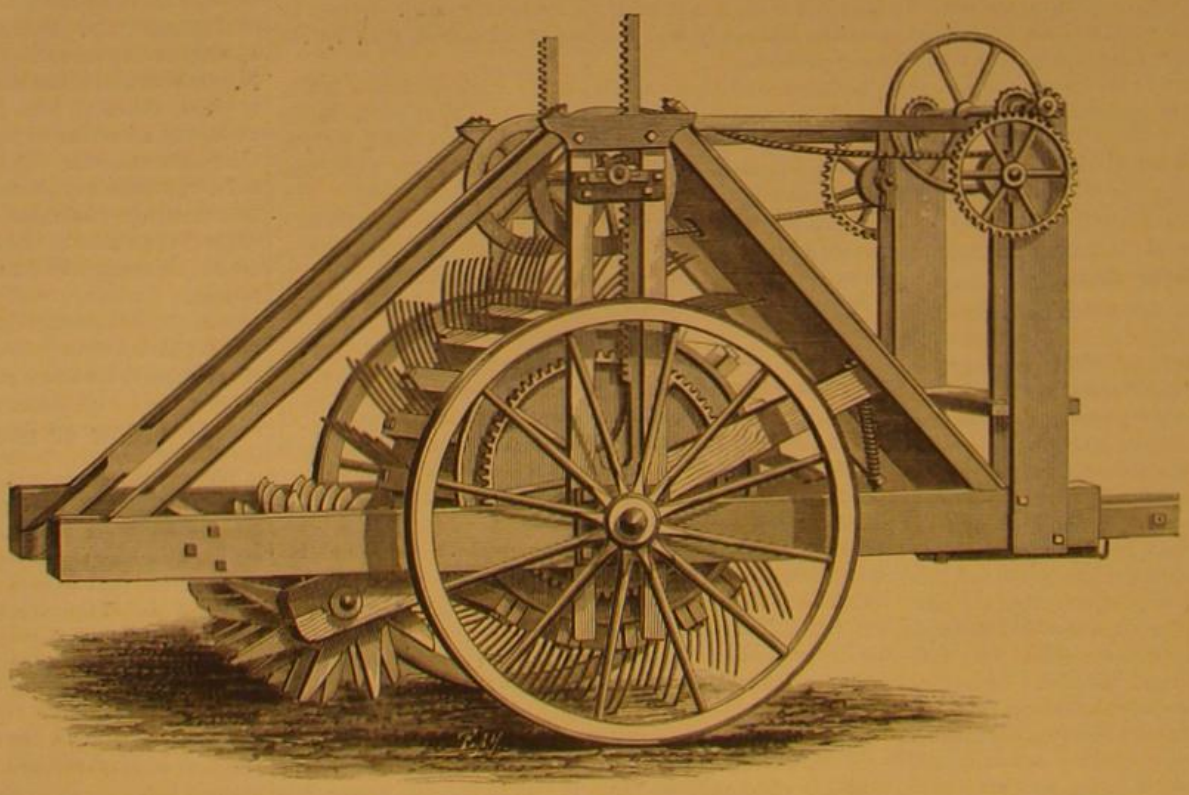
The cylinders may be geared by any means whatever, and may revolve in the same direction or the reverse. They clear themselves better of rubbish when they are reversed.

The cylinders are lifted clear of the ground by means of a sliding rack, which is operated by a pinion near the top of the king posts, in connection with the ropes and hand wheel, as shown; or cranks can be used instead of a hand wheel

By reversing the motion, the cylinders are lowered, the teeth forced into the earth, and, in turn, the carrying wheels are lifted clear of the ground.

This machine is claimed to do its work well, thoroughly pulverizing even heavy clay soils. It is particularly adapted to steam culture. It is the subject of several patents, the earliest bearing date March 19, 1861.

Any further information concerning this machine will ab furnished by Geo. G. Lobdell, of Wilmington, Del.



THE PULVERIZER OR "DELAWARE DIGGER."

Hydraulic Hoisting Apparatus.

A new apparatus for elevating and lowering platforms in hotels or warehouses, by means of water, designed to utilize the entire force of the water, and occupy a small compass has been invented by Mr. Albert Lucius of New York city The invention consists in the combination, with a hydraulic cylinder, of a piston, toothed rod, gear wheels, and winding drum. The horizontal hydraulic cylinder is closed at the back end and open in front. A piston, properly packed, is connected with a piston rod, which is constructed as a rack. This gears into a pinion hung in bearings cast to the front end of the cylinder in form of lugs. The arbor of the pinion carries a drum of large diameter, to which the hoisting rope is fastened, and around which it winds. A roller, hanging also in the lugs, bears against the smooth face of the toothed piston rod, and keeps it in constant gear with the pinion. The water is admitted at the back end of the cylinder, through a pipe, which is closed by a suitable valve. This valve is connected with a rope, extending up along the hoist way, so that by pulling it the water may be admitted. A water discharge pipe connects also with the back end of the cylinder, and has a valve which can be opened by a rope.

The operation of the machine is as follows: In opening the induction pipe, water is admitted to the cylinder behind the piston, pushing the latter forward, and causing thereby the rotation of the drum and the winding of the rope which elevates the platform. When both pipes are closed, the water will be confined with the cylinder to retain the piston, drum, and platform in any suitable position. When the discharge pipe is opened, the water gradually escapes.

To Cheesemakers.

The following groan from England, regarding the introduction of American cheese into their market, we find in the September number of the *Milk Journal*: It says:

We would draw especial attention to our report of the cheese market this month. We do not think there is any cause for alarm, yet the present state of the cheese trade is significant. Such words as "the American are absorbing all the demand," "Dutch, like English, is being driven out of consumption," have, to say the least, not a very cheerful tone. We cannot question the authority of the very eminent firm of cheese factors from whom we obtain our monthly reports. We have no wish to create a panic among English cheesemongers, but we cannot suppress the information afforded us, and therefore print it *verbatim et literatim*. There is no very immediate danger in the American competition; but it behoves us to be on the alert, and to produce cheese at the least possible expense, and of the very best quality. The success of America is to be attributed to the extensive organization of her cheese factories, whereby division of labor is effected, a large working capital used in the manufacture of cheese, and an uniform good make produced, by converting milk into cheese on a large scale; and by the employment of skilled labor under the superintendence of scientific, enterprising commercial men. The system which has done so much for America can undoubtedly do a great deal for us, and enable us to maintain our ground against all comers. We therefore watch, with a daily increased interest, the success of cheese factories in our own country.

ANIMAL food should not be eaten more than twice a day.

Scientific American.

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PROGRESS OF UNDERGROUND ROADWAYS.

Another tunnel, at an expense of $500,000, is to be constructed under the Thames River, at London, from Arthur street, near London Bridge, to St. George's Church, Southwark. The new tunnel is to be made on the same principle as the subway now existing, which extends from Tower Hill, under the Thames, to Southwark. The new tunnel, when complete, will make the third that has been constructed under the Thames. The great double tunnel, of Brunel, now forms part of the London underground railway system.

Several years' experience in London with the various forms of city railways, has conclusively demonstrated that the underground method is by all odds the best for rapid city transit. It affords a safe, quick, and cheap means of communication, unattended by substantial difficulties or objections. The bridge or viaduct plan of placing the track above the streets, is found to be most expensive, besides being cumbersome and obstructive to the public. This plan has been on trial in New York for the past three years, on a single track line, three miles in length, extending from Dey street, at the southern end of the city, northerly, through Greenwich street and Ninth avenue, to 32d street. But it has failed as a financial concern, and is shortly to be taken down and sold for old iron. No greater nuisance was ever inflicted on the town than the erection of this viaduct railway, and everybody will rejoice at its demolition.

Among the special advantages of underground city roadways, it may be observed that they are out of sight, encumber no streets, and their operation is productive of no serious annoyance to the public. Instead of encumbering the streets, every such roadway, in fact adds a new street to the city, and thus increases its area.

The leading engineers, both in Europe and in this country, regard the underground system as far preferable to the bridge system for city purposes, and new underground roadways have been commenced and projected at several points.

In the city of Chicago, two roadways have been already constructed under the Chicago river, and another surveyed. These underground and under-river roads have proved to be of great value to the public, as avenues for communication between the parts of the city separated by the river, over which bridges had been previously used.

At Detroit, a grand railway tunnel is about to be constructed under the Detroit river, to connect the city with the Canadian shore. Illustrations of this tunnel have heretofore been published in the SCIENTIFIC AMERICAN.

At Baltimore, Md., a splendid underground railway is now in process of construction, and is rapidly progressing. This railway will form a connecting link between the Baltimore and Ohio railway and the Philadelphia railway. This tunnel has an exterior diameter of 30 feet; 400 men are at work. It is to be finished in less than two years.

The latest and most approved engineering methods for city communication are thus being adopted in all directions—except in New York city. In this metropolis, the municipal managers are notorious for their crookedness, and they exhibit a singular perversity and blindness in respect to the engineering plans for rapid city transit.

Instead of building tunnels under the river between Brooklyn and New York, which could be constructed in one or two years for one or two millions each, they are now going on with the slow process of erecting a gigantic suspension bridge, requiring ten or twelve years for construction, at a cost of ten or twelve millions of dollars, drawn from the public chest.

In this city proper, where facilities for rapid local travel are imperatively needed, instead of encouraging the building by private enterprise of an underground railway, which could be constructed in a couple of years, for one or two millions per mile, they contemplate the erection of a monstrous elevated or bridge railway, at a cost of some sixty millions of dollars, the money to be drawn, after the manner of the Ring, from the public treasury. The nuisance of the Greenwich street bridge is thus to be again introduced on a larger scale, and on a more central, and therefore more objectionable line.

This new bridge will be some twelve miles long, dividing the city like a wall, greatly interfering with the comfort of citizens resident near its line, and forming an ugly eyesore for everybody. The New York *Tribune* has published engravings from the drawings of this bridge, showing the style of structure to be erected over the street crossings. It represents a heavy aqueduct-like erection in stone, of mediæval architecture, placed like a barrier across Broadway, reminding one of Temple Bar, in London, but more clumsy than the latter. According to the *Tribune*, there are to be some two hundred of these gloomy bridges, or one over each street crossing. Such is the latest style of New York engineering. It is strictly in character with the operations of the men composing the Ring, who rule New York, and who have, by their wretched management and shameless plunderings of the public treasury, nearly brought the city to financial ruin.

THE ACTION OF TRADES UNIONS IN REGARD TO APPRENTICESHIP.

We have never denied that, in the present organization of society, the right, and perhaps even the necessity, exists for those having certain common interests to form associations to protect those interests. We have never questioned the legitimacy of trades unions, as such; though we have denied their right, under any civil code now existing, to dictate to employers any thing except what wages they are willing to work for, and even this right we limit to the making certain wages represent a certain definite amount of work performed, not an indiscriminate *per capita*, regardless of the varying value of individual service.

The payment of wages by the hour, day, or any stipulated time, we regard as an essentially vicious system, and its existence has placed employers in a relation to the employed which has enabled the latter to fix a very false and unequally operating basis of wages.

The question of wages—a source of trouble, from the mutable character of relative values—is the only real question with which the trades unions are grappling. Though professing to aim at the permanent elevation of labor, and the final and permanent adjustment of its relations with capital, their efforts are wholly put forth to compel capital to pay the members of these organizations more than they at present receive, or to oppose the working of the laws of supply and demand, as much as may be, to prevent any decrease from present rates.

By this method of procedure, they lose two very important elements of strength, namely, the earnest sympathy of philanthropists and philosophers who desire the permanent amelioration of the working classes, and the political strength of numbers, which, if unity of action directed by wise counsel were secured, would soon enable the laboring population to work out for themselves such amelioration.

If any thing be sought beyond present increase of pay—or what amounts to the same thing, reduced hours of labor without decrease of wages—never was a blinder, more selfish policy pursued, than the course these organizations adopt in regard to apprentices. Not one leader among them seems to have either the shrewdness or the courage to think or say, "The more of us there are, the stronger is our organization, the sooner can we control legislation, and secure to workingmen and women that share of the world's goods to which their services as producers entitle them." On the other hand, their reasoning is this: "The world needs just so much plastering, shoemaking, horseshoeing, digging, etc. If we prevent the ranks of plasterers, shoemakers, horseshoers, diggers, etc., from filling up or increasing, the present workers in these fields of labor will have the monopoly of the work, and if not able to do it all, why then the law of supply and demand will work in our favor; and whenever it works for us we will let it work, without interference." It is "*we*," "*us*," and "*our*" with these trades unions, not "*mankind*," "*justice*," "*equality*."

In view of this action, how vain is it for the *Internationale* to prate of the abolition of war through the abolition of frontiers, of the general distribution of property, its equal common enjoyment, and all the other grand principles of social reconstruction which have lately been published to the world as the aim and purpose of this organization!

Boys who wish to learn trades now find it almost impossible to do so, such are the difficulties which have been created by the organizations in question. The numbers of artizans in the various trades are daily decreasing. Those who are excluded come to regard the monopolists of labor with even greater abhorrence than the monopolists of capital; and thus, instead of building up the great cause of the emancipation of labor, these societies are bending their efforts to the support of an abnormal system of wages, and the defeat of natural commercial laws, the action of which may be stayed, but never can be held in permanent check. Men may permanently stop the flow of a stream, and dry the channel below their dam; but, however small the stream, the natural and gradual accumulation of the waters will ultimately break through or over the strongest obstacle, and the natural order will be resumed.

So in this matter of apprenticeship, as assumed to be controlled by trades unions. Every apprentice excluded is a recruit rejected—the strength of the unions will remain only about constant, or will reach a point beyond which it cannot increase; while the excluded multiply, and the social forces destined to overthrow the power of these associations accumulate. Unless they adopt a more liberal policy, their fate will be that of the ancient guilds, and a generation or two will witness their decadence, if not their extinction.

Making the permanent elevation of the producing classes their high aim, they would adopt a principle the vitality of which would lend growth and strength to their organizations and would certainly triumph in the end.

THE FEAR OF CHOLERA.

It is said that a merchant, during one of the former visitations of cholera to this country, having become so unduly alarmed as to flee incontinently into the country, closing his place of business during his absence, a wag placed upon the door of the absentee the following notice:

"Not cholera sick, nor cholera dead;
But through the fear of cholera fled.
Will soon return, when cholera's over;
If from his fright he should recover."

The unreasonable and excessive fear of some people is well ridiculed in the lines above quoted, but such foolish terror differs very widely from the proper caution which should mark the action of public authorities upon the approach of this scourge. Such caution will receive the praise of all intelligent men, for although the nature of the disease is still problematical, and although there are yet wide differences as to its treatment when acquired, there is unanimity of opinion as to the causes which tend to aggrevate and increase the disease, the removal of which surely lessens its mortality.

This country has had a scarce defined fear, that the cholera would reach us ere long, and that the ravages it has made in the east would be transferred to our shores. In England the fear of the disease has assumed definite form, and the municipal officers of most of its cities have taken decided action upon the removal of nuisances and the enforcement of cleanliness. In London, the dustmen have been ordered to remove rubbish and refuse twice each week from every house, and daily to clean out every public dust bin, and cart away its contents. Owners or occupiers of houses allowing stagnant water to remain in water closets, etc., are fined ten dollars for each offence, and penalties are imposed upon all who pursue offensive trades after notice to discontinue them. It is also made penal to tolerate common nuisances in houses, or to admit into them live hogs, goats, geese, etc., which has been practiced by some of the lower classes. Butchers who sell stale meat, or dealers in fish or fruit who sell damaged or stale articles, are fined one hundred dollars, and the damaged articles are seized and destroyed.

The commissioners instruct and encourage the people in the free use of disinfectants, and warn them against uncleanly habits. Inspectors are constantly on the lookout for violators of health ordinances, and owners and occupants are exhorted to be more than usually vigilant in the care of their buildings.

This does not look like senseless fright. It is evident the health officers of London apprehend the advent of cholera before long, and are anxious to limit its horrors by every means in their power. The season is too far advanced to admit of much danger from cholera in this country during the present autumn and ensuing winter; but unless its progress shall have been stayed, the next summer will be likely to bring it to our shores. Should this occur, it is to be hoped all our cities, New York city in particular, will be better prepared for its reception than it has been during the recent hot weather, when a walk by either of the two great markets was equal in effect upon sensitive stomachs to a full dose of ipecacuanha, and a trip through some of the tenant house districts was enough to make the stoutest stomach rebel.

FEARFUL EXPLOSION OF TORPEDOES—CORONER'S VERDICT.

The explosion of Union torpedoes and other fireworks, at 126 Beekman street, this city, on the 14th inst., adds one more to the remarkable list of similar destructive accidents for which the present year has been so notorious.

The particulars of the catastrophe are familiar by this time to most of our readers. A wagon standing on one of the most frequented portions of one of the busiest streets in our city, close to Fulton market—which attracts thousands of people daily—was loading with boxes of a firework so dangerous that their use has been prohibited by municipal law. One box dropped, and instantly wagon, driver, and team were not only crushed and mangled, but scarcely a building in the entire block escaped injury. Scarcely could a place have been selected with more certainty that numbers would be killed by such an explosion. The slaughter is all the more harrowing when we remember that it occurred in an occupation that adds nothing to the welfare of mankind. The use of dangerous fireworks is, of all amusements, the most senseless and wasteful.

As one gentleman remarked, "we none of us know when we are safe." Walking along a quiet street, where we should have every reason to suppose we may tread firmly, we are liable perhaps, at any moment, to be thrown, mangled and bleeding, into mid air, or crushed beneath the walls of falling buildings. The reckless way in which human life is disregarded is frightfully appalling.

One of the proprietors of the establishment in Beekman street was awfully maimed, and has since died. Let the other offenders in this horrible affair be caused to feel that public

opinion may be made almost as terrible as the death swiftly meted out to their partner in guilt.

The testimony before the Coroner shows that these men persistently sold the torpedoes with full knowledge of their dangerous character, and in knowing and wilful violation of law. Serious explosions are said to have occurred with them in various parts of the country—one seriously injuring a carman at No. 252 Washington street, in this city—the torpedoes having been sold by this very firm after they had been notified to desist, and while actions at law were pending for their disregard of the notice.

It was testified also that the dangerous character of these torpedoes is so well known, that very few dealers in fireworks will have anything to do with them. Even the ill-fated driver was cautioned to drive slowly in taking them to the place of shipment, yet, notwithstanding these and other evidences of knowledge on the part of the manufacturers—Klueber & Goldschmidt—they sent these boxes with no warning upon them to let people know their dangerous character—no directions to handle carefully—nothing whatever to prevent an accident that might wreck a train or a boat. If ever there was a plain case of wilful recklessness of possible consequences, their action in this matter was such a case.

According to the patent of Charles Nelson, granted June 1, 1867, and under which it is alleged Klueber and Goldschmidt were manufacturing the Union torpedoes, a hollow ball is filled with a composition of amorphous phosphorus, chlorate of potash, sulphur, and chalk, which s plugged in. The exterior is varnished.

The claim covers such a preparation of these materials as shall be harmless in exploding, and doubtless such a preparation could be made, and perhaps was made at first; but any one who has seen the Union torpedoes explode, and who is acquainted with the materials in question, will doubt whether there was either much sulphur or chalk used in them. They were popular with boys on account of the violence of their report, and to secure this popularity we believe the manufacturers departed from the formula given in the specification of the letters patent, and wantonly increased the quantity of the most dangerous ingredients—chlorate of potash and phosphorus. An examination of their composition by a chemist would determine this, and ought to be made.

Among others, examined before the Coroner's jury, was Charles Nelson of East New York, who testified that he was the patentee of the Union torpedo; he had obtained the patent in 1866; had sold the patent early in 1870 to Klueber & Goldschmidt, retaining a percentage; sold the whole right; the ingredients of which the torpedo is composed are chlorate of potash, phosphorus, and a clay coating; they explode by concussion; does not think them dangerous; [laughter] would not be afraid to have them in a store; receives a royalty of 10 cents on every thousand; in August, received $290 as a half year's royalty; carried on the business of manufacturing them for three years; does not think that a fall of a box on the walk would cause the torpedoes in it to explode; had handled thousands of boxes, and never had an accident; never heard of one before this one; would be willing to have his children play with them; had originally made them in Germany; they are of the same material as the Orsini bombs thrown at the Emperor Napoleon, the only difference being that the Orsini bomb had an iron coating, and these were coated with clay; have no knowledge of chemistry, but know that this combination will cause an explosion; the shock of one box exploding might explode the others; extreme heat might explode them; heat of a stove would be sufficient; the heat of the sun would not be sufficient; did not known until Thursday's accident that the shock of a box falling would explode the torpedoes in it; could not say whether or not a torpedo exploding in the box would explode the others.

The writer once, in showing a class in chemistry the explosive character of a mixture of chlorate of potash and phosphorus—employing only a very small quantity—blew the bottom out of a stout Wedgewood mortar. These materials explode with truly fearful violence, as every chemist knows. When used in match making they are mixed with substances that counteract their violence; but even with these preparations great care is constantly necessary to prevent accidents.

Such are the ingredients which have been sent out, covered only by a thin coating of tawdry colored clay and packed in sawdust, to mutilate and kill peaceable citizens and destroy property.

The surviving partner was arrested, but admitted to bail to await the action of the Grand Jury. We do not know whether bail could have been legally refused, but in common with many others, we believe men who are so indifferent to the rights of others are too dangerous to society to walk outside of prison walls.

From other portions of the country come upon us still, in swift succession, the records of awful explosions of steam boilers, and the wholesale destruction of life thereby. The indignation of the public is culminating, and we shall greatly mistake if the coming winter's legislation does not impose much severer restrictions upon boiler users and dealers, and handlers of explosives, than they have yet been subjected to.

TEST FOR GALVANIZED IRON.—When zinc is deposited on iron by galvanic agency, it should form a chemical combination with the iron, and not be merely attached thereto. It is proposed by Mr. T. Bruce Warren, of England, to use this fact for practically testing the efficiency of the galvanization. If mercury be poured over the surface, the zinc that is only locally attached will form an amalgam with the mercury. Mr. Warren also uses this as a quantitative test, to verify the amount of zinc in combination with the iron.

[Special Correspondence of the Scientific American.]

INTERESTING EXTENSION CASES.

Washington, D. C., September 18, 1871.

The application of E. P. Torry for an extension of the patent granted to him and W. B. Tilton, for improvement in door springs, has been refused, and the case presents some novel features. The invention is a device for increasing or decreasing the power of the spring, in what is well known as the "tortive rod door spring," and consists in a combination of a protruding end of the rod, squared to fit a key, with a ratchet wheel firmly attached to the rod, and a pawl so attached to a bracket as to act as a stop to the ratchet wheel. The evidence presented by the remonstrant goes far to show that a mechanical equivalent of the device existed at the time the patent was applied for, and that therefore it should not have been issued. The extension, however, was refused on other grounds, which were these: The law provides that an extension can be granted on the application of the patentee only, which, by the construction of the courts, includes his executors or administrators. In the present case, Torry alone appears as applicant. He claims to act for both himself and Tilton, but at the same time acknowledges that he is ignorant of the whereabouts of Tilton, and even supposes him to be dead. Torry also claims that by an assignment he holds all Tilton's interest in the patent, including an extension, if granted, but the office records do not show such an assignment.

The patent to Thomas J. Chubb, of New York, has been extended, though strongly contested by Mr. A. R. Wetmore, in behalf of an ore dressing company.

The invention consists in placing the finely pulverized ore on a screen or perforated plate, in a thin stratum, and agitating the stratum by forcing up light puffs of air through it. Movable scrapers pass over the top of the layer to remove the lighter portions blown up by the air puffs, while the heavier portions pass to another receptacle. The opposition claimed that the patent should not have been issued, in view of the patent to E. L. Seymour, dated September 19, 1854. In answer to this, an agreement between Seymour and Chubb, dated in 1853, was produced, in which the former acknowledges the latter to be the inventor of the process. The case at this point became more complicated by the averment of the opposition that the paper referred to was a forgery. The office did not consider the charge sustained. A second point taken by the opposing party was that the invention is worthless for the purpose intended, the argument being briefly this: That a machine or process for separating ores without the aid of water is a great desideratum in the market, that Chubb's machine has not been brought into general use, therefore it is unpractical and a failure.

The following patents have also been extended this month: To George E. Burt, Abram Wright, and George F. Wright, for an improvement in horse powers, which consists in giving such a shape, to the ends of the side tracks, that closely fitted platform chains, of any desired width of sections, can be fitted tightly to the track, and yet pass over their extremities with a perfect and unvarying smoothness. The ends of the tracks are shaped in accordance with an exact geometric method. The invention has proved useful in lessening the wear of the machinery and in affording relief to the horse.

Also, the patent to Isaac A. Durham for improvement in edge planes for trimming boot and shoe soles, being a substitute for the naked knife, which is liable to cut the upper even when used with the greatest care; whereas this device is so constructed that there is no possibility of damaging the upper. Nothing of the kind was known at the time the patent was granted, and it has become so indispensable an implement as to quite revolutionize this branch of the trade.

Also, the patent to Chauncey Thomas for a carriage top prop, which consists of a stud arranged on the bows to form a bearing for the jointed bars or braces, by which the top is lowered and raised. A screw cup encloses the prop, forming an ornamental finish, also confining the leather to the bow and serving as a shoulder for one of the joint bars to rest upon.

Also the patent to Timothy Alden (deceased) for a type setting and distributing machine. This is a strong case, as illustrating the wisdom of the law authorizing extensions. The machine is necessarily very complex, and demands special skill and nicety of workmanship, in the construction and adjustment of its various parts. The inventor unfortunately died soon after the patent was issued, and when engaged in devising improvements in his machine. To secure the general or even partial adoption of such a mechanism, necessarily expensive, it must be brought to a high state of completeness, otherwise the chances of imperfection in its operation will overbalance the advantages. Hence it appears that the parties interested have been occupied, during the whole term of the patent, in making the needed modifications and improvements at great expense. It is stated that the inventor expended over $41,000 without remuneration, and the company controlling the patent has expended about $300,000.

One of the earlier machines, though somewhat improved on the original, was tested in the offices of the New York *Herald* and *Tribune;* and in 1868, the Appletons used one in setting up the type of a small volume and of several pamphlets. These and other experiments were sufficiently successful to afford ample encouragement that the machine would eventually be substituted for hand labor. It was found that by its use one compositor could accomplish the work of six compositors setting by hand. For example, 3,800 ems were set up and distributed in an hour, 500 to 600 ems being a full average by the ordinary mode. There can be no question that such a machine well merits the additional protection of seven years. It may not be known to all your readers that, under the present patent laws, no patent granted since March 2, 1861, can be extended.

The recent decision of the Commissioner in the case of David Eynon, applicant for letters patent for an improvement in machinery for making spikes, is exciting much interest and discussion, as bringing up, in a somewhat novel form, the much debated question as to what a "patentable combination" of devices may properly include. The facts are briefly these: The invention claimed consists in a combination or arrangement of the reducing rolls of a rolling mill, a spike making machine, and an intermediate furnace of peculiar construction, by means of which a bar of iron is so manipulated as to retain the heat it has when leaving the rolls until made into spikes, the object being to save time and material, and to produce a better article, it being a well known fact that iron deteriorates by cooling and reheating. The bar of iron is taken directly from the reducing rolls to the spike machine, and the rear end is swung over the furnace, so as to retain its proper temperature, while the other end is worked into spikes, thereby saving the time and waste of cutting into lengths, as well as the time and injurious effect of reheating. The above arrangement of the furnace, the rolls, and the spike machine is claimed, also the combination of the furnace with its movable roof. To the first claim the Examiner takes exception, as being a *non-patentable combination*, for the reasons that the distance of the reducing rolls from the spike machine is not stated, that no mechanism is shown for conducting the bar of iron to the spike machine or to the furnace, and that the devices of the combination do not *co-act* in producing the result. He contends that the claim is for a combination of three different mechanisms, separate from one another by indefinite distances, each designed for and subserving a different purpose, in no way dependent upon one another, or upon intermediate mechanism, and executing severally all the functions of which they are capable just as fully and perfectly if separated by miles of distance as if separated by a few feet only; and that the specification is silent in regard to the location of the rolls, which may be in the same mill, or in another mill, or another town.

Under rule 44, the case at this point on the examination was taken by appeal to the Commissioner, who, in the decision referred to, discusses the question at issue with great clearness and conciseness, and pronounces the claim allowable, though he advises the substitution of the word "combination" for the word "arrangement." Without attempting to give in detail the Commissioner's argument, the leading positions taken may be of interest, and were these, namely, that the test of invention is the result, a new result implying new machinery or a new combination of old machinery; if the effect of the combination is claimed as new, or as better, or as more economically produced, it is patentable, provided all the devices take part in producing the result; that in the case under consideration, the three machines, namely, the reducing rolls, the furnace, and the spike machine, constitute *one machine*, under the authorized definition of a machine, which includes every mechanical device or combination of mechanical powers or devices to perform some function and produce a certain effect or result; that the three machines co-act to produce a useful result, namely, a better and cheaper article; that the specified arrangement of these machines is the cause of and essential to the result, and each machine acts an important part; that it is not necessary that the parts co-operate at the same time, nor that they be connected by operating mechanisms, as the effect is complete without such connections.

The case was returned to the examiner for examination on its novelty; and has passed to issue. ‡

FAIR OF THE AMERICAN INSTITUTE.

This exhibition may now be said to be fairly under way, although there are still tardy exhibitors who have not yet filled their places.

In our last visit to the capacious building in which the fair is held, we passed through the sections containing agricultural machinery and implements, that containing the wood working machinery, and so far through the steam engineering department as to notice the boilers and engines. The

BOILERS

on exhibition comprise the well known Root's Iron Sectional Safety Boiler, exhibited by the Root Steam Engine Company, 500 Second avenue, New York; Phleger's Patent Steam Generator, manufactured by John B. Lady, 3,029 Chestnut street, Philadelphia, Pa.; a tubular boiler, the name of which, and the address of the exhibitor, we failed to obtain, but will endeavor to mention in a future article; and the Allen Boiler, illustrated and described on page 134, last volume of the SCIENTIFIC AMERICAN.

The Phleger Boiler has some features of novelty in construction, but the old principle of heating water in tubes heated externally is the chief feature of its construction, the tubes being so arranged in connection with a capacious steam dome, as to secure, it is said, very good circulation, economical consumption of fuel, and, according to the statements of the engineer in charge of the large engine which drives the principal part of the machinery, quite dry steam.

The Allen Boiler, exhibited by the Allen Engine Works, Fourth avenue and 130th street, New York, was not fired up, but will be used to supply steam to part of the machinery on exhibition.

THE ENGINES

shown are few in number, and possess few features of novelty. Of these, the principal one is an eighty horse power engine, of beautiful and substantial design, shown by William Wright & Co., of Newburgh, N. Y. It has an admirable va-

riable cut-off, controlled by the governor. Cams, revolving on a horizontal shaft, lift toes attached to the valve stems, the cams being so arranged that when the shaft is moved longitudinally, the toes are let off, earlier or later in the stroke, according to the necessities of the work performed. The cams are so constructed that, when the toes are let off, there is no reaction whatever upon the governor. The governor has the novel feature that the bolts are suspended in radial arms above, instead of below, the pivot of the arms, so that gravity aids instead of acting against centrifugal force. This arrangement admits of their being enclosed in a graceful urn, which gives a very ornamental appearance to the engine. The whole is a splendid piece of work, and attracts much attention from the mechanics and engineers who visit the fair.

Handren & Ripley, Albany Street Iron Works, 16 and 18 Albany street, New York, show several vertical, and one small horizontal Rider Cut-off steam engine. These engines have won an excellent reputation, and are worthy the notice of all who visit the fair. They were illustrated and described on pages 363, volume XXII., and 66, volume XXIII., of the SCIENTIFIC AMERICAN, to which the reader is referred for further particulars in regard to them.

Close by the Wright Steam Engine stands the Starkey Engine, which for simplicity, compactness, and cheapness is perhaps as remarkable as any shown. It is exhibited by the Columbian Iron Works, Wm. Taylor and Sons, Brooklyn, N. Y. It has no eccentric; the valve, which is a balanced oscillating valve, is worked by a connecting rod pivoted to the pitman of the engine, so that the motion of the pitman, as it departs from the perpendicular in turning the crank, is directly utilized to actuate the valve. The valve may be made to cut off, at any desired part of the stroke, by a very simple adjustment; and, as an example of how few parts may compose an effective steam engine, it is worthy of special notice.

Wood and Mann, Utica Steam Engine Company, Utica, N. Y., and 42 Courtlandt street, New York, show their portable and stationary steam engines this year, and make a fine exhibit.

The Baxter Steam Engine Company, 18 Park Place, New York, exhibit three different sizes of their engines, the features of which have been somewhat changed since its illustration and description on page 353, volume XX., of the SCIENTIFIC AMERICAN. We have not space to notice these alterations in this place, but they give a more compact and ornamental appearance to the engine, which has gained a wide popularity during the two years it has been before the public

The new Rider Caloric Engine, exhibited by the Delamater Iron Works, foot of West Thirteenth street, New York, attracts much attention, and is evidently a formidable competitor to the hot air engines now in market.

Another novelty is a small aero-steam engine, exhibited by Professor Rogers and Mr. Black, of the University of Pennsylvania. They employ a steam aspirator, acting on a similar principle to that of the well known injector, by which air is carried into the cylinder along with the steam, an increase of thirty-three per cent in power being claimed. The admission of air produces a striking increase in velocity, without any apparent change in the volume of steam admitted. This little affair is exciting considerable attention. Upon it is placed the Lynde's Safety Steam Engine Governor, illustrated and described in our issue of September 9th, present volume.

In the department of

AGRICULTURAL MACHINERY

there is very little that is new this year. There is the usual collection of churns, portable cider mills, etc., etc. Of the larger machines there is also the usual collection. The following mowers and reapers are shown:

Wilber's Eureka Mower is placed on view by the Wilber's Eureka Mower and Reaper Co. The well known Buckeye Mower and Self Raking Reaper is shown by Adriance Platt & Co. The Walter A. Woods Jointed Bar Mower and Self Rake Reaper is exhibited by the Walter A. Wood Mowing and Reaping Machine Co. The reputation of these machines is too well established to need a word from us. The Sprague Mowing Machine Co show one of their machines. This machine made its first appearance last year, and attracted general attention from its lightness, its boxed-in gearing, and other improved features. In the Columbian Mowing and Reaping Machine, exhibited by the American Agricultural Works, we notice some important improvements, one of which is a rake controllable by the will of the operator. The tongue is also adjusted so as not to bear upon the necks of the horses, the frame being perfectly balanced, and oscillating on the axle or main shaft. The guards are placed three and one half inches apart, and the cutter bar makes a four inch stroke, allowing the knives to pass sufficiently through the guards to prevent clogging. The reaping attachment can be detached, and the machine converted into a mower, in scarcely a minute of time. The knives make forty-eight vibrations to every revolution of the drive wheel, which is thirty-five inches in diameter, and have two and one half inches on the cut, thus preventing the possibility of choking in heavy bottom grass. This firm also exhibits a Smalley's Corn Plow and Cultivator combined, which covers two rows at once, can be adapted to any width of row, has reversible plows, which can be used for hilling up, and possesses other important features which we forbear to enumerate. It is evidently a first class implement.

The Advance Mower is so exhibited by the Belvidere Manufacturing Co., of N. J., but displays this year no new features of construction, so far as we were able to observe. Various sizes of the Excelsior Lawn Mower are shown by Robert C. Reeves, 185 and 18 Water Street, New York.

WOOD WORKING MACHINERY.

This department always forms an interesting feature of these fairs. We observe several novelties this year, among which is A. S. Gear's (56 Sudbury street, Boston, Mass.) Molding, Paneling, Dovetailing, Carving, and Boring Machine, which does a variety of work truly astonishing and in a manner scarcely to be excelled. No one who visits the fair should fail to see this machine.

S. W. Bidwell's Patent Blind Boring Machine, manufactured by the Colt's Patent Fire Arms Co., Hartford, Conn., makes its first appearance at these fairs this year. The machine bores the stiles and lays out its own work at the same time. It will bore outside and inside blinds. The gang of bits, twenty or more in number, is, by a very ingenious arrangement, adjusted so as to set the bits to any desired distance apart. It is claimed that it will bore and lay out the work upon seventy-five pairs of blinds per hour.

Mr. H. H. Evarts, of 93 Liberty street, New York, exhibits his Dovetailing Machine, described and illustrated in our issue of Feb. 11, 1871. Various styles and forms are made for dovetailing round corners, etc., etc. The machine proves its merits in actual operation, and is justifying the favorable opinion of it we expressed in the article alluded to.

Another novelty is S. C. Ellis' Marking or Laying Out machine, for laying out sashes, blinds, doors, etc. Wheels, carrying small spurs for marking, revolve upon a shaft. The stile or piece to be marked is laid upon a movable table and pressed up against the wheels; the latter being made adjustable lengthwise on the shaft to the proper distances. Great uniformity is thus secured, the pieces being laid out as nearly alike as is possible by any mechanical means. Mr. Seth G. Ellis, of Jersey City, is the exhibitor of this machine. He also shows a journal box of novel construction, made so that it can be set to prevent any lift of a mandrel. The cap of the box is made in two pieces, which are slotted and held by set screws, and so otherwise constructed that they may take up all wear, and hold the mandrel down to a perfect fit. Practical common sense is shown in every detail of this invention.

A new dovetailing machine comes all the way from California. The exhibitor is S. W. Shaw, No. 9 Pine street, New York. The pieces worked upon are not clamped, but simply held by the hand of the operator, and are guided by gages that pass over the cutters. The cutters project from a cylinder attached to a mandrel for forming the tenons. At the other end, a cone takes the place of a cylinder for forming the mortises. It is claimed that the machine, with a competent workman, will do the work of twenty men.

The exhibition of scroll saws is not so full as it was last year. We note nothing new except one shown by Henry L. Beach, 90 Fulton street, New York, who exhibits a Spiral Spring Scroll Sawing Machine, running at the high speed of from 1,000 to 1,200 revolutions per minute without jar. No support is required back of the saw, and the entire table is clear for work. The same exhibitor shows his Positive Motion Scroll Saw, illustrated and described on page 63, volume XIII. of the SCIENTIFIC AMERICAN.

There are also present band sawing machines exhibited by First and Pryibill, and by J. T. and R. H. Plasse, of New York, but these machines present no new features.

The Eureka Wood Working Combination Machine, shown by J. A. Wood, Far Rockaway, L. I., is worked by hand power, and is a useful machine for small shops.

There is, however, perhaps no machine in this department more deserving of mention than Haven's Compound Circular Sawing and Variable Grooving Machine, which cuts bevels in any direction, and does a variety of work in a superior manner.

SPRING OF INFLAMMABLE GAS IN KENTUCKY.—In Lincoln county, near the Cumberland mountains, Ky., there is a spring of water, kept in a constant state of agitation by the ascent of carburetted hydrogen. The well overflows once a day, and the gas is highly inflammable. No satisfactory explanation of the overflow of the water, which occurs about two hours after the *maximum* heat of the day, has yet been given.

Inventions Patented in England by Americans.

August 29 to September 4, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.

BILLIARD MAKER.—W. H. Newell, Hudson City, N. J.
BOLT, ETC.—G. C. Bell (of Buffalo, N.Y.), 8 Southampton Buildings, London, England.
COLORING MARBLE, ETC.—J. Zengler (of Chicago, Ill.), 8 Southampton Buildings, London, England.
ELECTRIC TELEGRAPH, ETC.—G. Little, Rutherfurd Park, N. J.
FIRE ARMS, ETC.—I. M. Millbank, Greenfield Hill, Conn.
GRINDING QUARTZ, ETC.—G. Mitchell, Philadelphia, Pa.
HARNESS, ETC.—D. Curtis (of Sun Prairie, Wis.), 34 Southampton Buildings, London, England.
MATCH, ETC.—McC. Young, Frederick, Md.
PREPARING HIDES, ETC.—L. F. Robertson, New York city.
PRINTING MACHINE.—A. A. Dunk, Philadelphia, Pa.
SAW.—G. B. Green, Philadelphia, Pa.
SIGNAL APPARATUS, ETC.—W. Robinson, Brooklyn, N.Y.
SPINNING MACHINE.—J. G. Avery, New York city.
STANNATE OF SODA AND OF POTASH.—C. Lennig, Philadelphia, Pa.
VEHICLE FOR PAINT, ETC.—P. Smart, Boston, Mass.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars, with full information on foreign patents, furnished fre

Business and Personal.

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

Repertory of Arts.—For sale, a complete set of the Repertory of Arts, handsomely bound, half calf, uniform size, with general indices comprising five series and 113 volumes. Perfect in every respect. Embracing Inventions, Discoveries, and Improvements in Arts, Manufactures and Agriculture, with Engravings—from 1795 down to 1856. Apply to MUNN & Co., office of the SCIENTIFIC AMERICAN.

Send 25 cents to C. F. & W. H. Chandler, School of Mines Columbia College, East 49th street, New York, for a specimen number of the *American Chemist*.

Patent Felt Floor Carpeting. C. J. Fay, Camden, N. J.

Wanted—Asbestos, long fibre, soft and pliable. Address, enclosing sample, Thomas S. Dixon & Sons, 1321 Chestnut St., Philadelphia.

Parties desiring to introduce and sell machinery of any kind, and of agricultural or other useful implements in Texas, will meet representatives of a firm at Galveston largely interested in that line, by addressing J., 49 Clinton Place, New York.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Gear Wheel Moulding Machines—Paget's Blocks and Gipsy Winches (English Patent). Hamilton E. Towle, 176 Broadway, New York.

Lyman's Gear Chart, with full directions for Laying out Teeth. Price fifty cents. Address Edward Lyman, C.E., New Haven, Ct.

Improved Mode of Graining Wood, pat. July 5, '70, by J. J. Callow, of Cleveland, O., enabling inexperienced grainers ("without the long required study and practice of heretofore") to produce the most beautiful and Natural Graining with unequalled speed and facility. Send stamp for circular.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin. $4 00 a year. Advertisements 17c. a line.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

To Machinists—Wanted a man of experience and ability, to take the Superintendence of a large Machine Shop. Address Q., P. O. Box 2180, New York.

A Valuable Patent and Business given away—Shop and Tools to rent—fine location for Manufacturing Agricultural Implements. Address C. B. Morse, Rhinebeck, N. Y.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time, labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours. F. Sage, Cromwell, Conn.

See advertisement of Wilkinson's Combination Pocket Tool.

Send to E. & A. Betts, Wilmington, Del., for list of nice Machinists' Tools, on hand, and making.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Arny, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Wanted—To invest $500 to $5,000 in a good paying Manufacturing or Mercantile Business. Address Box 374, Pittsburgh, Pa.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct

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

Power Punching and Shearing Machines. For car builders, smith shops, rail mills, boiler makers, etc. Greenlea Machine Works, Indianapolis, Ind.

Examples for the Ladies.

Mrs. J. Van Bergen, of Rochester, N. Y., purchased her Wheeler & Wilson Machine in 1858. In the first 14 months she made 1305 vests and pairs of pantaloons, from the coarsest to the finest material, besides doing her family sewing. She has not broken a needle for the last seven years.

Burnett's Kalliston, for bites of Mosquitoes and other insects, neutralizes the poison.

Answers to Correspondents.

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.

G. W. N., of Ga.—We do not believe the use of galvanized iron pipes, for domestic water service, advisable. Many kinds of water attack the zinc with great activity. To combine ungalvanized iron with that which is galvanized is a still greater mistake, as chemical action would be increased by the contact of water with the two metals. We judge it is zinc instead of iron that gives the taste to your water, and advise you to substitute a plain iron pipe for the galvanized one. The increase of carbonic acid gas in water, would be likely to increase the hardness of the latter, as water holds lime, magnesia, etc., in solution, by virtue of the carbonic acid it contains. The well is not properly ventilated, as is evident from your statement that carbonic acid accumulates in it since its mouth has been closed.

J. B., of Pa.—We are not aware that any success attended the attempt to cultivate what was called "vegetable silk" in Florida, in 1865. Our present impression is that it was a failure. Perhaps some correspondent will give the information.

Clay for Bricks.—Some time ago I found in your valuable journal an answer to an inquirer who asked if clay containing chalk could be used for making bricks, and who, I believe, sent a sample of the same to you. As far as I can remember, the answer given to him was, that pieces or particles of chalk in bricks would be slaked by getting wet, and cause the bricks to fall to pieces. From a journal on chemistry, published in Germany, called *Chemisches Central Blatt*, No. 32, Aug. 9, 1871, which I received today, I send you the following: "Hirschberg, of Sondershausen, recommends borax for counteracting lime in clay for brick manufacture. The clay containing lime is deficient, in that it attracts water after burning, whereby the lime is slaked and the consistency of the brick destroyed. The editor has proved by experiment that fresh burnt lime saturated with a cold solution of borax, retains its hardness, unchanged and without crumbling. Clay, containing lime, and mixed with such a solution of borax to a plastic consistency, did, after burning, produce brick which withstood all atmospheric influences.'—A. K., of Pa.

Water Pipes.—E. J. H.—It is possible to line a short length of iron pipe with porcelain cement, similar to that used in preserving kettles, and we have known this process applied to india rubber speaking tubes, but such experiments have either been too costly, or have died out for want of patronage, and there is no such article as an enamelled or porcelain water pipe to be procured at the present time. E. J. H. can, however, obtain a perfectly safe pipe at one fourth the price of block tin pipe, that will conduct water, without imparting any mineral contamination, namely, tin lined lead pipe, certified by eminent physicians, scientists, and experts, to be the best and safest pipe in the world for the conveyance of water for domestic use. Sold by the Colwells, Shaw, & Willard Manufacturing Co., 213 Center St., New York.—F. D.

Table Cutlery.—I would inform J. E. E., of N. J., that his reply to R. S. S. H., is incorrect. It would be a very hot roast or steak that would reach 338° Fahr., yet this is the degree of heat that table cutlery has to reach, to give it its proper temper. (Nystrom's "Mechanics," page 155). Heating a thousand times over will not lower the temper, unless heated to a greater degree. The reason hot water does not lower the temper of J. E. E.'s razor, is that boiling water is only 212° Fah. His razor was heated to 450° to give it its proper temper.—A. K. S., of Ohio.

Gas for Balloons.—To T. J. W.—It will take 12 cubic feet of hydrogen gas, used for inflating balloons with, to balance or suspend 1 pound in the air. The rule used for balloons is: Assuming the gravity of the air to be 1, the specific of the gas compared with the air is ·06; so one cubic foot of air weighs 527·04 (troy) grains; the cubic foot of gas weighs 31·62 grains; and so 527·04 − 31·62 = 495·42 grains difference between the air and gas, in one cubic foot. Multiply this difference by the number of cubic feet in the balloon, and divide by 7,000. This will give the capacity or buoyancy of the balloon, in pounds; then subtract the weight of balloon and car.—J. A. Mc., of ——.

Horse Power of Engine.—W. A. B.—There are more rules than one for estimating the horse power of an engine. I will give the following, which is about as safe as any. First, find the number of square inches in the end of cylinder, by squaring the diameter and multiplying by the decimal ·7854. Thus: cylinder 16 x 16 x ·7854 = 201·06 square inches in cylinder. Multiply the square inches in cylinder by the number of feet traveled in each revolution, which is 4 feet,—this by the number of revolutions per minute of the engine, 100, and that by 90, the pounds pressure per square inch; divide by 33,000 pounds (which is called a horse power, raised one foot high in a minute of time), then deduct from the whole one-seventh, and you will approximate your effective power. Example: Square inches in cylinder head:

$$\frac{291{\cdot}106 \times 4 \times 100 \times 90}{33{,}000} = 219\tfrac{1}{3} \text{ less } \tfrac{1}{7} \text{ for friction} = 188 \text{ H. P.}$$

J. A. Mc., of ——.

Galvanizing Wire Springs.—In your impression of Aug. 19th, O. A. B. wishes to know how to coat wire springs with spelter, without heating them. He can do this by procuring some of Webster's Patent Zinc Metal Paint, which he can apply with the ordinary paint brush, and by so doing, as veritably galvanized his springs (whether iron or steel) as though they had been in the "pickling pot" used by galvanizers, as this paint is made from the spelter itself, reduced into a paint by a patent mechanical process. I have seen springs, iron and zinc, coated with it, to which it adheres most firmly, and what is very astonishing, it sticks to the zinc as firmly as to iron.—J. B. D., of Birmingham, Eng.

Renovating Carpets.—In reply to O. J. M., Vol. XXV., page 170, I beg to state that the best kind of machinery for renovating carpets is four broom corn brushes, 15 feet long, 30 inches diameter, running at a speed of 150 turns per minute—two brushes above and two below the carpet. There is no need of any beaters, as the brushes will take out every particle of dust, and leave the carpets as clean as when they left the store; and, moreover, they will bring up a fine new nap, and freshen the colors. The brushes have three clamps or wings for holding the corn.—J. W. H., of Del.

Floating of Solid Iron on Molten Iron.—In answer to S. H. W.'s query concerning the suspension of cold iron in molten metal, the following explanation seems reasonable, and is accepted by many founderymen and others. According to the dynamical theory of heat, the molecules or particles of heated metals are in a state of great agitation, and the higher the temperature, the intenser the molecular motion. The difference in the specific gravity of melted and solid cast iron being slight (as 31 to 32 nearly), this constant and fierce movement of the particles of the former prevents a block of the latter from sinking. An analogous action is found in swift running streams or eddies, upon which bodies of considerably greater gravity than water are supported for a long time and also in the partial suspension of an egg in boiling water.—F. H. C., of N. Y.

Dimensions of Right Angled Triangle.—To C. E. C.—To find the length of the base, perpendicular, or hypothenuse of a right angled triangle, when one side and angles are given. Rule: As the sine of the angle opposite the given side is to the sine of the angle opposite the required side, then so is the given side to the required side.—J. A. Mc. of ——.

Cistern.—In regard to H. W. W.'s trouble with his cistern, I would say that he may remedy it by conducting the inlet water to the bottom of the cistern. By this means the contents are agitated at every rainfall, and if well ventilated from above, the water will be kept odorless. I have seen this tried in a cistern 12 x 12 x 6 feet, and the water is perfectly sweet, although it has not been cleaned for five years. Cleaning a cistern is useless for removing the odor. The cause is the motionless "dead" condition of the water, and agitation and good ventilation only are needed, unless it is known to contain some decaying substance. Put the inlet pipe in one corner, and attach a short elbow toward the center of the cistern.—F. B. C., of N. Y.

Weeds in Gravel Walks.—Let F. C. try a dilute sulphuric acid, say one part acid to from fifty to one hundred water, in order to kill vegetation from his gravel walks. Sulphuric acid, diluted one thousand times, is a very efficient fertilizer, but in a more concentrated form is very destructive to vegetable life.—A. C. B., of N. C.

Step for Water Wheel.—S. H. R.—Take a white oak butt, seasoned under water, dry, and turn the same convex to fit a concave spindle. If a good fit, this will be found to work complete.—J. E. S.

Circular Saw Mills.—We notice, in your issue of February 11, 1871, an answer by A. O. B., of Vt., to E. O. T.'s inquiry, that it is folly to run a large saw direct from the engine, from the great liability to spoil the saw. We have built sawmills, with from 52 inch to 66 inch saws, on the direct action principle (which we have patented in Canada), for over seventeen years; have from three to four hundred in use, and never knew a mill that gave such general satisfaction.—C. H. W. & Co., of Ont.

Steps for Water Wheels.—Taking for granted that the water wheel turns on a steel spindle—say about 5 or 6 inches below the shaft that the wheel is hung on—the best step is made of a red, live hemlock knot, the spindle resting on the end of the grain of it. Chuck it in a lathe, and make a recess to fit the spindle, say 2½ inches deep.—R. S. B., of N. Y.

Applying Sand to Iron.—Let M. N. S. (query No. 11, Sep. 9) take one pound of good common glue, two ounces of gum ammoniac liquefied as usual, then add two ounces of nitric acid.—R. S. B., of N. Y.

Coloring Straw.—Straw is colored much the same way as silk, only it requires stronger tinctures. Royal purple is dyed thus: Tie the straw loosely in bundles, place them in coarse bags, and weight them down in strong liquor, drawn from logwood chips. Boil two hours, take out, rinse in cold water—without taking the straw from the bags; then sink them over night in a vat or tub of dilute muriatic acid, strength, if memory serves me, of 2 degrees Twaddle's scale. Pass through a strong soap lather, rinse, and dry in the shade.—R. S. B., of N. Y.

Falling Bodies.—In answer to J. E., of September 2, let me say that if M = momemtum or working force, G = 32 1-6 feet, S = space fallen through, V = velocity, Q = quantity of matter, and T = the time used; then,

$$T = \sqrt{QS \div G}\,;\ V = GT\,;\ M = QV.$$

This is only true for a vacuum. But with dense weights, the air offers but little comparative resistance.—T. E. N. E., of Mass.

Chain Pump.—M. H., of Ky.—Is the water in a cistern benefited any by being stirred by the use of a chain pump, used by a great many in preference to the atmospheric pump only on account of the motion imparted to the water when it is used? I myself have used water drawn from a cistern covered with an iron cover, and having no opening whatever, as I filled it from the hydrant through the main hole with hose, and when full, put back the iron cover and did not open it again for about two months. The water was drawn through about 40 feet of lead suction pipe by an iron pump, and pronounced by all who used it as good water as they ever drank. I have met with a great many cases where the water was drawn from cisterns by an atmospheric pump, and had been for years without injuring the water in the least, but I have also met with cases apparently similarly situated, where the water drawn through the pump would taste, and the water from the same cistern, drawn with a bucket, would be entirely free from it, the suction pipes in both cases drawing water about 6 inches from bottom. Could there be anything in the leather that is used for the lower valve and the plunger, that would mix with the water as it passes through the pump?—M. H., of Ky. . . . . We answer M. H. that there is no doubt that in many cases the water of cisterns is kept from stagnation by the action of chain pumps. Water differs greatly in different locations in its power of remaining sweet, owing to the differences in kind and quantity of impurities (chiefly organic) it contains. The leather valves have no such effect as is hinted at in the query.

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.]

1.—Gelatine for Plaster Molds.—What is the best way to make gelatin for plaster molds, for casting undercut plaster objects?—M. M. C.

2.—Amalgam of Copper.—Can any of your numerous correspondents inform me the most expeditious method of forming a solid amalgam of copper?—T. C. T.

3.—Steam Heating Pipes.—I wish to know how best to connect the waste pipes, from the various rooms of a building heated by live steam, so as to run them all into one general waste or drip pipe, and yet prevent the steam, when only some of the rooms are heated, from rushing into the pipes not in use at the lower end. I have used, for this purpose, inverted check valves, with spiral springs around the stems to bear up the weight of the valves, placing one in a perpendicular portion of each drip pipe; but they sometimes stick fast in the seats, thus preventing the condensed water from escaping. What is needed is a contrivance which will allow the water to escape very readily, and yet prevent the steam from returning through it when the pipe is not in use.—R. T.

4.—Ink Stains on Leather.—Can any of your correspondents tell me how to remove ink stains from the covers of law books without injuring the leather?—H. S.

5.—Fixing Pencil Marks on Linen.—Can you give me some simple recipe for rendering common lead pencil marks indelible on white linen goods?—P. A. B.

6.—Dextrin.—What is the formula for making dextrin, not the gummy substance that is used for envelopes, but the straw colored powder that the photographers use to put on their plates?—A. B.

7.—Dyeing Straw Goods.—How can I color Leghorn straw a dark color?—A. B.

8.—Galvanizing Iron Wire.—Can some one tell me how to galvanize wrought iron wire?—L. W. C.

9.—Cleaning Shells.—I wish to clean some fresh water shells, that is, to take the outside and decayed part off, so that they will do for frame and other ornamental work. Will some of your readers tell me how?—L. W. C.

10.—Setting Boilers.—Can some of your numerous readers tell me how to set a boiler of the following dimensions, so as to give the best results from Iowa soft coal as fuel? Length of boiler, seven feet; diameter, twenty inches, with five four inch flues through the entire length. The stack is ten inches diameter and thirty-three feet high. Please give full particulars of size of furnace. In answer to A. H. G., G. A. T., on page 154, present volume, says: "I notice gas pipe used under the grate." Would an apparatus of this kind be suitable for my boiler? and if so, how far below the grates should the pipe be set?—J. W. H.

11.—Enameling Iron.—What is the process of enameling or glazing cast iron, such as is used in lining saucepans, so that heat or friction will not deface it?—E. P.

12.—Electric Light.—Would any of your readers be kind enough to give directions by which one may construct an electric light?—W.

13.—Carbon Bars for Batteries.—Will some of your readers inform me how to make carbon bars or rods for batteries?—T. C. K.

14.—Pitch of Molding Machine.—Will some of the readers of the Scientific American please tell me the most correct and easy way to get the right pitch of molding machine head, so that I can make the cutters to work the exact shape desired?—S. H.

15.—Microscope.—Will some of your readers give me instructions to build a microscope, and tell me what lenses to use?—E. T. N.

16.—Refining Gold.—I wish to know how to refine gold—a small quantity at a time—in the most expeditious and practical manner. Please give full details as to quantity of the articles used, and as to the time required, etc.—J. F.

17.—Recovering Gold.—How can gold be recovered from a cyanide solution that has been made for electro gilding?—J. F.

18.—Tempering Knife.—How can I harden and temper a knife (twenty inches long and five inches wide), carpenter's chisels, and drawing knives, without their bending and warping?—I. A. C.

19.—Brazing Iron.—How are iron cow bells brazed?—I. A. C.

20.—Bending Pipe.—How can I bend a wrought iron pipe (say two inches diameter) without destroying its circular form?—I. A. C.

21.—Rat Exterminator.—Will some of your numerous correspondents tell me some means to expel rats from a building? Traps seem to be useless.—J. C. H.

22.—Purifying Rum.—How can rum or spirits distilled from molasses, be purified from the taste of the oil which gives them the flavor of rum?—A. L.

23.—Indelible Printing Ink.—Can any of the readers of the Scientific American tell me how to make printers' ink indelible?—W. E. C.

24.—Plaster of Paris.—How can plaster of Paris be made harder and tougher when set, so as to lessen its liability to break when removing the mold from the object?—W. E. C.

25.—Hardening Steel Plates.—I would like to know the quickest way to harden a large number of small plain steel plates; and also to draw the temper of them.—E. B. T.

26.—Carpets.—Can any of your readers or any carpet manufacturers tell me what is the matter with my carpet? It is new English tapestry, but the smell arising from it is horrible. The colors are blue green, brown, and red. Does the smell come from the dye? Will some one be kind enough to suggest a remedy?—B. K. S.

27.—Coil in Boiler.—Will some one of your many readers inform me how I can put in a coil of pipe two inches in diameter, and keep it full of water? I had one in and had to take it out on account of leaking. The boiler is an upright one; the coil of pipe ran horizontally above the fire. I supplied the water in the boiler through the coil with hot water, and when it went in the boiler, the connection with coil and boiler was through an one inch pipe. As soon as I started fire, the heat would drive all the water out of the coil, and it would get red hot and as soon as I had steam and ran the engine, and began to pump the water in the coil, it would leak sufficiently to put all the fire out. I used oakum and corn meal, and stopped the leaking; but as soon as I would stop pumping water, the pipe would get red hot, and there would not be a drop of water in the coil. One morning I watched when I fired up, and as soon as I had twenty pounds of steam, I heard steam blowing out of the coil. I looked, and in about half a minute, water came enough to put all the fire out and drain the boiler. There is but one connection from coil to boiler; the other is the supply.—M. S. M.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

Boiler Explosions.—G. H.—W. F. Q.
Burglar Proof Safes.—W. W.
Lynde's Steam Governor.—J. B. B.
Mechanical Movement.—A. K. S.
Men of Progress.—W. B. S.
Propulsion of Canal Boats.—H.
Answers to Correspondents.—C. W. I.—M. H. B.—M. S. M.
Queries.—J. E. S.

APPLICATIONS FOR EXTENSION OF PATENTS.

Billiard Table Cushion.—Hugh W. Collaer, New York city, has petitioned for an extension of the above patent Day of hearing, November 22, 1871.

Bagasse Furnace.—Charles N. Black, of New York city, administrator *de bonis non* of Moses Thompson, deceased, has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

Mechanical Movement for Sewing and other Machines.—James Hanley, New York city, has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

Mode of Lighting Gas by Electricity.—Samuel Gardiner, Jr., Washington, D. C., has petitioned for an extension of the above patent. Day of hearing, December 6, 1871.

Snow Plow.—Newcomb Demary, Jr., formerly of Warsaw, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignee under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

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Practical Hints to Inventors.

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How Can I Obtain a Patent?

Is the closing inquiry in nearly every letter, describing some invention, which comes to this office. A *positive* answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

Construct a neat model, not over a foot in any dimension—smaller, if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, New York, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible, and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

Preliminary Examination.

In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of $5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

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To Make an Application for a Patent.

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OFFICE IN WASHINGTON—**Corner F and 7th streets,** opposite Patent Office.

Recent American and Foreign Patents.

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

MACHINE FOR DOUBLE SEAMING TINWARE.—McDuff Cohen and Robert M. Edwards, Charleston, S. C.—This invention relates to a machine for putting double seams into circular tinware, by means of a horizontal disk, on which the article rests, and a vertical disk, between which and the horizontal disk, the article is pressed, and where it is guided by an adjustable wheel separate from either of said disks, of which latter the vertical one has two parallel circumferential grooves, one beginning, and the other completing the double seam.

BOILER FIRE EXTINGUISHER.—Thomas R. Sinclaire, New York city.—This invention relates to a means for enabling a boiler to put out its own fires when steam is raised in it to a point beyond the permitted limit, by means of a system of pipes connecting the boiler and furnace, and provided with a safety water valve which, when the pressure is sufficient to raise its weight, rises, thus allowing water to be forced from the boiler to the furnace.

BLACKING BOX.—Edward M. Gates, Watertown, N. Y.—This invention consists of a blacking box and handle made from a single piece of wood, and provided with a swinging lid. It forms a neat and tidy holder for the blacking, and can be handled when using the blacking without liability of soiling the fingers.

AGITATOR FOR WASHING MACHINE.—Van Vanderburgh, of Bacon Hill, assignor to Horatio Graves, of Warsaw, N. Y.—This is a new rotary agitator for washing machines and wash boilers, to be used for disturbing the suds and causing them to properly strike the articles to be cleaned. The invention consists chiefly in providing the rotary agitator with an upwardly projecting flange or rim and open loops, which produce currents in the water.

REEL FOR HARVESTER.—D. Chaplin Nutting and Joseph D. Allen, of Bowling Green, Ky.—This is an improvement in the mode of adjusting (raising and lowering) the reels of reapers; and consists in the use of a rack and pinion operating on an arc of a circle concentric with the driving pulley of the reel. By simply turning a crank the hight of the reel can be varied as may be desired. By means of the circular rack the tension of the belt which impels the reel remains the same when the reel is moved up or down. The advantages of this arrangement will be readily understood by all who are acquainted with reaping machines.

CARRIAGE WASHING MACHINE.—Oliver P. Weston, of Shattuckville, Mass.—This apparatus for washing carriages consists in a combination of a pair of washing boxes and a lifting jack adapted for running the carriage into the boxes, the covers being withdrawn, and letting the wheels down into the water in the boxes, but supporting them above the bottom to allow them to be turned freely on the axles for washing, by which the water applied for washing them and the body of the carriage will be received as it falls into the boxes to be used as long as required. A great economy of water and labor is effected by this device, and doubtless the heavy water rates now exacted from livery stables in cities would be reduced by its general adoption.

HANDLE FOR CARRIAGE DOOR.—Edward Wells, of New Haven, Conn.—The object of this invention is to prevent the inner handle of a carriage door from being an obstruction to ladies' dresses, etc., and at the same time to furnish a powerful lever for opening the lock. The invention consists in concealing the crank of the handle between the body and inner lining of the door, and in providing a curved slot in said lining through which the crank pin or knob of the handle projects, so that, in fact, but a portion of said knob will project from the inner face of the door. The inconvenience of the long projecting handle is thus overcome, and still greater power available, as a longer crank proper may be used concealed than when in sight. This is an useful improvement, and one susceptible of beauty of design as well as utility. It is worthy the attention of manufacturers and dealers in such articles.

COTTON PRESS.—John Schley, of Savannah, Ga.—This improvement in cotton presses consists in one or more gangs, comprising two presses, with vertical followers working horizontally toward and from an operating shaft on opposite sides of it, with vertical press boards, the said followers being operated by right and left threaded nuts on the said operating shaft, which is correspondingly threaded, to which nuts they are connected by knuckle jointed arms in a manner to provide a cheaply constructed apparatus, which being worked by power, and when two gangs are used, being so arranged that the presses of one gang open while the others close, is calculated to turn off the work very rapidly, affording continuous employment for the attendants in attending to one gang while the other is in the condition not to require attendance. The shaft is to be operated by any competent power being turned in one direction for retracting the followers and the other way for pressings.

MECHANICAL MOVEMENT.—Charles W. Hurd, of Comstock's Landing, N. Y.—A horizontal lever is pivoted in the center. From the lever, each side of and at a suitable distance from the central pivot, extend two connecting rods. One of each pair of connecting rods or links is connected with one of a pair of vertical pivoted levers, above its center of motion, and the second rod of each pair is connected with the second of each pair of vertical pivoted levers, below its center of motion, by which means, when motion is imparted to the connecting rods by oscillating the horizontal pivoted lever, the four vertical levers are moved in opposite directions. The movement is designed for washing machines, churns, etc., for which it seems well adapted.

MARTIN'S ELECTRO-MAGNETIC FIRE ALARM TELEGRAPH.—This invention relates to a new electric fire alarm which is liberated by the motion of the armature, so that whenever the circuit is closed the alarm will be sounded. The invention consists in the combination with a detaining armature of a drop lever which liberates the alarm, said lever containing a card or plate marked to show the number of the fire district whence the alarm emanates. The alarm box is screwed to a wall or other suitable support, the lower or automatic box being secured far enough below it so that the bar or drop lever will work properly, and the alarm is then wound up. A wire runs from the magnets to a battery located at a suitable point, and another wire runs thence to one of the alarm boxes, such as are commonly attached to posts or walls of buildings in cities, and made convenient of access for watchmen, policemen, etc. The lever placed in such box is also connected with a circuit wire which communicates with the battery. By pressing down the lever, the electric current is sent through the wires that run to the magnets, and which are thus caused to attract the armature and sound the alarm. John W. Martin, of St. Joseph, Mo., is the inventor of this instrument.

LOCK FOR ALARM TILLS.—William H. Tucker, Indianapolis, Ind.—This invention relates to locks, for that class of tills for holding money or valuables, that are provided with alarms which sound, when the till is attempted to be opened burglariously, and thus attract the attention of those within hearing; said invention appertaining to the species of lock termed "combination," and consisting in an improved apparatus for operating the catches that secure the till, when locked, and in an improved apparatus for operating a second alarm that is connected with this lock, in addition to the ordinary alarm, for the purpose of preventing persons from trying to discover the combination.

METAL CARPET BINDING.—Reuel P. Johnston, of Steubenville, Ohio.—This invention relates to a new and useful improvement in binding carpets, whereby strength and durability in the binding are secured, and much time and trouble saved in putting down carpets; and it consists in forming teeth or hooks upon the opposite edges of strips of any suitable kind of sheet metal, and bending them over so that they are nearly parallel with the side of the plate or strip of metal, and then curving or bending the metallic strips so that the teeth upon each edge will engage with the edge of the carpet and securely attach the curved strip thereto, as hereinafter more fully described. It also consists in the device for fastening the metallic binding to the floor or base board of the room, which is done by hooks passing through slot holes in the binding, and which are screwed or nailed, or otherwise fastened to the floor, or to the base board of the room, as may be found most convenient. These hooks are fastened down first, and then the carpet is attached thereto with very little trouble.

PAPER WRAPPER FOR NEEDLES.—Mary Emma Baylis, of Redditch, England, assignor to Henry Baylis, of New York city.—In her specification the inventor says: In making a needle case or wrapper according to my invention, I take a blank piece of paper, or other flexible material, and fold it and paste its overlapping edges so as to make it into a flat tube, the said tube having the width of the case or wrapper to be made, and being somewhat longer than twice the length of the said case. From one side of the said flat tube, portions are cut away at its middle and at its ends. When the said tube is folded at its middle (the cut away side being inward), and the ends are turned down, it constitutes a double wrapper, in each of the flaps or sides of which twenty-five or other number of needles, stuck on fabric in the ordinary way, may be introduced. The cut away parts of the case or wrapper exhibit both the heads and points of the needles. Before closing the two sides or flaps of the case or wrapper, the ends are turned down so as to cover the tops of the needles. The case or wrapper may be inserted in a sheath of the ordinary kind. For convenience in removing the case or wrapper from the sheath, the top of the case or wrapper is provided with a tab, by griping which between the finger and thumb the case may be readily withdrawn from the sheath.

HAME TUG FOR HARNESS.—Paul R. Dawson, of Brenham, Texas.—This invention has its object to furnish an improved iron hame tug which shall be strong, durable, simple in construction, easily applied, and effective in operation. It consists in the construction and combination of a body, a detachable jointed eye, and lock plate, said parts being constructed and operating as specified. Also a pivoted guard, rod, and lugs, applied to the rear end of the tug.

Official List of Patents.

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FOR THE WEEK ENDING SEPTEMBER 19, 1871.

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119,000.—TREATING FLESH, ETC.—W. Adamson, C. F. A. Simonin, Phila., Pa.
119,001.—COTTON GIN.—C. N. Andrews, St. Louis, Mo.
119,002.—GLUE POT.—J. I. Baringer, Germantown, N. Y.
119,003.—WATER METER.—H.M.Bartlett, South Dedham, Mass.
119,004.—WATER METER.—H.M.Bartlett, South Dedham, Mass.
119,005.—BONE BLACK.—C. Y. Beach, Brooklyn, N. Y.
119,006.—TOY.—E. Beggs, Paterson, N. J.
119,007.—MORTISE MACHINE.—H. Bickford, Cincinnati, O.
119,008.—FIRE ESCAPE.—G. W. Bishop, H. H. Smith, Baltimore, Md.
119,009.—BALING PRESS.—G. Brodie, Plum Bayou, Ark.
119,010.—WOOD PAVEMENT.—C. P. Burgess, Rochester, N. Y.
119,011.—ROTARY PUMP.—L. Chapman, Collinsville, Conn.
119,012.—LATHE.—H. Chavons, Union City, Ind.
119,013.—LOCOMOTIVE.—J. Cooke, Paterson, N. J.
119,014.—DRIVING WHEEL.—A. F. Cooper, San Francisco, Cal.
119,015.—CULTIVATOR.—T. Dale, Russellville, Ky.
119,016.—ICE PRESERVER.—J. Dunning, Bangor, Me.
119,017.—GUDGEON.—W. W. Eastman, Meadville, W. H. H. Morris, Fairfield, Pa.
119,018.—SOAP.—C. Elling, Cleveland, Ohio.
119,019.—SHEARS.—G. F. Evans, Norway, Me.
119,020.—GUN LOCK.—W. R. Evans, Thomaston, Me.
119,021.—BOOT HEEL.—G. F. Fling, Portland, Me.
119,022.—GRAIN DRILL.—J. P. Floom, Canton, Ohio.
119,023.—GRAIN DRILL.—J. P. Floom, Canton, Ohio.
119,024.—SAP BUCKET.—A. Franklin, Galena, Ohio.
119,025.—PIANO TRUCK.—C. A. French, Davenport, Iowa.
119,026.—WATER WHEEL.—J. G. Garretson, West Liberty, O
119,027.—PACKING.—W. W. Girdwood, Bromley, Eng.
119,028.—BOTTLE.—C. Glover, New York city.
119,029.—HARVESTER.—M. Harrison, Laclede, Mo.
119,030.—VALVE.—J. W. Hopkins, New York city.
119,031.—EVAPORATOR.—J. L. Humphreys, Syracuse, N. Y.
119,032.—SPINDLE.—D. Hussey, Lowell, Mass.
119,033.—BRAKE.—F. M. Kelley, Hart county, Ky.
119,034.—GAS.—J. Kidd, New York city.
119,035.—BINDING.—D. M. Knowles, New Bedford, Mass.
119,036.—BOLT.—T. Kromer, Neustadt, Germany.
119,037.—ALARM.—J. C. Leistner, A. Keyser, Cincinnati, Ohio.
119,038.—BOILER.—J. A. Maynard, Newtonville, Mass.
119,039.—STEAM ENGINE.—J. H. McGowan, D. B. Caldwell, Cincinnati, Ohio.
119,040.—CIGAR.—M. V. McKinney, Louisville, Ky.
119,041.—SHEARS.—J. W. Mix, Batavia, N. Y.
119,042.—DUST PAN.—J. B. Morgan, Davenport, Iowa.
119,043.—LIGHTNING ROD.—D. Munson, Indianapolis, Ind.
119,044.—BREAST PUMP, ETC.—O.H.Needham, New York city.
119,045.—STOVE.—D. E. Paris, Troy, N. Y.
119,046.—FOUNTAIN.—G. Polyblank, J. Parkin, Cleveland, O
119,047.—FENCE.—D. Rhodes, Fredericktown, Mo.
119,048.—FIRE ARM.—C. B. Richards, Hartford, Conn.
119,049.—PILE.—T. & J. W. Richardson, A. Spencer, West Hartlepool, Eng.
119,050.—SASH HOLDER.—J. F. Rickel, Byron, Ill.
119,051.—HORSE SHOE.—W. Roberts, Cleveland, Ohio.
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REISSUES.

4,556.—SEWING MACHINE.—J. S. Alter, Leavenworth, Kan.—Patent 102,479, dated May 3, 1870.
4,557.—TREATING OIL.—D. E. Breinig, New York city.—Patent No. 61,633, dated January 29, 1867.
4,558.—COLORING MATTER.—J. Brönner, H. Gutzkow, Frankfort-on-the-Main, Prussia.—Patent No. 97,597, dated December 7, 1869.
4,559.—CORN PLANTER.—W. Morrison, Carlisle, Pa.—Patent No. 25,435, dated September 13, 1859.
4,562.—ROLLING LEATHER.—J. Whitney, Winchester, Mass. Patent No 37,991, dated March 24, 1863; reissue No. 4,122, dated September 13, 1870.
4,563.—CEMENT PIPE.—E. L. Baker, Boston, Mass., H. Knight, Brooklyn, N. Y., E. Dayton, Meriden, Conn.—Patent No. 49,828, dated September 5, 1865; antedated August 28, 1865.
4,564.—BED BOTTOM.—H. E. Bissel, Hartford, Conn.—Patent No. 94,701, dated September 14, 1869.
4,565.—FURNACE.—L. Cutting, San Francisco, Cal.—Patent No. 71,141, dated November 19, 1867.
4,566.—THRASHING SEED, ETC.—M. H. Mansfield, Ashland, Ohio.—Patent No. 56,583, dated July 24, 1866.

DESIGNS.

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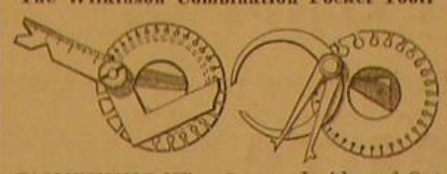


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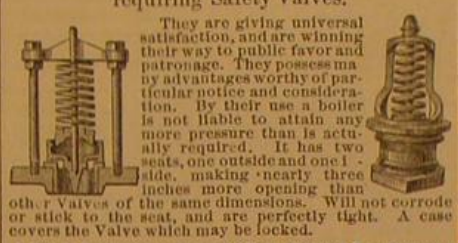
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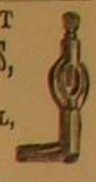
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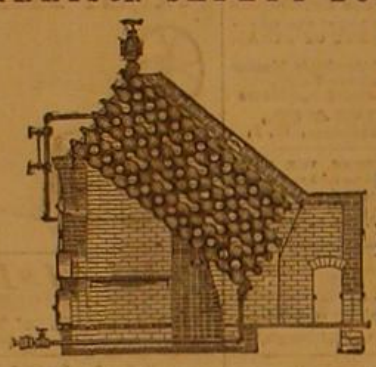
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SCIENTIFIC AMERICAN

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

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Anderson's Stone Dresser.

To substitute, for the slow and laborious operation of dressing stone by hand labor, a method of doing the same work by machinery, has been a problem, the solution of which has been earnestly sought, we are sorry to say, for the most part, unsuccessfully. It is true that, for cutting some of the soft varieties of stone, machines have been devised which do their work very satisfactorily, but we think we are warranted in the assertion that for working all kinds of hard stones used in building and mill work, no machine, meeting all the requirements of the case, has, up to the present time, been produced.

However, if we may credit the statements made in regard to the machine which forms the subject of the present article, it has proved itself equal to dressing the hard varieties of stone, with great facility, and in a very perfect manner.

The machine was publicly tested on July 11th, of the present year, at Quincy, Ill., with, it is said, entire success, eliciting the warm encomiums of many engineering experts, who were present on the occasion.

Of this test the *Daily Whig* (Quincy, Ill.), speaks as follows:

"The machine is, in construction, very similar to that of an iron planer, except that the tools are fixed in revolving cylinders, under which the stone passes, the width of stone cut at one passage being limited only by the length of the cylinder, which, in a large machine, may be at least six feet long, thus cutting a perfectly uniform level and handsomely marked surface (of either smooth or rustic finish, if desired) of six feet in width, and at the rate of three inches per minute, while taking off a depth of three inches or more of "rough." This will be doing the work of from thirty to fifty stone cutters. The unanimous opinion expressed by all who witnessed the operation of the machine in cutting different blocks of stone of various qualities, including several which had been selected on account of extra hardness—one having been brought from the Lock work at Keokuk, by Major Burnham, for that reason—was of unqualified approval, both in regard to the surface left on the stone, the amount of work accomplished, and the perfect condition retained by the machinery and tools after doing a large amount of cutting.

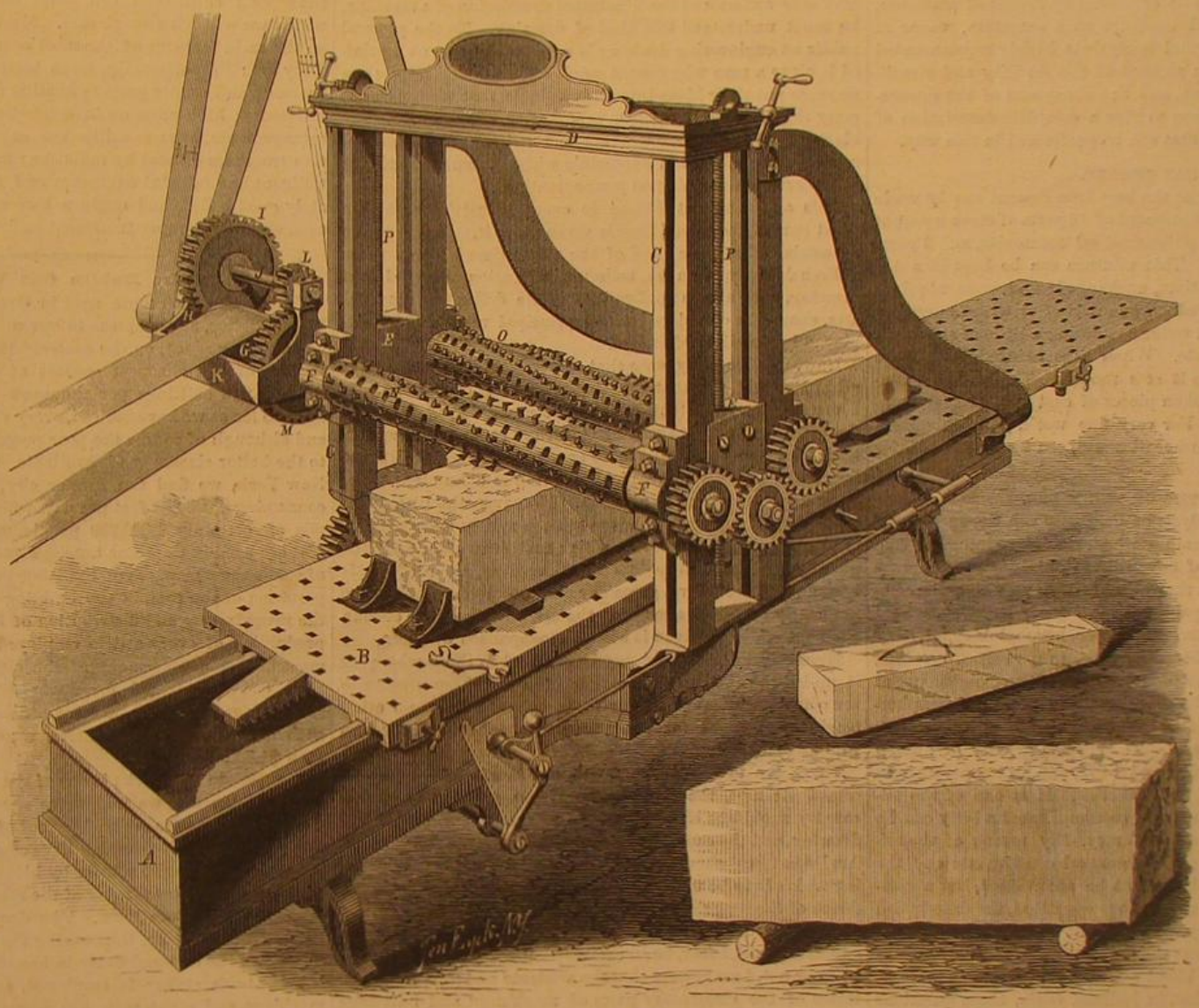
"It is generally conceded that this trial and its favorable results constitute an event of importance in the business history of our city, as well as of general interest, in consideration of the great change which must be brought about in the stone business as regards price, quality, styles, etc."

The *Herald*, of the same place, speaking of the quality of the stone dressed, says:

"The first test was made upon a Joliet stone about two feet wide, four feet long, and a foot thick. The machine operated like a charm, and although the stone was one of the hardest that could be obtained, the points walked right through the rough edge, and the chisels left a surface perfectly smooth and beautiful in appearance. Next a stone, brought from Keokuk, one of the same kind used by the Government in the canal works around the rapids, was tried. This stone, though not so hard as the one from Joliet, is said to be much more durable and more difficult to dress, on account of the quartz seams which it contains. About two and a half inches were taken off the edge, and the dressing was, in every respect, equal to that obtained in the first instance. Several other tests were made upon the same stone with similar results."

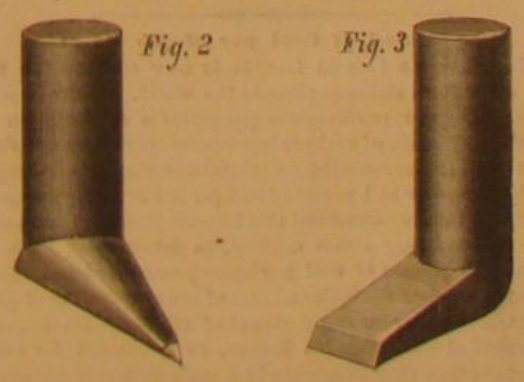
Photographs of the surfaces of stones dressed by this machine have been sent us, from which we are enabled to say that the character of the work performed is all that could be desired; and should no obstacles to its future progress arise, the advent of this machine will exert an extraordinary effect upon all the trades connected in any way with stone cutting.

A is the frame of the machine, upon which are formed the ways upon which the bed, B, is moved back and forth to feed the stone to the cutters, and in which a number of holes



ANDERSON'S STONE DRESSING MACHINE.

are placed to enable the operator to secure the stone to the bed and in place. To the frame, A, is secured the two side frames, C, the upper ends of the four uprights of each of which are connected to each other, and secured in their proper relative positions by the top frame, D. Blocks, E, are placed in the space between the four uprights of the two side frames, C, and move up and down upon the uprights. F represents



the boxes in which the journals of the cutter shafts or cylinders revolve, and which are secured to the opposite sides of blocks, E, by bolts, so that by tightening up the nuts of the bolts, the block, E, and boxes, F, when adjusted to the proper position, may be securely clamped to the frame, C. G is a pulley, around which passes the driving belt, and with which is securely and rigidly connected a small gear wheel, H. The pulley, G, and gear wheel, H, work loosely upon the projecting journal of one of the cutter shafts. The teeth of the small gear wheel, H, mesh into the teeth of the large gear wheel, I, attached to the short shaft, J, which revolves in bearings in the frame, K, attached to the block, E, and to which is also rigidly attached the small gear wheel, L, the teeth of which mesh into the teeth of the large gear wheel, M, rigidly attached to the journal of one of the cutter shafts.

By this arrangement of gearing, the rapidity of motion will be lessened, and the power increased in the same proportion, causing the cutter shafts to revolve at a slow rate of speed, and with great power. N is the forward, and O is the rear cutter shaft, to which are respectively attached the cutters, Figs. 2 and 3. The cutter, Fig. 2, which first operates upon the stone, is made pointed, and similar to the tool used by the workman for roughing by hand. Fig. 3 represents the form of the rear cutters, the edges of which are broad and flat, and which are so arranged that the path cut by each following cutter will overlap that of the preceding one. The shanks of the cutters enter the shafts, N O, and are secured in place by set screws. The cutters are made of steel or chilled iron, or may have diamond carbon faces, and are arranged in spiral rows upon the shafts, N O, so that in cuts not more than four inches deep, not more than four cutters on each cutter shaft will be cutting at the same time. P are long screws passing through and swiveled to the top plate or frame, D, and which pass through the center of the block, E, through screw holes formed in or through nuts secured to said block, E, so that by turning the said screws in one or the other direction, the blocks, E, and with them the cutter shafts, N O, may be raised and lowered to adjust them at any desired distance above the bed plate, B. To the upper end of the screws is rigidly attached a small gear wheel, in the teeth of which will mesh a screw pinion for the purpose of rotating the screws in either direction, for raising or lowering the cutter shafts.

It is claimed that for dressing limestone, sandstone, and marble, the steel cutters, shown in Figs. 2 and 3, will do their work perfectly, but that for granite or French burr, the carbon or "black diamond" points will be requisite.

Fig. 2 shows the form of steel cutters used on the forward, and Fig. 3 the form used on the rear, shafts for smoothing.

These cutters strike no violent blows, to fracture the stone or make breaks or holes in its surface. Their motion is so slow as not to heat the tools, but so forcible as to enter the hardest limestone, or marble. When cutting granite, by the use of tools armed with carbon points, the speed is increased one hundred times, cutting down a "rough" of three inches, and throwing it off in the form of impalpable powder.

The machine has been styled the Mastodon Stone Dresser. It was patented through the Scientific American Patent Agency, July 12, 1870, by Mr. A. G. Anderson, of Quincy, Ill., and the patent is now owned by Rice & Anderson, of that city, from whom further information may be obtained. P. O. Box 601.

It is no uncommon sight in our streets to see laborers rubbing down the fronts and steps of freestone buildings with sand and water to take off stains and give them a fresh and new appearance. In London they have recently for this purpose adopted the use of steam fire engines. The jet of water is projected with such force, it is said, as to remove the discoloration as effectually from the stone as by hand and sand and a fraction of the cost. On Portland stone it is said to be specially adapted, and if so, we do not see why it cannot be used on marble fronts as well as stone.

SCIENTIFIC INTELLIGENCE.

USE OF ELECTROTHERMOTICS IN ANALYSIS.

Professor Mulder proposes a new system of analysis, which admits of rapid manipulation, and can be performed as a lecture room experiment. A platinum wire is melted into the top of a graduated glass eudiometer, and connected with one pole of a Grove battery (three cells are sufficient for most purposes), and the connection with the other pole is accomplished by a wire passing through the mercury of the pneumatic trough. If a given volume of hydrochloric acid be introduced into the eudiometer in the usual way, and fine iron wire, attached to the connecting wire, be brought in contact with the platinum pole within the graduated tube, the iron will immediately begin to glow, chloride of iron will be produced, and as soon as the operation ceases, the lower wire can be withdrawn, and the remaining volume of hydrogen read off. In this way, hydrochloric acid can be analyzed in a few moments. The same principle will apply to the analysis of other compounds; for example, sulphuretted hydrogen with copper, vapor of water with iron, and mixtures of gases and (by synthesis), iron, carbon, and sulphur. Combustion can be accomplished in the same way, and the phenomena of the oxidation of alcohol, etc., be shown. Dissociation experiments can be exhibited by means of platinum, palladium, iridium, and rhodium with ammonia, vapor of water, etc. Electrothermal analysis is highly recommended by Professor Mulder, on account of the rapidity and simplicity of the manipulation, and the cheapness of the apparatus; and he promises soon to give a complete description of all of the experiments that can be performed in this way.

IRON CEMENT.

Winkler has found that the best iron cement can be made by preparing a mixture composed of 16 parts of clean wrought iron filings, 3 parts of pulverized sal ammoniac, and 2 parts of flowers of sulphur This mixture can be kept in a dry package any length of time, unchanged; and when required for use, it is better to reduce one part of it with 12 parts of iron filings, and enough water containing a little of sulphuric acid, to form a stiff paste. When thus reduced, it must be immediately applied, as it sets rapidly. The author recommends it for joining broken pieces of cast iron, and for stopping large fractures. For very fine work, pure pulverized iron filings, such as apothecaries use, can be substituted for the coarse article.

ANALYSIS OF THE BLOOD.

The zoöchemical analysis of Professor von Gorup-Besanez contains the most accurate method, for determining the constitution of the blood, of any hitherto published. It appears from this learned work that blood is of a very complex composition, but is still capable of exact analysis. The normal blood contains water, fibrine, albumen, hæmoglobine, fat, fatty alkalies, lecithin, cholesterine, urea, grape sugar, creatine, creatinine, uric acid, phosphates, sulphates, and carbonates of the alkalies, chloride of sodium, chloride of potassium, phosphate of lime and magnesia, iron, and traces of silica, oxygen, nitrogen, and carbonic acid. The specific gravity of human blood varies between 1·045 and 1·075, and its temperature in the veins, between 93° and 104° Fah. It is one of the triumphs of modern science that so complicated a body can be determined with so great accuracy. By means of the microscope and spectroscope, the general constituents and the probable origin of the blood can be ascertained, but a complete analysis is a long and tedious operation, the description of which occupies forty-two pages of the work in question. Professor von Gorup gives the best methods for deciding upon the origin and age of blood stains on metal, wood, stone, cloth, etc., and shows that, in judicial cases, these questions can be ascertained with absolute certainty,

SOLUBILITY OF OXYGEN IN WATER.

By a transposition of words, we are made to say on page 192, current volume, that nitrogen is more soluble in water than oxygen; this is a mistake, as is apparent in the subsequent part of the article, where the table shows that Mallet makes use of the greater solubility of oxygen in water to obtain that gas from the atmosphere. Water takes up about one twenty-fifth of its bulk of oxygen, at 32° Fahr., and one thirty-third at 60° Fahr. According to Bunsen, 100 cubic inches of water dissolve 4·11 cubic inches of oxygen at 32° Fahr., and 2·99 cubic inches at 59° Fahr.; and the same author states that 100 cubic inches of water at 32° absorb 2·03 cubic inches of nitrogen, and 1·48 cubic inches at 59° Fahr. These numbers are materially affected by pressure, as shown by the results obtained by Mallet.

Workmen and Mechanical Drawing.

Professor Fleeming Jenkin, in his introductory address on Mechanical Science (British Association), spoke at some length on the subject of drawing: I have in many places said (he observed), and I cannot say too often, that the great want of the workman is a knowledge of mechanical drawing. Unfortunately I can obtain little attention from the general public to this demand for the workman. Very few persons, not being engineers, know at all what mechanical drawing is. I am sorry to say that some examiners in high places, who direct the education of the country, know very little more than the general public, and teachers, who should give bread, give chaff. I unhesitatingly say that the chief inferiority of Englishmen has been in this one branch of knowledge. Mechanical drawing is the art of representing any object so accurately that a skilled workman, upon inspecting the drawing, shall be able to make the object, without any further verbal or written instruction from the designer. The objects represented may be machines, implements, buildings, utensils, or ornaments. They may be constructed of every material. The drawings may be linear, shaded and colored, or plain. They must necessarily be drawn to scale, but various geometrical methods may be employed. The name of mechanical drawing is given to one and all those representations, the object of which is to enable the thing drawn to be made by a workman.

Artistic drawing aims at representing agreeably something already in existence, or which might exist, and for the sake of the representation; mechanical drawing aims at representing the object, not for the sake of the representation, but in order to facilitate the production of the thing represented. Now, I say that it is this latter kind of drawing which is so vastly important to our artisans, and hence to our whole wealth producing population.

Very few workmen or men of any class can hope to acquire such excellence in artistic drawing that their productions will give pleasure to themselves and others; but a great number of workmen must acquire some knowledge of the drawings of those things which they produce, and there is not one skilled workman or workwoman who would not be better qualified, by a knowledge of mechanical drawing, to do his work with ease to himself and benefit to the public.

Mechanical drawing is a rudimentary acquirement of the nature of reading, writing, and arithmetic. In order that a man may understand the illustrated description of a machine, he must understand this kind of drawing. To the general public an engineering drawing is as unintelligible as a printed book to a man who cannot read. The general public can no more put their ideas into such a shape that workmen can carry them out, than a person ignorant of writing can convey his meaning on paper. Reading and writing on mechanical or industrial subjects is impossible without some knowledge of the art I am pressing on your attention.

This art is taught abroad in every industrial school; a great part of the school time is given up to it. In a Prussian industrial school, one third of the whole time is given to it. A French commission on technical education reported that drawing, with all its applications to the different industrial arts, should be considered as the principal means to be employed in technical education.

Now, I deliberately state that this subject is not taught at all in England, and that the ignorance of it is so great that I can obtain no attention to my complaints. A hundred times more money is spent by Government to encourage artistic drawing than is given to encourage mechanical drawing; and I say that mechanical drawing is a hundred times more important to us as a nation. Moreover, the little *quasi* mechanical drawing which is taught, is mostly mere geometrical projection, a subject of which real draftsmen very frequently, and with little loss to themselves, are profoundly ignorant. Descriptive geometry and geometrical projection are nearly useless branches of the art, and the little encouragement which is given is almost monopolised by these.

Mechanical drawing proper is confined to those who pick it up by practice in engineering offices. These draftsmen are often excellent; and for their behoof I claim no other teaching. I speak for the artisan who makes, and for him who uses, machinery.

There are two ways in which our shortcomings may be remedied; first, the schools of art now established in this country should be enlarged, so as to teach real mechanical drawing, and the examinations conducted by the Science and Art Department should be greatly modified; secondly, the drawing which is to be taught in the schools under the superintendence of the new school boards may be, and ought to be, mechanical drawing. Free hand drawing, as a branch of primary education, will, I fear, be an useless pastime: but whether that be so or not, I am certain that the accurate and neat representation of the elementary parts of machinery and buildings would be popular with the pupils, and could be effectively taught.

This kind of drawing educates hand and mind in accuracy; it teaches students the elements of mensuration and geometry; and it affords considerable scope for taste where taste exists. The chief difficulty will be to obtain competent teachers. I should occupy you too long were I to attempt to show how these must themselves be trained. My chief aim to day has been to claim attention for a most important and wholly neglected branch of education.

One Pound of Coal per Horse Power.

It is said that a firm in London is now constructing the most economical steam engines in the world. For their mill engines, these manufacturers guarantee a consumption of less than 2 pounds of coal per horse power per hour; and they claim that in some cases these engines in practice have brought the figure as low as 1 pound of coal per horse power per hour. To realize the importance of this improvement, we must consider that ordinary steam engines, in many cases, burn as much as 10 pounds of coal per horse power per hour. This is common, when the boiler admits of the evaporation of only 6 pounds of water for every pound of coal. When engines are supplied with Cornish boilers, so celebrated for their economy (since they evaporate 12 pounds of water for every pound of coal), the ordinary consumption is 5 pounds of coal per horse power per hour; and the reduction of this amount to 3 or even 2½ pounds has thus far been considered something extraordinary—the best result, in fact, to be practically obtained. That there is, however, still room for improvement, is evident from the theory of the mechanical equivalent of heat. One pound of good anthracite coal will produce, in combustion, 14,220 units of heat; while 1 pound of bituminous coal will produce 13,500 units. Let us adopt the round number, 14,000 units; that is to say, the proper combustion of 1 pound of coal should heat 14,000 pounds of water 1 degree, or 140 pounds 100 degrees, or 14 pounds 1,000 degrees Fahr. But heating water 1,000 degrees changes it into steam; and experiments have proved that it takes exactly as much heat to change 14 pounds of water into steam as to heat 140 pounds of water 100 degrees. Therefore the 14,000 units of heat developed by the combustion of 1 pound of coal will change 14 pounds of water into steam; and it is by the intervention of this steam that we have to obtain the mechanical equivalent of the 14,000 units of heat. The well established mechanical equivalent of each unit is 772 foot pounds. In fact, for every foot that we cause 772 pounds to descend, we may actually obtain a unit of heat; and therefore we are entitled to expect inversely the development of a force of 772 foot pounds for every unit of heat expended. The 14,000 units of heat, obtained by the combustion of 1 pound of coal, should give us, then, 14,000×772, or 10,808,000 foot pounds If the coal is burned in 1 hour, we ought to obtain this force per hour; and, as 1 horse power is equal to a force of 33,000 foot pounds per minute, or 33,000×60 = 1,980,000 foot pounds per hour, we ought to have 10,808,000 ÷ 1,980,000, or 5·4 horse power per pound of coal consumed per hour. The best engines, therefore, in place of obtaining, as heretofore, only one tenth or one twentieth of the theoretical equivalent of the heat consumed, are reported to have reached nearly one fifth, which is certainly a wonderful advance. Of course, the full theoretical equivalent can never be expected, for reasons which we will not now discuss. Most engineers are agreed on the main features of the most economical steam engines. They are: Proportionally large boilers, with large heating surfaces, and proper grates; heating of the feed water in the condenser; high pressure in connection with proper cut off arrangements, so as to utilize the expansion; careful protection from loss of heat by radiation; and, above all things, intelligent and faithful engineers and firemen. Many moderately good boilers and engines lose all claim to reasonable economy by improper treatment in firing.—*Technologist.*

The Dublin Gas Works.

Coal gas is much more used in Great Britain than in the United States, and whereas in our country it is an expensive illuminating agent, on the contrary it is, in the former country, one of the cheapest sources of light, selling for from three to five shillings per thousand feet. Throughout Ireland, so far as we have noticed, every village has its gas works, and although of course the poor people burn tallow dips, yet to the better classes gas is available. Comparing Dublin with New York, we find the former city, of 250,000 inhabitants, consuming 4,000,000 feet per day, whereas in our own metropolis of certainly 1,000,000 people, not more than 8,000,000 feet are used in the same time. The cause of this low price of gas is the cheapness of the labor in the mining and transportation of the coal, in the building of the gas works and the manufacture and distribution of the gas; in fact, in the production of every article employed and in every department in the management of the establishment. Good gas coals can be obtained for about $3.50 per tun; ordinary laborers for from 50 to 60 cents per day, and skilled laborers, such as machinists, carpenters, masons, etc., for not more than $1.50 per day.

The Dublin gas works is one of the best managed works in Great Britain, and we find there several points of interest. The clay retorts are set in benches of nine, and closed with the self sealing doors, which have machine turned edges, and, being attached to the retorts by hinges, are brought in close contact with the iron facing of the retorts, also perfectly true, by means of an iron lever. The doors are thus closed gas tight, without luting, thus saving the expense of the latter as well as the cost and delay in handling doors, as with us.

The steam stoker is employed, and with two of these machines and eight men, 540 retorts are charged and discharged, the retorts being worked in six hour charges, the men working twelve hour relays. The machine empties three retorts at a time, by means of as many long rakes, which are thrust into the retorts and rake out the coke, which falls through an opening in the floor into the iron wagon. Three scoops, filled from a hopper with coal, are then moved into the retorts, overturned and withdrawn. There are three men upon the machine, one controlling the steam, one the valves that fill the scoops, and one the movements of the rakes and scoops. A fourth man stands upon the floor to sweep up whatever may fall thereon during the operation. This is certainly the most expeditious working of retorts we have ever seen.

McKenzie's patent mixture of coal and coal oil was formerly employed at the Dublin works. It is now, however, abandoned. In place of this, the coal is coarsely pulverized in a Chilean mill and mixed with the coal tar, produced upon the premises. This mixture is quite dry and is found to work well. After a time the coal tar from this process fails to yield any gas, when it is sold to a patent fuel company in Wales. A portion of it is also consumed upon the spot in making a patent fuel with the coke breeze, which is thus cemented into cylinders of four inches diameter and one foot length.

Some year or two since, the city compelled the works to adopt the iron process, and for purifiers the engineer adapted two disused gasholders. At the bottom, one and one half feet in depth of lime is placed and, then, supported upon as many trays, six layers of a mixture of bog iron ore and sawdust, each layer one and one half feet thick, and finally another layer of lime. The purifier works well, delivering gas containing 20 to 25 grains of sulphur and one per cent carbonic acid, and with a moderate pressure. This use of the layer of lime confirms a previously formed opinion of the writer as to the benefit of its employment in the iron process of purification.

To re-enumerate therefore the noticeable peculiarities of these works, we mention: The self sealing retort doors; the

steam stoker; the use of the mixture of coal and coal tar consuming the coal tar upon the premises; the two enormous purifiers, formerly two gasometers, and a depth of nearly ten feet of purifying material therein.—*American Chemist.*

Soluble and Insoluble Phosphates of Wheat.

BY F. GRACE CALVERT.

The results of my investigations have met, fully, my expectations, viz., that the phosphates in each of the cortical envelopes of the grain vary not so much in kind as in quantity; their proportion varies gradually from the exterior envelopes to the interior ones; so that, while flour contains only a trace of the phosphates, specially soluble, the bran contains a large quantity of it.

Total proportion of phosphoric acid in 100 parts of bran, 1·682; in 100 parts of flour, 0·921.

Total proportion of phosphoric acid in soluble phosphates: in 100 parts of bran, 1·211; in 100 parts of flour, 0·080.

A miller having agreed to grind and bolt several sacks of wheat, in order to enable me to obtain in a separate state the different materials which constitute the grain, sent me five different samples as representing, roughly, the different layers. No. 1, coarse bran; No. 2, brown flour; No. 3, coarse grits; No. 4, fine grits; No. 5, flour.

Proportion of phosphoric acid in the different parts of a grain of wheat.

	No. 1.	No. 2.	No. 3.	No. 4.	Flour.
Phosphoric acid combined with sesquioxide of iron....	0·042	0·047	0·037	0·015	0·019 p.c.
Phosphoric acid combined with magnesia and small quantity of lime.....	1·485	1·259	0·657	0·329	0·144 "
Phosphoric acid combined with potash	1·071	1·046	0·459	0·280	0·758 "
Total,	2·598	2·352	1·153	0·624	0·921 p.c.
Phosphates soluble in water	1·942	1·666	0·918	0·529	0·080 "

Thes facts tend to prove that the greater part of the phosphates contained in wheat are not combined with organic matter, but are in the free state; and the greater part is soluble and combined with potash and magnesia, while the insoluble phosphates are represented by lime, iron, and a small proportion of magnesia, the latter salt being probably the neutral phosphate of magnesia, $3MgO,PO_5$, while the soluble salt of magnesia is $2MgO,HO,PO_5$.

These analyses show clearly, that notwithstanding custom and vanity have led us gradually to prefer white to brown bread, or rather, that made with nearly all the constituent elements of wheat, this practice is not the less erroneous, when we consider the nutritive properties of wheat, especially as nourishment for children, for whom phosphates are so essential in the formation of bone and blood.

These views are confirmed by the researches of M. Mège Mouriès, who has shown that there exists, in the interior cortical envelopes of wheat, a special ferment which rapidly converts starch into sugar, and consequently facilitates the conversion of flour in bread, a ferment to which he has given the name *cérealine*. The observations of M. Mège Mouriès led him to devise a particular mode of grinding the wheat and of making bread from the flour thus obtained, and the results were such that he was enabled to obtain from each quintal of wheat: process of Mège Mouriès, 82 flour, 101 bread; ordinary process, 70 flour, 82 bread.

People who should not Smoke.

In an article on the medical aspect of smoking tobacco in the *Food Journal*, Dr. E. B. Gray asks:

"Is smoking injurious?" This is an every day question apt to be put by patients to their doctors. Like most broad questions of the kind, it involves far too many considerations to admit of being answered by a plain yes or no. A medical man, who has long been a moderate smoker and watched the effect of the habit on himself and others, here offers what he believes to be the true answer to the question.

First of all, there must be an understanding about the quality of the tobacco to be smoked. Bad—namely, rank, quickly intoxicating, and prostrating tobacco (certain kinds of shag and cavendish, for instance) must always be injurious. Few can smoke them at all—none, habitually at least—with impunity. So too with regard to quantity, even good tobacco smoked to excess will to a certainty be injurious to the smoker, sooner or later, in some way or other. Of the various evil efforts of excessive smoking, more will be said presently.

Next, as to the smokers. There are people to whom any tobacco, however smoked, is simply poison, causing, even in small doses, vomiting, pallor, and alarming prostration. Such people never get seasoned to its effects, even after repeated trials; and if they are wise, they will forever let it alone. They will display still further wisdom by not presuming to make laws for others who have not the same idiosyncrasy.

No one can enjoy smoking, or smoke with impunity, when out of health. The phrase "out of health," though it may sound vague, is definite enough to frame a general rule. At the same time, it is useful to know what, if any, are the particular disorders and conditions of health in which tobacco does special harm. As far as the writer's knowledge goes, these have never been specified by medical writers as clearly as is desirable.

To begin, a man with a bad appetite will, if he smoke, most assuredly eat still less—a noteworthy fact for smokers or others recovering from wasting illness or "off their feed" from whatever cause. This effect of tobacco, by the way, while an evil to the sick man who cannot eat enough, becomes a boon to the starved man who cannot get enough to eat; and ample illustration of this was furnished among the French and German soldiers in the recent war. Again, no man should smoke who has a dirty tongue, a bad taste in his mouth, or a weak or disordered digestion. In any such case, he cannot relish his tobacco. It should be a golden rule with smokers, that the pipe or cigar which is not smoked with relish had better not be smoked at all. Indigestion in every shape is aggravated by smoking, but most especially that form of it commonly known as atonic and accompanied with flatulence. Diarrhœa, as a rule, is made worse by smoking.

One of the commonest and earliest effects of excessive or untimely smoking is to make the hand shake. This gives the clue to another class of persons who ought not to smoke—persons, namely, who have weak unsteady nerves, and suffer from giddiness, confusion of sight, tremulous hands, tendency to stammer, or any such symptoms. And if tobacco does harm in mere functional weakness, still less allowable is it in actual organic disease of the system; as, for instance, where there exists any degree of paralysis or other sign of degenerative change in the brain or spinal cord. The improper use of tobacco does beyond question somehow interfere with due nutrition of nerve substance. An illustration of this, familiar to oculists and medical men, is the so called tobacco amaurosis, a failure of vision occurring in excessive smokers from mal-nutrition of the retina. Another class of persons who ought not to smoke are those who have weak or unsteady circulations and complain of such troubles as palpitation, cardiac pain, intermittent pulse, habitually cold hands and feet, or chronic languor.

Lastly, there is reason for believing that the habitual use of tobacco is likely to retard the due growth and development of the body. If so, no one should become a smoker till he is well past the period of puberty. Boys, moreover, have no excuse for smoking, for they are spared the hard wear and tear of adult life.

Now, after eliminating those who from idiosyncrasy cannot, and those who from bodily ailment or from tender years should not smoke, there will still always be a large residuum of happy folk who can smoke, enjoy smoking, and are indeed the better for it. These are they who use tobacco without abusing it—use it, that is to say, in moderate quantity, in due season, and honestly for the sake of the comfort which it gives them—a comfort every bit as legitimate as that which drinkers of tea, coffee, or wine extract in each case from their favorite beverage.

The Detroit River Tunnel.

We are able authoritatively to state that work upon the river tunnel will be commenced at once. Mr. Joy has returned from the East, and will see to it that operations are begun at the earliest practicable moment. All the money required has been secured, organizations have been effected on both sides of the river, which in due time will be consolidated; the City Council has adopted, and the Mayor has approved, the ordinance giving the right of way through and under the streets; and all that now remains is for the engineer to prepare the necessary working plans, set the machinery in place, and go to work. Mr. Cheesebrough, the engineer who constructed the lake tunnel at Chicago, and who made the surveys of the river bed and approaches, and prepared the plan of the proposed tunnel here, will have charge of the work. He is expected here within a few days to complete the necessary preliminary work. The plan of the tunnel contemplates really a series of three cylindrical tunnels. Two of these will be for railroad purposes, each being 18½ feet interior diameter. They will be parallel, and 50 feet apart. This plan is deemed preferable to a single tunnel with double tracks, both on account of less liability of accident to trains and delay from obstructions, and on account of the strength and economy of the structure. The third tunnel will only run under the river, and will be below and midway between the other two. It is designed for drainage purposes only, and will have an interior diameter of five feet. The third tunnel will be constructed first, in order to fully develop the character of the soil which is penetrated, and to drain the other two tunnels as the work progresses. It is expected that the building of the lower tunnel will fully determine the feasibility of the whole project; and this will therefore be completed before work is undertaken on the railroad tunnel proper. If difficulties are met with anywhere, of course they will be underneath the bed of the river, and the drainage tunnel will be likely to encounter them. Their nature, and the possibility of overcoming them if they are met, can then be determined, before any great expense is incurred or property of the city is damaged by excavating in and underneath the streets.

Work will be first commenced on the grounds of the Detroit and Milwaukee Railroad Company, near the foot of St. Antoine street. Here a shaft, ten feet in diameter, will be sunk to the required depth, and excavation under the bed of the river will proceed from that point. As the excavating proceeds, a shell of brick masonry will be constructed in a permanent manner. By the time the middle of the river is reached, if the project still appears feasible, operations of a similar character will be commenced on the other side of the river, and the work will proceed from both directions. The building of this experimental and drainage tunnel, it is expected, will not consume more than two or three months; so that we shall soon know whether or not the proposed railroad tunnel under the river is possible. If the successful completion of the first tunnel shall prove that it is so, work upon the others will be immediately begun and proceeded with, with all possible dispatch. The engineer estimates that a year and a half or two years will be required to complete the work, allowing time for unlooked for delays, and proceeding cautiously and slowly under the bed of the river, where the water is deepest and there is danger. Of course, much depends upon the results attained in the experimental tunnel. If it shall appear that the larger tunnels can unquestionably be built, and without danger or delay, the work will be pushed with all possible dispatch, and probably completed within a year.

The company which has undertaken this project only require to know what is feasible in order to have it completed and in practical operation at the earliest possible moment. The entire length of the tunnel, not including the approaches, will be about two miles, and its estimated cost nearly $3,000,000. When completed, it will be used by all the railroads entering the city.—*Detroit Post.*

Nitro-Glycerin.

When glycerin is allowed slowly to trickle into a mixture of equal measures of nitric acid and oil of vitriol, at a low temperature, two atoms of its hydrogen are replaced by two atoms of protoxide of nitrogen, and there results a heavy oily liquid known as nitro-glycerin, a body which has more than ten times the explosive power of gunpowder. It has come into extensive use for blasting, and the number of terrible accidents that have happened from it, by explosion from mere friction, illustrates not only the tremendous forces that can be stored up in the shape of atomic tensions, but how exquisite is the balance by which such terrible agencies are kept in equilibrium.

This terrible explosive seems little to respect its company and surroundings. Dr. Gorup Besamez reports the account of an explosion of ten drops of the substance in his laboratory, and the astonishing effects he records as resulting from this explosion are well calculated to give a most respectable and respectful notion of the properties of nitro-glycerin. One of the doctor's pupils, in the course of an investigation, placed the above mentioned quantity of the substance in question in a small cast iron dish heater over the small Bunsen gas burner in common use in laboratories. Result: forty-six panes of glass in the windows of the laboratory demolished, the iron dish hurled through a brick wall, the iron stand upon which it was supported partly split and partly twisted out of shape, and the tube of the Bunsen burner split and flattened. Those in the laboratory, fortunately, escaped without injury. This circumstance confirms the results of Dr. E. Kopp's observations upon the conditions upon which nitro-glycerin explodes or quietly burns. When caused to fall drop by drop on an iron plate at a full red heat, it burns off like gunpowder; but should the iron plate not be thoroughly red, but still sufficiently heated to make the nitro-glycerin boil suddenly, an explosion invariably occurs. The latter must have been the conditions under which the nitro-glycerin was heated in the case above cited. Nobel claims that nitro-glycerin can be rendered perfectly harmless and safe for transportation by mixing it with ten per cent of wood spirit or methylic alcohol. When required for use this added substance must be removed, its removal bringing the explosive back to its original dangerous state. An admixture with twenty-five per cent of its weight of sand will, it is said, allow it to burn quietly without explosion, but if struck with a sudden and violent blow, it takes fire, but only the portion struck burns. Such a mixture, now known as dynamite, may be exploded by means of fulminate of mercury, itself fired by the electric spark or by a slow match.

Packing for Oil Wells.

In pumping oil, it is customary to apply a pump to wells separately from the oil pump for the purpose of drawing off the gases and relieving the oil, in the crevices of the rock beneath the pump tube, of atmospheric pressure, or for causing a vacuum. It is not unfrequently necessary to withdraw the tube for repairs or other purposes, and when this is done the air rushes down and fills the vacuum, driving back the oil and causing much trouble and expense in getting it back, when the tube is replaced and the pump is again put in operation. In fact, oil wells are sometimes ruined by withdrawing the tube and subjecting the oil in and below the well to atmospheric pressure. An important invention, devised by Henry S. Cate, of Deerfield, Pa., consists in preserving the vacuum by preventing the ingress of air. He employs a disk of rubber, or other elastic material, confined between the two metallic annular rings, on the collar of the casing, by means of clamps or in any other suitable manner. Through the center of the rubber packing there is an orifice smaller in diameter than the tube, but through which the tube passes air tight, by reason of the elasticity of the packing.

The bearing of the metallic rings is on the outer edge of the packing, so that the latter can contract or expand nearly its entire width from the center. In drawing up the tube through the elastic packing, the latter will be drawn up around the tube in the form of a truncated cone, which will withstand the pressure of the atmosphere and preserve the vacuum beneath. The packing will expand for the collars and thimble of the tube to pass and contract again to the tube, thus keeping the connection all the time air tight.

The inventor does not confine himself to this particular mode of applying packing to the tube for the purpose named, but claims any equivalent device.

Steam Navigation on Canals.

A correspondent sends us an account of the canal steamer *Andrew H. H. Dawson*, in which he states that the vessel went from Albany to Buffalo in 8½ days, with a cargo of 180 tuns; and returned with 1,400 bushels of corn and 6 tuns of coal, about 190 tuns in all, from Buffalo to Troy, in 7 days. Her dimensions are 96 feet x 17 feet 2 inches, depth 9 feet, her ends are very full, and her draft is 5 feet 4 inches. She has an engine with cylinder 12x12 inches, and an ordinary screw propeller located in the center of the bow. She has accomplished 3 miles an hour, under 80 lbs. of steam; and made the better time, the greater the depth of water she was in. The writer claims for the "Dawson" that she creates no swell or wave whatever, and that the screw produces a current under the boat. Many other improvements are attributed to her, and as she is an experimental vessel, she may yet be much improved upon.

Improved Turbine Water Wheel.

The invention, of which our engraving gives an excellent representation, is designed to direct and control the flow of water upon the buckets in a more efficient and convenient manner than can be done with the devices for the purpose heretofore used. The principal feature of the invention is the employment of movable chutes, in connection with stationary chutes, to direct and control the currents of water as they enter the wheel, the parts of the invention and their operation being as follows:

Fig. 1 is a perspective view with a portion of the top annular plate broken away, the better to show the construction of the parts. Fig. 2 is a sectional and plan view of a portion of the device, showing the adjustable chutes.

A represents the immovable bottom plate, to which are attached the plates or chutes, B, which direct the water toward the center at right angles, and upon the face of the buckets.

C represents an annular top plate, bolted to a spider, D, which latter turns freely on the wheel shaft, together with the annular plate, C, and the plates, or chutes, E, bolted to the under side of the annular plate, C, whenever actuated in the manner to be described.

The partial rotation of the annular top plate, C, about its central axis, causes the chutes, E, to approach or recede from the fixed chutes, B, thereby enlarging or contracting the water courses between them, or shutting them off entirely when the two series of plates are brought close together.

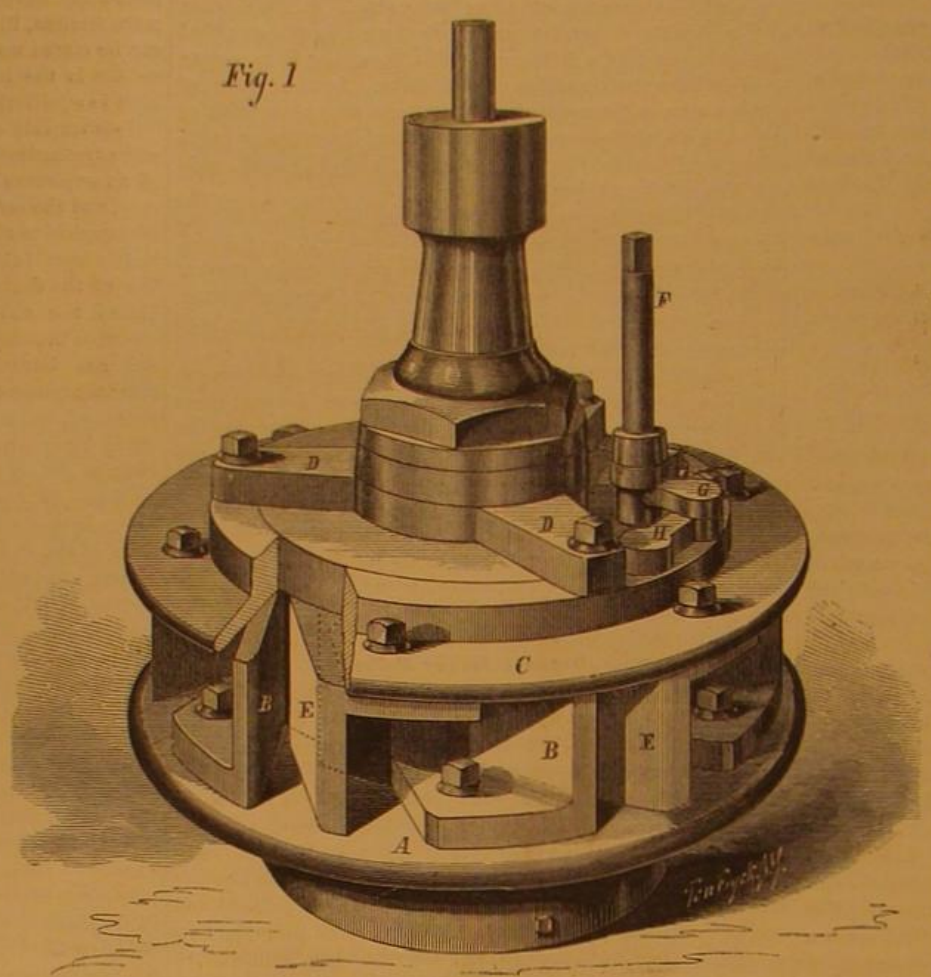
This movement is accomplished as follows:

The vertical shaft, F, which has its bearings in the fixed central disk within the annular top plate, C, and in a lug bolted to the disk, has extending from it an arm, G, and this arm is connected to the annular plate, C, by a link, H, pivoted to the arm, G, and the top plate, C. Therefore the rotation of the shaft, F, causes the top plate to move partially about its axis according as the shaft, F, is rotated to the right or the left by a lever at the top.

The pressure upon the chutes being upon both sides of them, as the water enters the wheel from the usual vertical trunk or pipe, the movement is not difficult, and the link and arm, acting like a knuckle joint, give all the necessary power to close the chutes.

Patented through the Scientific American Patent Agency, Oct. 3, 1871. For further information, address R. Bryant & Brothers, West Chesterfield, Mass., or John Humphrey & Co., Keene, N. H.

Fig. 1



BRYANT'S IMPROVED TURBINE WHEEL.

Gardner's Improved Steering Apparatus.

Mr. John Gardner, of New York city, has invented a new Ship's Steering Apparatus to be used more especially when the rudder post is set roking or inclined. The upper end of a raking or inclined rudder post, is made polygonal in form, and passes up through a hole in the bottom of a box or casing and fits into a hole in a large bevel gear wheel, so that the rudder post can rise and lower with affecting the operation of the steering apparatus. The bevel gear wheel revolves upon the bottom of the box or casing, and into its teeth, upon its front and rear sides, mesh the teeth of two bevel gear wheels, one of which wheels is rigidly attached to a counter shaft. The other wheel is run loosely upon this shaft, and serves simply to hold the wheel down to its seat and give steadiness of motion to the gearing. The shaft is placed at right angles to the axis of the rudder post, and its journals revolve in bearings attached to or formed in the box or casing. To the counter shaft is attached a gear wheel, into the teeth of which mesh the teeth of a gear wheel attached to the shaft of the steering wheel the journals of which revolve in bearings attached to the box or casing. The gear wheels are beveled more or less to correspond with the angle between the shafts. The steering wheel is thus always vertical, and consequently in the best positionto be operated by the steersman.

The British Coal Fields.

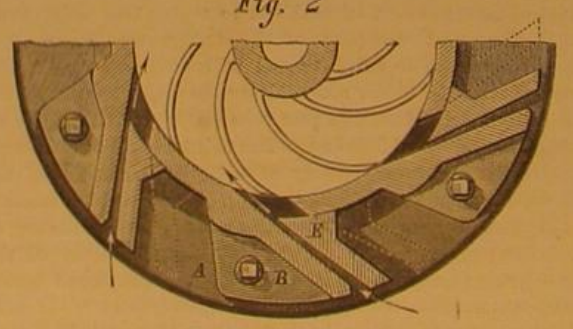
A statement, hazarded some years ago by a Mr. Jevons, as to the probable exhaustion of the coal fields in Great Britain at no very distant date, succeeded in calling public attention in that country to this most important question; and practical action was taken by the appointment of a Royal commission of scientific men to investigate and report on the whole subject. The final report has just been issued, and is a valuable and exhaustive document.

The statement of the Commissioners, on the main question, is as follows: The coal fields, now known to exist, will maintain the present supply and provide for the increased demand which experience has taught the coal owners to expect, for the next 277 years. If there be no increased use of coal, the supply will be sufficient for 1,300 years. In calculating the available coal fields, the Commissioners have recognized the fact that the heat, at a depth of 4,000 feet, forbids the laborers to go lower, the temperature being 105° Fahr., in which no man can work for more than a very few minutes at a time. The total quantity mentioned in the estimate reaches the astounding figure of 146,480,000,000 tuns, which, as has been already stated, will last 277 or 1,300 years, according to whether the demand is stationary or increases in its usual ratio.

The good effects of this inquiry have already been seen. The enormous heaps of waste coal (slack), which lie around the pits' mouths in the mining districts, have set inventors to work to utilize them as fuel, and the locomotives in France and Belgium are generally fired with compressed bricks of coal made from this dust. Improved methods of reducing iron and other ores, and of manufacturing metals, will do much to keep the consumption from growing beyond reasonable limits. But before these fields are exhausted, it is probable that steam will be superseded altogether. If the result of the ever vigilant search through the mysteries of nature, which the scientific men of the present day are pursuing with such unfaltering zeal and activity, will be to utilize light, solar heat, electricity, or magnetism, as motive power, we cannot tell; but one thing is certain, that the supply of either of these forces is practically infinite.

The Commissioners have not investigated the question of coal fields in Ireland, although the world has long been aware of the existence of large beds of the valuable mineral

Fig. 2



in that country. Further information of this point would be of great interest, and the development of a coal industry might affect the future of Ireland to an important extent.

Imitation of Leather.

This is an age of imitations; and the sham is so often taken for the real that even judges themselves have been misled. In manufactures, there is such a constant demand for something new that the best energies of man are severely taxed to meet the requirements of the hour, and it is surprising to many how promptly this craving is satisfied. As an instance of the extending power of the imitator's art, which will be interesting to carriage trimmers, we have noticed that Messrs. Elkington & Co., of Birmingham, have arranged to produce, by the electrotype process, imitations of the choicest grains of leather. They say that the system of producing leathers in exact *fac simile* of morocco, seal, and other skins, by means of electro-deposited copper rollers, has now become an established branch of leather manufacture. The fine grain of the most rare and valuable skins can, by this process, be reproduced at a merely fractional cost, as compared with the ordinary imitations.

The system, as described by the *Mechanics' Magazine*, is as follows: An ordinary machine roller is fitted with a mandrel, upon which is deposited, by a new process, the copper *fac simile*. The latter is an exact copy of any rare or choice skin required to be reproduced, and it is only by a recent improvement in electrotyping that the difficulty of depositing upon such a substance as leather has been surmounted. An ordinary skin can thus be impressed with the beautiful surface of morocco skin, even to the finest variations of grain, and several thousand may be copied by one deposit. In all cases the actual skin required to be copied must be sent. These rollers are supplied ready for the machine; or, if preferred, manufacturers may send their own mandrels, and have the *fac simile* deposited thereon.—*The Hub.*

Kennedy's Improvement in Wrought Iron Columns.

Mr. John P. Kennedy, of New York, has patented an improvement in the construction of wrought iron columns, in which he constructs triangular columns, or girders of longitudinal bars connected together by cross bars and diagonal braces, to obtain the greatest strength with the least weight of metal, and to provide an arrangement for the construction of large columns of great length, whereby they may be made up of sections, which, being prepared for riveting together, may be conveyed, to the place where the columns are to be erected, in pieces or packages of pieces, and there put together. The said columns are made in triangular form in cross section because it gives greater strength with a given weight of metal than any other form, and is claimed to be the best manner of combining the longitudinal and transverse bars and braces.

Rolled T bars are used for the longitudinal bars, having one at the apex of each angle, and are placed so that the vertical parts of the T bars are on radial lines of the axis of column, while the head of each bar is parallel with the side corresponding to the base of the triangle, in the apex of which the said bar is. The cross bars and braces have the ends suitably bent to fit the sides of these parts, and are riveted to them. The head of one of the bars of a column of this kind, being suitably arranged relatively to the cover of a gas holder, will serve as a guide for the wheel of the holder.

Instead of the ordinary T bar, in some cases two angle bars are used, by riveting them together so that the united flanges form the head; while the plates, which are considerably wider than said flanges, form the vertical part of the bar, and may be supported from the inner edges about half way to the top of the T, and arranged on the angle of the sides of the column to receive the ends of the cross bars and braces.

The columns are provided with suitable cast iron or granite bases, and may have cast metal or other ornamental capitals. Columns constructed in this way may be extended in length indefinitely, the longitudinal bars being spliced at the ends and "breaking" joints.

Slag Cement.

The composition of the slags of the blast furnace should be for the most part as follows to obtain from them a good cement. Essential elements: silicic acid, 40·28; clayey earths, 15·13; calcareous earths, 36·24. Non-essential elements; manganese, oxide of iron, alkalies, etc., 8·35. One part of these slags in fine powder is sprinkled, and agitated in a suitable vessel, with two parts of an equal mixture of hydrochloric acid (35 per cent HCl) and water. The slags decompose, a lively disengagement of HS taking place. The mass finally forms a thick jelly, from which water removes the chlorides completely. After removing these, the residue is dried and reduced to an impalpable powder; one part of this powder, intimately mixed with nine parts of slags in powder, gives an excellent cement in water or air, as it may be desirable to apply it.

A SIMPLE METHOD OF ENAMELLING CAMEO PICTURES.—Ordinary well polished glass plates are coated with normal, collodion of the usual description, and when the film has set perfectly, but has not become completely dry, the pictures, which have previously been trimmed and finished, are dipped rapidly into alcohol, and applied without delay to the plates. The prints are pressed and rubbed down with smooth writing paper, and the operation of mounting is proceeded with as soon as the backs of the pictures have become white, or, in other words, as soon as the alcohol has again evaporated. The cardboard should be allowed to remain in water for at least half an hour previously to its being employed for mounting. The more rapidly the pictures are applied and pressed upon the collodion surface, the more beautiful will be the finished result.—*L. G. Kleffel, in Photographic News.*

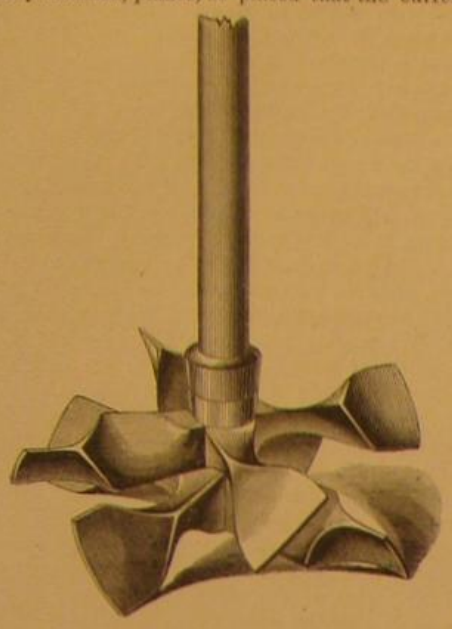
PHOTOGRAPHIC IMPRESSIONS WITH FUCHSIN.—A piece of linen goods colored with fuchsin and dried, was exposed to the light under a photographic negative, when the image of the plate became visible on the goods, the picture looking greyish and faded where the lights were strongest. Still the picture was rather weak, and the goods were soaked for two days in a bath of sulphate of copper, when the picture was found to be more developed. After several rinsings in water, and two days exposure on the grass, the rest of the goods was bleached white, leaving the picture of a pure violet tint on a white background.—*E. Demoulin.*

PLUMBAGO IN WYOMING.—Messrs. Kelly, Wallace & Co., of Cheyenne, Wyoming, write to inform us that, at a place 50 miles north of that city, large deposits of plumbago, of a nearly pure quality, have been discovered. The district is known as the Black Hills, and the valuable mineral has excited much attention and curiosity throughout the neighborhood.

CHURN DASHER.

Our engraving shows an improved churn dasher, for which it is claimed that it so thoroughly agitates the cream or milk that not only is the butter separated therefrom with greater ease and rapidity, but that a larger quantity is obtained.

The form of the dasher is well shown in the engraving; it will be seen that, instead of the usual flat and sometimes perforated blades, it is provided with blades of double, but oppositely inclined, planes, so placed that the current made



by the action of one inclined surface is met and broken, by the action of another surface inclined in another direction.

The result is that when the dasher is moved up and down with the proper force, a violent agitation of the cream or milk is produced, the air being carried under the surface and thoroughly aerating the fluid.

This modification of the old churn dasher, which has yet held its own against powerful competition, will doubtless strengthen the hold it has retained upon the favorable opinion of dairymen. The inventor claims that the same principle of construction is equally adapted to revolving or other kinds of churns.

Patented, through the Scientific American Patent Agency, Sept. 7, 1869, by Miles Fisk, whom address at Adrian, Mich.

Moritz's Jacks for Replacing Cars.

Mr. David Moritz, of Black Rock (Buffalo), N. Y., has invented a traversing jack for replacing cars, which is to be applied to railroad cars, for the purpose of replacing them upon the rails when they are run off the track. To a portion of the car body is attached a bed plate, on which a cross head or bar shaped frame, attached to the jack, traverses. The cross head is provided with double flanges which embrace parallel rails or sides of the bed plate, and is provided with friction rollers to facilitate its movement. Both the bed plate and cross head are suspended from the car by the jack. The screw of the jack works in a nut affixed to the car body. The nut is swiveled in a shell affixed to the car, and is, by toothed wheels, connected with an upright shaft, which carries a hand wheel. By turning this wheel, the nut will be revolved to work the screw up or down, and thereby raise or lower the jack. A ball-joint forms the connection of the nut with the cross head, permitting the jack to rest in an inclined position on uneven ground. From the car is also suspended, by a ball joint, a vertical shaft which passes through a pinion, hung between ears formed on the cross head. The pinion meshes into teeth formed on the inner side of the bed plate. The vertical shaft can slide up and down in the pinion, and is connected by feather and groove to the pinion. This connection enables the car to be elevated without throwing the pinion out of gear.

The operation is as follows: When a car, having one of these jacks near each end, runs off the track, the bed plate at the off end is lowered by means of the screw, and, after it has reached the ground, the nut is still turned to raise the wheels of the car from the ground. The end of the car is then entirely supported by the jack. By next turning the vertical shaft, by means of a handle fitted to its upper end, the pinion will roll along the rack and carry the cross head and end of the car horizontally until the wheels of the latter are again above the rails. The car is then again lowered upon the track, and the bed plate raised off the ground. The nut can be locked, to hold the bed plate elevated, by means of a pawl, catching into a ratchet wheel, on the shaft.

Milroy's Method of Constructing Foundations.

Mr. John Milroy, whose name is so well known in connection with the excavator he has brought into extensive use, has invented a method of constructing piers or foundations of concrete or brickwork. The arrangement embraces two special features, one referring to the construction of the piers either in complete circular or segmental sections, and the other to the use of a curb or shoe to be used with them. Each section is founded on a platform, and within a frame, which may be constructed of wood and built up in segments. The ring is shown as formed with a mortice at one side, a tenon being placed at the other, for connecting or locking together a series of columns or cylindrical piers when constructing foundations for a continuous pier or quay.

A holder is employed in lifting the rings, and it consists of a three armed frame having levers jointed to the outer ends of the arms, and connected by chains to a central ring; those connecting chains are of such length that, when lifting force is applied to them the strain tends to draw in the upper ends of the levers, and force out their lower ends, which are shaped to catch in cavities formed for the purpose in the bottom edge of the ring; and when the latter is being lifted, the strain acting as described, prevents the levers from being loosened or displaced. When the ring has been lowered into its place, the upper chains are slackened and the lower ends of the levers are drawn inwards clear of the ring by means of three chains connected to their lower ends.

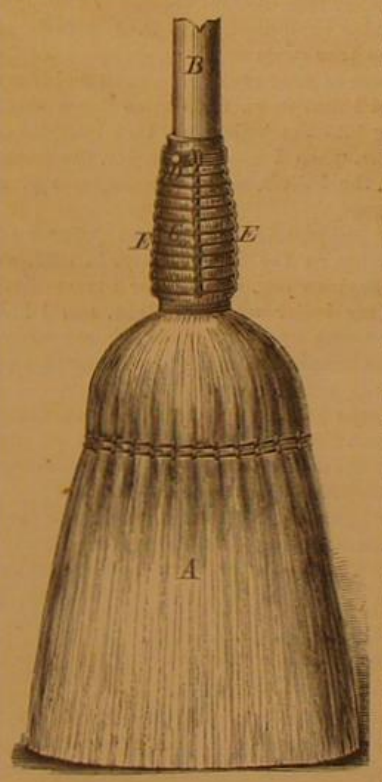
The rings are joined together with Portland cement, either by laying a bed of cement in the usual way, or, after a ring has been lowered into its place, the joint between it and the one next below it is pointed with cement round the inside and outside, and cement is then run into vertical holes made in the rings for the purpose, and rammed well in so as to spread throughout and fill up a small space left for the purpose between the two rings. Bricks may finally be inserted in the holes, to act as dowels between the rings, and thus prevent any movement of them upon each other.

The curb or shoe consists of a thin cylindrical shell easily sunk, and presenting a sharp and elongated entering part, while, from the space within elevation is accomplished without difficulty. The cylindrical shell is surmounted by a flat annular plate, the outer edge of which corresponds with and joins the top of the shell, and it is, in addition, supported by radial brackets or feather plates fixed or formed in the angle inside the shell. The bottom course of the pier rests upon the annular plate, and is fixed to it by bolts.

COPSON'S IMPROVED CORN BROOM.

The object in making this invention has been to improve the manner of attaching corn brush to the handles of brooms, so that if, by any means, the circumference wire should be broken, or the tack which holds it should work out, the wire will still be held securely, confining the brush as before.

To effect this desirable result, use is made of extra braided wires combined with the outer surface wire, as we proceed to describe, referring to the accompanying engraving.



A is the brush of the broom, arranged and applied to the handle, B, in the usual manner. C is the outer wire wound around the butts of the brushes. The end of this wire is secured by the tack, D, in the common way.

Extra braided wires, E, are bent and looped around one of the lower coils of the outer wire, the extra wires being passed alternately over and under the successive coils, and crossing each other between the coils, as shown.

The ends of the braided wires are bent back around the upper coils of the outer wire, and driven into the handle.

The braided wires thus hold and bind the coils, so that should the tack, D, work out, or any part of the outer wires be broken, the brush is firmly held. Four, more or less, of the braided wires may be used as deemed convenient and tasteful.

A patent has been ordered to issue, through the Scientific American Patent Agency, to R. E. Copson, whom address, for further information, Hamburg, Iowa.

How to Photograph a Tracing without a Camera.

I laid out several thicknesses of cloth, on a smooth drawing board, on top of which I placed a sheet of sensitized paper, superimposed the same with the drawing, right side up, and pressed the whole down perfectly smooth with a piece of glass which was kept in place by clothes pins and weights, and exposed it under the skylight until the edges of the paper showed a sufficiently dark impression, when it was removed, toned, and fixed. In this manner an exact copy of a drawing can be made, the only difference, as a matter of course, will be, the lines will be white and the body of the paper dark, which is of no disadvantage whatever.—*Anthonys Photographic Bulletin.*

Davis' Spirit Level, Plumb, and Inclinometer.

The manufacture of this well known and valued instrument was commenced in a small workshop, and has increased in importance till it now occupies a factory costing $70,000. All these instruments are made and adjusted by machinery, so that uniform accuracy may be relied upon. The maker not only furnishes the best article in this line we have seen, but, by improved machinery, is able to supply the trade at as low prices as other manufacturers who sell an inferior article. To all dealers in or users of such instruments, we recommend that they send for a pamphlet, giving prices and testimonials from a large number of practical men who have them in use. See advertisement on another page.

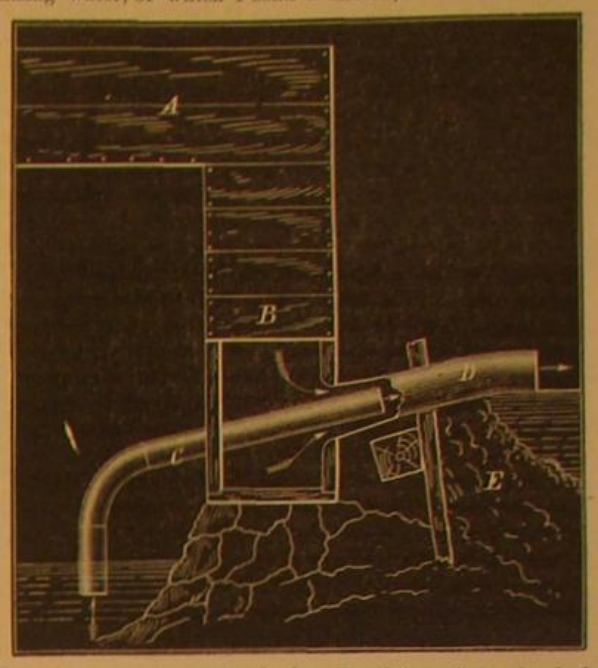
Correspondence.

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

Device for Raising Water.

To the Editor of the Scientific American:

Having learned by experience the value of the device, for raising water, of which I send a sketch, I wish to offer it



through your columns for the benefit of "our" mechanical family. Millwrights often work at a great disadvantage from the difficulty and expense of removing the water from the foundations of their mills during construction; this device will in many cases remove that difficulty at a very small cost. The whole thing can be made by any good carpenter with a few planks and pieces of stove pipe.

In the sketch, the side of the penstock is removed to show the arrangement of the suction and the discharge pipes.

A is the flume, B, the penstock, C the suction pipe, D, the discharge pipe, and E the coffer dam.

The suction pipe, C, extends a few inches into the discharge pipe, D, which, taking water from the penstock, B, surrounds the end of the suction pipe with an annular jet of water which draws with it the water in the suction pipe. In practice, I find that, with a head of 8 feet, a 10 inch discharge pipe draws the water through a six inch suction with such force as to carry cobble stones with it, while lifting the water three feet, developing also a powerful appetite for mud, gravel, etc. Will some scientific man tell us how far water can be drawn by this device with a given head?

G. W. PEARSONS.

Potsdam, N. Y.

[This device is described in Ewbank's "Hydraulics and Mechanics," and is used in Australia for mining purposes. A description of this application of it will be found in another column. Various other uses for so cheap and simple an arrangement will suggest themselves to our readers.—EDS.

Treatment of Colorado Ores.

To the Editor of the Scientific American:

I notice, in your paper of September 16, a letter from Mr. Thomas J. Lee, asking some information in relation to the treatment of Colorado ores. This is an old subject with me, as I visited the Territory in 1865, and formed the opinion which is expressed below. At that time, no proof could be brought forward, for there were too few assays of ore in quantity to form any basis for proof. But I think the publication of the United States Report on the Geological Exploration of the 40th Parallel by Clarence King, (vol. 3, by Mr. Hague, his assistant), offers pretty conclusive proof that the Colorado ores are not, in general, milling ores. There is proof of this in the experience of mill men there, and reason for it in the theory of amalgamation. The future of Colorado is a future of smelting, and all operations in any other direction seem to me to be wanton waste, so far as the ores found near Central City and Georgetown are concerned. Mr. Lee is therefore right in looking to concentration for success, and there is nothing to prevent very successful and thorough concentration.

It was long ago pointed out that mercury has but little affinity for gold, and that the so called "amalgamation" method of extracting that metal from its ores is really a mechanical and not a chemical process. The principles on which the separation is accomplished are easily explained. If we have a substance composed of two elements, one having a specific gravity of 5 and the other of 10, it is easy to see that if we can provide a liquid with a density of, say 7, the latter element will sink in it and the former cannot. To accomplish the separation of the two, we have only to crush the substance to a certain fineness and place it on a bath of the liquid. As soon as each particle of gravity 10 comes in contact with the liquid, it will sink in it, and we have only to agitate the sand until every particle is brought to the surface of the bath. We shall then have the two elements separated, one on the top and the other at the bottom of the liquid.

This is precisely what takes place in the so called amalgamation of gold ores. Gold has a specific gravity of 19·33, and mercury a density of 13·6. The iron pyrites in which the gold of Colorado is found, have a gravity of about 5, and the quartz, which is another constituent of these ores, a gravity of 2·5. It would appear, then, that in a mixture composed fo

gold, 19·33 sp. gr., and pyrites, 5 sp. gr., there should be no difficulty in effecting the separation, when the ore in a finely divided state is passed over mercury in which the gold can, and the pyrites cannot, sink. There is no difficulty in satisfying the mechanical conditions. That was done centuries ago, and the simple machinery employed never fails in its action when properly used.

There is a difficulty, however, in treating gold ores by separation by means of mercury, and in the explanation of that lies the reason of the troubles experienced in Colorado. Native gold is rarely or never pure; it is alloyed with silver, which has a specific gravity of 10·56. A simple sum in proportion will satisfy your readers, that, when the amount of silver reaches 35 per cent, the alloy has the same specific gravity as mercury, and therefore cannot sink in that fluid. It cannot, in other words, be "amalgamated." The question then simply is: Do the ores of Colorado contain more than 35 per cent of silver? The owners of the mines, whenever questioned, have lustily denied that their ores contained any such percentage of silver; but Mr. Hague's report on the mining industry of that, among other, Territories, conclusively proves that they do. The following proofs of this fact are not the results of assays on picked or casual samples, but are the actual buying and selling assays of lots of ore delivered at smelting works. Thirty-five per cent of silver I will call the normal alloy, though, for working, the percentage of silver would have to be less, or it would be as likely to swim on as to sink in mercury.

	Gold.	Silver.
Normal alloy	65	35
Consolidated Gregory ore, = gold, 5·6 oz.; silver, 20 oz. =	22	78
Illinois lode, " " 4 " " 20 " "	16	84
Gardner " " " 3¾ " " 11¾ " "	23	77
California " " " 3 " " 18 " "	15	85
Burroughs " " " 6 " " 12 " "	33	67

It should be remarked that the return from the Illinois lode was thought to be exceptionally rich in silver, but it is not very different from the others which are not exceptional.

These returns are all from first class ore, but the common milling rock contains the same proportionate amounts, the richness of the ore being reduced by the displacing of a certain amount of gold-bearing pyrites by barren quartz. This is proved by the average of large quantities of milling ore as follows:

Average of 1,340 tuns Burroughs ore: gold, 1 oz., silver, 4½ oz.; or gold, 18, silver, 82. Average of 2,056 tuns from various mines, gold, 4½ oz., silver, 11 oz.; or gold 30, silver, 70.

It should be observed that the nine mines, from which these 3,400 tuns of ore came, all delivered ore which contained far more silver than gold. Not one can supply an ore containing more gold than silver. It is therefore apparently impossible to amalgamate Colorado ores, and yet it has been and is done. The reason is that the alloy in these ores is very rarely uniform in composition. The ore may even contain free gold, together with the alloys. Such ores would yield a part of their gold and retain a part. Mr. Hague estimates the yield in the Colorado mills at 55 per cent, and thinks that 15 per cent more may be obtained from the tailings. My own observation would put these figures very much lower, but, as they stand, they show the correctness of the explanation I have given of the impossibility of thoroughly treating alloys of gold by amalgamation. Mr. Hague says of the experience in Colorado: "It has already been shown that by the ordinary mode of crushing and amalgamating, about 50 or 60 per cent of the gold contained in the ore is extracted, while nearly all the silver and nearly all the copper are allowed to be wasted."

Under these circumstances, it would be natural to expect that inasmuch as a less amount proportionately of the silver than of the gold has been removed from the ore, the tailings will contain a larger proportion of silver than the original ore. This is not found to be so in Colorado. Eight samples of tailings from various mines assayed 21 gold and 79 silver; eight others, 38 gold and 62 silver. The reason of this probably is that some of the silver exists in the form of proper silver minerals, which are mostly brittle and easily lost in concentrating; only a part being alloyed with the gold. The great fact that the ores of Colorado contain too much silver to be susceptible of thorough amalgamation remains reasonable from simple and well known mechanical laws, and is proved by experiment.

These facts are not new. The requirements of amalgamation have long been known and submitted to abroad. Nor is this the first time they have been brought forward in connection with the Colorado question. But the mine owners have, so far as my experience goes, systematically resisted all efforts to ascertain the truth, roundly asserting that their ores contained very little silver, much less in fact than 35 per cent. They were unable to separate the "retort" from the ore, and thought if the bullion they obtained was nine tenths gold, the remainder left in the tailings must be the same. Mr. Hague's study of the subject may call them to their senses, and his book is certainly the most useful publication we have on Colorado ores.

New York city. JOHN A. CHURCH, E. M.

Influence of the Moon on the Durability of Timber.

To the Editor of the Scientific American:

On page 244, Vol. XXIV., you published my report of an experiment on the question "Has the Moon any Influence upon the Durability of Timber?"

One year ago (Sept. 3, 1870, page 148), D. A. M., of Cincinnati, Ohio, expressed himself, through your paper, as being quite certain that hickory timber cut three days after the new of the moon will not decay, or become worm eaten for a long time; while if the same timber be cut in the full of the moon, it will become worm eaten in a few months.

It is now over a year since I cut two hickory sticks, three days after a full moon, marked them, and placed one in the ground out of doors, and the other in an old garret. Three days after the next new moon, I cut two more sticks, similar to the first, marked them, and placed them beside the first.

I send you a section of each, properly marked, by which you will see there is no perceptible difference between those cut in the old, and those cut in the new, of the moon.

Wallingford, Conn. D. E. S.

[The specimens sent show no difference, and we regard the experiment of our correspondent as conclusive.—EDS.

Psychic Force.

To the Editor of the Scientific American:

As the question of psychic force is occupying the attention of scientific men, I would like to ask some one interested to tell me what power it is by which the somnambulist can see with his eyes closed, or by which he can see in the dark if they are not closed, to perform the feats that are ascribed to him? Is this psychic power, or anything akin to it? I once heard a candid man relate an incident. When he was a young man going home late in the evening, barefooted, after the labors of a warm day, it became excessively dark; he stepped upon something which proved to be the uncovered wrist of a drunken man lying in the road, which startled him. He instantly saw, notwithstanding the extreme darkness, what he had stepped upon. He saw that it was a stranger, and could and did describe him, sufficiently to identify him to a party of men whom he soon met on horseback, hunting for their drunken friend. He returned with them to the spot, only to find the object of their search by groping and feeling about, although the horses indicated his presence by their snuffing. What enabled him to thus see the man in the dark? Was this psychic power, or did his fright have the effect of dilating the pupil of the eye so that he could see, on a principle similar to that by which some nocturnal animals can see in the dark? Or was it all unreal?

September, 1871. L. R. W.

A Practical Engineer's Experience with Steam.

To the Editor of the Scientific American:

On page 179, September 16th, current volume, is a communication on steam boiler explosions, from D. A. Morris, in which he explains the true cause of the majority of explosions. I am an engineer of some experience, and I find if my boilers are tight, and I shut down my engine for a short time, no water going into the boilers, so that everything is at rest in the boilers, when I start my engine, the steam will invariably rise in the boilers, so as to show more pressure on the pressure gage.

I remember well on one occasion, when I was engineer on the tugboat *H. P. Clinton*, on the Saginaw river in 1862, we were laying out on Saginaw bay, waiting for some vessels we were expecting; my boiler was very tight, and I had pumped it up to the fourth try cock; we lay about twenty-five minutes with sixty pounds steam, when we sighted two vessels, and we started, and the engine did not make more than ten or twelve turns before the steam showed eighty pounds on the gage; and I dropped the damper, and we did not get 100 rods when the steam had got to ninety pounds, and the safety valve blowing off vigorously.

My remedy is, when I stop my engines, to always have feed water entering the boilers, or the steam blowing off slightly. If you think this worth notice, it may save some valuable lives. S. J. DIETER.

Saginaw City.

Seeing under Water.

To the Editor of the Scientific American:

Your correspondent, A., upon page 181, current volume of the SCIENTIFIC AMERICAN, described a plan which will enable a person to see under water to a considerable depth, and concluded the article with a suggestion that submarine observations be conducted upon the same principle from on board the *Great Eastern*.

When the preliminary soundings along the Atlantic telegraphic plateau were in progress, I thought out a scheme for examining the bed of the ocean. The proposed outfit consisted of the following named articles: Two stovepipes ten inches in diameter and 100 feet long, lashed and braced side to side, and submerged in a nearly vertical position, several mirrors for reflecting sunlight into one of the pipes, and a first class marine telescope with which to carry on observations through the other pipe.

The limited experience which I have had in sixty-five feet of water, through two short lengths of pipe and with a pair of opera glasses, convinced me that the plateau can be seen and many portions of it minutely examined.

Submarine engineers can facilitate the construction of piers and breakwaters by the stovepipe arrangement. The device is not patented—it is free to all. R. B. S.

Watch Case Springs.

To the Editor of the Scientific American:

I recently saw a communication making complaint of the steel case springs for watch cases; also a reply giving directions for putting in. I have found the following to answer my purpose better, with less breakage. First, draw the temper in all springs; never put one in without. If it needs fitting, do it. Then cover the spring with soap, heat to a bright red tempering heat, and throw it in oil. The soap should scale the spring, leaving it white. Then draw to a blue, polish and draw again to a blue, and again polish and draw to the blue, and the spring is ready for the case. It is a well known principle that steel should be at a neutral temper, neither hard nor soft. If the jeweller will try this, he will not make any more brass springs. R. B. FREEMAN.

Watkins, N. Y.

How to Construct an Inexplosive Lamp.

To the Editor of the Scientific American:

I have waited patiently for six months to see what remedy scientific men would offer as a preventive to the explosion of lamps from the use of burning fluids. I am fully convinced that the desired improvement does not lie in the direction of a change in the character of the fluid used, so much as in the manner of using it. Carburetted hydrogen mixed with oxygen of the air will ever be explosive—no matter from what it is generated; and we must have the carburetted hydrogen before we can have the light. Now I will, by experiment, prove that a combination of hydrogen and oxygen can be exploded in any lamp, whether of glass or metal, with perfect safety, provided the outlet to the lamp is left so that the expansive force of the ignited gases find this much the weakest part of the vessel. For instance, fill a strong glass decanter, of one quart capacity, with equal volumes of olefiant gas and oxygen. Fill over water, leave a gill of water in the bottle, and cork it with a well fitting cork. Immerse a small piece of tissue paper in naphtha or petroleum; roll in this paper one grain of potassium, so that the water left in the bottle shall not come in contact with the potassium for some minutes. When all is ready, drop the paper and potassium into the bottle of mixed gases, force in the cork to a level with the mouth of the bottle, and set upon it a pound lead weight in the shape of a Minié ball. The instant the potassium ignites, a violent detonation takes place, and your lead weight goes up 100 to 150 feet. Probably you may not find your cork; but your glass bottle is unharmed. This experiment you may repeat 100 or 1000 times with no damage to your glass bottle. You may try the same experiment upon an ordinary glass lamp, with the same results, if you will leave off the leaden weight, using only a close fitting cork.

For more than twenty years I have made these illustrations before my classes in several colleges of the West and South, holding the glass vessel in my hand ungloved, and have never had a well annealed glass vessel to be shattered, although the report is deafening. The reason why the process is harmless, is, that there is a ready exit for the force, with no necessity for rupture.

Now, how simple to arrange a lamp upon a perfectly safe principle! The oil vessel may be of the ordinary shape, except that the neck be long enough to hold fast the burner (made to fit it securely by grinding the glass), after the manner of a stopper. Then, should an explosion take place, the only damage that can possible accrue will be to throw out the burner and inflamed wick together, and this would not, in one time in one million, set fire to the fluid, or break the oil vessel.

The gases I have named (olefiant gas and oxygen) seem to exert a greater force than any other—greater, at least, than common oil gas and atmospheric air. I have proved my theory correct 500 times in 20 years upon these gases, as well as on chlorine and hydrogen, binoxide of nitrogen and hydrogen, etc. Now this is just the thing required for both economy and safety. No screw on the burner. I do not want any patent for it—nor do I want any one else to have one. I know what I say, when speaking of the safety of it, and do not care what oil is used. J. M. PARKER,

Professor Mathematics and Physics, La Grange College, Mo.

Half the Cost of Steam Power Saved.

To the Editor of the Scientific American:

A series of experiments, which I have recently tried, proves that half the fuel now consumed in the production of steam power can be saved, by using the heat that escapes, in the exhaust steam from an engine, to produce additional power. In the experiments tried, the exhaust from the twenty horse engine (that drove the shafting in the shop where the trial was made) was used, and the heat which this exhaust steam contained was sufficient to drive another twenty horse engine, with the mill to which it was attached, developing as much power as the engine whose exhaust was used. The apparatus with which these surprising results was produced is very simple, and can be attached to any engine now in use. It consists of a plain tubular boiler, ten feet long and twenty-six inches in diameter, with seventy 1¼ inch iron flues in it. This boiler was filled with the bisulphide of carbon, and set in an upright position. The exhaust steam was passed through the flues, entering at the top end, and passing out into the atmosphere at the bottom, and was perfectly condensed in the flues, imparting its latent heat to the fluid in the boiler, which was rapidly converted into vapor to a pressure of 50 lbs. to the inch. This vapor was used to work an engine in place of steam, and was condensed by cooling after being used, pumped back into the boiler, and used again continuously. Only forty gallons of the bisulphide of carbon were required to fill the boiler and work the engine constantly, and the amount of fluid lost did not exceed half a gallon per day. The engine, used to work the vapor in, was of 12 inch bore and 24 inch stroke, and ran at 50 revolutions per minute. The steam engine from which the exhaust was used, was 10 inch bore and 24 inch stroke, and ran at 60 revolutions per minute. The temperature of the condensed water discharged from the flues of the bisulphide boiler did not exceed 116 degrees Fahr. at any of the trials made.

JOEL A. H. ELLIS.

100 Summer street, Boston.

Is Psychic Force Spiritualism?

To the Editor of the Scientific American.

MR. CROOKES ON THE "PSYCHIC" FORCE.—It is nearly twenty-five years since the "Rochester Knockings" first drew public attention, in the United States, to this "Force." Mr. Crookes, an eminent scientist of England, has recently presumed to name it "Psychic." He has, with commendable

hardihood, undertaken to investigate it with as little professional prejudice as possible.

It is to be hoped that he will have the independence and manliness to avow, publicly, his conclusions and convictions, even if he should come to the belief already reached by thousands and thousands of men and women, who have already investigated the subject, with as much honesty and sincerity, if not with quite as much science, as Mr. Crookes, namely: Spiritualism; the conviction, that every human being has a spiritual body and a natural body, that upon the death (so called) of the natural body, the spiritual body still lives on forever, and that this spirit does now, under certain unknown conditions, communicate with spirits yet in the natural body, and does now, by unknown laws, cause physical phenomena, unexplainable by natural laws.

The literature and traditions of every nation and tribe on earth are full of these phenomena. Founders of religions have always wisely availed themselves of these manifestations. The day is dawning, when he people will be permitted to share and understand the universality of these glorious truths of religion.

Spiritual influence is the true solution—as B. Stewart, in "Nature," candidly says: "We are not entitled to reject his testimony (that of a spiritualist) on the ground that we cannot explain what he has seen in accordance with our preconceived views of the universe, even although these views are the result of a long experience; for, by this means, we should never arrive at anything new," and no new truth could be discovered. THOS. G. WILLIAMS.

Euler's Bottle washing Machine.

This invention relates to an improved machine for washing bottles; and consists in the arrangement of certain holding and rotating devices in a vessel designed to contain the cleansing or rinsing liquid. Through the side of a box or vessel, open on top, of rectangular or other form, and lined with sheet metal, are fitted a suitable number of horizontal spindles, which receive rotary motion by a band, or gearing from a suitable driving shaft. Within the box or vessel each spindle is provided with a cone or plug, of such shape as to fit conveniently the cavities usually provided at the bases of bottles. These plugs may be removable, so that such of different size or shape may be applied to fit the several kinds of bottles. Plates sliding on cross bars are firmly secured within the box and are forced by springs toward the plugs. The bottles to be washed are first dipped into the water contained the box, and are thus about half filled. They are then in placed with their bases against the revolving plugs, and with their mouths against the plates, the springs holding them properly in position. The plates are perforated in line with the spindles, so that the mouths of the bottles will not be closed by them. The spindles being revolved, the bottles will also be turned by the friction of the plugs, and will be thoroughly rinsed and cleansed by the water within and without. The boxes may be arranged in pairs, side by side, so that both ends of every spindle are utilized. A fresh water reservoir, supported above the box on a frame, has a discharge faucet within which is placed a valve, held on its seat by a spring. From the valve is suspended, through the discharge opening of the faucet, a crooked wire or rod, by which the valve is opened.

Each bottle, after having been rinsed as above described is held against the wire, so as to raise the valve and thereby open the faucet, letting clean water flow directly into the bottle below, to complete the cleansing process The spring will close the valve immediately after the withdrawal of the bottle from contact with the wire. Conrad Euler, of Evansville, Ind., is the inventor of this machine.

Fertilizers from Sea Weeds.

Mr. Upham S. Treat, of Eastport, Me., has invented the following process for making fertilizers from sea weeds, upon which he has obtained a patent. The sea weed is subjected to the action of steam under pressure until it is reduced to a pulp. It is then passed through a mill, where it is thoroughly mixed with ten per cent, more or less, of finely powdered quicklime. After being thus mixed, it is elevated or placed in some suitable place to be thoroughly aired and dried, when it is ready for packing in barrels and for market.

Upon the Atlantic coast, sea weed is a most abundant article, used at present to some extent as a fertilizer, in combination with barnyard and other manure; but its valuable qualities seem to be dissipated and in a great measure lost, by exposure to the atmosphere in its crude state, or from not securing proper chemical treatment. By Mr. Treat's process, it is claimed, all its native richness is preserved, and a hitherto almost useless weed is converted into an efficient compound for enriching the soil.

Volcanic Disturbances in the East.

The news of most terrible earthquake shocks and volcanic disturbances comes to us from the Philippine Islands. In the small island named Camiguin, near to Misamis, for some months past a succession of most violent earthquakes has been experienced, causing crevices, etc., in the open country. On the 1st of May, about five o'clock in the evening, the earth burst asunder, and an opening was formed 1,500 feet long. Smoke and ashes, earth and stones, were thrown up and covered the ground far and near. At about seven o'clock, as darkness was coming on, this crater burst into activity with a loud explosion, followed by a shower of lava and ashes. About 150 persons were destroyed. The eruption of the new volcano has since been so tremendous that the inhabitants have forsaken the island, and of the 26,000 previously there, not 300 are left. Camiguin is only about thirty-six miles in circumference, and was very productive in abacá (the Manilla hemp) yielding annually from 30,000 to 40,000 piculs, or more than a tenth of the produce of the world. There is little hope of the island ever being again re-occupied or cultivated.

TRADE MARK REGISTRATIONS.--INTERESTING DECISION BY THE HON. M. D. LEGGETT, COMMISSIONER OF PATENTS.

In the matter of the application of the Dutcher Temple Company for registry of trade mark—Appeal.

The applicant seeks to have registered as a trade mark the "letter D encompassed by the figure of a lozenge."

This device is placed upon "loom temples" manufactured by the applicants.

The examiner rejects the application on the ground that the proposed trade mark has no feature that indicates "origin or ownership."

The examiner's doctrine on the subject seems to be that every trade mark must include either the name of its proprietor, or his place of business, or both.

The object of a trade mark is to distinguish the goods of one manufacturer or merchant from those of another in the market. The only benefit the proprietor of a trade mark can hope to derive from it, is that such mark may point out the goods, upon which it is found, as coming from him, and thereby bring customers back to him when desiring to make additional purchases. This being the only object a dealer can have in adopting a trade mark, he may generally be trusted to see that it be known where the goods come from, on which the trade mark is placed.

The origin of goods may be determined in many ways, provided they have upon them some mark by which they may be distinguished in the market from other similar goods The name of the manufacturer or the name of his place of business are evidently not the only means of determining the origin of marked goods.

In the case of *Filling vs. Fassell* (reported in Vol. 8, Am. Law Reg., p 402) tried in the Superior Court of Missouri, the judge says: "The books are full of authority establishing the proposition that any device, name, symbol, or other thing may be employed as a trade mark which is adapted to accomplish the object proposed by it, that is, to point out the true source and origin of the goods to which said mark is applied." On the strength of such authority, decision was given in favor of the plaintiff sustaining the words "Charter Oak," accompanied by a figure of an oak tree, cast upon the plates of stoves, as a legal trade mark. In these words and device the court, it seems, found enough to indicate "origin or ownership." With such a mark permanently attached to the stoves, they were readily identified in the market, and of course could easily be traced to their origin. The fact of the mark opened and pointed the way to the factory where the article was made. It was the owner's "ear mark," which he placed upon all his goods of the kind, and by which the public come to know the stoves were made by him.

There are many other decisions recognizing the fact that mere symbols or devices or unmeaning words may, by continued use, indicate origin, and thereby become legal trade marks.

A careful reading of the decisions will show that the courts have held with very great unanimity that the person's name or place are neither absolutely essential to the validity of a trade mark. If it possesses the evidence upon its face that it is put forth or given out as a distinguishing mark of the goods to which it is attached, that is, distinguishing as to origin and not as to kind or quality, it may have all the requisites of a valid trade mark without naming the person or place whence it came. The very fact that it bears evidence of being the manufacturer's or dealer's private mark, by means of which his goods are distinguished in the market, is sufficient indication of origin to warn against copying by competing dealers, and this answers the public demand.

At common law, the trade mark to become legal and to vest an exclusive right in the persons adopting it, must have been so long in use as to be known and recognized in the market. That is a person could not adopt a trade mark to day and successfully sue for infringement of it tomorrow. Whether the office should demand that a trade mark should have such use before admitting it to registry, has been a question with the examiner; but I am of the opinion that one object of the registry law was to settle this very question. *Registry* is notice to the world, and supplies the place of *long use* at common law.

The applicant's device is not a genuine name, it is not indicative of quality. It does not consist of words or devices that others in the same trade would be likely to select for a similar purpose, and I see no valid reason against admitting it to registry.

The decision of the examiner is reversed.

(Signed,) M. D. LEGGETT, Commissioner.

Sept. 21, 1871.

WHAT CONSTITUTES PATENTABILITY IN AN ARTICLE OF MANUFACTURE.---IMPORTANT DECISION BY THE COMMISSIONER OF PATENTS.

In the matter of the application of Charles A. Moore, for letters patent for improvement in clock cases. Appeal from Examiners in Chief:

The applicant seeks a patent on what he claims to be a new article of manufacture, consisting of a pressed glass clock case, constructed with the entire front, sides, top, and bottom in one piece, the front being adapted for the face and hands of the clock, and the whole ornamental in design, and cheaply manufactured.

He is met by references to glass boxes, vessels, preserve dishes, porcelain ware, pressed clock fronts, clock covers, etc., etc., and also to clock cases made of porcelain and earthen ware.

The only question now to be decided, is the pertinency of these references.

It is very difficult to establish any rule as to references that shall be plain and of universal application, consequently there are almost as many different rules of practice, in finding references and making rejections, as there are different examiners in the office.

Some examiners are very quick to detect resemblance, and will reject almost everything. Others are equally quick at finding differences, and will grant patents on mere shades of variation. Hence a picket fence is rejected on reference to a comb; a urinal, on reference to a blacksmith's furnace; a surgical instrument for injecting spray into the throat or nasal organs, on reference to a fireman's hose; a rubber packing for fruit jars, on reference to a pump; a device for lacing ladies' shoes without the use of holes or eyelets, on reference to an old mode of cording bedsteads; an ore crusher, on reference to a nut cracker.

In each of these cases there will be found a remote resemblance between the device in the application and the reference. In some of them, however, the examiners have displayed more inventive genius in finding the references, than the applicants would dare claim for their devices.

As before stated, the impossibility of prescribing definite rules of general application as to the pertinency of references, has given rise to a great want of uniformity in the office practice.

It is proper, however, to say that references should be limited to things of a kindred nature—to things so nearly related in adaptation and use, as that seeing one, would naturally suggest the other. There should be some analogy between the use and result of the device in question, and the reference upon which it is rejected. The analogy should be so close that the device would likely be suggested to a person skilled in the art to which the device relates, by seeing the thing used as a reference. Unless there be such analogy, the reference could hardly be regarded as pertinent, even in applications for machine patents.

But in regard to applications for patents on manufactured articles, the field of reference is still further limited. The only questions to be settled are:

1. Is the device of itself an article of trade?
2. Is it useful?
3. Is it so different, in essential points, from other articles of the class to which it belongs, as to be easily distinguished in the market?

These being answered in the affirmative, a patent should be allowed. Try the case in hand by this rule.

1. The device is intended as an article of trade, not as a clock, but as a clock case; intended to be put upon the market simply as a clock case, and sold to clock makers.

2. It is more cheaply made than any other transparent clock case, and equally ornamental; hence it is useful. "The beauty of an ornament is one great test of its utility," says the learned judge in the celebrated *Magic Ruffle* case. (2 Fish, 336.)

3. There certainly would be no difficulty in distinguishing the clock case in question in the market, from any of the references, as an article of manufacture; it is essentially different from preserve dishes, tumblers, ordinary glass boxes, pressed glass clock fronts, or glass clock covers. It belongs entirely to another family of articles. Neither could it ever be mistaken for porcelain or earthen ware clock cases of the same family. The results sought in this clock case are cheapness, ornamental form, and the special quality of displaying the internal machinery of the clock, without exposure to dust or the use of a cumbersome cover.

This last quality is not possessed by either porcelain or earthen ware.

I do not recognize any pertinency in any of the references.

The decision of the Board of Examiners in Chief is therefore reversed.

(Signed,) M. D. LEGGETT, Commissioner.

United States Patent Office, Sept. 23, 1871.

EXTENSION OF CENTERING MACHINE PATENT.

In the matter of the application of E. F. Whiton for the extension of letters patent, bearing date July 14, 1857, for a Centering Machine.

DUNCAN, Acting Commissioner:

The following is the substance of the examiner's report:

The machine or device described in the patent is intended mainly for centering and marking the centers of shafting.

On examination, the invention is found to have been new at the time the patent was granted, and it is found also to be useful and important.

In proof of the fact last stated, a number of affidavits have been presented, all of which certify to the superior utility of the invention, but these affidavits, as well as applicant's statement, are entirely silent as to the value of the invention to the public. Perhaps, however, this omission was unavoidable, considering the fact that the thing invented is not a machine for *creating* or *producing*, but rather a convenient tool or adjunct, the purpose of which is, and can be, only simply *directive*.

It would seem from the statement in the case and otherwise, that at the time of making the invention the patentee was a laboring mechanic, and possessed of but little means; that by the assistance of a brother he was enabled to commence the manufacture of his improved device, but that for several years his business was characterized by losses instead of gains, these losses resulting from inadequate machinery for the manufacture of his device, and the want of means to procure better; and also from the imperfect construction of the device itself, which rendered those first made unsalable.

Applicant expresses the opinion that had he possessed the necessary means, he might have made and sold at least five hundred of his centering devices annually; as it is however, he has made and sold but seven hundred and fifty-one.

The statement of receipts and expenditures is as follows:

PATENT, DR.		
To cash received for 751 centering machines		$35,888
PATENT, CR.		
By cost of manufacturing 751 centering machines	$32,702	
Procurement of patent	175	
		32,877
Excess of receipts over expenditures		3,011

It is not deemed essential, under the provision of the statute which requires the applicant for an extension to make statement of the ascertained value of his invention, that this statement should be given in dollars and cents. Doubtless it was only contemplated, by the provision referred to, that the applicant should furnish the necessary data to enable the Commissioner to form an intelligent judgment as to the merits of the invention. (See case of Peter Cook, Commissioner's Decisions, 1870, 24.

In the present case it appears that seven hundred and fifty machines have been sold, and the testimony is emphatic as to the satisfactory character of their operation.

The patentee's diligence in the introduction of his invention is of the most commendable character; and the small profit realized appears to be an entirely inadequate remuneration for the time, ingenuity, and expense bestowed upon it. The patent will be extended.

DRAINING LAND.—A strong metal pipe, about 20 feet in length and 6 inches in diameter, is adjusted in a slanting position over the lot to be drained. To an opening in the bottom of this pipe, another is firmly jointed, inclining backwards at an angle sufficient to allow of its end resting on the ground lot. Connected with the principal pipe, is a strong canvas hose, down which a current of water descends, and issues at the mouth of the pipe. In its course, it forms a vacuum in the second pipe, and the water is thus sucked up and discharged with the current flowing through the principal pipe. This device is in use, for the purpose described, in Australia, but is known to most men practically acquainted with hydraulics.

DRESSING ROLLED IRON.—An improvement in dressing the scale off finished iron bars in rolling mills is in use at the extensive works of Griswold & Co., Troy, N. Y. It consists of a wire brush fastened on a bar fixed on the discharging side of the rolls, and is said to be a great improvement of the friction with cinders usually applied for the purpose.

Feed Water Regulator and Low Water Alarm Combined.

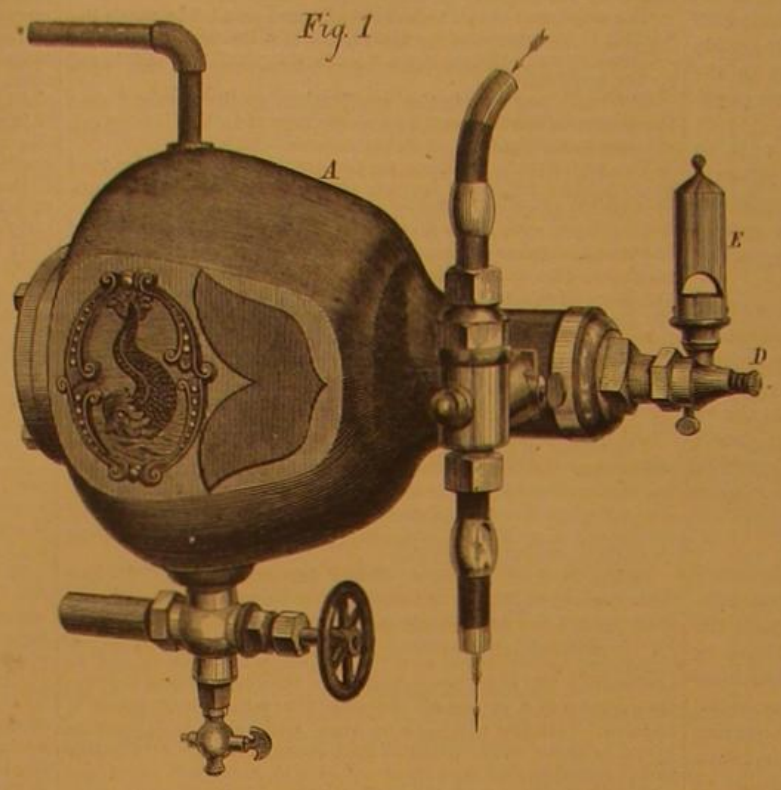
We illustrate herewith an appliance for steam boilers, which we consider useful and economical on any boiler, but more especially on those in shops too small to warrant employing an engineer solely to care for the engine.

The office of the appliance, as its name indicates, is, first, to regulate the flow of water from the hydrant or tank to the pump (which is constantly running) so as to keep the water at a regular hight in the boiler—just enough constantly entering to supply the evaporation (which, doubtless, all will agree, is the best way to supply the water); and every one using small boilers knows that it is a difficult thing to accomplish, especially when power is irregularly used, requiring more or less steam, as the work demands. In the next place, should the water pipes get stopped, or the attendant forget to turn on the water, causing it to fall a few inches, an alarm will be sounded before too low water occurs. In this particular, it is like the "Reliable" low water alarm illustrated in this journal some time ago, which, we are informed, has been very successful.

In the Regulator, power is gained to perform, with the same works, the two offices, as described.

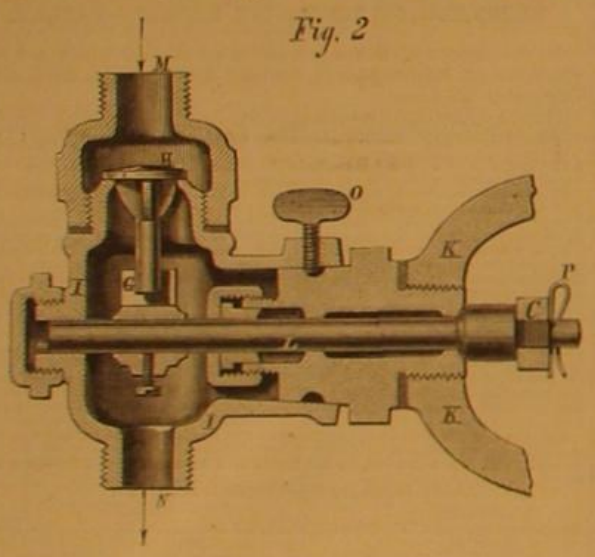
Fig. 1 is a cast iron case, A, about ten inches wide, and fifteen inches long, in which is suspended a float, which hangs by its lever on the shaft, L, which passes through the water valve case, I, a longitudinal section of which, cut transversely across the neck of A, is shown in Fig. 2. The float, as it rises or falls, turns the shaft, L, and if it fall too low, it will also, with its end extending past the shaft, tip the valve, as in the alarm above described, and sound the whistle, E. The case, A, is connected to the boiler by both steam and water pipes, so that the water in it will be on the same level as the water in the boiler. Thus the float will constantly be holding the valve, H, by the trip, G, or shaft, L, just open enough to allow water to pass as described. The hydrant pipe is connected at M, and N is the

Fig. 1



LYNDE'S FEED REGULATOR AND LOW WATER ALARM.

Fig. 2



passage to the pump. K shows a section of the neck of the iron case, A, when I is screwed in. This instrument is also arranged to turn on steam to pumps, if desired to feed by them, or it will start and stop a power pump, if desired to feed in that way; but it is shown in the manner believed to be the best and most economical way to feed, and in which it is the most useful.

This appliance is now on exhibition at the American Institute Fair in this city, and further information may be obtained by addressing the patentee and manufacturer, J. D. Lynde, at 405 North Eighth street, Philadelphia, Pa.

Improved Curb Roof.

Among the patents issued for the week ending Aug. 22, 1871, was one to Mr. Dudley Newton, architect, of Newport, R. I., for an improvement in the curb or mansard roof.

The improvement lies in the introduction of an ornamental fascia and bedmold, above the cornice and below the slate or shingles, so arranged as to allow water to drip clear of it into the gutter; said gutter being built in the main cornice at a sufficient distance below to allow this ornamental work to appear to advantage from the ground.

Referring to the engravings, Fig. 1 represents a section of roof. A is the rafter, the foot of which projects over the plate, B. C is the cornice, in which is built the gutter, the metallic lining of which extends nearly to the top of the plate, B. D is a fascia—plain or ornamental, put on outside of the extended lining of the gutter. E is a bedmold covering the ends of the rafters. F is slates or shingles running over the edge of the bedmold, E. Fig. 2 shows a portion of one of these roofs with dormer window.

It will be seen from the foregoing that a separate line of finish is obtained above the main cornice, making a break between it and the slate, and correcting its shelf like appearance, so often complained of, and thereby greatly adding to the architectural effect. It gives a perfect gutter, easy to get at and keep in order, and is less liable to leak than any other. It admits of placing the dormer windows in the most favorable positions as regards hight from the floors in the rooms, and greatly improves their exterior effect.

Wishing to benefit the profession at large, Mr. Newton offers the rights to use this roof, to architects throughout the country on very moderate terms, but will in no case sell such rights to builders. Parties wishing further information may address him for circulars

Fig. 1.

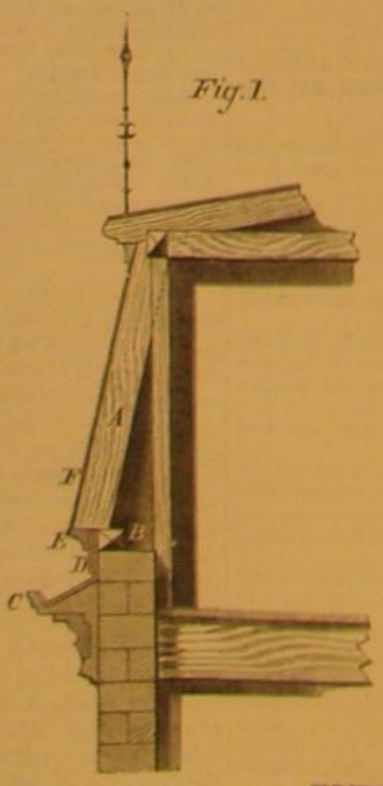
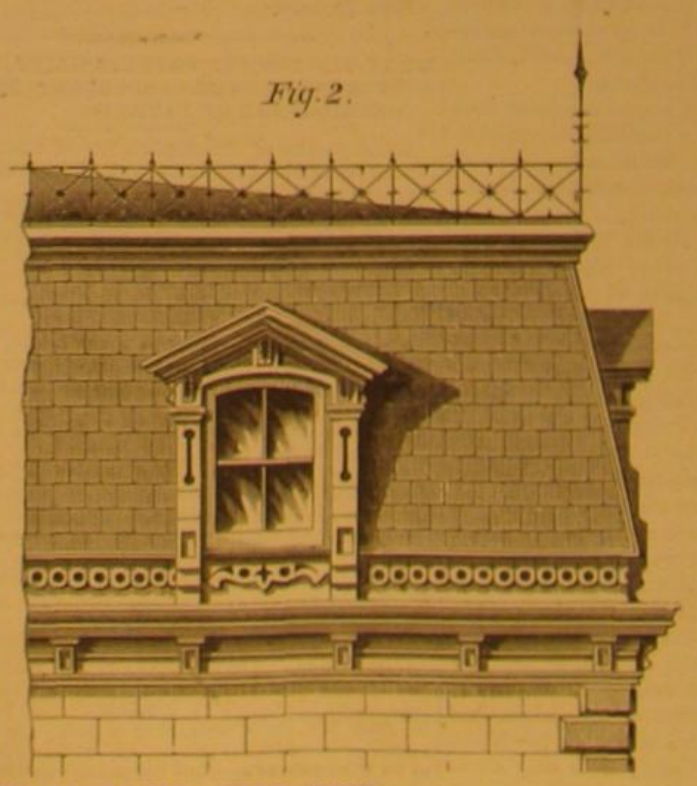


Fig. 2.



NEWTON'S IMPROVED CURB ROOF.

Improvement in Slat Mattings for Car Floors, etc.

This invention has for its object to furnish an improved slat matting for car floors, saloon floors, and other places, which shall be so constructed as not to be injured or broken by the expansion of the wooden slats, and not to be made loose and shaky by the contraction of said slats consequent upon change of temperature or dampness. It consists in the combination of rubber washers or buttons with the wooden slats and connecting rods of the matting. The wooden slats of the matting are strung upon rods in the ordinary manner. Rubber washers or buttons, in the form of short tubes, are placed upon the rods between the slats. The ends of the rods are secured at the outer sides of the outer slats by having heads formed upon them, or by nuts or other convenient means, metallic washers being used, if desired. By this construction, should the wooden slats expand or swell, the rubber will be compressed, and the slats and rods will be prevented from being broken. The rubbers are somewhat compressed when the matting is being made, so that, should the slats shrink or contract, the rubbers will expand, and thus hold all the slats securely in their proper relative positions. Should any one of the slats be accidentally broken, the expansion of the rubber blocks or washers will take up the space, and thus keep the other slats securely in their places, and prevent all play or rattling of said slats, which is unavoidable when wooden or other unyielding washers are used. This construction also enables the wooden slats to be made narrow, to present the smallest possible space to receive dirt, and thin washers to be used, thus making the matting with narrow spaces between the slats, giving it a neat and light appearance while having the requisite strength. Samuel Lewis, of Williamsburgh, N. Y., is the inventor of this improvement.

PARISH'S IMPROVED LAND MARK.

The destruction of land marks often leads to misunderstandings, and even litigation. In a matter so important, especially in new countries, where these indications are the only guides to settlers, it is essential that land marks should not only be durable, but that their inscriptions should be so clear a guide as to be unmistakable.

Monuments, or landmarks of stone, are liable to be broken off, or to crumble from the effects of frost. If any inscription is painted upon them, it is in time effaced by atmospheric influences; and to carve inscriptions in stone is an expensive operation.

The object of the present invention is to obviate all these difficulties and objections by the use of cast iron land marks, of a special design, as shown, having the proper inscriptions cast upon them, such land marks, it is claimed, being cheaper, while far more efficient and durable than any that can take their place. The design is so clearly indicated in the engraving that it need not be described in detail. Three of the land marks are shown, one lying loosely upon the ground, one standing loosely, and a third being inserted in the ground, as in actual use.

Fig. 1



Fig. 2

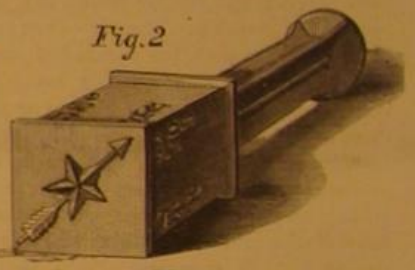


Fig. 3



The part entering the ground is long, and, being ribbed quadrilaterally, is very strong. The arrow upon the top indicates the meridian, and the inscription gives the numbers of section and township, and the range of the exact position where the land mark is placed.

Design patented January 3, 1871, by John H. Parish. For further information address George Peacock, Talladega, Ala.

Consumption and Climate.

THE following sensible advice is the closing paragraph of an elaborate article on consumption and climate by Dr. Hall: "We have long considered it one of the inhumanities of man to man, in so glibly advising persons to go from home to distant places, involving, many times, ruinous expenses, especially when it is given as a last resort—advice often given when everything possible has been done and tried without efficacy, merely on the ground that possibly it might make some change for the better, while the overshadowing probabilities are that death will be the result anyhow. Any man who is considered by an intelligent physician to have actual consumption, ought by all means to stay at home."

Scientific American.

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LABOR IN ENGLAND, AND THE INTERNATIONAL WORKING MEN'S ASSOCIATION.

Those who have believed the International Working Mens' Association of small account in its influence upon industrial affairs throughout the world, may learn a useful lesson from the recent struggle between labor and capital in England, in which, at present writing, the former has every prospect of victory. There has been, in this country as well as in England, general blindness to the significance of this organization; its leaders have been stigmatized as wanting in sagacity, and its members as rabble. That it has brains to organize, and resources not to be ridiculed, has been proved on more than one occasion.

It is worse than useless to shut our eyes to facts which we shall ere long be called to face, and which must inevitably produce changes in the distribution and rewards of industry, scarcely to be imagined, much less predicted. The working classes of different nations throughout the civilized world have, by modern advances in civilization, been put into a kind of intercommunication that fifty years since would have been impossible. Steam travel, the telegraph, and cheap printing, have given them knowledge of each other's condition in all parts of the world. National and international exhibitions of the products of industry have familiarized them with national peculiarities of handicraft, and although the majority of them—especially in Europe—are still ignorant, there have sprung from their ranks those who have shown qualifications for leadership, and who have effected an association out of materials which, though perhaps the most heterogeneous ever yet known in any organization, yet hold together by a universal feeling of brotherhood, having almost the cementing force of a religion.

Already has one civil war been born of the struggle between this power and capital. Yet the Paris Commune was only one division of the International. To-day an army of workmen in England are, and have been for months, supported without work by contributions from subordinate branches of the International, in a struggle for a reduction of hours of labor without decrease of wages. As we have said, it seems now that their demands must ultimately be complied with.

A brief history of this movement may not be uninteresting in this connection.

About four months since, a demand was made by the workmen, in the workshops on the Tyne, for a reduction of one hour's labor per day without a corresponding reduction in their pay. The demand was refused; and, about the first of June, the workmen, numbering some ten thousand, struck. The Trades' Unions in England immediately contributed fifty cents per week to each striker. Next, the movement was approved by the General Trades' Council, in London, and other trades' unions, and the allowance was doubled. Some of the strikers, having savings, refused assistance, and so the allowance has gradually been increased to two dollars per week for such as accept it.

A significant feature of this strike is the united attempt made by the prominent engineering firms in England to defeat it. These sided with the Tyne firms, and raised a large fund for the purpose of importing workmen from other parts of Europe. But in making this attempt, they came in contact with the International Working Mens' Association, the General Council of which sent agents to Belgium and Denmark to warn workmen against yielding to the solicitations of the English manufacturers. Notwithstanding this, a large number of workmen were obtained from Belgium, and others were secured from the Government Arsenal in Denmark. There were also some Germans and Norwegians induced to go to England through the activity of the agents despatched to their respective nationalities.

But the influence of the International, coupled with the threats and remonstrances of the English workmen, soon overpowered that of the manufacturers, and all but the Norwegians have been sent back to their homes at the expense of the strikers. The Norwegians, numbering less than one hundred and fifty, held out, and still remain in England.

At times, there have been fears that the strike for reduction of hours would become general throughout England, and great efforts have been made on the part of the Tyne workmen to bring about such a movement. But, although they have failed in this, the powerful union to which they belong, extending to both sides of the Atlantic, seems resolved not to let them be worsted in this contest.

We have thus the spectacle of united capital pitted against united labor, on a scale to test the relative strength of each. By those who make political economy a study, and who read carefully the signs of the times, this is seen to be one of many such contests yet to follow, some of them perhaps not bloodless, as this has yet been, but all of the gravest importance to the future welfare of society.

Prone as is the American public to refrain from recognizing and preparing for approaching emergencies, there are among us some, who see that the adjustment of the relations of capital to labor, will soon force itself upon public attention, in a manner which will admit of no temporizing. To such, the struggle now progressing in England possesses features of unusual interest; and its result will be looked upon, by the unions at least, as establishing a precedent for the future.

On the evening of September 23rd, the officers of the recent eight hour demonstration in this city held a meeting, in which it was resolved to organize the building trades into a grand "Building League," and it was further announced that a great strike is arranged to take place next April, which will include the whole of the United States and Canada. How much of this is vain boast, intended to intimidate employers, and to secure present concessions, time will show; but that trouble is brewing is plain enough.

IMPORTANT DECISIONS BY THE COMMISSIONER OF PATENTS.

We give place, in our present number, to two decisions by the Commissioner of Patents, which, in the liberality of their views and the emphasis given to the principles announced, are calculated to have an important influence in promoting the useful purposes of the patent laws.

The first of these decisions pertains to the question of the patentable novelty of new and improved articles of manufacture. On this subject, the Commissioner's logic is quite interesting, and in the course of his remarks he imparts wholesome light for the minds of his subordinates, the examiners in chief and the primary examiners.

In the particular case before him the invention sought to be patented was a transparent glass clock frame, an entirely new, useful, and elegant article of manufacture, in regard to the patentability of which no person of intelligence, except an examiner in the Patent Office, could have any doubts.

Over this simple case, which ought to have been decided in favor of the applicant in ten minutes, the primary examiner racked his brains and ransacked the Patent Office for references, and finally, after a number of days useless delay, made a solemn official decision, rejecting the case.

The applicant was then obliged to go to the trouble of arguing the matter before the primary examiner, upon a rehearing. After further examination and further searches, conducted on the usual red tape plan, the examiner rendered a second adverse decision.

The applicant was now subjected to the payment of a new official fee, in order that he might have his case reviewed by the Board of Examiners in Chief.

This Board consists of three able gentlemen, qualified by their knowledge of science and the patent laws, and especially appointed to correct the mistakes of the primary examiners.

In due form, after the usual delay, the case came up before this Board for hearing, when the applicant showed that his invention was a new and useful improvement, and that he was clearly entitled to a patent. But the Board of Examiners were unable to see it, and after due deliberation they came to the conclusion that the decision of the primary examiner was correct, and that in view of the fact that preserve dishes, tumblers, etc., are made of glass, and are transparent, there could be no patentable novelty in making transparent clock cases of glass.

So the applicant was again rejected, and compelled, in order to get the decision set aside, to go through the delays and expenses of an appeal to the Commissioner of Patents in person, in whom, happily, he found an individual possessed of common sense, and not afraid to use it.

The Commissioner reviewed the case, and quickly disposed of it, reversing the previous decisions, and ordering a patent to be issued.

The worthlessness of the decisions of the primary examiner and of the examiners in chief in this case is made apparent in the closing sentence of the Commissioner's decision, where he says: "*I do not recognize any pertinency in any of the references.*"

In other parts of this *dictum*, the Commissioner exposes, without any compunctions, the absurdity of some other Patent Office decisions; such, for example, as the rejection of improved picket fences upon references to combs; and of improved urinals on references to blacksmiths furnaces.

He lays it down as the governing rule of the Patent Office that patents are to be issued, not only for chemical and mechanical inventions, but also for all kinds of *improved articles of manufacture*, and that the examiners, in searching for references, *cannot legitimately go outside of the particular class of articles to which the alleged improvement belongs.*

It is evident that the Commissioner seeks to make a new departure for the Patent Office, and that in the future he desires the examiners to give a more broad and liberal interpretation of the law, in favor of the applicant. In this he will be fully sustained by the public, and his present decision will give very general satisfaction.

Patent Office Examinations.

We have for some time inclined to the opinion that our system of official preliminary examinations was a failure, productive of more trouble to inventors than benefit; and the present decision of the Commissioner tends to corroborate this view. We particularly commend it to the study of our English friends who have fallen so desperately in love with our system that they are anxious to engraft it on the British statutes.

"It is very difficult," says the Commissioner, "to establish any rule as to references that shall be plain and of universal application; consequently there are almost as many different rules of practice in finding references and making rejections as there are different examiners in the office."

"The impossibility of prescribing definite rules of general application as to the pertinency of references, has given rise to a great want of uniformity in the office practice."

"The examiners have displayed more inventive genius in finding the references than the applicants would dare claim for their devices."

Such is the practical working of the system of official preliminary examinations, after thirty-five years' experience therewith at Washington, as presented in this decision of Commissioner Leggett, who, as all will admit, is one of the most able and intelligent officers that have ever filled the Commissioner's chair.

We are pretty well satisfied that the law ought to be amended, making it the duty of examiners simply to see that the patent papers are correct in form, and if so, then promptly to issue the patent. But a necessary condition of this change will be the publication of all existing patents, in a cheap and popular form, so that applicants may readily make their own examinations as to novelty, and judge for themselves as to the propriety of taking out a patent. The question of the validity of a patent rests, after all, with the courts for decision, and it matters but little what the Patent Office examiner thinks about it.

The second decision of the Commissioner relates to trade marks, and is referred to in another paragraph.

TRADE MARK REGISTRATIONS.

To a considerable extent the Congressional laws for the registration of trade marks, passed last year, have been nullified by the conceit of the officials, to whom the business of registration is committed at the Patent Office. The matter of registration might be readily done by a smart person in half an hour's time; but as now conducted it is a long and serious operation.

In some cases, the examiner appears to spend days in considering whether or not the words sought to be registered are new words, or in deciding whether registration shall be granted without a device, or whether the applicant shall be required to append a device to the words of his trade mark; or whether he shall be required to add his name and address, whether a symbol only may be registered, whether a letter only may form a trade mark, and so on *ad infinitum*. The examiner, in fact, expends far more ingenuity in concocting excuses for refusing registration than the applicant exhibits in devising the trade mark itself. But what is an examiner good for, except to make trouble and delays for the applicant?

All these questions are conclusively answered in the able and interesting decision by Commissioner Leggett, relative to trade mark registrations, which we elsewhere publish. From this document, the examiner will learn that *any device, name, symbol, or other thing*, may be legitimately employed as a trade mark, and as such may receive registration.

In view of this decision, it is to be hoped that the officials will in future higgle less over the small points, and use more common sense coupled with diligence in granting certificates of registration. The law was made for the express purpose of protecting manufacturers and merchants in the symbol or design they have devised for a trade mark; and it ought to be the sole aim of the examiner to grant the registration, except in those cases that are positively and unqualifiedly forbidden by the law.

CHEMICAL MANURES.

The constituents of a fertilizer, which give it its invaluable, properties are known to be elements which originate only in animal and vegetable life. But the countless generations of beasts, birds, and fishes which have inhabited this planet in prehistoric times have not passed away without leaving behind them somewhat for the benefit of mankind. Wherever, on or under the earth, the sea has been, (and where has it not?) there are to be found the remains of organic existences; and, as would naturally be supposed, the fish tribe furnishes the greater part of these specimens, and deposits of their remains, either as fossils, or intermixed with the substances of rocks, are found everywhere. And many of these beds conserve so much of the valuable properties of the fish, that

they are largely used as manure. Rocks, more or less phosphatic, exist in most countries, and readily yield their prosphorus to increase and perfect the growth of our cereal crops. Phosphate of lime is the usual combination of which these deposits are formed; and this mineral needs treatment with sulphuric acid, which eliminates some of the lime, and consequently increases the per centage of phosphorus, and makes its liberation, when the compound is subjected to the decomposing effect of the soil, more certain and more plentiful.

This product is superphosphate of lime, and its manufacture is becoming a most important industry in many parts of the United States. In the neighborhood of Charleston, S. C., there is a bed of phosphate, extending for miles in length, at a depth of only six feet from the surface. It is full of fossils, and is thoroughly impregnated with phosphorus. The bones of extinct animals, of nearly every species found in the secondary formations, have been discovered there, as well as of sheep, hogs, dogs, horses and other cotemporaries of the human race. Bones of man, flint hatchets, and other mute witnesses of the existence of mankind in ages long passed away, have been observed by investigators of this stratum.

This immense and valuable phosphatic deposit is now being worked on a very large scale, fifteen companies being engaged in producing fertilizers by the treatment above described, varied more or less by circumstances. The product of this manufacture is 1,000 tuns of superphosphate of lime per day, and is being mostly shipped to England. The *South*, a new venture on the waters of New York journalism, states that the capital employed in the trade is over $2,000,000, and that one company has a contract to deliver 200,000 tuns. It is to such enterprises as these that our farmers of the Eastern States must look for means of improving their impoverished lands.

THE ETHER CONTROVERSY.

By no event is the difficulty of writing contemporaneous history better illustrated than in the controversy that has arisen in reference to the discovery of the anæsthetic properties of ether. Although some of the chief actors in the scene and many of the witnesses are still living, it seems to be impossible to obtain concordant testimony in reference to the real originator of the application of ether, that has brought such blessing to mankind. Acrimonious controversy, passionate personality, professional hostility, dogged obstinacy, have taken the place of calm judgment and impartial investigation; and thus it has been brought about that no two writers agree in their account of the important discovery. We do not care to let loose the dogs of war and revive the bitter contest, but in our capacity as journalists, it comes in our way to allude to two pamphlets on the vexed question which have recently been sent to us. One of them is a reprint of the report of the late Edward Stanly, of North Carolina, presented to the House of Representatives of the United States, on the 28th of August, 1852, from the select committee on the ether discovery, strongly controverting the claim of Mr. W. T. G. Morton to any appropriation of money as a reward for his alleged discovery; and the other is in the form of "Historical Memoranda relative to the discovery of etherization, and to the connection with it of the late Dr. Wm. T. G. Morton, prepared by a committee of citizens of Boston chosen to raise a "Morton memorial fund." There is something in the latter pamphlet to appeal to the sympathies of the public and to silence all bitter feeling: and whatever may be the precise fact of who was the original inventor and revealer of anæsthetic inhalation, Dr. Morton's connection with it was, beyond a doubt, sufficiently important to entitle his family to a full and substantial recognition. And it would be a disgrace to our civilization if this part of the claim were not recognized; but, when we admit all this, it does not necessarily follow that there are not others whose share in the discovery was not closer, and whose claim to recognition is not greater than was Dr. Morton's. The mistake in the pamphlets appears to be the strong partisan bias in which they are prepared. The one is Jackson or nothing, and the other is Morton or nothing. Neither admits of any halfway argument, and to the unprejudiced reader, both greatly damage their cause. We have been reading the pamphlets with interest because it is really important to know to whom the world is indebted for one of the most important blessings that was ever conferred upon it; and by reading between the lines of the two productions, we arrive at a history which runs very much as follows:

Dr. Charles T. Jackson, of Boston, is a thoroughly educated chemist; Dr. W. T. G. Morton, late of Boston, was just the opposite, having enjoyed few opportunities, and being in fact an ignorant man. Dr. Jackson was familiar with the properties of sulphuric ether, had taken it to relieve pain and prescribed it to others; Dr. Morton could not have distinguished sulphuric ether from sulphuric acid. He was casting about for something to administer to a nervous woman in a dental operation, and rushed over to Dr. Jackson's laboratory to borrow a bag to be filled with air, intending to act upon the imagination of the patient, and lead her to think that she had really taken something to relieve pain. Dr. Jackson scouted the idea of practicing such an imposition, and advised Morton to administer sulphuric ether. "What is that?" asked Morton; "is it a gas or a liquid?" He was informed on these points, tried the experiment, fortunately succeeded, procured some more ether, the odor of which he asked Dr. Jackson to disguise for him, took it to the Massachusetts General Hospital, without disclosing what it was, made the proposition to administer it to a patient in a capital operation, was permitted to do so on the 16th and 17th of October, 1846; fortunately for mankind no fatal result occurred, *and the application was complete.* The attending physicians took a great risk in administering an unknown substance, and by their skill and careful handling of the case are entitled to great credit. They make no claim to the discovery, as they used what was handed to them without question. If Dr. Morton had been thoroughly honest and candid in the matter, he would have aid that he received the bottle from Dr. Jackson, and it is a question whether the attending physicians were not guilty of a want of professional courtesy in withholding from Dr. Jackson the cred't that belonged to him, knowing as they did, either at the time or immediately afterwards, that the suggestion and the science came from him. It looks at this distance of time as if there were some personal hostility or jealousy at the bottom of such reticence, but the eminence of the gentlemen in question precludes such an interpretation, and we cannot attempt an explanation. Dr. Morton at once scented a fortune in the new application of ether, and conscious that Dr. Jackson was the true discoverer within the meaning of the law, he proposed that a joint patent should be taken out. To this Dr. Jackson objected, as he was opposed to restricting the use of ether in any way, and he could not see what claim Dr. Morton could set up to join with him as an original discoverer. From that moment Dr. Morton determined to set up his own tabernacle, and to run off with all the glory and all the profit; and he succeeded in procuring a patent, and in surrounding his name with such a halo that the number of his disciples became very great, including the names, as we see from one of the pamphlets, of some of the most eminent physicians in the country. He certainly established the fame of ether by the noise he made about it, and, from this point of view, was entitled to pecuniary reward. To Dr. Jackson the world owes the discovery; to Dr. Morton, chiefly, the application.

FAIR OF THE AMERICAN INSTITUTE.

A visit to this exhibition, since our last issue, took us among the pumps and steam engineering adjuncts, safety apparatus, governors, etc. Among the

PUMPS

the most decided novelty is the Compound Propeller Pump, exhibited by General H. S. Lansing, who has now on exhibition, at the Novelty Iron Works, in this city, the large sized pumps described and illustrated on page 118, current volume of the SCIENTIFIC AMERICAN. The barrel of the pump shown at the fair is of glass, and, the water being colored, its motion through the pump, as acted upon by the propellers, is very prettily shown. We notice that a change has been made in the position of the rests, intermediate between the screw propellers, the former being brought down close to the latter, instead of standing midway between the propellers, as shown in the illustrated article referred to above, which change, we were informed, gives a better result.

A. S. Cameron & Co., foot of East 23rd street, New York, show a collection of beautiful steam pumps, of their manufacture, the most important being the "Special" steam pump, and a large vacuum pump, for sugar refineries, etc. The finish of these is very fine, and they make a very creditable display. Their peculiar features are well known to the engineering public.

Waring & Parke, 133 Center street, New York, show the well known "Earle" steam pumps, and Waring's Air Compressor.

The Woodward Steam Pump Manufacturing Co., 76, 78, and 80 Center street, make the usual display of their well known steam pump, including the Safety Steam Pump and Fire Engine.

Charles B. Hardick, of the Niagara Steam Pump Works, 23 Adams street, Brooklyn, shows various sizes of the Niagara Steam Pump," of fine finish, and well known for their simplicity, reliability, and efficiency.

The Automatic Steam Vacuum Pump Manufacturing Company exhibit one of their Steam Vacuum Pumps, which first made its appearance at last year's fair. This pump is unique in its construction and operation. A large chamber having been filled with steam, is suddenly emptied by the condensation of the steam. Water rises to fill the vacuum. Steam is then admitted to the chamber over the water, and the latter, being held from retreating by a check valve, is forced out of the chamber to any hight of column which the steam will equilibrate. The steam is prevented from condensation, by its contact with the water in the chamber, by a stratum of air, which being heavier than the steam lies upon the top of the water like a piston. On condensing the steam, water again flows into the chamber by atmospheric pressure, and so on, the condensation being effected by a very simple automatic injecting apparatus, and the admission of steam being performed by automatic valve gear.

Wright's Bucket Plunger Steam Pump took the first premium at the fair of last year, and is this year again exhibited. It is well adapted to nearly all the purposes for which steam pumps are used. It is exhibited by the Valley Machine Company, Easthampton, Mass.

The Bridgeport Manufacturing Company, 55 Chambers street, New York, show their American Submerged Double Acting Non-Freezing Force Pumps, which have become so widely known as to render a description needless.

We notice in this department also a

WATER METER,

exhibited by the inventor, Mr. S. B. Everett, of Ansonia, Conn. It is an inch meter, and weighs only eight pounds. It is a proportional meter, leading out of the side only a very small fraction (two drams for each cubic foot) of the water delivered, measuring the drip by a triangular bucket wheel, which drives a register, and allows the drip to run to waste. Superior durability, combined with accuracy and compactness, are claimed for this meter, which attracts much attention.

We further noticed a novel wooden water pipe, which seems durable, and is certainly very cheap. A specimen, said to have been used under ground for eight years, was shown us, and gave no appearance of decay. The sections of this pipe are made in two semicylindrical pieces, the edges being joined by tongue and groove. The parts are held together by a copper wire, wound spirally, the turns being, we judge, about an inch and a half asunder. The pipe was tested in our presence, under a pressure of 120 pounds to the inch, which pressure it endured without leaking. The exterior is coated with coal tar, in which the pipe is boiled before using. In a sanitary point of view these pipes are unobjectionable, and they are much cheaper than lead. Exhibited by Moulton Brothers & Co., Johnson, Vt.

Mr. N. Hotz, 58 Greenpoint Avenue, Brooklyn, N. Y., shows a very ingenious and, we judge, valuable improvement in faucets. The principle of this faucet may be described as that of balancing the pressure of the water against a valve, so that the valve may be as easily raised under great pressure as under light pressure, the only parts that can wear being two rubber washers, which a boy may replace when necessary. The faucet, moreover, is not liable to damage from freezing. The same improvement is applied to hydrants, which, by its use, will be always operative in the coldest weather.

The Water Filter, exhibited by Parrot and McCauley, of Morristown, N. J., and described and illustrated in this journal on page 182, current volume, attracts general attention, and seems to be making a very favorable impression. We refer the reader to the article alluded to for particulars of this filter, which is worthy of more than ordinary attention.

Among the

ADJUNCTS OF STEAM ENGINEERING,

we notice Berryman's Feed Regulator for boilers. This was illustrated and described on page 223, Vol. XXIII., of the SCIENTIFIC AMERICAN, to which the reader is referred for a full description of a very ingenious and efficient device. The Berryman Manufacturing Co., whose New York Agency is at 36 Cortlandt street, New York, are the exhibitors.

Lynde's various Safety Appliances, several of which were illustrated and described on pages 148 and 149, Vol. XXI., of the SCIENTIFIC AMERICAN, and another of which appears on another page of the present issue, are well worthy the attention of steam users.

Moore's Fly Wheel Governor, shown by Dill and Moore, 149 Center street, New York, is a fly wheel, upon two straight arms of which balls slide outward, against the force of elliptical springs, by the action of centrifugal force. This governor has the advantage that it can be run in any position, inclined, vertical, or horizontal, and may be used for all classes of engines, marine, stationary, or portable.

The Huntoon Governor is also shown by William L. Chase & Co., 95 and 97 Liberty street, New York. The principle of this governor is the employment of the reaction of oil in a closed chamber, upon a screw propeller, as a regulator for the motion of engines, etc.

Bulkley's Improved Pyrometer, described and illustrated on page 130, Vol. XXIV., of this journal, is shown by Henry W. Bulkley, 10 Barclay street, New York.

The boiler, the name of which we failed to obtain last week, is Lowe's Improved Tubular and Flue Boiler, exhibited by Todd & Rafferty, No. 10 Barclay street, New York. The furnace of this boiler is constructed so as to consume the gases far more perfectly, it is claimed, than has hitherto been done, thus securing greater economy in fuel. The boiler supplies steam to some of the machinery at the fair, and works, we were told, very satisfactorily.

MISCELLANEOUS OBJECTS OF INTEREST.

Attracting perhaps as much attention as any other machines on the floor of the Rink, stands one large—and one small Lyall's Positive Motion Loom. The large loom is running on carpet five yards wide, and the small one on narrow print goods. Both looms have been much improved since their first appearance at the fair two years ago, and they now run as smoothly as could be desired, doing excellent work, and eliciting many encomiums from those who inspect them. We are informed that these looms are effecting a revolution in the manufacture of wire cloth, being peculiarly adapted to the production of such fabrics. Five new mills have been started, with the purpose of employing these looms, since they were first introduced, which is a sufficient vindication of our opinion, in regard to the importance of the improvement, expressed in the descriptive article which first brought the invention prominently before the public; and for which some of our cotemporaries rather incautiously took us to task. This inclosure forms one of the most attractive features of the present fair.

Another very attractive and interesting display is the Fitz Henry

LEATHER SCOURING AND HIDE WORKING MACHINE,

shown by the Hide and Leather Machine Company, 64 High street, Boston, Mass., which scours and works leather in such an effective manner as, it is claimed, to enable one man to do the work of ten by the old system of hand working. The description of the construction, operation, and advantages of this machine might well fill the entire space allotted to our notices this week, and we will not, therefore, attempt it. Suffice it to say that the machine imitates the working of the hand tools exactly, producing the same effect, only doing its work more thoroughly and rapidly. No one visiting the fair should fail to see this machine in operation. It forms one of the features of the exhibition.

Another most interesting machine is the Campbell's Combination

PRINTING PRESS

which is shown in operation, and to which it will be impossible to do full justice in our limited space. This press will not print unless the paper is fed in. The moment the sheet is not presented to the grippers, the inking rollers and all the other parts necessary to make the impression cease to move. The mechanism by which this beautifully automatic action is effected is a triumph of ingenuity. As the sheet is fed in, it passes over small apertures in the ends of a set of small air tubes, which are gently pressed down upon it, the paper thus acting as a valve, preventing the movement of a small plunger in a cylinder, which plunger, by suitable contrivances, controls all the other movements of the press. When we say that the "Aldine Press," the finest art journal published in America, is printed on one of these presses, we have said enough for its delicacy of execution. The press is shown by the Campbell Press Works, Thomas H. Senior, agent; office, *Sun* Building, New York. The same firm also exhibit a smaller press of different construction.

EDITORIAL SUMMARY.

GUN COTTON is now manufactured in England to an amount exceeding 100 tons per annum. The cotton fiber is reduced to a pulp, as in paper making, in which condition the excess of acids is readily removed. The pulp is compressed into disks, under a pressure of 18 tons to the inch, and then dried. These disks are $\frac{1}{8}$ inch to 7 inches in diameter, and $\frac{1}{4}$ inch to 2 inches thick. In the open air this compressed cotton burns intensely but without explosion; but when properly exploded under close confinement, its strength is from two to five times that of the same weight of gunpowder. If accidentally wetted, this form of gun cotton can be redried by exposure to the sun, or even by a gentle heat, without risk of explosion or deterioration.

NEW TEST PAPER.—Professor Böttger announces the discovery of a new re-agent, which, he asserts, is highly sensitive to the alkalies. It is a coloring extract of the *coleus verschaffelti*, and is produced by digestion, for 24 hours, in pure alcohol, to which a few drops of sulphuric acid have been added. The hue is a brilliant red, which turns green on contact with any alkali. It is not affected by carbonic acid, and will detect the slightest trace of ammonia in illuminating gas, if moistened and placed against an open jet. The presence of the minutest quantity of a carbonate of any of the alkalies is detected by it.

THE GLACIERS OF AMERICA.—The Rocky Mountains are likely to afford the explorers of this continent the same opportunities of investigation of the phenomena of glacier formation, and of meteorological occurrences at great altitudes, that Switzerland has so long given to Europeans. On Mount Ranier, in Washington Territory, there is a glacier ten miles in length by five in width, and many others are known to exist. The erudite weekly London publication, the *Academy* suggests the Rocky Mountains to the Alpine Club, as a field new to its members, who are by this time well acquainted with all the accessible peaks of Switzerland.

THE POLARIS.—We have received news from the *Polaris* and are able to report that she left Disco Island, off the coast of Greenland on August 17th. There had been a disagreement, between Captian Hall and the scientific members of the expedition as to the objects of the voyage, but this had been amicably arranged by Captain Davenport, of the United States ship *Congress*. Captain Hall has decided to keep to the west side of Smith Sound, as the other route, by Jones Sound, originally intended to be pursued, is likely to be more difficult of passage, the pack ice being already considerable in quantity.

THE RHYSIMETER.—Our English advices inform us of the invention of a new instrument called by the above name, for measuring the force of flowing liquids. It exhibits the force of impact of the moving fluid, and is somewhat similar in construction to the anemometer. Another obvious purpose for which this indicator can be used, that of measuring the speed of ships, will probably be its most valuable application. A column of mercury forms the index, and the instrument may be mode self registering and recording.

OIL WORKS IN RUSSIA.—At Riazan, a large city 150 miles to the southeast of Moscow, Russia, extensive works for raising and refining petroleum are now in course of erection, for which the necessary machinery is being constructed in England. The coal mines at Kharloff and in the neighborhood of Taganrog are known to lead to deposits of enormous extent, and it is believed that the supply of oil from these mines will be practically inexhaustible.

Examples for the Ladies.

W. Kelly, of Amsterdam, N.Y., earned with a Wheeler & Wilson Machine, in 14 years, $14,564, in making coats; an average of more than $20 a week, with but a few cents for trifling repairs.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished fre

Business and Personal.

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

Repertory of Arts.—For sale, a complete set of the Repertory of Arts, handsomely bound, half calf, uniform size, with general indices comprising five series and 113 volumes. Perfect in every respect. Embracing Inventions, Discoveries, and Improvements in Arts, Manufactures and Agriculture, with Engravings—from 1795 down to 1856. Apply to MUNN & Co., office of the SCIENTIFIC AMERICAN.

To Manufacturers.—Wanted.—By a competent man (American) a situation to run wood working machinery. Sash and door factory preferred. Address Box 138, Morris, Grundy Co., Illinois.

Turkey Boxwood pieces for Sale, suitable for engravers and fancy turners' use. Address Stephens & Co., Riverton, Conn.

Wanted—Time & Wages Table. Chas. W. Sleeper, Lowell, Mass.

Consumers of Plumbago will do well to send their addresses to C. H. Clark, Loco. Mining Co., Laramie City, Wyoming Territory.

Manufacturers of Steam Pumps will please send Descriptive Circulars and Price Lists to Joseph Capps & Sons, Jacksonville, Ill.

A superior chance for a few young men to learn the trade of making Machinery. Special terms made with any who have some practical experience. Address Lock Box 129, Woonsocket, R. I.

Patent Wanted—One connected with Notion, Toy, or Hardware trades. Barnes & Cruttenden, 335 Broadway, New York.

Patent Felt Floor Carpeting. C. J. Fay, Camden, N. J.

Parties desiring to introduce and sell machinery of any kind, and of agricultural or other useful implements in Texas, will meet representatives of a firm at Galveston largely interested in that line, by addressing J., 49 Clinton Place, New York.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St. Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Gear Wheel Moulding Machines—Paget's Blocks and Gipsy Winches (English Patent). Hamilton E. Towle, 176 Broadway, New York.

Improved Mode of Graining Wood, pat. July 5, '70, by J. J. Callow, of Cleveland, O., enabling inexperienced grainers ("without the long required study and practice of heretofore") to produce the most beautiful and Natural Graining with unequalled speed and facility. Send stamp for circular.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin. $4 00 a year. Advertisements 17c. a line.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time, labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours F. Sage, Cromwell, Conn.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y

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Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck & Co., New Haven, Ct.

Answers to Correspondents.

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.

SUBSTITUTE FOR ALCOHOL FOR BLOW PIPE LAMPS.—A. K. wishes a substitute for alcohol. I have tried several, but have not found one efficient. In the use of alcohol, a large part of the burning surface is invisible while soldering, and thus a larger blaze is required to direct it. If a few drops of kerosene be added, the whole of the blaze is visible, thus enabling the operator to use less burning surface; for he can direct the whole amount to the purpose for which it is needed, and at the same time economizing the burning of the alcohol.—R. B. F., of N. Y.

DIMENSIONS OF A RIGHT ANGLED TRIANGLE.—I think C. E C. will find his dimensions for a right angled triangle nearer correct by the following method than by the others already given. Given the three angles and perpendicular—let A B C be a right angled triangle; C, the right angle, A, the angle between base and hypothenuse. Let a, b, c, be the sides respectively, opposite these angles; then sine $A = a \div c$, or $c = a \div$ sine A, which, by using logarithms, gives value of c to be log. c = log. a — log. sine A. To find b: tan. $A = a \div b$, or $b = a \div$ tan. A, or log. a = log. b — log. tan. A. Squaring sides does not insure the accuracy this does, unless they are even squares and roots.—E. H. J., of Ga.

DIMENSIONS OF A PLANE RIGHT ANGLED TRIANGLE.—The base and angles being given, to find the perpendicular and hypothenuse. The solution by J. L., of N. Y., is good as far as it goes. The equation in the form given requires two operations for each of the sides containing the right angle. Then he refers to the square root to find the hypothenuse, which requires four more operations, thus requiring six shots to bring down the game that may as well be brought down with two, thus: For the perpendicular, multiply the base by the tangent adjacent angle; and for the hypothenuse, divide the base by the cosine adjacent angle. The solution by N. F. P., of ——, begins well, but as to the hypothenuse he is badly fogged; he gets parts of two rules mixed up, that do not pertain to the question; then, to show another method for this side, he gives a rule not known to the disciples of Davies. He says: "Multiply the square o the base by the square of the perpendicular," etc. The solution of F. E N. E., of Mass., is subject to the same objection as that of J. L. The plan of solving a triangle partly by trigonometry, and partly by some other method—as by the square root, or by mechanical construction—is like a farmer plowing half a field with a polished cast steel plow, then throwing it by for an old fashioned spud or wood plow. Moreover, no matter how much the principles underlying an operation may be elucidated, the rule should be terse and concise to the last extremity. But D. B., of N. Y., bears off the palm. He says "the squares of the two sides containing the right angle will be proportional to each other inversely as the two angles are." This is something new, a proposition not known to Euclid, or Descartes, or Legendre.—H. C. P., of Mich.

ROLLING BODIES—The problem of the three balls, too, in the same column, is as unfortunate as that of the triangle; both answers are incorrect. The second one would be well enough as far as it goes, if "not" were introduced between the words "will" and "roll;" and the person who would pick up that ball first down the plane, for the gold ball, would be badly cheated, as the gold ball would be the last one down the plane. The explanation would be too long in an answer of this kind but it is readily given. See "Gregory's Mathematics," Art. 6, page 241, or "Bartlett's Analytical Mechanics," example 6, page 243, with the final equations on page 246, same example, for a discussion of this question, though a good idea of it may be had without going into the calculus, as Mr. Bartlett has done.—H. C. P., of Mich.

DIMENSIONS OF RIGHT ANGLED TRIANGLE.—In your paper of Sep. 16th, N. F. P. gives the following rule for finding the hypothenuse "Multiply square of base by square of perpendicular, extract the square root of result." Thus, if the base be 3, and perpendicular 3, hypothenuse will be 6, or more than the sum of the other sides, which proves that a straight line is not always the shortest distance between two points.—W. L. S., of N. Y.

CONSTRUCTION OF BELLOWS.—In the issue of September 9th, T. E. L. gives directions how to equalize the flow of air from a pump or bellows, by boring an inch hole in a keg, and fastening it to the bottom of a tub two thirds full of water. If there were any great flow of air, surely this would not equalize the pressure, as the friction of water in such a small hole would prevent any tendency in that direction. Moreover, if there were no friction, the pressure of the water outside would vary inversely as the quantity of air in the keg. A common pair of blacksmith's bellows, with a weight on the top, would regulate the flow much better. By turning a tub upside down, and letting it float in water after the manner of a gasometer, a tolerably even pressure may be secured.—W. L. S., of N. Y.

FLOW OF WATER THROUGH PIPE.—In answer to J. R. B. (query 17, Sep. 16) I would say that we have found the same trouble with a lead pipe that he has with an iron one. The pipe is laid in uneven ground, and from one point there is descent both ways. Our theory is that the air which is always held in suspension in spring water, collects at this point, and can only be driven out by a rapid flow of water. If a torrent of water could be forced through the pipe, no doubt the air would be forced out at once, but with only a moderate increase of speed, it is natural to expect that the pipe should take some time to clear itself.—W. L. S., of N. Y.

HEATING SURFACE OF BOILER.—I will reply to A. H. G. (Sep 16, 1871), in regard to heating surface of boilers, by referring him to the "Practical Examiner on Steam and the Steam Engine," page 24, where it says: "The extent of heating surface ought not to be less than nine square feet, and one square foot of furnace bars, to each nominal horse power." The rule is a very good one.—J. K. W., of Mich.

TWIN BOILERS.—S. T. P., of Ind.—Will the objections urged against tubular boilers when the water supply is connected, as, for instance, the forcing he water from one to the other, on account of hotter fire under either, be applicable to two portable engines and boilers, each engine supplying its own boiler, and having a steam connection only from the dome of each, above the water? Answer: We think not.

COLORING GOLD.—Let R. L. K. take one ounce nitrate of soda, and one half ounce of chloride of sodium, and dissolve in a slight excess of warm water, afterwards adding to the solution about five drams hydrochloric acid. The solution should be kept boiling while the work is in it.—R. S., of Mass.

STEPS FOR WATER WHEELS.—If querist (No. 3, Sep. 16th) will use locust—the end turned spherical—and keep it under water while running, it will last for years; it is better than lignum vitæ.—M. W., of N. J.

HEATING FURNACE.—If N. S. H. (query 12, Sep. 16th) will take an iron pot or box, fill it with lead, and heat it to redness, he can heat his springs without danger of overheating; this is the way files are heated for hardening.—M. W., of N. J.

H. G. F., of Nevada.—You can have your ores analyzed which will determine the percentage of precious metal. Send your specimens to John C. Draper, Professor of Chemistry, in the University Medical College. His terms are reasonable, and you can rely upon his analyses being correct. His address is 429 Lexington Avenue, New York.

Asthma.—"Whitcomb's Remedy very soon relieved me."—*Rev. A. L. Barber, Wallingford, Conn.*

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.]

1.—CHEWING GUM.—What are the ingredients and the quantity of each used in making rubber chewing gum; and what is the process of manufacture? Can any scientific reader tell me if the saliva, produced by chewing this gum, has any injurious effect on the system? Is it as injurious as tobacco? What effect has gum made from white resin, on the system?—C. B. S.

2.—MELTING RUBBER.—At what degree of heat will rubber soften, and how long will a piece of rubber, one inch square, stand pounding before wearing out? (I allude to such rubber as is used for wagon springs.) Can rubber be melted and poured, in a liquid form, into a mold? What is the process of preparing it for this purpose?—C. B. S.

3.—WIRE FOR ELECTROMAGNET.—Will some of your correspondents answer the following question: Is brass wire as effectual for winding electromagnets as copper?—C. E. S.

4.—RHUMKORFF COIL.—Can any of your correspondents tell me where I can obtain a Rhumkorff coil, and what will it cost?—C. E. S.

5.—HORSESHOE MAGNET.—If a horseshoe magnet is suspended so as to revolve freely, will its motion be retarded if the armature be brought near its poles?—C. E. S.

6.—ELECTROMAGNET.—How large an electromagnet is required to produce a spark?—C. E. S.

7.—SLAG FROM FURNACES.—I see by some remarks in the issue of September 2d that the slag from blast furnaces can be used for making blocks. Please inform me the process necessary for their manufacture.—E. H. J.

8.—ANNEALING CAST IRON.—Will some of your readers give me the process for annealing cast iron?—E. B. J.

9.—COAL BUCKET.—I handle 20,000 tuns of coal yearly by steam power. Is there any known substitute for the bucket, and is there any self dumping bucket now in use?—B. W. O.

10.—CHEAP LIGHT.—I work my vessels at night to save demurrage. What is the cheapest mode of obtaining a powerful light, and what does the calcium light cost per hour?—B. W. O.

11.—DOUBLE ACTING RAM.—In your paper of September 16th, page 186, under head of "Fountain," C. H., of N. H., speaks of a double acting ram. Will he be so kind as to say how it is constructed, or where the information can be got?—J. M.

12.—TEMPER OF STEEL TOOLS.—I notice in your columns dedicated to "Queries" and "Answers to Correspondents" that the general belief of experts is that the temper of tools cannot be drawn by immersion in hot water, or by a degree of heat less than the heat required for tempering. Will some of these persons explain why it is that the temper in steel knitting needles is lost after long usage, the said needles being exposed to no greater heat than may be induced by the friction of the needles while in use?—J. H. N.

13.—BUG DESTROYER.—I want to know what will destroy red spiders and green bugs or lice on plants.—G. W. B.

14.—COMBUSTION IN BOILER FURNACE.—Will G. A. T. in answer to A. H. G., on combustion in boiler furnace, be more explicit? Does he put the three eighth inch pipe around near the walls of the ash pit, and how far below the grate bars, and will it answer equally well for burning sawdust.—L. P. O.

15.—PARAFFIN CANDLES.—In making candles from refined paraffin, how can I keep the candles from becoming mottled or speckled?—J. K. S.

16.—GAS FOR TOY BALLOONS.—What gas is used for toy balloons, and how is it prepared? What amount of material would be required for inflating 100 of such balloons?—C. B. S.

17.—WELL.—I have a thirty foot well in a sandstone ledge in which the water a portion of the year gets very low. By digging deeper I think a better spring might be reached. But I wish to save the expense and trouble of taking down the walls and excavating deeper. Is it feasible to drive a tube twenty feet, commencing at bottom of present well? Will some one having had experience in drive wells answer through "Correspondence" column?—De S.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

BOILER EXPLOSIONS.—D. H. J.
CARPET PROBLEM.—A. D. B.
EXPLOSIVE WATER.—T. W. B.
FRICTION.—C. M.
LUSUS NATURÆ.—J. S. D.
PORTABLE BOAT.—O.
SEASONING LUMBER BY DRY STEAM.—R. G. B.
WATCH OPENER.—F. G. W.
ANSWERS TO CORRESPONDENTS.—F. H. O., JR.—H. B.

Recent American and Foreign Patents.

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

BOXES FOR SHOE BLACKING, POMADE, ETC.—This invention consists in so forming boxes of plate metal by striking up, that they shall not possess seams or angles for the adherence of the contained material, and have no sharp edge at the mouth to cut the brush; it provides a foot on which the box may not only be conveniently poised, but which may be used as a handle to the box. It is the invention of Gelfert H. Wetjen, of New York city.

BENDING MACHINE FOR CLIPS, SCABBARD JOINTS, RAILWAY CHAIRS, ETC.—A very powerful machine has been invented for the above named purpose, by Mr. John Forbes, of Halifax, Canada, which evidently is capable of doing a large amount of excellent work. The nature of the invention forbids anything like detailed description in such a notice as the present. The scope of the machine extends to many kinds of work other than those enumerated, and the invention will repay examination by those interested in machines of this kind.

BED SPRINGS.—Hull Chandler, of Bennington, Vt.—Semi-elliptic springs are placed upon the frame of the bedstead to support the ends of the slats. The lower end of each spring has a hook, bent down into a recess provided for its reception in the supporting plate. To the upper face of the spring is secured a transverse block, of semicircular form. The slat rests on this block, and can freely rock thereon, thereby giving more play and greater flexibility to the bed bottom. From the block projects a pin through a slot of the slat, to guide the same, and prevent it from falling off.

GRAIN DRYER.—Alfred J. Mason, of New Orleans, La.—To effect his object the inventor makes use of a combination of cold air induction and exhaust pipes, with a drying cylinder beater. By this combination the grain may be either heated or cooled, as desired, and, it is claimed, the apparatus is very efficient for drying and cooling grain, for expanding and contracting rice, etc., etc.

GRAIN BINDER.—Mr. Oliver Ross, of Bowens Prairie, Iowa, has invented a grain binding apparatus for attachment to reapers. The operator, in using this device, draws the band across the bundle, and places the end of the band in grab fingers. He then presses a lever which operates the mechanism which completes the binding and cuts the band. The invention possesses features of originality upon which eight claims have been allowed in the patent.

PIPE WRENCH.—Henry Wilson, of Tarr Farm, Pa.—The lower jaw of this pipe wrench is rigidly affixed to a handle. The other handle is pivoted to the handle having the fixed jaw, and forked at its upper end. The movable jaw is pivoted to the upper part of the same handle. A pin projects from the sides of the movable jaw through slots in the forked upper part of the pivoted handle. Whenever the lower end of the other handle is carried toward the handle, its forked upper end will swing the movable jaw with great power toward the fixed jaw for holding a pipe or other thing.

MACHINE FOR SPLITTING WOOD.—David Milliken, of New York city.—This invention consists in a novel arrangement, with a feeding trough, of splitting axes mounted on swinging arms, which are raised by a revolving wheel and accelerated in their fall by springs, in such manner as to be similar in action to the action of an ax wielded by hand. The invention also comprises a novel arrangement of apparatus for actuating a pair of feed rolls by one of the ax carrying arms, in such a manner that the feed rollers will not be actuated if the ax fails of entering the wood far enough to split it.

SOFA BED.—Julius Werner, of New York city.—This invention relates to a new sofa bed of peculiar construction, which, when contracted, will hardly be distinguishable from an ordinary plain sofa or lounge, while, when folded apart, it will form a comfortable and large bed. Double jointed head and foot rests hinged to the ends of the sofa back, and a combination of a pivoted seat with a hinged back, frame, and rests in a peculiar manner, are the features of the invention upon which the claims are based, and for which a patent has been obtained.

CARPENTER'S BENCH.—Friedrich Starke, of Dayton, Ohio.—This invention has for its object so to apply the vise to a carpenter's bench that it can be set against the side or end of the table, as may be found most convenient. Carpenters' benches are at present either provided with a vise at the end or side only, or with two separate vises, the former plan being insufficient for the several kinds of work to be performed, while the latter is too expensive and cumbersome. The present invention consists in swiveling the post in which the nut of the vise is held to a corner of the bench, so that the entire vise can thereon be turned to work against the side or end of the bench, as may be convenient.

RECOIL ORVIATOR FOR ORDNANCE.—Samuel F. Hawley, of Constableville, N. Y.—This invention has for its object to prevent the recoil of cannon and heavy guns; and consists in the application to their muzzles of counter-recoil chambers, which receive the direct concussions of the charges, and thereby counteract the effect of the air rushing into the barrels to fill the vacuum subsequent to explosion. To the muzzle of a cannon is secured an extension which continues the bore of the gun and forms an annular chamber around the bore. This chamber is open at the back, but closed in front, and its inner wall is perforated. The front is claimed to receive the concussion of the charge which escapes from the vent in rear, while the vacuum created by the explosion is supplied, before the effects of the concussion on the front of the chamber is spent, through the same vent, thus counteracting the ordinary effect of, and causing the cannon to remain stationary after, an explosion.

BAG HOLDER.—Oscar Barrett and Azzel D. Brooks, of Dartford, Wis.—This invention relates to a new device for holding bags open to be filled with grain, vegetables, or fruit; and consists in the use of a semicircular hoop, folded under the rim of the bag, and of three or more forked posts for supporting said hoop. The central post is vertical; the others, equidistant from it, are inclined forward. The three posts are slightly forked at their upper ends, so that they can be used to support the semicircular hoop. This hoop is placed against the mouth of the bag, and the latter then placed over it, so that when the hoop is placed into the notches or forks of the posts, it will serve to hold the bag in position, as shown. By this device bags can be expeditiously secured in place, and will be properly held open to be filled.

WAGON SEAT.—James B. Foote, of Hamden, N. Y.—This invention consists in suspending a wagon box seat from springs placed at the top of two standards, on which the said seat slides and by which it is guided. The ordinary square box of a road wagon, with strong wood posts rising up from the sides, one from each, and supporting a C spring at the upper ends connected by one of its ends, while the other end overhangs the outside and has a rod of iron, a chain and rod depending from it. These rods, which extend downward about to the top of the box, pass through the seat ends, and hold the seat by nuts, pins, or india rubber springs and nuts. Inside of the holes through the seat ends or arms for the rods, mortises are provided for the post, which pass through them and guide the seat in moving up and down, and prevent it from swinging. According to one plan the rods will have a number of holes to admit of supporting the seat higher or lower; but when the short rods and chains are used, the hight of the seat may be varied by hooking the chain upon the spring, which may have hooks capable of engaging any of the links.

HAY AND STRAW CUTTER.—John A. Cornish, Marshfield, Mo.—This invention relates to a hay cutter with which is connected a mechanism for keeping the hay always in contact with the feed roller, whether there be more or less in the box, and in which the feed roller is spirally fluted, and turned always at the right moment, by means of a bar rotating in a plane parallel with the axis of the roller and striking the sides of the spiral corrugations one after another.

AUTOMATIC GOVERNOR VALVE.—Joseph B. Potter, Conneautville, Pa.—This invention has for its object, first, to automatically regulate the flow of steam from a boiler to the steam chest of an engine, in such manner as to reduce the volume of the flow directly as the pressure in the steam chest; and, second, to equilibrate the pressure upon the governor valve from the steam chest by means of a counter spring, which yields when the flow of steam from the steam chest is momentarily checked by the arrival of the slide valve at the center of its throw, and the consequent closing of both ports and returns when the slide valve passes to either end of its throw, so as to open one of the ports, and by this alternate yielding and returning, maintains a continual oscillation of the governor valve, thus preserving the constancy of the pressure in the steam chest.

CAR COUPLING.—Henry R. Robbins, Baltimore, Md.—This invention relates to a car coupling in which a tongue, pivoted in and projecting from one drawhead in order to connect two cars, enters a box placed within another drawhead, passes under and raises a pin that extends across said box, and passes through slots in the sides of the latter, said tongue being caught and held in the box by the falling of the aforesaid pin into a groove in the upper side of the tongue, the uncoupling being effected by raising said pin, through the instrumentality of a yoke connected with its ends, until it is clear of the groove in said tongue, when the latter may be withdrawn from the box.

FEED WATER HEATER FOR STEAM BOILERS.—John F. Taylor, Charleston, S. C.—This invention consists of a hollow chamber, called a "heater," provided with a number of tubes running transversely of it, and fitted crosswise of the interior of the smoke box, in front of and at a short distance from the tube sheet of the boiler, so as to be in the path of the unconsumed products of combustion in passing from the boiler to the smoke stack, whereby the heat thereof is utilized in heating feed water, the chamber receiving water from a feed pump at its bottom and discharging it at its top with the boiler.

MOLE TRAP.—G. W. Hardwick, Wyandotte, Ind.—This invention consists in a spring fork set over the tunnel in which a mole travels, and provided with a trigger against which the mole is compelled to press as he passes along.

DOOR FASTENER.—Warren A. Howard, of Dugway, N. Y.—This invention relates to portable door fasteners, which may be carried in the pocket and applied on the inside of a chamber. It consists in a bar with a claw, having a hole between the prongs thereof, combined with a shoulder, perforated in line therewith, and also perforated at right angles to the bar to hold the bolt of a portable door fastening.

SOFA BED.—Abraham Morris, of New York city.—This is a sofa bed which may be easily folded together to form a sofa, the invention consisting principally in pivoting the sofa seat and connecting it by rods to the extension bed frame, so that when the seat is turned outward it will at the same time extend the frame to support the outer half of the bed.

PICKET POINTER.—John W. Minor, of Middleborough, Mass.—The picket to be pointed is placed edgewise upon a beam with its end against a head block. A pivoted lever, carrying a cutter, is then made to face this cutter through the wood, the cutting being an arc of a circle. The pivot is adjustable, so as to give blunt or sharp points, and to accord with the width of the picket.

SAFETY ATTACHMENT FOR WATCH CHAIN OR GUARD.—Charles W. Mehrer, of New York city.—This is a device for attachment to a watch, to be carried in the pocket with it for preventing it, by means of hooks, from being picked out, said hooks being concealed in a case, and being thrust out into the clothing if the chain or guard which is attached to the protector be suddenly jerked.

TREADLE MOTION.—George K. Proctor, of Salem, Mass.—A double crank, the wrists of which are placed at right angles, is attached to the fly wheel of a sewing machine or other machine to be driven by the feet. The mode of attachment by means of a recrossed crank, screw threaded hole, and a plate, by which the improvement may be readily attached to the fly wheel of different sizes and forms of machines, constitutes the features of the invention.

BEE HIVE.—This hive is the invention of Edward D. Pugh, of Fort Plain, Iowa. It provides for frequent and convenient opening and closing to clean it of moth eggs and insects, without disturbing the bees; also for improved ventilation, for the better support of the combs, for the accomodation of young broods, and other essentials of a first class hive, the whole evidently being the design of a man thoroughly conversant with the habits of bees and the requirements of bee keepers.

WALL PAPER TRIMMING MACHINE.—Mr. Hubert L. Todd, of Corning, N. Y., has invented a machine for trimming wall paper, the use of which will obviate the tedious process of shearing off the blank edges by hand as heretofore done. The cutting is done by circular knives attached to rollers, between which the paper is caused to pass by winding it from one roller to another, the power being supplied through the medium of a crank attached to the journal of one of the knife bearing rollers.

POT COVER.—William Henry Barker, of Windsor, Can.—A stamped sheet metal pot cover of the ordinary kind, has a number of small holes made through it in one part near the edge, to admit of pouring off the contents of the pot without lifting the cover. A small lid is hinged to the upper side of the pot cover, to fall down over the holes and close them, so as not to allow the steam to escape while it is required that the pot be covered. Projections enter the pot to hold the cover from falling off when the pot is tilted to pour off the liquid contents.

WINDOW SCREEN.—Oscar F. Frost, of Monmouth, Me.—This is an improved construction of window screens, to facilitate their insertion in and removal from the window. It consists in attaching the mosquito bar to the frame or sides by a groove and tongue, and in attaching the frame to the window casing by means of key hole slots and screws. The advantages are, that this screen is readily adjusted to the window and removed therefrom, and, when not in use, may be rolled up and laid away, taking up but little space and not liable to be damaged like the common screen.

BURGLAR ALARM.—Mary A. Holland, of Passaic, N. J.—This invention relates to improvements in the bell sounding and signaling apparatus employed with apparatus to be set in motion by the opening of windows or doors to sound an alarm, or with the bell pulls of hotels for signaling from the different rooms. It consists in an arrangement of apparatus whereby the bell may be sounded from any window without affecting the apparatus connected with the other windows or doors, or interfering with the efficient operation thereof.

CORN HARVESTER.—This machine, by a variety of ingenious devices, pulls the ears from the standing stalks, husks them and deposits them in a suitable receptacle attached to the machine, which is drawn by horses. The ears are pulled from the stalks by fingers placed at such a distance from each other that the stalks will pass between them, but the ears cannot. Should any of the stalks be drawn from the ground, they are seized by conical rollers, and pulled down through the fingers to tear off the ears, the latter being husked by passing between endless belts, carrying a system of claws or teeth, which strip off the husks. The machine is the invention of Madison Thorp, of Waterloo, Iowa.

SEWING MACHINE.—Frederick E. Decker, of Newark, N. J., assignor to Edward Simon & Brothers, of New York city.—This invention is a new and improved attachment to a sewing machine for turning the rough edges from the leather covering of round or oval satchel handle stock, at the same time they are stitched on by the machine, or as they pass from the needle when being sewed. It consists in a pair of grooved guiding wheels and a pair of rotary cutters, having operating gear arranged to be actuated by a pawl lever connected with the feed bar, to be moved by it for feeding the handle along at the same time that the feed plate of the machine is worked. Such adaptations of the rollers are made as may be requisite for trimming the rough edges from any work done on a sewing machine.

COTTON CHOPPER, SCRAPER, AND CULTIVATOR.—Frank A. Leonhard, of Columbia, Tenn.—This invention has for its object to furnish a simple, convenient, and effective machine for chopping, scraping, and cultivating cotton, so constructed that the supporting and cultivating rollers, while supporting the chopper at the proper elevation, shall be capable of adjusting themselves to any unevenness of the ground laterally. The claims cover an arrangement of rollers and scraper in connection with arms, whereby they are adapted to oscillate, as shown and described; also an arrangement of two sets of rollers and scrapers, and a vibrating chopper, in connection with a pivoted frame.

GRATE BAR.—Joseph A. Miller, of Providence, R. I.—The object of this invention is to so construct grate bars as to combine strength with lightness of metal, and large area of air space with narrow openings, and allow freedom to expand and contract with varying temperatures. A broad central bearing bar is connected with end pieces, to the sides of which are attached one or more sections, consisting of three (more or less) independent brackets, which brackets increase in size and width from the inner to the outer one. The top portion of each bracket is round, with a rib extending down, and diminishing in thickness, so that a great area of air space is allowed beneath the fuel, while the ashes and incombustible matter mingled with the fuel freely escape to the ashpit. Instead of casting the sections to the central bar, the sections or the brackets may be cast separately and hooked or attached in any manner to the central bar.

RAILWAY CAR TRUCK.—John R. Mestler, of Galveston, Texas.—The car axle carries the wheels in the ordinary manner. The journal box is made of halves, of which each contains a semi-cylindrical cavity for holding the end of the axle. Bolts serve to lock the halves of the box together. Within the halves of the box are placed, in suitable grooves provided for their reception, two semi-annular plates made of case hardened steel. They embrace a collar, which is placed upon and securely fastened to the axle, and also made of case hardened steel. The plates constitute a swimming journal for the axle, which, by its collar, has its entire bearing thereon. The collar has flanges at the ends to embrace the journal for the purpose of preventing longitudinal displacement. Each plate is held in place by a screw. The upper screw fitted through the upper half of the box, is tubular, and carries an oil reservoir at the upper end for lubricating purposes. The lower screw is fitted through the lower half of the box. A rubber washer is placed upon the axle and crowded, by a spiral spring, against the back of the journal box to entirely close the aperture in the same. The rubber prevents dust and impurities from entering the box, and does away with the packing heretofore used, and also with the expensive brass disks.

BURGLAR ALARM FOR WINDOW.—Mary A Holland, of Passaic, N. J.—This s an improvement in alarm attachments to windows for ringing bells when hey are raised; and it consists in an arrangement of apparatus for imparting a vibrating movement to a vertical bell supporting rack or frame, by means of a cam or notched plate on the window sash and a spring. Both the upper and lower sashes are to be caused to sound the alarm, and they are both provided with a set of apparatus for working it, and both sets of apparatus are connected to a bell crank at the top of the window frame. The cranks of the two sashes are so arranged that the cords or wires connecting them with the bell crank extend along the bottom of a groove formed in the window frame between the sash, so that no labor is needed to provide space for them, or at least not more than for slightly deepening the groove. This admits of readily applying the apparatus to windows already built.

LATHE FOR TURNING IRREGULAR FORMS.—Henry R. Hill, Nelson W. Twiss, of New Haven, Conn.—This invention relates to mechanism arranged, in combination with a slide lathe, for cutting or turning prismatic and other forms, intended more especially for turning or cutting stone columns, stone fence posts, balusters, etc., but applicable to wood, metal, and other material; and consists in the construction and arrangement of certain parts, consisting mainly, of a lathe carriage, cutter, cutter slide, spring, eccentric, and feathered shaft, whereby, by a change in the form of the cam, a variety of irregular forms are produced. The article to be turned constantly revolves with an uniform motion, and the position of the cutter, at every moment of time, is governed by the cam. At first sight it appears difficult to cut a perfectly flat surface on a revolving body, as a prism or a polygon, or to flute a column or other article; but as the revolving cam, which governs the cutter, may be of any form, the operation is made quite easy. For turning a taper, the tail center is moved laterally, as in ordinary lathes.

BRIDLE BIT.—Smith C. Boughton, of Waterford, N. Y.—This invention has for its object to furnish an improved driving bit, which shall be so constructed that it may be differently adjusted to meet the different faults of the animals to be driven, bringing the animal in every case completely under the control of the driver. By pulling upon the driving reins, the cheek pieces are forced against the horses' mouths, and the nose band acting as a fulcrum, the bits are thrown to the roof of the animal's mouth with great force, which, together with the side pressure of the cheek pieces, causes him to yield at once. When the nose strap is not used, the bits press upon the animal's lower lips, which, with the side pressure of the cheek pieces, forces the animal's mouth open, loosening his hold upon the bits. In another arrangement, pulling upon the driving reins forces the cheek pieces against the sides of the animal's mouth, and the bits against the roof of his mouth, but not with the same force as when the first arrangement is used. Still another will not compress the sides of the mouth, and may be used for ordinary driving. For a tender mouthed animal, the arrangement may be so adjusted as not to allow the bits to press with much force against the animal's lower lip when the reins are pulled upon, thus applying the pressure to the nose and relieving the tender mouth. Various other arrangements of the bits may be made, to meet special faults of the animal to be driven.

Inventions Patented in England by Americans.

September 5 to September 11, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.

CHILLED ROLLS.—G. G. Lobdell, Wilmington, Del.
FURNACE.—C. F. Pike, Providence, R. I.
FURNACE.—P. W. Mackenzie, Blauveltville, N. Y.
NAVIGABLE VESSEL.—B. T. Babbitt, New York city.
ORDNANCE.—H. Arden, Brooklyn, N. Y.
PICKLE FORK.—H. Laurence, New Orleans, La.
PREVENTING OXIDATION.—C. Godfrey, Dix Hills, N. Y.
PRINTING MACHINERY.—G. P. Gordon, Rahway, N. J.
PRINTING PRESS.—V. E. Mauger, New York city.
PRINTING PRESS.—V. E. Mauger, New York city.
STOPPER.—W. C. Street, New York city.

Official List of Patents.

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119,215.—ROCK DRILL.—C. Bernard, Florida, Mass.
119,216.—STEAM WAGON, ETC.—W. C. Bibb, Madison, Ga.
119,217.—SEWING MACHINE.—J. L. Borsch, Philadelphia, Pa.
119,218.—FIRE ARM.—A. Burgess, New York city.
119,219.—LOCOMOTIVE ENGINE.—W. A. Carns, Malden, Mass.
119,220.—WATER WHEEL.—J. T. Case, Bristol, Conn.
119,221.—HORSE POWER.—R. J. Cheney, Petaluma, Cal.
119,222.—LAMP CHIMNEY.—M. H. Collins, Chelsea, Mass.
119,223.—SHAWL STRAP.—G. Crouch, Westport, Conn.
119,224.—PAPER PULP.—A. K. Eaton, Brooklyn, N.Y.
119,225.—GENERATOR.—J. Eberhardt, Conshohocken, Pa.
119,226.—LADDER HOOK.—S. D. Fish, Schuyler Falls, N.Y.
119,227.—GAS.—T. B. Fogart, Brooklyn, N.Y.
119,228.—FEEDING MACHINE.—J. C. Gould, Oxford, N. J.
119,229.—SHEARS.—I. Grass, Sandusky, Ohio.
119,230.—CHAIR, ETC.—M. A. Hayward, Brooklyn, N.Y.
119,231.—BOLT CUTTER.—J. Johnson, Cochransville, Pa.
119,232.—SUCKER ROD.—D. Jones, Boston, Mass.
119,233.—TRUSS.—N. Jones, Syracuse, N.Y.
119,234.—CRIMPER.—M.R. Lemman, W.A.L.Kirk, Hamilton, O.
119,235.—SPINDLE.—T. E. McDonald, Trenton, N. J.
119,236.—FENDER.—W. H. Miller, Philadelphia, Pa.
119,237.—ANIMAL TRAP.—J. H. Mooney, G. A. Lloyd, San Francisco, Cal.
119,238.—TANNING.—W. Morris, Philadelphia, Pa.
119,239.—BLACKING.—J. H. Patterson, Glen's Falls, N.Y.
119,240.—BENDING WOOD.—S. Patterson, Berlin Heights, O.
119,241.—GRAIN BINDER.—A. Philippi, St. Lous, Mo.
119,242.—ACCELERATING GROWTH.—A.I.Pleasonton, Phil., Pa.
119,243.—FAUCET.—O. Salgee, Brooklyn, N.Y.
119,244.—WASHER.—J. H. Schmidt, Stockertown, Pa.
119,245.—DENTAL PLATE.—F. M. Shields, Sacramento, Cal.
119,246.—SEWING MACHINE.—D. M. Smyth, Orange, N. J.
119,247.—PISTON, ETC.—E. Sullivan, Mount Washington, Pa.
119,248.—PACKING.—E. Sullivan, Mount Washington, Pa.
119,249.—CAR HEATER.—B. D. Thompson, New York city.
119,250.—DISINFECTANT.—H. A. Tilden, New Lebanon, N. Y.
119,251.—FISHING ROD.—T. Tout, Cambridge, Mass.
119,252.—SALT.—A. C. Twining, New Haven, Conn.
119,253.—CAR SPRING.—R. Vose, New York city.
119,254.—CAR SPRING.—R. Vose, New York city.
119,255.—PROPELLER.—H. Waterman, Brooklyn, N. Y.
119,256.—RETURN BEND.—S. L. Wiegand, Philadelphia, Pa.
119,257.—GENERATOR.—S. L. Wiegand, Philadelphia, Pa.
119,258.—LOCK SPINDLE.—C. O. Yale, New York city.
119,259.—MOLDING PIPE.—W. D. Alford, Cuyahoga Falls, O.
119,260.—MOTIVE POWER.—J. N. Bethune, Warrenton, Va.
119,261.—CULTIVATOR.—D. Boggs, H. Rohs, Cynthiana, Ky.
119,262.—GAME TABLE.—E. Brunswick, Chicago, Ill.
119,263.—LATCH.—C. B. Clark, Buffalo, N.Y.
119,264.—AMALGAMATION.—A. B. Crosby, Greene, Me.
119,265.—WRENCH.—A. Cumberworth, Toronto, Canada.
119,266.—BLIND FASTENER.—G. K. Dearborn, Smithfield, R.I.
119,268.—WARDROBE, ETC.—O. L. and W. Gardner, Glen Gardner, N. J.
119,269.—LUBRICATOR.—J. Harper, New Haven, Conn.
119,270.—DAMPER.—W. B. Hayden, Columbus, Ohio.
119,271.—FASTENER.—A. Haye, Morrisania, N.Y.
119,272.—FLOWER POT.—A. D. Judd, New Haven, Conn.
119,273.—PICTURE NAIL.—H. L. Judd, Brooklyn, N. Y.
119,274.—WATER WHEEL.—J. C. Kelly, Groveland, N.Y.
119,275.—ADJUSTER.—L. B. Lathrop, San José, Cal.
119,276.—LOOM.—I. Lindsley, Pawtucket, R. I.
119,277.—LOOM.—I. Lindsley, Pawtucket, R. I.
119,278.—LOOM.—I. Lindsley, Pawtucket, R. I.
119,279.—HORSE POWER.—J. Marshall, New Orleans, La.
119,280.—VISE.—R. Phillips, Boston, Mass.
119,281.—AXLE SHIELD.—B. F. Robbins, Harwich, Mass.
119,282.—POLISHING.—A. Saffer, New York city.
119,283.—SPINDLE BEARING.—J. H. Sawyer, Lowell, Mass.
119,284.—SEWING MACHINE.—A. Shattuck, Buffalo, N. Y.
119,285.—SEEDER, ETC.—W. D. Stroud, Oshkosh, Wis.
119,286.—DIE.—W. Terrell, Ansonia, Conn.
119,287.—LUBRICATOR.—S. Ustick, Philadelphia, Pa.
119,288.—LUBRICATOR.—S. Ustick, Philadelphia, Pa.
119,289.—WARDROBE.—H. Whittemore, Orangetown, N. Y.
119,290.—WASHSTAND, ETC. H. Whittemore, Orangetown, N.Y.
119,291.—POLISHING LEATHER.—L. Wolfson, Boston, Mass.
119,292.—FLAG HALYARD.—W. Albert, Brooklyn, N. Y.
119,293.—HANDLE STRAP.—A. Alexandre, New York city.
119,294.—LAND ROLLER.—W. W. Andrew, La Porte, Ind.
119,295.—HUB.—S. Atha, West Liberty, Ohio.
119,296.—WHIP STOCK.—H. W. Avery, Westfield, Mass.
119,297.—WAGON TONGUE.—C. J. Babcock, Rives, Mich.
119,298.—BATTERY.—L. Bastet, Tarrytown, N. Y.
119,299.—FIXTURE.—J. E. Baum, Philadelphia, Pa.
119,300.—WASH BOILER.—S. Bennett, Newcastle, Pa.
119,301.—MEDICAL COMPOUND. T. W. Bethel, Brooklyn, N.Y.
119,302.—COUPLING.—C. Bridgman, St. Cloud, Minn.
119,303.—CLOTH MEASURER.—T. M. Brintnall, Medina, Ohio.
119,304.—SHUTTER WORKER.—A. Brown, Boston, Mass.
119,305.—ELEVATOR.—G. W. Brown, New York city.
119,306.—WEDGE.—T. B. Brown, J. N. Dinsmore, Kendall's Mills, Me.
119,307.—BAG.—J.M., J. P., S. H. Bryant, Temperanceville, Pa.
119,308.—STEAM WAGON.—O. H. Burdett, New Athens, Ohio.
119,309.—CARRIAGE BOLT.—O. C. Burdict, New Haven, Conn.
119,310.—GENERATOR.—G. F. Burkhardt, Boston, Mass.
119,311.—CLOTHES PIN.—B. Burling, Whitehall, N. Y.
119,312.—BEDSTEAD.—S. S. Burr, Boston, Mass.
119,313.—PROJECTILE.—J. G. Butler, Fortress Monroe, Va.
119,314.—STEAM PUMP.—L. and T. E. Button, Waterford, N.Y.
119,315.—GOVERNOR. H. Camp, G. W. McIntosh, Rouseville, Pa.
119,316.—DESK.—W. C. Carter, J. P. Emery, Galva, Ill.
119,317.—DRILL, ETC.—T. A. Chandler, Rockford, Ill.
119,318.—FRAME.—H. Chatain, Washington, D. C.
119,319.—HINGE.—P. P. Child, St. Louis, Mo.
119,320.—HAY RAKE.—A. L. Chubb, Grand Rapids, Mich.
119,321.—FIXTURE.—H. Clayton, Lexington, Ky.
119,323.—LIGHTNING ROD.—A. Codington, Bound Brook, N.J.
119,324.—ICE SHAVER.—W. H. Collins, Boston, Mass.
119,325.—SEED DROPPER.—L. H. Converse, J. K. Welter, Springfield, Ill.
119,326.—STRAW CUTTER.—J. A. Cornish, Marshfield, Mo.
119,327.—VISE.—J. W. Coyne, Madrid, N. Y.
119,328.—WATER WHEEL. J.M., W.L. Cress, Taylorsville, Tenn.
119,329.—GAS.—D. Davison, New York city.
119,330.—TORPEDO.—J. C. Dickey, Titusville, Pa.
119,331.—CAR SEAT.—A. B. Dinsmore, Springfield, Mass.
119,332.—SLATE.—F. D'Ossone, Philadelphia, Pa.
119,333.—BOLT.—G. R. Dunn, Newark, N. J.
119,334.—EXCAVATOR.—J. M. Dunn, Erin, Miss.
119,335.—KEY BOARD.—W. D. Edgar, Ottawa, Kan.
119,336.—BEE HIVE.—J. C. Edwards, Cattleville, Mo.
119,337.—INSECT TRAP.—S. Endslow, Blain, Pa.
119,338.—WASHING MACHINE. J. P. Eshleman, West Salem, O.
119,339.—WHEELBARROW, ETC. H. J. Evans, Christieville, Can.
119,340.—FANNING MILL.—F. Eves, Fountain City, Wis.
119,341.—TRUNK.—H. S. Farley, Sing Sing, N. Y.
119,342.—WATER CLOSET.—B. G. Fitzhugh, Frederick, Md.
119,343.—STOVE GRATE.—C. O. Foley, Troy, N. Y.
119,344.—SEAT.—M. T. Glynn, J. L. Goodman, Boston, Mass.
119,345.—MARINE RAILWAY.—J. H. Gosline, Hampton, Va.
119,346.—COTTON PRESS.—G. W. Grader, Memphis, Tenn.
119,347.—LAMP POST.—J. W. Graham, Chillicothe, Ohio.
119,348.—TRUNK.—N. Groel, Newark, N. J.
119,349.—VENTILATOR.—G.B. Hall, J. Shaffer, Kansas City, Mo.
119,350.—SEWING MACHINE.—H. M. Hall, New York city.
119,351.—FAN.—W. DeLancey Hall, Memphis, Tenn.
119,352.—TEAPOT, ETC.—H. J. Hammond, Newburgh, Ohio.
119,353.—GRADING MACHINE.—J. F. Hanna, Momence, Ill.
119,354.—MOLE TRAP.—G. W. Hardwick, Wyandotte, Ind.
119,355.—LANTERN.—J. F. Harly, Kipton, Ohio.
119,356.—HARVESTER.—G. W. Harrison, Lansing, Mich.
119,357.—CARTRIDGE SHELL.—A. C. Hobbs, Bridgeport, Conn.
119,358.—TOY.—E. V. B. Hoes, Green Bay, Wis.
119,359.—COUPLING.—C. L. Horack, Hastings, Minn.
119,360.—LOCKING NUT.—J. M. Horton, Milwaukee, Wis.
119,361.—CLOD BREAKER, ETC.—H. H. Hull, Bergen, N. Y.
119,362.—MOTIVE POWER.—J. B. Hunter, Ashley, Ill.
119,363.—PROPELLER.—H. Jackson, Brooklyn, N. Y.
119,364.—VALVE.—J. Jonson, New York city.
119,365.—MELTING COPPER.—J. Kintz, West Meriden, Conn.
119,366.—BEE HIVE.—A. H. Klepper, Muscatine, Iowa.
119,367.—COTTON PRESS.—J. B. Knight, New Orleans, La.
119,368.—SLATE FRAME.—W. Knight, Covington, Ky.
119,369.—HARVESTER.—J. Lamburn, Boundary, Ind.
119,370.—HOLD BACK.—J. A. Lannert, Cleveland, Ohio.
119,371.—WHIFFLETREE.—J. A. Lannert, Cleveland, Ohio.
119,372.—FENCE.—H. Latshaw, McKnightstown, Pa.
119,373.—WASH BOILER.—G. J. Leach, Rome, N. Y.
119,374.—LATCH.—J. H. Lee, Marshall, Texas.
119,375.—FILTER.—R. M. Linn, Lookout Mountain, Tenn.
119,376.—EARTH CLOSET.—J. M. Loewenstein, N. Orleans, La.
119,378.—STOP VALVE.—H. G. Ludlow, Troy, N. Y.
119,379.—TRUSS PAD.—J. B. Marsh, Brooklyn, N. Y.
119,380.—ELEVATOR.—I. Mayfield, Mayfield, Ky.
119,381.—CALENDER.—W. McAdams, Newton, Mass.
119,382.—SADDLE.—W. B. McClure, Alexandria, Va.
119,383.—THREAD CUTTER.—J.J.McLoughlin, Nashville, Tenn.
119,384.—WRINGER.—C. V. Mead, Trenton, N. J.
119,385.—BUTTER WORKER.—P.P.Meredith, Stevensville, Mon.
119,386.—GUN LOCK.—A. Miller, Daleville, Ala.
119,387.—CHURN.—H. H. Montgomery, Greensburg, Ind.
119,388.—DROP PIPE.—G. C. Morgan, Chicago, Ill.
119,389.—INSECT DESTROYER.—D.G.Mosher, Mosherville, Mich.
119,390.—DESK.—H. Mott, Troy, N. Y.
119,391.—BILLIARD CUSHION.—J. Murphy, New York city.
119,392.—WHISTLE.—A. Neuhausen, Wheeling, W. Va.
119,393.—BENDING WOOD.—H. Ocorr, Sheboygan, Wis.
119,394.—ARTIFICIAL STONE.—J. O'Friel, Brooklyn, N. Y.
119,395.—TOOL HEAD.—S. W. Paine, Williamsport, Pa.
119,396.—WASHING MACHINE.—J. H. Palmer, Yonkers, N.Y
119,397.—HARROW.—D. A. Parkman, Union City, Tenn.
119,398.—HARROW.—J. M. Payne, Benton, Ill.
119,399.—WASHER.—H. W. Pell, Rome, N. Y.
119,400.—EQUIPMENTS.—W. H. Penrose, Fort Lyon, Col.
119,401.—ELEVATOR.—F. B. Perkins, Boston, Mass.
119,402.—NAIL.—C. H. Perkins, Providence, R. I.
119,403.—ALARM LOCK.—C. E. Pierce, New York city.
119,404.—CULTIVATOR.—W. M. Pitts, Holden, Mo.
119,405.—GOVERNOR.—J. B. Potter, Conneautville, Pa.
119,406.—TEMPERING.—H. H. Ray, Arena, Wis.
119,407.—HEEL.—C. A. Read, Bridgeport, Conn.
119,408.—WAGON SEAT.—J. L. Reed, Hastings, Mich.
119,409.—COUPLING.—H. R. Robbins, Baltimore, Md.
119,411.—SEED PLANTER, ETC.—J. Sample, Franklin Co., Miss.
119,412.—JOURNAL.—J. Sault, South Manchester, Conn.
119,413.—CEMENT.—D. O. Saylor, Allentown, Pa.
119,414.—CLAMP.—A. Schmackers, Cincinnati, Ohio.
119,415.—HORSESHOE.—R. Seiffert, Chicago, Ill.
119,416.—COUPLING.—G. C. Sherman, Chicago, Ill.
119,417.—FIFTH WHEEL, ETC.—E. W. Silsby, Ottumwa, Iowa
119,418.—HOE.—Z. B. Sims, Bonham, Tex.
119,419.—STEEL PLATE.—W.W., D.D. Skinner, Des Moines, Iowa.
119,420.—WAGON HOUND.—F. Smith, Tiffin, Ohio.
119,421.—GATE.—B. Snyder, Clinton, Wis.
119,422.—BURNISHER.—V. K. Spear, Lynn, Mass.
119,423.—PLOW, ETC.—W. W. Spear, Allegheny city, Pa.
119,424.—WATER WHEEL.—B. Stetson, Uxbridge, Mass.
119,425.—TILLER, ETC.—J. W. Strange, Bangor, Me.
119,426.—BOILER COMPOSITION.—C. A. Sweet, Ripon, Wis.
119,427.—VALVE.—J. F. Sweet, Cedar Rapids, Iowa.
119,428.—HEATER.—J. F. Taylor, Charleston, S. C.
119,429.—KNOB.—N. Thompson, Brooklyn, N. Y.
119,430.—PULLEY, ETC.—N. Thompson, Brooklyn, N. Y.
119,431.—COUPLING.—E. M. Van Hoesen, N. H. Brown, Syracuse, N. Y.
119,432.—WASHING MACHINE.—J. Varney, Batavia, Ill.
119,433.—PLOW.—J. C. Vertrees, Gallatin, Tenn.
119,434.—STOVE COVER.—J. V. Vrooman, Schenectady, N. Y
119,435.—TRAP.—W. I. Webb, Phila., Pa.
119,436.—STILL.—E. Werner, Canton, Ill.
119,437.—MOTION.—H. F. Wheeler, Boston, Mass.
119,438.—GATE.—F. Whitaker, Bel Air, Md.
119,439.—BRUSH.—G. Willett, St. Albans, Vt.
119,440.—BRUSH.—G. Willett, St. Albans, Vt.
119,441.—OIL CAN.—G. D. Winchell, Cincinnati, Ohio.

REISSUES.

4,567.—WHEEL.—J. R. Baird, Vincennes, Ind.—Patent No 117,142, dated July 18, 1871.
4,568.—STOVE.—M. A. Boughton, Norwalk, Conn.—Patent No. 113,842, dated April 18, 1871.
4,569.—AUGER.—J. Swan, Seymour, Conn.—Patent No. 116,509, dated June 27, 1871.
4,570.—WRINGER.—W. Whitney, Winchendon, Mass.—Patent No. 33,861, dated December 3, 1861.
4,571.—GLASS MOLD.—W. C. King, Pittsburgh, Pa.—Patent No. 114,569, dated May 9, 1871.
4,572.—LAMP.—C. B. and S. Mann, Baltimore, Md.—Patent No. 114,964, dated May 16, 1871.

DESIGNS.

5,276.—CAN.—J. J. Bockee, Jr., New York city.
5,277.—CIGAR BOX.—A. Lis, Covington, Ky.
5,278 & 5,279.—CARPET PATTERN.—W.McCallum, Halifax, Eng.
5,280 & 5,281.—CARPET PATTERN.—D. Paton, New York city
5,282.—FRAME FOR SEAT.—H. M. Sherwood, Chicago, Ill.
5,283.—KNITTED FABRIC.—J. Taylor, Phila., Pa.
5,284.—ICE PITCHER.—G. Wilkinson, Providence, R. I.
5,285 & 5,286.—STAND.—A. Wunder, New Haven, Conn.
5,287.—BRACKET.—A. Wunder, New Haven, Conn.
5,288.—FASTENER.—P. Bradford, New Haven, Conn.
5,289 & 5,290.—ORGAN CASE.—L.K.Fuller, Brattleborough, Vt.
5,291.—TROLLING SPOON.—J. H. Mann, Syracuse, N. Y.
5,292.—FRUIT BOX.—J. Sherman, Burlington, N. J.
5,293.—PIANO FRAME.—J. Whitney, Boston, Mass.
5,294.—LIFTER.—E. B. Wilbur, Raynham, Mass.
5,295.—DOOR BOLT.—A. Wunder, New Haven, Conn.

TRADE-MARKS.

446.—LINIMENT.—W. H. Adams, F. A. Young, Bangor, Me.
447.—MEDICINE.—Atchison & Bro., Frankfort, Ind.
448.—MEDICINE.—Dunn & Co., London, England.
449.—LEATHER.—Eagle Works, Chicago, Ill.
450.—PLASTER.—C. W. Massonneau, Red Hook, N. Y.
451.—CORN SALVE.—J. McKee, New Orleans, La.
452.—MEDICINE.—J. Scott, New York city.
453.—MEDICINE.—Thompson, Steele & Price Manufacturing Company, Chicago, Ill.

EXTENSIONS.

ELASTIC GORE CLOTH.—C. Winslow, Lynn, Mass.—Letters Patent No. 17,309, dated August 4, 1857: reissue No. 492, dated September 15, 1857.
CUPOLA AND OTHER FURNACES.—P. W. MacKenzie, Jersey City, N. J.—Letters Patent No. 18,051, dated August 25, 1857; reissue No. 1,403, dated February 10, 1863; reissue No. 1,843, dated December 27, 1864.
APPARATUS FOR SUSPENDING EAVES TROUGH.—J. A. Watrous, Green Spring, Ohio.—Letters Patent No. 18,113, dated September 1, 1857.
MOWING MACHINE.—G. C. Dolph, West Andover, Ohio.—Letters Patent No. 18,141, dated September 8, 1857; reissue No. 904, dated February 21, 1860.
EXTENSION GAS TUBE.—C. Monson, New Haven, Conn.—Letters Patent No. 18,154, dated September 8, 1857.
CULTIVATOR.—C. H. Sayre, Utica, N. Y.—Letters Patent No. 18,073, dated August 25, 1857.
SEPARATING ORE.—T. J. Chubb, New York city.—Letters Patent No. 18,038, dated August 25, 1857.
TYPE SETTING AND DISTRIBUTING MACHINE.—H. W. Alden, New York city.—Letters Patent No. 18,175, dated September 15 1857; reissue No. 3,572, dated July 27, 1869.

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PATENTED IN UNITED STATES, SEPT. 17, 1867. MARCH 17, 1868, AND SEPTEMBER 22, 1868.

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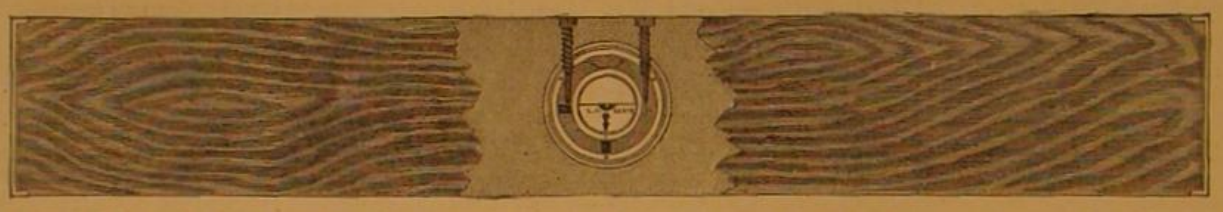
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SECTIONAL ELEVATION OF ADJUSTABLE SPIRIT LEVEL, PLUMB, AND INCLINOMETER.

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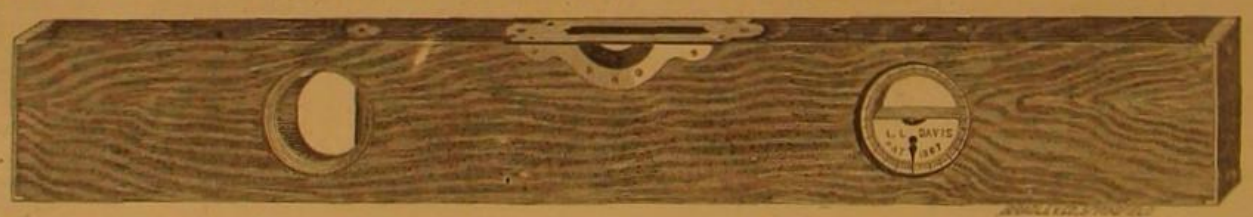


No. 5.

This Level takes the place of the old-fashioned Spirit Level and Plumb, which has been universally used by all classes of mechanics for many years. The advantage of this Level and Plumb over all others is the accuracy and simplicity by which it works; having a graduated scale showing the different angles, being conveniently and neatly arranged for getting elevations of any hight, the graduated scale showing the exact elevation or number of degrees per foot, simply by turning the center or bubble-case with a pointer attached, the bubble-glass being well and substantially protected, not liable to breaking or derangement, as is often the case with other Levels, and in case the bubble-glass should become out of true or out of line with the base of the Level, it can be regularly and accurately adjusted again to its proper place, simply by turning the top screws, which will cause the bubble to move forward or backward at any point desired. These screws in connection with studs, as shown in the above cut, act as stops and adjusting screws; the left hand screw, when facing the pointer, serves for adjusting the Level—the right hand screw, for adjusting the Plumb. These Levels are offered to the trade with the assurance that they are what is claimed, as a desirable instrument and a valuable tool, perfected to meet the wants of all classes of mechanics.

ORDINARY LEVEL PLUMB AND INCLINOMETER COMBINED.

No. 13.



No. 13.

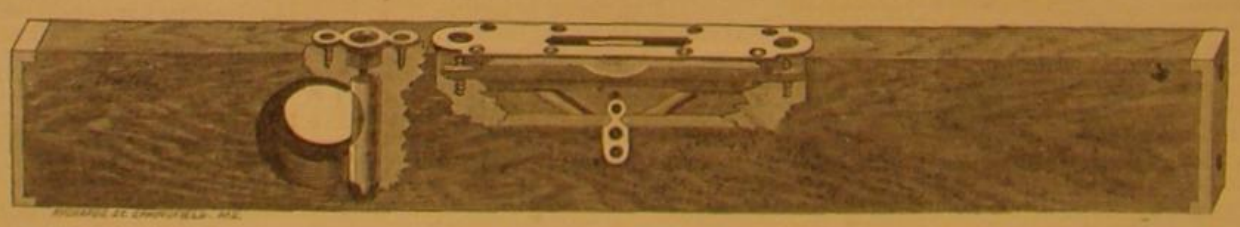
The construction of this Level is the same as the improved ordinary Level and Plumb, with the addition of the Inclinometer, which adds very much to its value or convenience for general use. It contains the old-fashioned Level and Plumb with his patent Adjustments and the Inclinometer combined.

This Level will be most highly appreciated by all mechanics having occasion to use it for getting angles or elevations of any required hight. It being so simply constructed, its operations will need no explanations, as it will be readily seen by any ordinary mechanic.

The Inclinometer may also, if desired, be used as a Level and Plumb.

SECTIONAL ELEVATION OF ORDINARY ADJUSTABLE SPIRIT LEVEL AND PLUMB.

No. 10.

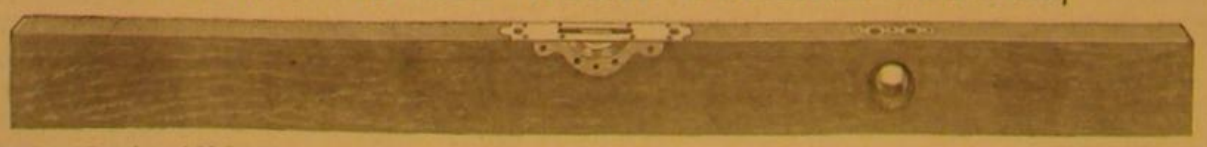


No. 10.

The adjustments of this Level and Plumb are perfectly reliable in all its parts; the Level adjustments having three positive bearings: a screw at each end of the bubble case, and a steel pin through the center, as represented in the above cut. In case the bubble-glass should become out of true with the base of the Level, from any accident, it can be readily adjusted again to its proper place, by turning the two center screws, one at each end of the top plate. Turning one screw back and the other forward, will cause the bubble to move at any point desired. This adjustment has no springs or any elastic substance whatever, and, when once adjusted, there is no liability of its getting out of order. The Plumb glass is adjusted by an eccentric step. Turning the eccentric step either way will adjust the Plumb.

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No. 35.



No. 35.

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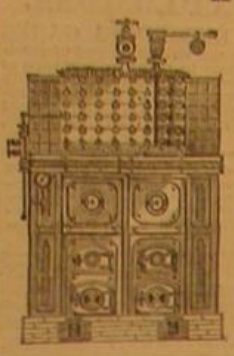
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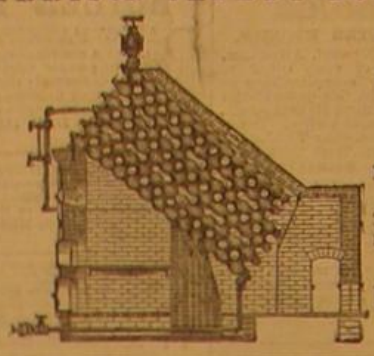
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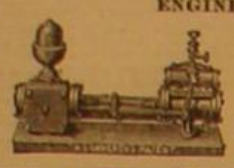
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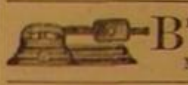
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Vol. XXV.—No. 16. [NEW SERIES.] NEW YORK, OCTOBER 14, 1871. $3 per Annum. [IN ADVANCE.]

BESSEMER'S HEAVY ORDNANCE.

For some time past Mr. Henry Bessemer has been devoting his attention to the construction of heavy ordnance, and the development of a new system by which a weight of projectile may be fired far exceeding anything that has been yet attempted, combined, at the same time, with a lighter form of gun, requiring the employment of less metal in its construction. To achieve this end, he seeks to consume his powder charge in such a manner as to utilise the whole of its effective force, and, at the same time, to avoid throwing any sudden and excessive force upon the gun. Such a design affects, first, the construction of the gun, and, secondly, as a matter of course, the form of the projectile. Of the many arrangements which have been designed by Mr. Bessemer, and which have succeeded one another as he arrived more nearly to practical results, we have selected one of the earlier forms, reserving the publication of other and more advanced modifications till a latter period; and here we may remark, that Mr. Bessemer is at the present time having constructed a monster piece of ordnance which shall embody his latest designs, and the trials of which will subject his theories to the extended test of actual experience. In the largest description of rifled ordnance now in use, the sudden explosion of the heavy powder charge required to project the elongated shot is so great, that a thickness of metal at the breech, about equal to that of the bore, is required to resist the tendency to rupture the shock occasions. This necessity places comparatively confined limits upon the size of heavy guns, and the weight of projectiles employed. Again, the sudden energy called forth by the powder explosion which exerts so destructive an influence on the breech of the gun, decreases as the shot, acquiring velocity, moves along the bore of the gun, until, as it reaches the muzzle, the final pressure upon it is far less than that which originally started it into motion. To equalise this force then, and exert upon the projectile a constant pressure along the gun, is the first object the inventor seeks to obtain, and he anticipates reckoning the weight of shot, not by pounds but by tuns, which, with perhaps a somewhat low velocity, would, if fired against armor plated ships and forts, fall upon them and crush them.

But in so greatly increasing the weight of the shot, the inventor naturally increases the length of his gun, considering a barrel of, say, 50 feet in length, to be necessary for his purpose. In this barrel there would be generated a series of continued or repeated explosions, which would exert a comparatively low and equal pressure during the whole time that the projectile traverses it.

Thus, in the present system a given charge of gun powder may exert at the moment of explosion a force of 60,000 lb. per square inch on the chase of the gun, and by the time the projectile has traversed a distance of 10 feet, the pressure may be reduced to a mean of 15,000 lb. per square inch throughout the entire length. Mr. Bessemer proposes to substitue for this violent and unequal action a continuous force of only some 3,000 lb. to the inch, maintained upon the shot throughout the entire length of its extended travel along the bore of the gun, hoping to obtain an equivalent duty with a vastly reduced strain.

The engravings on the next page will explain the mode in which Mr. Bessemer has embodied his ideas. Fig. 1 is an elevation, Fig. 2 is a longitudinal section of part of the gun, and Fig. 3 a cross section. The inner tube of the gun may consist of several thick plates of iron, each bent into a tube and welded, the inner and outer surfaces being bored and turned so as to receive a series of steel hoops placed on hot, and exerting an interal force on the gun. At the ends of the inner tubes are flanged hoops for the purpose of connecting the several lengths together by bolts.

The breech of the gun may be secured by a movable breech plug screwed into the end of the tube, and made gas tight by an expanding metal elastic cup, forming a knife edge on the plug, and forced against a ring of copper or other soft metal let into a groove formed round the breech for that purpose. This breech piece is shown at *e*, having a knife edge. The removal of the breech piece is effected by the rod, *g*, fastened into the rear of the breech, and supported in a bearing suspended from a crane; a balance weight is fitted upon the end of the rod, having handles for the purpose of turning round the breech piece.

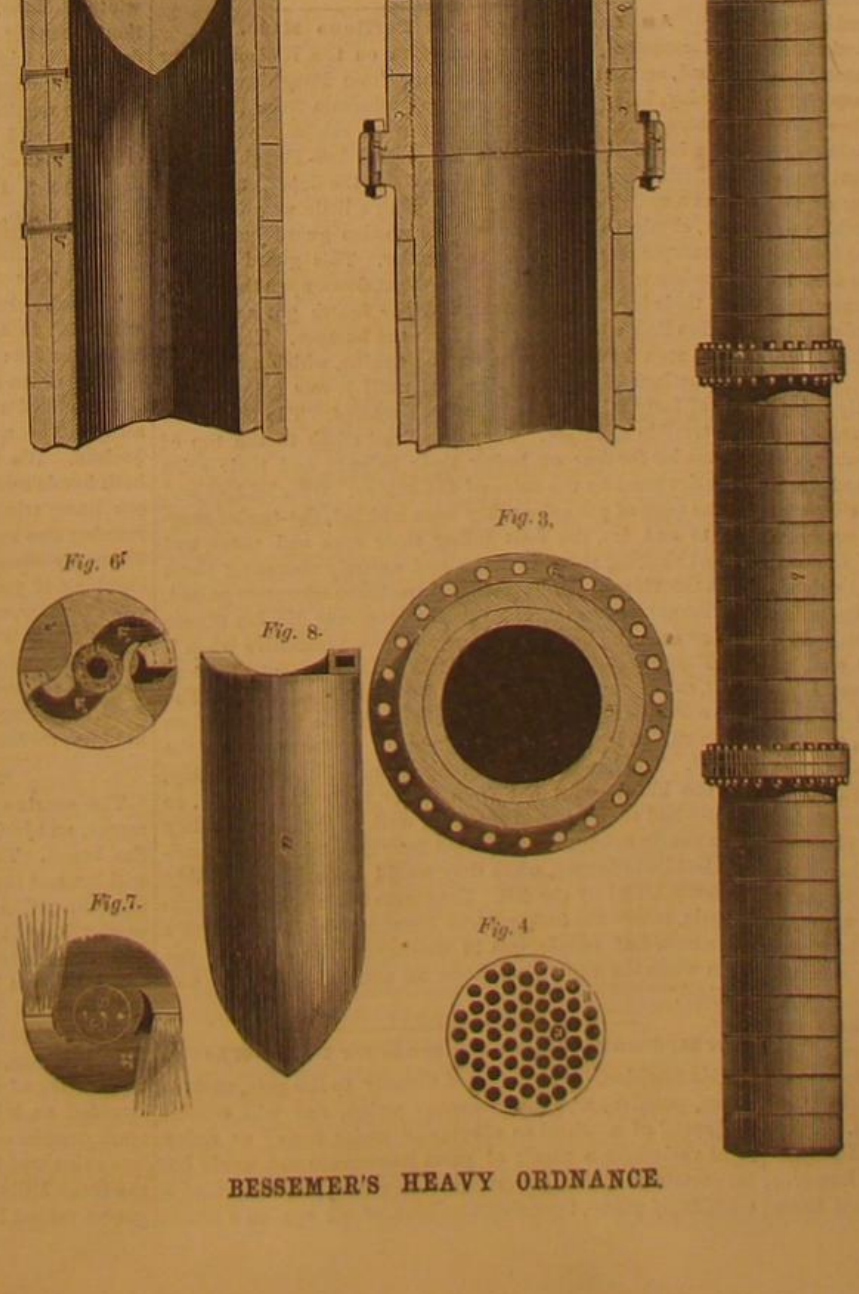
In order that a continuous supply of gas under pressure may be generated and made to act to on the projectile as it advances, a cartridge or powder chamber is provided, which fits loosely inside the gun; it consists of a cylindrical mass of steel, in which a large number of small holes or chambers have been drilled parallel to the axis of the gun. From 20 to 100 of these chambers are made according to the size of the ordnance, and vary from two to five inches in diameter. The explosive material is placed in these cells. By preference, Mr. Bessemer recommends the use in each chamber of a number of separate charges of powder, separated from each other by diaphragms having a fuze for communicating the ignition, or else parted by a thin layer of meal powder. The quantities of powder in these charges increase at every succeeding discharge of the series, and the intervals of time between the discharges diminish, so as to keep time with the increasing velocity of the projectile, and thus keep up the pressure in its rear nearly uniform throughout its entire movement from the breech to the muzzle of the gun.

In Fig. 2, the cartridge above described is shown in its proper position within the gun, as well as in end elevation, Fig. 4. In both these figures the cells which contain the powder charge, will be seen, as well as the diaphragms dividing the powder itself. Each of these diaphragms is pierced with a small hole, so that the charges are fired in rapid succession. The powder is ignited by percussion caps contained in a separate cell, *o*, fastened into the central part of the cartridge; and behind the cap is a small steel rod fitted so that it can be easily moved. In a line with this rod is a similar one, *l*, passing through *g*, so that on receiving a blow at its outer end it comes in contact with the former, and strikes the cap. The cells of the cartridge preserved from injury, and the charges are kept dry by a soft metal capsule covering the end of the chamber. As shown, the cartridge can be easily removed after it has been fired.

It will be understood that the powder in the various cells of the cartridge is ignited at the mouth of each cell, but they may be so arranged that the cells may be fired successively as the shot advances along the gun, and various means may be adopted for firing the charges, such as a central fuze communicating with each cell, or a suitable electrical apparatus actuated by the projectile itself.

In Fig. 2 is shown a nearly spherical shot, of a reduced diameter in one direction, where a portion has been cut away, so as to form a flat band around it. Thus, for a gun of 2 ft. bore, the shot may be 26 in. cut down to 24 in., as shown. The advantage of such a projectile over a spherical shot, is that there would be less windage, and that no rotation could be set up in the passage of the projectile through the gun, thus insuring a greater accuracy of fire.

In Figs. 6, 7, 8, is shown the elongated projectile proposed to be used by Mr. Bessemer, in which a part of the powder charge is inserted in the rear of the shot, or in an auxiliary chamber, to obtain rotation. In this arrangement a separate charge is placed in the shot, as shown, and the latter is provided with openings at the rear, tangential to the circumference; the ignition of this supplementary charge at once gives additional impetus and rotation to the shot as it passes along the gun. The powder is placed in the recess at the rear of the shot, firmly compressed in it, and afterwards partially bored out, as shown, to insure such rapidity of fire that the whole may be consumed before the projectile quits ghe tun. The degree of rotation would of course depend on the amount of powder consumed, and the size and direction of the openings through which the high pressure gases escaped. As shown in the drawing, the central opening, through which the projectile is loaded, is closed with a plug bored out in the middle and fitted with a fuze, by which the charge is ignited from the first flash that pro-



BESSEMER'S HEAVY ORDNANCE.

ceeds from the cartridge of the gun. We may now describe, in a few words, the means designed for maintaining a succession of rapid discharges from the cartridge by help of the projectile in its passage along the gun. At short intervals, along the chase of the gun, small holes are drilled in pairs, c c, into which insulated wires are are fitted. Both on the inside and outside of the gun, non-conducting screw caps are placed to preserve the insulation. The ends of the rods or wires stand sufficiently in relief on the inside of the gun to be touched by the projectile as it advances, and metallic contact between a pair is effected, and the ignition of a powder charge in a cell of the cartridge is effected by means of an Abel's fuze and a battery. In this way, the whole of the cells may be discharged successively, and a comparatively uniform pressure maintained, while the shot traverses the 50 or 60 ft. of gun barrel, the maximum pressure being regulated, of course, by the amount of powder in each cell. This arrangement is shown in Fig. 5, where it will be seen that the cartridge forms the actual breech of the gun.

We refrain for the present from making any comments upon Mr. Bessemer's novel and very striking designs. They possess a vast amount of characteristic ingenuity, and will, if attended with success, effect a greater reform in the construction of heavy guns and armor than has yet been dreamed of. We shall have, however, to refer to the subject again and again, as Mr. Bessemer has effected many important modifications in his plans, and is engaged in perfecting the modes of mounting and operating his monster ordnance. Besides as we said, he is now occupied in manufacturing a full sized gun, for subjecting his theories to the test of actual practice. —*Engineering.*

SCREW AND RIVET MANUFACTURE.

Condensed from Engineering.

Birmingham abounds in screw and rivet manufactures. At the works of Messrs. Nettlefold and Chamberlain, a patent process of manufacture is carried on. The screws manufactured by the firm are principally wood screws, but other threads are also cut; and they manufacture a quantity of screws for stove work and for reaping machines, as well as for other special purposes. The rivets made here are chiefly those adapted for light work, such as are employed by tinmen and coopers, and weighing from a few ounces to about 16 lb. per thousand. Up to a certain point the mode of manufacture of rivets and screws is similar, according to the process here employed. The first part of the operation for both classes of work is to cut the wire into the proper lengths, and to form the head. This, in the case of small work, is all done by one machine, and at one operation. Where comparatively thin wire is employed, the coil is simply hung over a wire attached at one end of the machine, one end being placed between the jaws of a feeder, but where heavier wire is employed, it is necessary to pass it through a straightener before allowing it to enter the machine. The feeder consists of two jaws, which close as they move forward, gripping the wire, and carrying into the machine, but separating as they move backwards, preparatory to making a second bite at the wire. The proper adjustment of this feeder is a matter of no small importance, depending, firstly, upon the required length of the screw or rivet; and secondly, upon the size and thickness of head required. The character of, and consequently the amount of metal required for, the heads of screws, especially those employed for ecclesiastical ornaments and other fancy work, varies so much that no especial rule can be laid down for guidance as to the additional length of wire that must be allowed for the purpose, and the proper setting of the feed motion, of the machine is therefore a matter which experience alone can properly regulate. The machine having been properly adjusted for feed motion, and suitable dies inserted for the formation of the head of the rivet or screw, it is set in motion; a crank action causes the feeder to draw in the wire, with a proper proportion of excess wire, for the formation of the head, projecting in front.

The jaws of the feeder now hold the wire rigidly while an eccentric action projects the head die forward from the opposite direction, stamping, or rather squeezing, the projecting wire in a head of the required shape and form at one operation. This done, a cutter, working sideways from the machine, severs off the now finished rivet, or screw stock, as the case may be. Another revolution of the machine causes a second rivet to be thrown out; and this goes on incessantly so long as the roll of wire lasts, the operation being perfectly automatic when once set in motion, and requiring but little attendance, so that one person is enabled to overlook several machines. Besides these horizontal machines, which will work with wire up to about half an inch in thickness, there is also at these works a vertical, or as it is there called, an "upright" machine, which will take wire of a much greater thickness. For this, the wire requires to be first cut into proper lengths by a suitable machine of simple construction. The machine consists of a bed plate, on which is a receptacle for the lower die or holder. On either side of this there is an upright, between which works a stamper in a suitable guide piece, at the bottom of which is fitted the upper die for forming the head of the rivet, and motion is given to it by an eccentric revolving on a shaft above, and which is driven direct by a strap from the overhead motion shaft. It is fed by hand. In both these machines the heads are made without heating the iron. The heads to which we have hitherto been referring, so far as screws are concerned, are those which are round, and flat at the top, to be afterwards cut across for screwdrivers. Many screws, however, require to be made square headed, for spanners, and these are generally forged by hand; but however neatly they may be made, it will always be found that there is a certain degree of irregularity in their shape, which renders it necessary to pass them afterwards through a shaping machine. Besides the great expense of this, it is found that the heating and cooling of the iron, during the forging of the head, reduces its strength, and that the heads of such bolts will sometimes give way when subjected to a severe strain. The screw stocks having now been completed, the next process is to smooth down the heads, and to give them the proper size and form. The machine for this consists of a revolving holder, into which the end of the stock is firmly fixed, so that the head will revolve between two cutters shaped to cut it to the proper form. As soon as the machine is set in motion the attendant draws up a lever which causes the cutters to close upon either side of the screw head. These, however, are firmly set so that they will not approach one another beyond a certain point, otherwise this operation would have to be very carefully effected, and the result tested with callipers; and even then, with the greatest care, the screw heads could not be so evenly made as they now are by these machines. After this, the stocks are placed into a hopper attached to another machine, from which, by a self acting motion, they are caused to slide down a slotted incline, at the bottom of which is a revolving vertical barrel, with circular cuts at intervals down its side; into these cuts the screw stocks fall one by one, with their heads projecting above the top of the barrel. They are then carried round beneath a small circular saw which cuts the nick in the head for the screwdriver, after which the stock is thrown out of the machine and carried away to receive the final operation of threading. The threading machines—which are worked exclusively by women and girls—require great accuracy in their adjustment, but when once properly set, it is impossible that there can be any deviation in the thickness of the screws cut. The cutter consists of two parts, a die, against which the screw revolves and a cutter which is pressed by a lever against the opposite side of the screw; and these are first so set that they cannot approach within the proper distance of one another. The head of the screw is first fixed into a mandril head, where a driver point enters the nick, and it is firmly held in position by a set screw. Of course a good deal of knack is required in this branch of the manufacture to get the cutter always into the trough of the screw, and so as not to cut the thread; but the greatest nicety—which is only acquired by great practice—is required when the screws are gimlet pointed. The packing of screws in paper is all done by hand, and with the greatest rapidity, the screws being put down side by side, alternate head and tail, by the two hands working together, each placing a screw with the head outwards, and rising row upon row until the required number —generally a gross— is completed. They are then tied up and labelled, and are then ready for the market. It may be here remarked that the breaking off of part of the heads of wood screws, which not unusually occurs, is owing generally not to any error in making the screws, as might naturally be supposed, but more often to the wire having received a twist in the operation of drawing. This causes a strain in the fibers of the metal, which too often cracks open, during the operation of gathering in the metal in forming the head.

An Involuntary and Perilous Ride.

A locomotive, running as an extra on the Hudson River railroad, arrived at New Hamburg from Poughkeepsie on Saturday, being stopped there by a telegram from that city in consequence of a singular and what might have been a tragic incident. Before the locomotive left Poughkeepsie, four little boys who were playing about the depot, supposing it was a switch engine, and only going a little way down the track, climbed stealthily upon the wooden guard just above the bumper on the rear of the tender. This guard is only six inches wide. Three of the boys sat down upon the guard, with their legs hanging over, and the fourth got astride of the iron link which protrudes from the bumper. They could not be seen by the men upon the engine, which moved off and continued increasing its speed until it was going at the rate of forty miles an hour, as was ordered. The boys were in a terrible situation. They dared not climb to the top of the tender for fear of losing their balance, and their cries were drowned by the noise of the engine. Over bridges and on the edge of precipices they were whirled, the tender surging to and fro, the dust filling their eyes and noses, and almost choking them to death, and entirely obscuring them from the view of the flagmen and trackmen who were passed. The locomotive was signaled at New Hamburg, Mr. Jas. Signor having seen the boys on the rear of the locomotive when it left Poughkeepsie. The poor little fellows presented a sorry sight, as they were covered with dust from head to foot. The boy who was astride of the link was unable to walk when taken off, his legs being awfully chafed by the motion of the engine. The hands of the other boys were blistered terribly, and the blood oozed out from under their finger nails, so tightly had they grasped the wood work of the tender. They were nearly exhausted, and could have maintained their position but little longer, when they would have been probably instantly killed by the fall. They were taken back to Poughkeepsie, where the incident had become noised about, and a large crowd of people was in waiting at the depot to see them when the train they were on arrived.—*National Car Builder.*

New Hydraulic Rotary Governor for Water Wheels.

This machine, being attached directly to the gate, secures direct, positive, and instantaneous action, and will control the speed of a wheel as effectually under heavy as under light variations, a result of great importance and never before attained. The governing device consists, in part, of a centrifugal pump, throwing a column of oil against a sensitive piston. This piston will sustain a weight just sufficient to balance the column of oil under any required speed, a given amount of weight always maintaining the same rate of speed. Attached to the piston is an adjustable spring balance, which remains at rest when the wheel is running at speed, and on any change of labor receives and weighs the amount of variation, indicating at once the amount of change of gate required to restore the speed, and, having control of the power which operates the gate, places it at once in position to maintain exact speed under the new condition of labor on the wheel. So rapid is it in its action that it can, we are informed, when necessary, be adjusted to operate the entire gate in eight seconds, when, if fifty per cent of the power used is simultaneously thrown off, the gate is placed in position to meet the changes in *four seconds*, and before hardly a perceptible change in the speed.

It is simple in construction, durable, reliable, and easily attached to the gate. When attached to any good turbine wheel, the speed cannot, under the heaviest variations, be accelerated so as to damage the most delicate machine.

John S. Rogers, Treasurer, No. 19 John street, Boston, furnishes machines suited to any condition of labor or kind of water wheel.

Destructive Effect of Salt on Axles.

The London papers give accounts of several accidents on railways, occasioned by the fracture of the axles of salt cars. It appears that between the sound portion remaining and the outside of the fractured axle, the surfaces were quite smooth, presenting the appearance of having been severed by a sharp instrument. This peculiar effect is thought to have been caused by the gradual action of the brine on the metal, the heat at the boss favoring the evolution of chlorine from the brine, and its then combining with the iron to form a soluble chloride of iron. From the position of the defect, it was not discoverable by ordinary inspection; and whatever may be the scientific explanation of the peculiar destructive action which thus goes on in the axles of salt cars, the fact must be regarded as a very serious one, especially in view of the statement made, that on one railway alone, no less than seven axles of salt cars were broken while running, in a period of less than three months, and this out of a total number of about five hundred wagons, showing an enormously large proportion, as compared with the fracture of cars of any other description of rolling stock. To diminish this liability, the plan has been proposed that, in addition to requiring such cars to be provided with well constructed axles of good quality, it also is insisted that the date of their commencing to run be stamped upon the axles, and that a reasonable number of years be prescribed as the maximum of their being used.

The Wood Sawing Club.

The Lockport *Journal* contains the following practical suggestion:

"Now that the croquet and base ball season will ere long be over, we would suggest, in order that the muscle developing process may not stop, or that the amount developed by the summer's exercise may not lie dormant during the long winter months, that the base ball athletics turn their attention to sawing up the wood piles of widows and sick folks during the winter. The exercise is fully as healthful, is not so violent, dangerous nor tiresome as base ball, and we are sure the results will gratify a curious public fully as much, and we would prefer to give the 'score' of a wood sawing class to that of a base ball club, in our columns. What say you, gents? Physicians recommend young ladies to form walking clubs. This is a matter in which steps should be taken."

The Sun at Midnight in Norway.

The following paragraph is from the description of a scene witnessed in the north of Norway, from a cliff 1,000 feet above the sea:

"The ocean stretched away in silent vastness at our feet; the sound of the waves scarcely reached our airy lookout; away in the north, the huge old sun swung low along the horizon. We stood silent, looking at our watches. When both hands came together at twelve, midnight, the full round orb hung triumphantly above the wave; a bridge of gold, running due north, spanned the water between us and him. There he shone in a silent majesty that knew no setting. Combine, if you can, the most brilliant sunrise and sunset you ever saw, and its beauties will pale before the gorgeous colors which lit up the ocean, heaven, and mountain. In half an hour the sun had swung up perceptibly, the colors changed to those of morning, a fresh breeze rippled over the flood, one songster after another piped up in the grove behind us; we had slid into another day."

The Use of Trade Marks.

The courts are steadfast in their purpose to protect trade marks, and juries are ready enough in following the lead of the bench. The annexed, from the Philadelphia *Inquirer*, will interest manufacturers. The mark which was imitated was "Stark" in a semicircle, the alleged imitation being the word "Star" in a similar form, which the Stark Mills complained of as tending to mislead buyers:

"In the suit instituted in the Circuit Court of the United States, by the Stark Mills against the firm of Bailey & Cascaden, arising out of the use, by the latter firm, upon their seamless bags, of a mark alleged to be in imitation of the trade mark of the Stark Mills, the court some time since awarded an injunction to restrain the further use of the mark complained of; and on Saturday last a jury, to whom was submitted the question of the damages to be awarded to the Stark Mills for the violation of their right to their mark gave a verdict in their favor for $6,032."

NEW APPLIANCES FOR WOOL SCOURING AND DYEING.

[Condensed from Engineering.]

Some very efficient appliances for facilitating the processes of wool scouring and dyeing have been recently brought into use at the Prospect Wool and Cloth Dyeing Works, Huddersfield, England.

The intention of Mr. Kirkham, the inventor, has been well carried out by Mr. Melling, of Rainhill, the engineer to the company, who has fitted up the machinery; and the ease and precision with which one man, or even a boy, can control all the movements that are required, while he remains quietly seated, would surprise those who have been accustomed to think that the old fashioned method of "stanging," as the hand process is technically called, is the only one that would rightly carry the wool through all its varied courses till completely dyed.

In addition to the "stanging," the usual way of operating involves much labor in the removal of the wool from pan to pan, and considerable waste of materials, as well as great loss of heat, all of which are largely rectified by the newly patented plan.

The wool during its treatment in the various liquors requires pretty continual turning over or "tossing" to insure the whole of the fibers becoming equally and uniformly impregnated, or cleansed, as the case may be, as it must not be allowed to become matted.

To do this by the ordinary "stanging" process, one or two men use a kind of pitchfork with a long and strong wooden handle, with which, and by the exertion of great force, they drag the wool up from the bottom of the pan as best they can, and stir it or toss it about in the liquor, using the handle as a lever, resting it upon the edge of the pan or vat as a fulcrum. The wear and tear shown upon the edge of the vat indicates clearly that this work is no slight matter. This work is also very trying, as the liquor is kept on the boil, by a fire below, all the time the process is being carried on.

The new engine consists of one steam cylinder, which is single acting only by steam. It is placed vertically, and is closed both top and bottom. The piston rod passes upwards through a gland in the top cover, and is attached to a heavy cast iron weight, to force the piston to make its down or suction stroke, after the steam has raised it to the top. The upward stroke, being the one by which the main work is done, is performed by the steam. The valves are actuated by very simple cam-shaped tappets, placed upon a vertical spindle, with which there is a communication from the working platform, so that by hand the position of the tappet may be varied as required. The engine is self acting when started, but is still under perfect control. It works but slowly, making three or four double strokes per minute, with about 40 pounds steam pressure. It is provided with a series of inlet and outlet passages, so that either atmospheric air, or liquor from any vat or tank with which it is in connection, may be drawn in on the downward stroke, and be delivered by the up stroke, according to the valves and passages which may be open. The valves to each are conveniently placed in a line, under the eye, and within the reach of the attendant, who can open one or more valves, as he pleases.

About 40 vats can be worked by one such engine, but in the case now under consideration there are but four scouring, dyeing, and washing vats, of wood, each 7 feet 6 inches × 6 feet × 6 feet, and three or four smaller ones, for preparing the dye liquors, the former being upon the ground floor, and the latter, placed about 6 feet higher than the others. Each of the dye vats has a cold water supply; a steam pipe and valve leading to the bottom, for boiling the liquor by steam from the boiler; a large outlet valve, by which the vat can be emptied quickly by letting the liquor run to the main drain or stream; and connection pipes to the engine. But another important fitting to these vats is a false bottom made of iron, finely perforated, which is so placed near the bottom of the vat, and there firmly held, that when air is forced into the space below it by the engine, it shall produce a certain and determined action upon the liquor, etc., which may be contained in the vat. The proper fixing of this plate has been a matter of considerable difficulty, as an imperfect action might either roll the wool into lumps, or perhaps leave the corners unmoved.

No. 1 vat is filled with water, say 1,700 gallons, and the steam is turned on to warm the water, during which time one of the workmen puts into the vat the scouring ingredients, which, according to the nature and condition of the wool, are judged to be necessary. This differs much from time to time, and needs the careful attention of the person in charge of such work, under whatever system it has to be treated. Then the engine is set to work with the air suction valve open, and the first discharge of air, which takes place on the up stroke of the piston, is passed into the bottom part of the vat, under the perforated plate, through which it rises through the whole volume of water, which it disturbs and turns about, like a wave of the sea over a rough and rocky shore. Two or three such strokes, discharging air under a pressure, as indicated by the pressure gage, of 25 pounds per square inch, serve to thoroughly mix the liquor and all the chemical substances which have been put into it. The air finds its vent naturally from the surface of the water, and has done its work. When this preparation has been made, the bale is cut open, and the wool is lifted by two men into the vat, either entire or in portions, as is most easy to them. The engine is again made to pump air into the vat, and ten or twelve strokes suffice to thoroughly shake out the wool, and drown it in the liquor, as though it were rags in a paper maker's rag engine. Steam is now admitted, and the liquor is made to boil freely till the oily character of the wool is wholly removed, by the perfect washing action imparted to the contents of the vat by the intermittent discharges of air from the engine, which, by its beautiful action, continually tosses the wool and the liquor in every direction without throwing it out of the vat. The scouring liquor thus used, is not, however, entirely exhausted of its chemical properties, and, being hot, is now allowed to run off to vat No. 2. The vats being on one level are soon equally full, and the engine is then, by a change of valves, made to draw off the liquor remaining in No. 1 vat, and to deliver it into No. 2, where it only needs to be strengthened by the addition of some fresh scouring materials; and No. 2 vat is ready to receive a bale of wool to be treated as that in No. 1 has been; meanwhile the first bale of wool still remains where it was in No. 1 vat. It now needs washing or rinsing to free it of all the scouring materials. This is done by a rapid supply of cold water, and a pretty frequent tossing by air from the engine. When washed enough, in one or more waters, which are run off to waste, the wool is ready for the next process, which, in the operation we witnessed, was that of chroming." This chrome liquor is admitted to the vat from one of the preparing cisterns, which, are placed at the higher level, and it is diluted with water, and boiled up with steam, as the attendant sees necessary while at the same time the engine is made to toss the whole about, as in the previous parts of the work. After this "chroming" has continued its proper time, the former operation of passing the liquor to another vat is repeated, and the wool in No. 1 is left once more; this time it is ready for the logwood dye for making it black, or for any other color for which the previous process has left it fit. The dye liquor is supplied hot from its preparing cistern, as was the case with the chrome liquor, and when done with, it is in its turn also passed on to another vat, to be strengthened and used again, and so on. The wool is now ready for removal from the vat in which it was first placed, the process being complete.

There is little or no waste of heat in such an arrangement as this, and also little or no waste of dye liquor. Each quantity is passed on, from one vat to another, hot, and ready with a little help of new stuff, for repeated operations. The saving thus obtained is a very important item.

The result is, that the work can be turned out at a considerably reduced cost, notwithstanding the outlay for machinery, while at the same time a much greater uniformity of color can be produced, and with greater evenness throughout the whole batch of wool under treatment than by the ordinary method.

A special chemical action, in this system of dyeing, has much to do with the good result, arising from the extra quantity of oxygen imparted to the dye liquor from the blowing and tossing by compressed air.

This arrangement can be added without difficulty to any of the ordinary vats or pans now in use, thus rendering the application of the new system one within the reach of any person desirous of reducing the heavy hand labor of his works as far as possible.

The Manufacture of Russian Sheet Iron.

A particular kind of sheet iron is manufactured in Russia which seems not to have been produced elsewhere. It is remarkable for its smooth glossy surface, which is dark metallic gray, and not bluish gray, like that of common sheet iron. On bending it backwards and forwards with the fingers, no scale is separated as is the case with sheet iron manufactured in the ordinary way by rolling; but on folding it closely, as though it were paper, and unfolding it, small scales are detached along the line of the fold.

This sheet iron is in considerable demand in Russia for roofing, and in the United States, where it is largely used in the construction of stoves, and for encasing locomotive engines. It is there named stovepipe iron.

Russian sheet iron has been recently subjected to chemical examination in the metallurgical laboratory of the Royal School of Mines, and the analytical work has been executed by Dr. Percy's assistant, Mr. W. J. Ward.

The occurrence of a peculiar carbonaceous mass, left after the solvent action of dilute hydrochloric or sulphuric acid, may reasonably be accounted for, Dr. Percy says, by the method of manufacturing Russian sheet iron, which he describes. The sheets are interstratified with charcoal powder, and bound up in packets, each of which is subjected to repeated hammering. Hence, it is easy to conceive how fine particles of charcoal should be beaten in over both surfaces of each sheet; and, if this be so, a relatively larger proportion of carbon should exist in the thin sheet, as is the case. Yet, that some of the carbon is combined, may be inferred from the fact that distinct hardening occurs after heating the metal to redness, and immersing it while hot in water, and especially in mercury.

In the volume on iron and steel, which Dr. Percy published in 1864, he stated that the mode of manufacturing the Russian sheet iron in question was kept rigidly secret; that it was made from iron smelted and worked throughout with charcoal as the fuel; that, according to information which he had received from three independent sources, the sheets, after the completion of the rolling, were hammered in packets, with charcoal dust interposed between every sheet; and that they were subsequently assorted, and the outer ones, being inferior in quality, were thrown aside as wasters.

Our author has since found that the secrecy was more dependent on ignorance of the Russian language than on anything intentional; and he now gives various particulars of the process.

The manufacture of sheet iron in Russia, he says, is chiefly confined to the iron works on the eastern side of the Oural Mountains. The malleable iron, which is the subject of this manufacture, is derived from pig iron, obtained by smelting the following ores with charcoal in cold blast furnaces—namely, magnetine, carbonate of iron (*sphæro siderite*), and red and brown hematite. The conversion of the pig iron into malleable iron is effected either in the charcoal finery or in the puddling furnace.

The puddle balls, intended for the manufacture of sheet iron, are rolled into bars five inches wide and half an inch thick. The iron should be more crystalline than fibrous, and should contain sufficient carbon to render it more like steel than iron. The machinery required consists of one or two pairs of rolls and two kinds of hammers. Reheating is conducted in furnaces of particular construction. The rolls are driven by water wheels, and should make not fewer than fifty revolutions a minute. The hammers are also put in motion by cams on the axles of water wheels. The hammer heads are of wrought iron, with striking faces of steel. Each anvil consists of a solid block of white cast iron. It is necessary that the hammers and anvils should be so made, in order that they may have the requisite hardness, in default of which the surfaces of the sheets would not acquire sufficient brightness or polish.

The puddle bars, five inches wide and one fourth of an inch thick, are cut into pieces twenty-nine inches long, which weigh about 15·35 pounds avoird. (10 pounds?—J. P.). These pieces are heated to redness, and cross rolled into sheets about twenty-nine inches square, and in order to become thus extended, they require to be passed through the rolls about twelve or fourteen times. The sheets thus produced are arranged in packets of three in each, heated to redness, and rolled, each packet passing through the rolls about ten times. But just before rolling, the surface of each packet is cleaned with a wet broom, usually made of the green leaves of the silver fir, and powdered charcoal is strewn between the sheets.

The sheets obtained from this rolling are sheared to the dimensions of twenty-eight inches by fifty-six inches. Each sheared sheet is brushed all over with a mixture of birch charcoal powder and water, and then dried. The sheets, so coated with a thin layer of charcoal powder, are arranged in packets containing from seventy to a hundred sheets each; and each packet is bound up in waste sheets, of which two are placed at the top and two at the bottom. A single packet at a time is reheated, with logs of wood about seven feet long placed round it, the object of which is to avoid, as far as possible, the presence of free oxygen in the reheating chamber. The gases and vapors evolved from heated wood contain combustible matter, which would tend to protect the sheets from oxidation in the event of free oxygen finding its way into the reheating chamber.

The packet is heated slowly during five or six hours, after which it is taken out by means of large tongs and hammered. The packet is moved about so that the blows fall in a certain regular order. After this treatment the surface of the packet presents a wavy appearance, as the striking face of the hammer and the face of the anvil are both rather narrow. When the packet has traveled about six times under the hammer, in the manner specified, it is removed; and immediately afterwards, completely finished sheets are arranged alternately between those of the packet.

The actual cost of manufacturing these Russian sheets is about £12 15s. per tun, to which must be added general charges, which raise the amount to £16 or £17 per tun, exclusive of profit. The average price of sheet iron at the fair of Nijni-Novgorod is about £22 or £25 per tun.

Moving in Circles.

It is astonishing how some people move in a circle, and run round and round in the well worn ruts, without attempting to widen the one or step out of the other. They do things in a certain way because some friend or neighbor does so, without a question as to the propriety or fitness of their doing the same thing in the same way, whether the circumstances admit of it or not. We were forcibly impressed with this, not long since, while stopping a few hours in a flourishing town in one of the finest counties in Central Ohio.

On a fine broad street, there were no less than five or six residences, mostly on contiguous lots, built as nearly alike as possible, with the front door in each, in some unaccountable way, set obliquely into a corner at the end of a balcony running along the side of the main building, making a row of singularly awkward looking dwellings, and sadly marring the beauty of the street architecture.

Another case in point is that of a man now building a two story and basement house on a twenty foot lot. His heart is set on a "swell front," not because he admires the style, or that it is at all adapted to so narrow a house, but because his friends have built on that plan, and he does not wish to be singular. It is in vain the architect has assured him that a swell front—which we never see on a house too narrow for it without calling to mind a character in "Little Dorrit" who, as Dickens tells us, "was not so much a man as a sort of swelled boy"—will give to a house of that width a cramped look, and make it seem even narrower than it is, that a front of this style for a building not wide enough to accomodate it, savors of affectation, and is in bad taste. It is all in vain; the foundation is laid and the work goes on. The precedent has been established by one of his neighbors, and will be followed in more than this single instance by others who cannot be prevailed on to give up the cherished ambition of an "imposing swell front."—*Building News.*

A FORM of stereoscope, in which mirrors were used to produce the effect, was devised by Wheatstone, in 1838; but the stereoscope now used was invented by Sir David Brewster, in 1849. The former was known as the reflecting stereoscope; and the latter, in which lenses take the place of mirrors, is called the refracting or lenticular stereoscope.

Improved Pressure Recorder.

An instrument that will record the pressure in steam boilers, gasometers, etc., and indicate it so that such pressure may be referred to the exact time at which it occurs, is one that, in our opinion, ought to form an adjunct to every steam boiler in use. Such an instrument would definitely settle the disputes as to whether boilers explode under undue pressure, or not, and would furnish legal evidence, that in many cases would be invaluable, in determining the negligence of boiler attendants.

The instrument shown in our engraving, Fig. 1, is a recording pressure steam gage. The pressure is received upon a diaphragm in the chamber, *a*, through the inlet, *c*. The diaphragm transmits motion through a sliding rod to the index finger, *b*, which moves a pencil point to or from the center of an annular ruled disk or card, the inner edge of which is numbered like the dial of a clock.

The dark lines, curving from the center of the card outward, towards its perimeter, separate the surface into divisions corresponding to hours on the dial; and the lighter lines between them, running in the same direction, indicate ten minute divisions.

The concentric lines indicate pressure in pounds, from nothing at the outer edge of the card, toward the center.

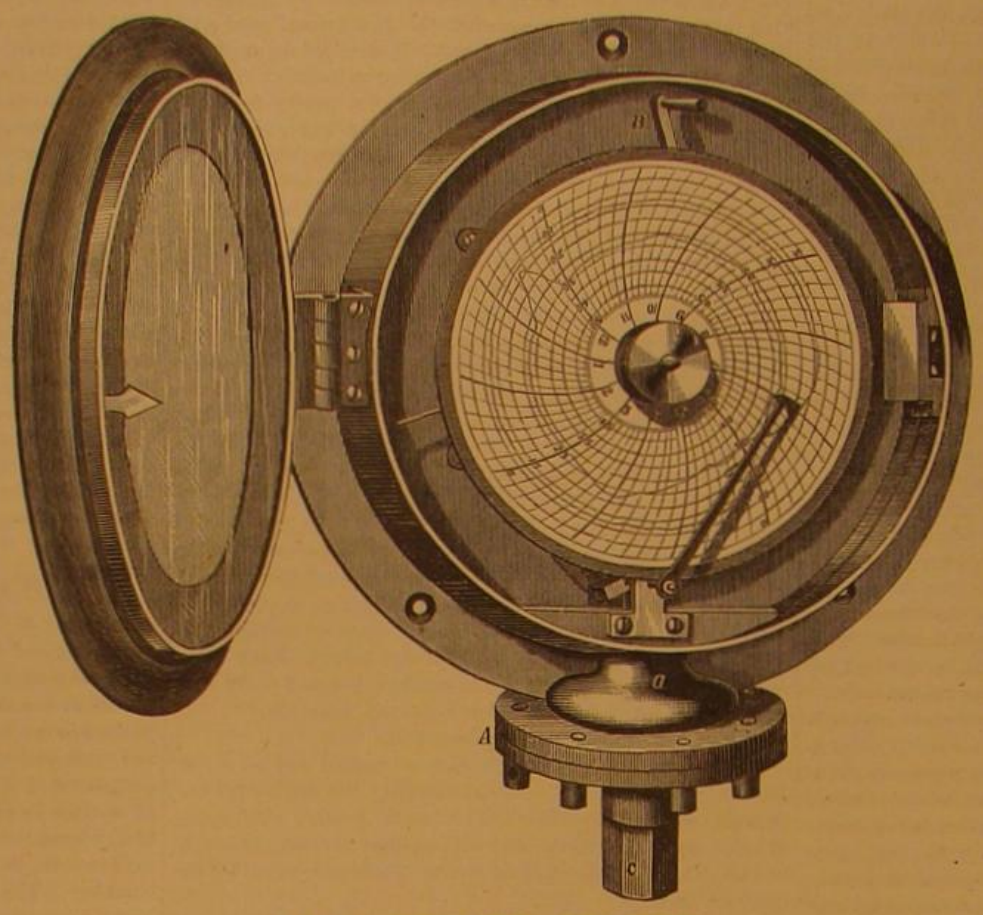
The card being revolved by clockwork, the pencil point, in the extremity of the index finger, makes a tracing on the card, showing the precise pressure indicated at any hour or minute of the day.

Fig. 2 is a modification of the instrument, designed to indicate the pressure of gas.

A cylinder, A, communicates with the cylinder, B, through a short pipe, C. Water is put into these cylinders through the funnel, D. The pressure of the gas is transmitted, through E, to the surface of the water in B, and causes the water in A to rise, carrying upward a float, F. From the top of a stem, attached to the float, F, projects an arm, G, which arm moves, upward or downward, the slender rod, H. The rod, H, carries a pencil point, which gives the tracing on the card.

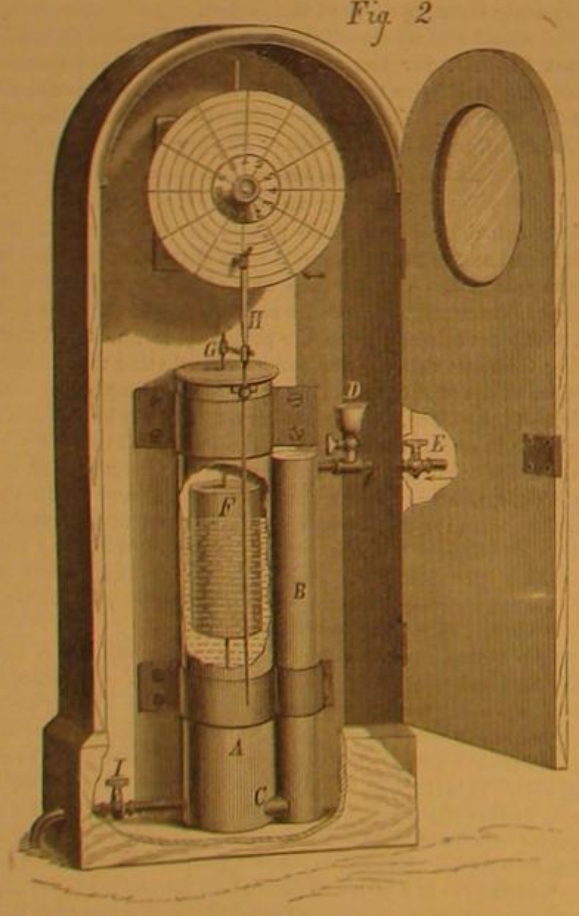
The card is ruled with straight radial lines, instead of curved ones, as on the steam gage, Fig. 1, as the pencil point moves in a straight line instead of a curved one.

These instruments are simple, and are, no doubt, reliable. We consider their indications more valuable than those of instruments which simply trace a curve of pressure, without referring the variations from the established standard to the times at which they occurred.



DAVIS' PRESSURE RECORDER.

Fig. 2



For further information address D. P. Davis, 44 Courtland street, New York.

Reconstructing Old Dwelling Houses.

It is a common remark with those who have repaired an old dwelling house, that it costs more to reconstruct an old house than to build a new one. In some instances the saying is true, while in others it is not. The expense will depend on the sound or unsound condition of the old structure, the alterations to be made, and the management of the proprietor and the builders. In some instances, the structure to be rejuvenated is so different from what is desired, that the most economical course will be to tear the old building down at once, or remove it and appropriate it to some other purpose. If, for example, the siding and roof are old and must be renewed; if the rooms are not of the desired hight and size; if some of the timber has decayed, and the studs and joists are so far apart that the laths will spring, between the timbers to which they are nailed, and thus fail to make a strong wall,—the old dwelling had better be demolished, as a new edifice can be erected more economically than such a shell can be satisfactorily reconstructed. On the contrary, if the frame is sound and the rooms of the desired form, new siding, new windows, new doors, and new walls can be substituted for the old ones much more economically than the old frame can be demolished and a new structure erected.

There are two ways of repairing an old dwelling, one of which is expensive and unsatisfactory, and the other is satisfactory and economical. The expensive way is to let a builder take the job by contract, and agree in writing to do this and that as per contract. Of course, every professional builder knows enough to make an estimate that will cover all expenses and leave him a generous profit. Whenever a contract is drawn, builders are not always careful to note every minor item; and proprietors do not always think of every little job until it is too late to be noted in the contract. Such things cause difficulty. The builder of one of the college edifices of Cornell University was not obliged to make box window frames, and provide weights for the windows, as that particular item was not specified in the contract. So the building was finished without window-weights, as such appliances had not been thought of by the directors until the building was nearly finished.

The most economical way to repair an old dwelling is to employ a faithful and competent joiner to prepare a bill of such materials as will be required, and to do the work by the day. It may be well, also, to provide one or more assistants or helpers; but let the proprietor bear in mind, that, as the number of workmen is multiplied,—unless the superintendent is a judicious manager,—the expense will be augmented. As a rule, it is true that four men, working together at such labor as one man can do, will not acccomplish as much in one day as one man alone will do in four days. First, then, let a thorough examination be made of the structure, and let every alteration be plainly noted on paper, after which let a bill of items be carefully made out. For example, one or two sides of the dwelling will require residing. Estimate the number of feet, or the pieces required of a given length and width. If a box cornice or bracket-cornice is desired, let a correct estimate be made of every board, molding facia, bracket lintel, etc. If a verandah is to be erected, make a note of every piece of timber, cornice, flooring, and roofing; after which, let every article be brought on the ground, and the lumber stuck up or spread out in the sun to dry. One great fault in building is using lumber that is is only half seasoned. If lumber that has been sawn a year, or even four years, is spread out in the hot sun for a few weeks, it will shrink but little after being worked up in finishing a dwelling house. Floor boards in particular should be spread out at least four weeks on slabs or timber to keep to keep the ends off the damp ground; and every day they should be examined to see if they do not warp. The rounding or convex side should always be kept up. Clapboards should always be thoroughly seasoned before they are nailed in their places; as boards partially seasoned, when nailed at both edges as clapboards are secured will usually split during the seasoning process, and thus form damaging and unsightly cracks. As soon as the lumber is sufficiently dry, let every piece be dressed out ready for use; then strip one side of the structure, erect the verandah, put up the cornice, nail on the siding, and let the paint brush follow the hammer in close succession before newly dressed lumber will have a chance to get wet. By adopting such a plan,—"getting a good ready," and knowing what is to be done,—the expense, of repairing an old house, will be much lighter than if the various operations were conducted in a hap-hazard manner.—*Technologist*.

McKenzie's Improved Carriage Top.

In the construction of these improved mechanical arrangements applicable to carriage heads, which are made to open and close—such as the landau—the ordinary outside carriage head joint or jointed support is used, although in some cases dispensed with, this joint having, however, by preference, an action the reverse of that usually adopted; that is to say, the upper end is attached to a turning axis, which works on the pillar top or equivalent part of the carriage. To this axis lever teeth or other gearing is secured, which gearing is also connected to the cant rail, hoop stick, or equivalent, and likewise to a spiral or other convenient spring made of india rubber or other suitable material, the lower end of which spring is secured to the lower part of the pillar top. These parts can all be covered. The other end of the outside carriage head joint is provided with the same arrangement of gearing and spring, either in addition to or substitution for that at the top end.

Ropes or chains and pulleys may be used to enable the head to be raised or lowered, or opened and closed, from the coachman's or traveler's seat. The opening and shutting or raising and lowering are effected without handling the jointed supports, as is necessary in the ordinary arrangements, by pushing or pulling the head in the usual way, except when the ropes and chains are used, when it may be effected by acting on them; but this will cause the carriage head joint or support to strike outward and not inward, as generally is the case; hence, when the carriage head has to be raised, it can be much more easily effected than by the ordinary arrangements.

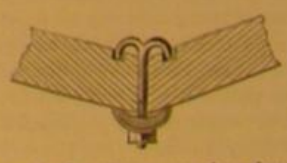
Where carriage heads have side lights which can be slid along and dropped into the door, or otherwise removed out of the way when raising or lowering the head—such, for instance, as are sometimes adopted for the fore half of the carriage—modifications can be adapted and applied so as to dispense with the outside joint or jointed support, and, by covering all the mechanism, keep the same entirely out of view.

Mr. Alexander McKenzie, of Westminster, England, is the inventor of this improvement.

BAIN'S PORTABLE BUILDINGS.

The building shown in our engraving is intended for a





dwelling in the case of persons moving from one place to another not far distant—as laborers on railroad bridges, excavations, etc., are often required to remove. It is also intended for outbuildings for farmers, and especially tenants on farms. It is suitable for barns, stables, tool sheds, shops, granaries, smoke houses, and chicken coops; in short, for any purpose for which outbuildings are needed.

The buildings are constructed of boards or planks in side, and roof sections of any desired number, to suit the size of the building required. These sections are joined together to form the proper angles, and fastened in such manner as to obviate the necessity of framework or corner posts. The fastenings used are the same in the various sizes, and allow

the angles, formed by the joined sections, to be increased or decreased, so that a section of a side, and a corresponding roof section, may be added to or taken from, the building without impairing its efficiency or affecting the strength of the fastenings.

Curved weather strips are applied to the outer portion of the angles, their shape permitting their adjustment to the angles in altering the size of the building, while they completely exclude the wind and rain, and also operate in connection with peculiar shaped bolts, which fasten them to the building, as binders, to strengthen and support the structure. The roof sections may be carried to a point, or a cone of sheet metal may be fitted at the summit, as shown.

The cone may be used as a ventilator or flue, in which case it should be made with a circular shaft, in order to more readily fit the roof sections to it, their points being cut properly for this purpose.

The building may be set upon any kind of ordinary foundation. To secure it at the bottom, if thought necessary, a sill or rail can be used.

The roof can be covered, if desired, by canvas or other material, but the inventor prefers to strip the joints with tarred or painted canvas.

The advantages of this kind of building are cheapness, portability (the pieces being light and few), the ease and facility with which such houses can be put together or taken down, and the capability of enlargement or diminution, nothing being needed but duplicate sections to enlarge as much as desired.

Patented August 8, 1871, by Francis M. Bain, of Delaware, Ohio, who may be addressed for further information.

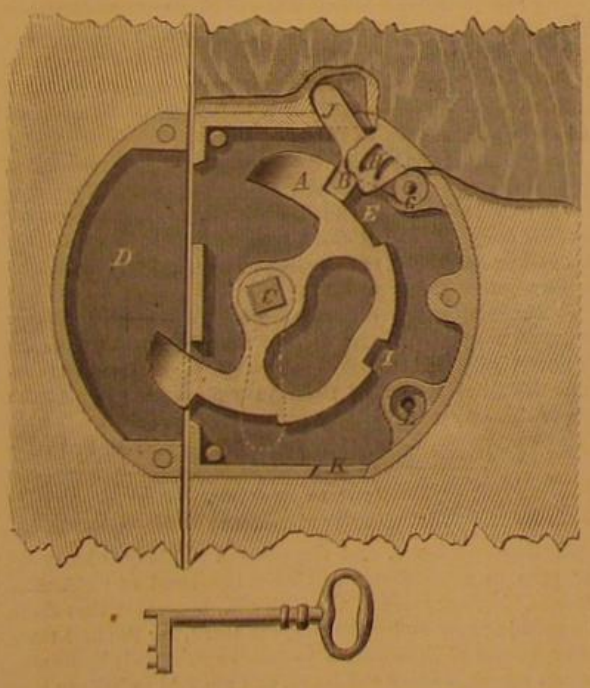
WARNER AND PAYNE'S DOOR LOCK.

This is a very simple lock, the bolt of which may be used either as a latch bolt, or as a lock bolt to securely fasten the door to which it is applied.

Besides the case, it consists of only two working parts, namely, the bolt, A, and the pawl, B, and the pivots on which they turn, all of which are cheaply made.

The bolt, A, which is in form something more than a semicircle, turning freely on its spindle, C, drops by its own gravity into the position shown in the engraving, and enters the keeper, D. In this position it may be turned by the knobs or handles on the spindle to a distance limited by the length of the notch, E, in which the pawl, B—also acting by gravity—enters, and with the shoulders of which notch the pawl engages.

This motion, however, is sufficient to release the bolt from the keeper, so that the knobs only are required to move the former when used in the manner described.



The pawl, B, turns upon a hollow pivot or cylinder, G, the opening in which coincides with a hole in the case of the lock. From the center of this opening, two segmental apertures, H, are cut through the case. The pod of the key enters the hollow pivot of the pawl, and the two wards enter holes in the pawl reached through the segmental openings, H. By turning the key thus applied, the pawl is raised, so that the bolt may be turned further round by the knobs on the spindle, and the pawl may enter the notch, I, the latter being made to fit, quite closely, the downward projection on the pawl. In this position, the bolt cannot be turned from the outside without the use of the key. The pawl, however, has a handle, J, from which projects a knob on the inside of the door, by the use of which the pawl may be raised and the bolt turned without the key. By making the bolt similar at both extremities and providing a second opening, K, for the handle of the pawl, and a proper pivot hole, L, for the pivot of the pawl, the lock is made reversible for right and left hand doors.

Patented through the Scientific American Patent Agency, Oct. 3, 1871, by Martin P. Warner and Edwin W. Payne, of Morrison, Ill.

Novel Uses of Electricity.

The efforts which have been made from time to time, with but poor encouragement, to engrave on metals by means of electricity, seem at last, says the *Iron Age*, to have resulted in the attainment of practical results. An ingenious French mechanic has produced an invention by which a metal plate, upon which a design is drawn with a chemical ink of some kind is slowly rotated with its face vertical, and several other similar plates, graded in size, are also slowly rotated by appropriate mechanism. The object of the invention is to engrave on the smaller plates the design traced upon the largest, on different scales of magnitude, which is accomplished by applying a cutting point to the face of each plate, and which is pressed against it by means of an electric current whenever a blunt point, applied to the large plate, encounters the ink in which the design is traced—the cutting points being at other times withdrawn. The point presented to the first plate is merely a "feeler," which determines by electrical agency whether the ink is beneath it or not. If it is, the points are pressed into the surface of the other plates; if not, they are withdrawn and prevented from cutting. The feeler and the briuns must, of course, all follow a spiral track. This is crude, and can be made applicable to the reproduction of certain kinds of designs only, but it is considered a long step in the direction of practical success.

Correspondence.

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

The Psychic Force.

To the Editor of the Scientific American:

An anonymous writer from Jersey City, signing himself B. D., remarks in your last number, that the unearthing of the jugglery which I maintain to underly the manifestations exhibited by Home, requires "far deeper plowing than Dr. Vander Weyde has done in his letter of August 12."

I say so myself; but how can B. D. expect that I would be able thoroughly to unearth tricks which not only I had no opportunities to investigate, but which I have even not seen, and of which I know nothing except by description, in which, no doubt, many most important details were left out, and only such particulars were mentioned as served to apologize for the apparent credulity of the reporter, Mr. Crookes? His whole report is evidently one sided. He overlooked little particulars, which would, to a more competent expert than he proves himself to be, have given the key to the mystery of the whole performance.

When, some years ago, the Emperor Napoleon III. had seen Home's exhibition, he was full of astonishment at the wonderful feats he had witnessed, and invited, the next day, the eminent savant Arago to the Tuileries; and, after giving him a detailed statement of the performances, asked an explanation on scientific principles. "Sire," said Arago, "it is utterly impossible for me to give a satisfactory explanation of phenomena which I have not seen myself." I think this is an excellent rule, and I have since followed this example, and do not pretend to give a satisfactory explanation. All that I did, and intended to do, was to suggest some ideas explaining how such tricks might be done, and to call attention to the infinite resources offered to the initiated in the field of physical sciences.

B. D. makes one strong point out of the fact that Mr. Crookes saw Mr. Home change his dress, and therefore knows that there was no machinery secreted about him. Well, this only proves that the tricks were performed by means of contrivances not concealed on Mr. Home's body; or, after all, perhaps there may have been some machinery concealed in the clothes he put on—a trick of which I myself have been guilty. Mr. Crookes, it appears, was not enough of an expert to examine carefully every article of dress put on by Home, otherwise he would surely have mentioned this also.

Another strong point made by B. D. is the statement that the apparatus was arranged without Home's supervision. I ask, therefore: Who arranged it? Evidently, Mr. Crookes did not do it alone; his assistant, who looked under the table during the performance, says he saw certain motions of the accordion, and Mr. Crookes inserts in his testimony the existence of these motions, which he did not see at all himself. This has no value, it is not even legal testimony, as before a court you may not swear as to facts you know only by hearsay. I have my strong suspicions that there was collusion between Home and Mr. Crookes' assistant; this is another trick of which I myself confess again to have been guilty often: but Mr. Crookes is too confiding and too innocent to cherish any such suspicions.

B. D. thinks I am "attributing to Mr. Crookes, and the two other gentlemen, an amount of obtuseness that is not characteristic of either of them." B. D. must profess little knowledge of human character not to know, or never to have observed, that many men, very intelligent and of sound judgment in almost all respects, are obtuse, and even stupid, in certain peculiar matters—for instance, in their religious tenets, or in their political convictions. It has even been asserted that most men are insane on some particular subject, and it is surely true of a great many I know; they rather believe in a mysterious supernatural agency, acting in an absurd, nonsensical manner, than in the well known natural laws and forces, acting always consistently and wisely, and of which those who are more acute than their fellow men take advantage to deceive them.

Certain men will profit by the general love for the mysterious, by the universal predilection for believing in what is liked best, without investigating what is strictly true, and by the general disgust of people in being told that they err in judgment. This last fact is the strong point which maintains the belief in supernatural agencies. Men, in general, are not ashamed to complain of their bodily defective constitution, and even their mental deficiences in regard to memory, etc., but never in regard to their judgment; this is infallible, in their own sight. Therefore, when you tell them that they erred in judging about the so called spiritual manifestations, and that they were totally mistaken in ascribing them to the mysterious agencies, the belief in which they so dearly cherish, you will find that there are very few who will ever forgive you.

I will only add, as a proof for the necessity of witnessing such performances in order to explain them, that I was at a total loss to explain the feats performed by the Davenport brothers, as long as I only had heard of them by report; but as soon as I saw their performance, at the Cooper Institute in 1864, it was not only all clear to me, but I performed myself all their feats, before many witnesses, when no public performances were taking place. As at that time I lived in the Cooper Institute building, I had access to the hall in which their box or closet remained, and in which they performed every evening. I had, therefore, for some two weeks, a good chance to practice, and soon became as expert in all their feats as the genuine original performers themselves, and must declare that I since have remained utterly astonished at the obtuseness of the audiences which nightly paid their money, and believed in supernatural agencies to account for so clumsy and stupid deceptions. The only way by which I can account at all for this fact, is the consideration that the very great majority of those who came there, are prejudiced in favor of the reality of supernatural agencies; they expect and they wish to see them, and therefore get what they wish. Luther gave proof of his deep knowledge of human nature when he said: "Just as you want your mental belief, so you will get it."

P. H. VANDER WEYDE.

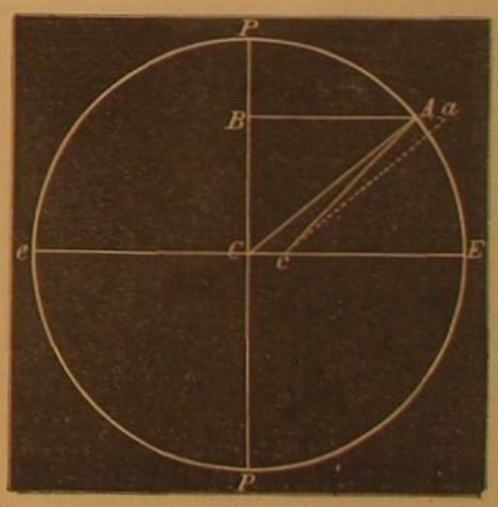
New York, Sept. 27, 1871.

Variation of a Plumb Line from the Perpendicular.

To the Editor of the Scientific American:

In looking over a file of the SCIENTIFIC AMERICAN, I find in your issue of January 14, 1871, a discussion relative to the tendency of a plumb line to vary from the true perpendicular, as is found to exist at the central shaft of the Hoosac tunnel. A mathematical demonstration by J. E. Hendricks, of Des Moines, Iowa, is there given, which I think can be shown to be incorrect both in principle and in the result.

Let P, E, P, e, be the earth; P, P, the axis; E, e, the equator. As the earth revolves upon its axis, every place on its surface, except at the two poles, describes a circle; thus a body, placed at A, will, in one revolution of the earth, describe a circle, the semidiameter of which will be A, B, perpendicular to the axis, P, P. In like manner; C, E, is the semidiameter of the circle described by the revolution of a place at the equator. But C, E, is the semidiameter of the earth, and A, B, the cosine of the latitude of the place, A. By the "Laws of Central Forces," when the periodic times of a revolution are equal, the centrifugal forces are as the radii. Whence a body at E has its centrifugal force as much greater than at A as the radius C, E, is greater than the radius A, B. Consequently we have this universal rule: The centrifugal force



at the equator, is to the centrifugal force at any other place, as the radius is to the cosine of the latitude of the place.

With the foregoing explanation, we come direct to the question at issue. Required the point toward which a falling body will tend, at the mouth of the central shaft of the Hoosac tunnel in 42° N. Lat., the centrifugal force at the equator being to the force of gravity as 1 is to 289. 1. As radius: to the cosine of 42° :: is 1, (the centrifugal force at the equator): the centrifugal force at 42° N. Lat. = 0·74314.

Hence the force of gravity at that point is to the centrifugal force in the ratio of 289 to 0·74314. To construct the problem geometrically, draw the dotted line, A, a, (representing the centrifugal force and its direction), so that it shall have a proportionate length to line A, C, (representing the force of gravity and its direction), as 0·74314 is to 289; draw the line, a, c, parallel to A, C, and c will be the point to which the falling body will tend, along the diagonal, A, c. c will be a point on a semidiameter at the equator, drawn parallel to a tangent at the equator, where it is intersected by a meridian of the place of experiment. 2. To find the angle of variation from a true perpendicular: The line, A, a, equals C, c, the angle A, C, c, equals the latitude of the place of experiment, 42°, therefore, as the logarithm of 289 is to the logarithm of 0·74314, so is the sine of 42° to the angle required, which = 5′,55·095″.

To find the amount of deflection at the bottom of the shaft it being 1,030 feet deep. As radius is to the sine of 5′,55·095″, so is the logarithm of 1,030 to the distance, which = 1·7722 feet in the direction of the centrifugal force.

The foregoing demonstration is based on the supposition that the earth is a sphere, and the place of experiment at the

level of the sea, but the earth being spheroidical in form, and the place in question some thousand feet above that level, will change the result here given. Knowing the difference between the polar and equatorial semidiameters, the ordinate A, B, corresponding to any required degree of latitude, can be readily found, to the length of the ordinate thus found, all the hight above the sea level; then instead of using the formula as radius is to the cosine of the latitude, say as the logarithm of the equatorial diameter, in feet, is to the logarithm of the ordinate A, B, plus the hight above the sea level in feet, so is 1 to the centrifugal force at A, which will slightly alter the fraction from what is before given, representing the centrifugal force at that point; thereafter, in the solution, follow with the proportions as before given.

Corning, Mo. HORACE MARTIN.

Facts and Figures Regarding Steam Boiler Explosions.

To the Editor of the Scientific American:

In your issue of September 23, John Lynch, M.D., Professor in South Carolina University, is very severe on the profession of which I am a humble member. He says that "the world looks to the practical engineer for an explanation of the causes of the frequent steam boiler explosions. But the recent examination of the so called experts shows that the world (and, no doubt, the experts also) has been deceived," etc. I must differ with the learned professor. The practical engineers who testified, among whom is Mr. McMurray, have shown that the boiler of the *Westfield* exploded simply because it was not strong enough to resist the internal pressure of the steam. It is true that the said experts used the opportunity to ventilate their mysterious theories, and let off the gases with which their boilers are charged; and even the learned professor seems anxious to add to the number of "probabilities" which are so injurious to all calm and candid investigations. In this age of scientific inquiry, it is certainly strange that even educated men should cling to the superstition of the middle ages, as they evidently do, from the love of the mysterious, which enables thousands to accumulate wealth as astrologers, mediums, and quacks. So great is this love of the mysterious that I would not be astonished to find at some future investigation of boiler explosions, the newly discovered psychic force act an important part. We are told that this is a latent force, possessed by many (unknown to themselves), a force able to suspend a man in mid air, and move the heaviest furniture; and no doubt it is the cause of earthquakes and boiler explosions.

The only reliable manner of investigation is to carefully examine the results produced under various circumstances, and thence to find the common cause. To do this, I will take for investigation two explosions with which I am familiar in every detail. The first was the most disastrous explosion that has ever come under my personal notice. A kier, about four feet in diameter by ten in hight, situated some fifty feet from the boiler, and connected with the same by an 1¼ inch pipe, had a safety valve, 2 inches in diameter, and was filled about eight feet with woolen yarn and water. The steam pipe entered near the bottom of the kier, and ended near the center of a cast iron pipe called the "vomit" pipe. After the whole of the water was heated, this vomit pipe ejected water and steam on top of the yarn, in the same manner as the patent wash boilers vomit the water from the bottom over the clothes. This kier exploded with terrific force, carrying destruction to every building within 100 feet, and projecting the upper part of the kier like a rocket into the air, the bottom separating from the cylindrical shell. I have never seen a more complete ruin. Buildings were shattered, walls thrown down, roofs and rafters torn off, and houses and trees in the vicinity covered with yarn of all colors. Now here, certainly, could be no hydrogen gas, still less free oxygen; and certainly not even red hot plates to ignite the compound. There could be no low water, no overheated plates. No camel's back expansion; no water overcharged with heat while in a quiet state; no sudden evolution of steam, no electricity, although there might have have some psychic force. What caused this kier to explode? Overpressure! What caused the immense destruction? Instantaneous relief of an immense power! I am sorry I cannot gratify the love of the mysterious; but facts are stubborn things. The safety valve was choked with woolen yarn; and every bleacher is familiar with the trouble, in all kiers, of swelling by the steam getting under the cloth or yarn, and raising the same bodily. Now this kier was built to stand thirty pounds pressure, and when the vomit pipe discharged freely, any overpressure should have been relieved by the valve; but the kier swelled, the safety valve was choked, the pressure rose, and the weakest part gave way, opening the whole bottom, containing an area of 1809½ square inches, which, at 30 pounds pressure, would give a force of 54,285 pounds on the bottom, and a reactive force to lift the kier of 27,142½ pounds. The whole power stored up in the kier, if expended in one second of time, was equal to 345,600 horse power, certainly sufficient to cause all the destruction accomplished.

The second case happened within one mile of the first. It was the explosion of a 125 horse power Miller's safety boiler, and consisted of fifteen sections, each of twelve three inch tubes, which were connected with the water and steam main by two one inch pipes each. This boiler supplied steam for a 200 horse power Corliss engine, carrying a load, as near as could be ascertained, of 180 horse power; it had a grate surface of 11 ft. 6 in. by 5 ft., or 57½ square feet, with an extraordinary good draft. The engineer, an honest, intelligent man, stood near one of the fire doors when one of the tubes burst, the weld opening for about twelve inches. The result was a discharge of steam which partially extinguished the fire, with a hissing noise, but not the slightest damage either to life or property. On taking out the sections, it was found that seven had been injured by fire, and it was perfectly evident that they were exposed to a severe fire with little or no water. These are the facts. The pressure at the time of the explosion was 80 pounds. We ask why no serious damage was done, and find an answer in this: Each section was connected with the rest by two one inch pipes, giving an area of one and a half square inches, or a force of 120 pounds, with a reacting force of 60 pounds, not sufficient to displace any part of the structure. Here we have low water, red hot plates or tubes, sudden expansion of metal, favorable provision for the formation of hydrogen gas, and all the mysterious conditions for a first class explosion; why not the disastrous results? Simply because the relief of the power stored in the boiler took too much time, and time is an important consideration in estimating power.

If it is your good fortune, Mr. Editor, to open a bottle of champagne, with a friend or two, and let the stopper pop, you have a *bonâ fide* explosion; "the act of driving out any thing with noise and violence." If you drink one alone, and wish no one to hear the noise of the explosion, insert a tubular corkscrew provided with a pet cock and relieve the gas gradually; if no such corkscrew is handy, keep your hand on the stopper, and so let out the gas and prevent an explosion. If the bottle be weak, and you have the stopper secured by the wire, a sudden shaking, particularly when a little warm, will cause a "burst; to break suddenly." If you drink too much, you are "on a burst," because some people in that interesting condition break things suddenly, although I suppose editors never do.

Steam boilers, as other things, become weak by wear. They grow weak sooner when forced, when bad water is used, when they are irregularly fed, or when they are carelessly managed. In fact, the occasional reports of the Hartford Steam Boiler Inspection and Insurance Company tell the whole story. For July, 1871, they report "Furnaces out of shape, 33—6 dangerous; fractures in all, 40—19 dangerous; burnt plates, 50—16 dangerous," etc. Boilers may be, and often are, so faulty in construction that some of their parts have to resist a greater strain than they are able to sustain, as may be seen in boiler works where some difficult parts are often forced into position, and at times are split and rejected, but more often made to answer. There is no mystery as to the cause of boiler explosions, and there is a simple remedy. All modern ships are built in compartments, so that injury to one does not impair the efficiency of the rest; and we must do the same with steam boilers. There are many such in the market, and there are some that combine an economy never before reached with absolute safety. They are appreciated by manufacturers, and some of the largest of them, such as the A. & W. Sprague Manufacturing Company, who are using over 100 steam boilers, are now putting in safety boilers, as much on account of their great economy in fuel as their safety from disastrous explosions. One firm in Rhode Island manufactures now over 300 horse power of safety boilers per week, and has orders on hand to last till January. Ferry boats and steam ships must soon follow. And the world will be forced to admit that engineers, even if not perfectly familiar with modern chemistry, have conquered steam and made it safe and cheap.

JOSEPH A. MILLER, C. E.

Boston, Mass.

Testing the Purity of White Lead.

To the Editor of the Scientific American:

On the 18th of March last, you were kind enough to publish a test of the purity of white lead by use of the blowpipe, sent you by me over my own signature. A short time after its publication, a criticism of it appeared in your columns, signed by "X," of Pittsburgh, Pa.

I did not at the time deem it incumbent upon me to notice the criticism—if it can be so called—first, because the writer did not see fit to sign his own name, as in all fairness he should have done; and secondly, because I did not consider that to a reader of ordinary care, it really called in question the correctness and certainty of the blowpipe test, but only stated that the writer had once made an experiment in another and entirely different manner from that directed by me, which experiment had proved a failure.

My attention has, however, been recently called to the fact that the communication of "X" has been made use of (I trust without his knowledge) in trade circles, in such a manner as to make it appear as a partial refutation of the test, so I am induced to ask again the use of your columns to reply, which I will do as briefly as possible.

In my description of the test, I did not state that carbonate of lead would or would not reduce to its metallic base when heated in a crucible, so I cannot see that the gentleman's experiment has any bearing upon the test whatever. What I did state, and what I now beg to reiterate, is simply this: That a sample of pure carbonate of lead (white lead) when exposed, upon a piece of charcoal, to the action of the "blue" or hottest part of the flame of the blowpipe (in chemistry the word "reducing" is used, it being, in the use of the blowpipe, synonymous with "blue" or "hottest") will quickly part with its carbonic acid and oxygen.

I will also say that it makes no difference whether the sample be dry or in oil (except that in the latter case it will reduce a little quicker, as the oil helps it) whether a long or short time has been consumed in its corrosion or manufacture, whether it has "age" after manufacture or not, or by whom or by what process it has been converted into a carbonate.

But if a sample be adulterated with oxide of zinc, sulphate of baryta, whiting or other carbonate of lime (the usual adulterations), it cannot be reduced, because the adulterations cannot, by any heat obtainable with the blowpipe, be reduced to their own metallic bases, and cannot, of course, be converted into metallic lead.

The test is simply the adaptation of long and well known chemical facts to a beneficial commercial use, and I have not heretofore claimed and do not now claim more for it. As I fully realized its importance, and anticipated the probable effect of its publication upon the trade in imitation and adulterated white lead, before writing it I had applied it to many and various samples of white lead, both of American and foreign manufacture, of various "ages," and its results were in every instance confirmed by my tests or analyses in the "wet" way.

It will be found equally useful in detecting adulterations in litharge, red lead, or orange mineral, the latter being simply a superior article of red lead.

If "X" instead of setting up a test (?) of his own, and then proceeding to knock it down, will consult any analytical chemist as to the truth of the test, or will make the test as directed in my description, he will certainly be at once convinced of its correctness and reliability; and this course I would recommend to any one interested in the matter.

I will not again trespass upon your valuable space to reply to an anonymous communication on this subject, and I thank you for your indulgence in this instance.

St. Louis, Mo. FELIX MCARDLE.

Exit Mr. Paine.—He Declines the Challenge for a Test of His Electromotor.

To the Editor of the Scientific American:

Barnum, in his "Forty Years Recollections," relates his purchase of Peal's Museum, and the running of it in opposition to his other museum, the abuse of each other, growing out of their simulated rivalry, resulting as a profitable advertisement.

Now, I desire to assure you that there is no collusion of this kind between Mr. Smith and myself. I do not remember to have ever met the gentleman, and, as far as I am concerned, he is a Mr. Smith seeking knowledge under difficulties.

Mr. Smith, feeling uncomfortable in his "ridiculous position," attempts to make a diversion by citing certain alleged violations of contract on my part. I am at a loss to conceive what relation my private business matters may have with the subject matter under consideration, but Mr. Smith undoubtedly has an object in view, and in courtesy to him I proceed to state, that he has not seen, neither has any one seen, such a contract as he specifies in his seventh paragraph, for the very good reason that no such contract, *expressed* or *implied*, ever did exist, and furthermore, my name cannot be found as a party to any contract where it is not expressly stated that the enterprise is experimental, and to be solely under my supervision. Therefore, the remarks attributed to me in Mr. Smith's eighth paragraph are the coinage of his own brain, as they are predicated of a condition of things that had no existence.

Mr. Smith's closing proposition amounts to just this: "Mr. Paine, I bet you five hundred dollars that I can flog you; now if you don't step out and let me try, you must consider yourself flogged." Mr. Paine respectfully declines to accept this sportsman's bluff, and does not fear to let the matter be an open question.

To Mr. Smith and others, who have attempted to cast odium on my experiments, I have already given too much notice. Hereafter I propose to allow these gentlemen to continue their defamation of me as may please them. At the proper time my work will show for itself.

H. M. PAINE.

Selenitic Mortar.

To the Editor of the Scientific American:

We live and learn, and the present teachings open wide our eyes in astonishment. Under the head of "Selenitic Mortars," in your issue of the 20th ult., I discover that there is something new under the sun, and learn, for the first time, that sulphate of lime added to mortar renders it hydraulic. I again repeat, we live and learn, as I am told to believe that such is the case. However, my experience tells me, that plaster of Paris, in its natural state, will not render any lime hydraulic. This is easily proved. However, if any one doubts my assertion, I call upon him to make an artificial hydraulic cement out of a pure lime. I should first get rid of the sulphate in any ingredients I might have to use (pumice grit, for instance, for the cementing material therein is pure sulphate of lime) by "roasting," and I should add an ingredient containing alumina and the oxide of iron. Soapstone would answer; but, better still, any clay containing those two ingredients, and which is very abundant all over the world. This has, however, to undergo a certain preparation, which I thought was known only to the writer; and then I should proceed in my manufacture as Colonel Scott, R. E., has done. I may remark, that in 1840 to '45, I built many bridges and culverts in Matwa, India, of cement thus formed; and in 1846–'47, I laid the artificial foundations of the Aden defensive works with coral lime (the purest of lime), rendered hydraulic by the admixture of pumice grit deprived of its sulphate; I found in Aden that if this sulphate was not got rid of by "roasting," there was no hydraulic property whatever. We all know for internal work (decorations) plaster of Paris is used, and that it alone is very quick setting. I admit, any lime may be made selenitic by Colonel Scott's process; but that that alone will render any lime hydraulic, I cannot admit. The secret is the burnt clay. If nodular lime stone be procurable, calcine it, *without* washing, and you have an hydraulic cement, unless the clay

in the nodules be over abundant; and this was the origin of my cement in 1840. As the result of my observation, I wrote an article on this subject in the *Country Gentleman* of March last.

J. KILNER,
Major-General Retired List, Royal, late Bombay, Engineers.
Fredericton, New Brunswick, D. C., Sept. 19, 1871.

A Leaf from a Practical Engineer's Experience.

To the Editor of the Scientific American:

I sent you an account of a circumstance which happened while I was running a portable engine, which you printed in an early number of last volume of the SCIENTIFIC AMERICAN.

I mentioned that in about four seconds the steam rose from eighty to one hundred and forty pounds. The safety valve would never, of its own natural action, have saved that boiler. I was looking at the steam gage at the moment that it began to indicate more pressure, and I raised the valve lever as high as the construction of the connections would allow, till mud and foam rose high in the air, and the pressure came down to the running point.

After reading of the *Westfield* explosion, and the opinions of your correspondents, I came to the conclusion that it is high time that something was done for the safety valve. It is in the same condition now that it was in seventy years ago. We need a valve that will rise two or three inches out of its seat in one moment, so as to give full relief before the pressure has time to get to a bursting point. That valve might be set so that it would not act unless there was positive danger. It might be constructed with what I will call the first load direct on the valve stem, without a lever. I would continue the stem upward, and connect it with a loaded lever or a spring that might be held down with a catch that would be let go with the first motion upward of the valve stem. It would almost entirely do away with the idea that if part of the fire surface gets red hot, and the water rises over it while in that condition, that there must be an explosion. If there are any weak points in my plan, I hope your correspondents will let me know them, so that the public may find out whether there is any means of reducing the number of boiler explosions.

San Francisco, Cal. JOHN MAILER.

Controlling Balloons.

To the Editor of the Scientific American:

While experimenting with a magnetic needle and observing the well known fact, that when the needle is thrust through any solid body and delicately poised, the attraction of the needle is strong enough to turn the body toward the north, it occurred to me that this principle of the needle might be applied to aid in guiding balloons.

Aeronauts have vainly sought for some contrivance for guiding, or preventing the rotation of the balloon. Now, suppose we construct a powerful magnetic needle, or bar, long enough to pass through and project from each side of the balloon; as the slightest influence will rotate a balloon or any other body when suspended in still air, or in a steady current of air, the magnetic bar would keep one side of the balloon toward the north, and other appliances could be used to drive it in other directions.

Hartford, N. Y. JOHN H. MARTIN.

Baltic Sea Soundings---Results of a Recent Exploration of the Baltic.

The greatest depth of the Baltic between Gothland and Windau as reported by the discovery ship *Pomerania* was found to be 720 feet, not 1,000, as was formerly supposed. At the depth of from 600 to 720 feet the water was, at the end of July, very cold, the thermometer giving from ½ to 2° R. No plants were found at this depth, and only a few specimens of one or two species of worms were brought up with the clay and mud. The cold probably prevents fresh water animals from living at such a depth, while the small quantity of salt which the water contains renders it unfit to support sea animals. Animal life abounds from the surface to about 300 feet below it, while plants were seldom found at a depth of more than sixty feet. The Baltic is supplied with salt water by the Cattegat, through which a deep water current flows into the Baltic, while the brackish water which is lighter, streams into the North Sea by a surface current. In the part of the Baltic which lies to the west of Rugen, the difference between the brackish water of the surface and the salt water of the depths is far more strongly marked than in the eastern basin, and consequently a number of animals and plants are to be found in the former which are entirely absent in the latter part, where the water contains a comparatively small percentage of salt. Both animal and vegetable life were found to be most abundant on the coasts of Mecklenburg, Slesvig and Holstein, and in the bay of Lubeck.

Terrible Conflagration in Wisconsin and Minnesota.

As we go to press, we have telegraphic reports that a terrible conflagration is devastating some of the finest wooded regions of Wisconsin and Minnesota. Fifty townships have been burned out, including dwelling houses, barns, fences, telegraph lines, and every inflammable substance on the surface of the ground. Hundreds of families have been rendered homeless. Animals, wild and domestic, are running in every direction. The burned territory now presents an area of *three thousand square miles!* This is almost equal to the total area of the State of New Jersey.

TRUTH is immortal; the sword cannot pierce it, fire cannot consume it, prisons cannot incarcerate it, famine cannot starve it.

RECENT IMPORTANT PATENT DECISIONS BEFORE THE UNITED STATES CIRCUIT COURT FOR THE EASTERN DISTRICT OF PENNSYLVANIA.---MC'KENNAN, JUDGE.

SAPONIFIER PATENT.

Pennsylvania Salt Manufacturing Company *vs.* E. A. Thomas; Pennsylvania Salt Manufacturing Company *vs.* Christian Barry. The complainant is the assignee of George Thompson, to whom reissued letters patent Nos. 2,570 and 2,571 were granted, for the unexpired term of fourteen years, from October 21, 1856. The first is for the process of putting up caustic alkali (soda or potassa) in metallic casing or integument, by pouring the molten caustic alkali into the casing, and then doing up the top: and the other is for caustic alkali inclosed in a light metallic integument or metallic casing. One is for the process of putting up caustic alkali, and the other for the product of such process.

The validity of these reissues is assailed upon the ground that they are not for the same invention described in the original patent. They are divisions of the original patent, and are, therefore, to be treated as but one patent, with two distinct claims. Although this division of the patent may have been unnecessary to effectuate the invention, it in no view impairs the validity of the reissues. Nor will discrepancy in the titles, and variations in the description and claims of the original reissued patent, avoid the latter. Their effect results only from diversity of subject matter. Battin *vs.* Taggart, 17 Howard, 84.

The material inquiry then is, is the subject matter of both patents the same invention? In other words, are the process and the product claimed in the reissue substantially described in the original?

In the original patent, the nature of the invention is stated to consist in "a new and useful mode of wrapping cakes of potash or caustic soda in air tight wrappings, so as to preserve it from the action of the atmosphere, being designed to enable the manufacturer, of the caustic alkali, to put them up in original packages of uniform size and weight, of such convenient size that when a package is opened the whole may be used at once." Two modes of carrying the invention into effect are described. One is to provide canisters of thin sheet iron, cemented at the joints with inflexible cement, into which the caustic alkali is poured in a molten state, and while hot, the lid is closely fastened down, so as to exclude the atmosphere. Now, while this patent describes and claims the process of putting up caustic alkali in air tight integuments, it describes also the object and result of the process. Packages of caustic alkali are produced of uniform weight, and such convenient size that when a package is opened the whole may be used at once. The very object of the description is to indicate a product possessing original merit as the result of an improved process.

In reissue No. 2,570, which is for "an improved process of putting up caustic alkali," the description of the process is manifestly in substantial accordance with the description in the original specification.

Reissue No. 2,571 is for an "an improvement in the manufacture of caustic alkali," and claims "caustic alkali, incased or enveloped in a tight metallic integument or casing, substantially as above described." The mode of incasing it, and its peculiar properties when incased, are distinctly described and stated, and with no material variation of phraseology from that employed in the original specification.

It is apparent that the subject of both specifications is caustic alkali, so put up and prepared as to secure special commercial properties, protection against deliquescence, capability of safe transportation, and adaptation to general use. The reissued patent, then, is for the same alleged invention described in the original specification, and the apparent object of the amendment was to make an explicit claim for it as a new article of manufacture and commerce, which was distinctly indicated as the patentee's invention, but was not technically claimed in the original specification.

It has been repeatedly adjudged that this may be done. "This," says Mr. Justice McLean, in Battin *vs.* Taggart, 17 How., 84, "the patentee had a right to do. He had a right to restrict or enlarge his claim, so as to give it validity and effectuate his invention." And so Mr. Justice Grier held in passing upon this patent, in this court, in Pennsylvania Salt Manufacturing Company *vs.* Guggenheim, 3 Fisher, 423.

The respondent further objects to the patent, that the invention claimed is not novel. I do not propose to notice in detail the evidence adduced on this point. It is sufficient to say of it generally, that it does not prove that the product, with distinguishing properties claimed by the patentee to belong to his, was in use before his invention. The hydrate of soda was a well known chemical substance, rapidly deliquescent when exposed to the air, and, by reason of its causticity, difficult to handle and dangerous to transport. An obvious security against these risks was to inclose it in anticorrosive, air tight vessels, and so it was treated, but in the modes adopted for its preservation it was only employed in the laboratory, in surgical operations, and in the arts, which would admit of the use of large quantities of it at one time.

It was not until George Thompson, after repeated experiments, perfected his method of putting it up, that caustic soda was brought into very general household use in the manufacture of soap. This was undoubtedly due to the plan devised by him for its preparation, whereby portability, safety and convenience in handling and transportation, and special adaptation to domestic use, were, for the first time, secured. The proofs, therefore, fall short of overcoming the presumption of novelty arising from the patent.

A grave objection is that which brings in question the patentability of the alleged invention. A patentable subject must be not only new and useful, but it must involve some exercise of the inventive faculty, and it must not be merely the application of an old thing to a new use. It is undoubtedly true, that small metal cans and infusible cement were in use before Thompson's invention, and that caustic alkalis were preserved from deliquescence by inclosure in air tight packages of glass, iron and wood; but still the fact remained that caustic soda was unavailable for general use, and especially for the domestic manufacture of soap. By Thompson's method it was invested with commercial properties and practical adaptabilities which did not pertain to it before.

Its deliquescent tendency and corrosiveness confined its consumption within narrow limits. By Thompson's efforts these difficulties were practically overcome, and it was fitted for general use and the supply of a universal want. In the language of Mr. Justice Livingston, in Langden *vs.* De Groot, 1 Paine, 206, "it was rendered more portable and convenient for use." The effect was to immensely increase its consumption in the domestic production of soap, which was before manufactured by other methods, or in large establishments only. Indeed, it may be considered as originating a new branch of domestic manufacture. This is certainly indicative of original merit, and is demonstrative of its great public utility.

The patentability of an alleged invention is, in many cases, most satisfactorily shown by its utility. In Webster on "Subject Matter," 30, it is said, "the utility, then, of the change, as ascertained by its consequences, is the real practical test of the sufficiency of an invention; and since the one cannot exist without the other, the existence of the one may be presumed in proof of the existence of the other. Wherever the utility is proved to exist in any great degree, a sufficiency of invention to support the patent must be presumed." Judged by the standard of utility, then, a sufficiency of invention to support this patent is to be presumed.

In a commercial sense it has just claims to be regarded as a new product. It was so treated by Commissioner Mason in the original application for a patent. In his opinion he very forcibly says: "Had he discovered an ingredient which, mixed with alkali, would, without injury to its properties in other respects, have prevented it from a tendency to deliquescence, he would have made a patentable discovery. Is not this equally so? In fact, the packages of alkali, done up as proposed, may, in substance, be deemed a new commodity, a new article of merchandise, for although its constituent ingredients are the same as were before known and used, a new property has, in reality, been communicated to it. In point of fact, the article now offered for sale is the alkali without any tendency to deliquescence; this, though chemically not new, is so commercially, and is so proved by the affidavits filed." Equally satisfactory proof of this has been exhibited in this case, and to this is to be added the wide extension of its use, as a significant recognition of its novelty as a commercial product.

The whole question was before this court in the Pennsylvania Salt Manufacturing Company *vs.* Guggenheim, and the patent was held to be valid. Such a judgment, pronounced by a judge whose knowledge, experience and ability invest his opinion with the weight of high authority, must and ought to overbear all doubts upon the subject in this controversy.

That there are differences in the method employed by the complainant and respondents, to incase the soda and seal the packages, is doubtless true; but the product of both is substantially the same, namely, caustic soda encased or enveloped in a tight metallic integument, which may be preserved and transported, and thus introduced into general use.

The respondent, therefore, is an infringer.

Decrees were entered by the Court, referring the case to John Cadwalader, Jr., Esq., as Master to report damages Harding, for plaintiff; Cuyler and Burton, for defendant.

THE WETHERILL ZINC CASE.

In the United States Circuit Court for the District of New Jersey, Judge McKennan ordered a decree to be entered for the plaintiff, deciding Samuel Wetherill's patent to be valid, and that the New Jersey Zinc Company had infringed it, and referred it to S. D. Oliphant, Esq., of Princeton, as Master to estimate and report the savings and gains made by the defendants, and also awarded a perpetual injunction. Judge McKennan said he would file an opinion in full hereafter, but would now state the points of his decision, as follows:

In the Circuit Court of the United States, for the Third District of New Jersey:—Samuel Wetherill and George W. Gilbert, administrators of Charles J. Gilbert, deceased, and Martha M. Jones, administratrix of Samuel T. Jones, deceased. Also, Samuel Wetherill and George W. Gilbert, administrators of Charles J. Gilbert, deceased. In equity.

1. The patent of Samuel Wetherill for a process of reducing ores of zinc, by the direct application of fuel to the ore in a crushed state.

2. The conspicuous merits of his process are: Great economy in the consumption of fuel; a more thorough liberation of the oxide from the ore than could be accomplished by any known treatment of it; the production of white oxide of zinc, of a better quality and at a less cost than it had been produced before; and the utilization of the slag resulting from the use of some of the ores of zinc. These results demonstrate its utility and value. Of its novelty there is no question.

3. Its essential features are in the employment of a thin bed fire of chestnut coal, and of a superincumbent layer of pulverized ore and pea coal, approximately of the thickness of three inches; the enforced passage of atmospheric air in numerous small jets through the mass, by which its combustion is maintained; the vaporization of the zinc and its oxidation in the furnace above the charge are effected, and the withdrawal of the charge when the zinc in the ore is expelled, and the repetition of the process.

4. It is fully, clearly, exactly, and particularly described in his specification.

5. It is satisfactorily shown, by the oral proofs and by the analysis of the slag, that the thinness of the bed coal and of the charge of crushed ore and coal, within the limit of eight or nine inches, and alternation of the process, are essential to its practical efficiency and success.

6. Burrows' patent is for a furnace, not for a process.

7. The directions given in his specification for the use of his invention, in the statement of its object, do not describe Wetherill's process in its essential features, or so that one skilled in the art could practice it.

8. He was not the first to conceive the practicability of reducing zinc ores by the direct application of fuel to them in a crushed state, and to demonstrate it by successful experiment.

9. Wetherill was the first to comprehend and perfect the process claimed by him, to describe it intelligently and fully, and to reduce it to practice.

10. The respondents are shown to have used his process substantially, and are infringers.

Decree for injunction and an account.

The case was argued by George Harding for plaintiff, and S. D. Cozzens, of New York, for defendants.

THE IRON SHIP A MAGNET.—The following are a few important facts, as deduced by Mr. Stebbing from his experience of iron ships: 1. A compass may be very true on one or several points, and greatly disturbed on others. 2. The errors of one ship are no guide to the errors of another. 3. The errors are least toward the middle of the vessel. 4. Every iron ship is a magnet in itself; some have the north pole aft, and some the south. The magnetic axis is frequently determined diagonally through the ship. 5. There are in all iron ships two points, either opposite, or nearly so, at which there is no error; there are two other points where the error is the greatest. An error will sometimes not alter three degrees in a range of five points, but may then change thirty degrees in the next five points.

TRUE liberty consists in the privilege of enjoying our own rights—not in the destruction of the rights of others.

Improved Carpenter's Bench.

This is a very simple and practical improvement, which will add much to the convenience of carpenters. Our engraving of it shows so clearly the nature of the invention, that very little is left us to do in description.

At present carpenters' benches are provided with only one vise, attached to the side of the bench; or with two vises, one at the side and the other at the end. The invention of Mr. Starke enables one vise to perform the office of two, thus lessening the expense of such benches while adding to their usefulness.

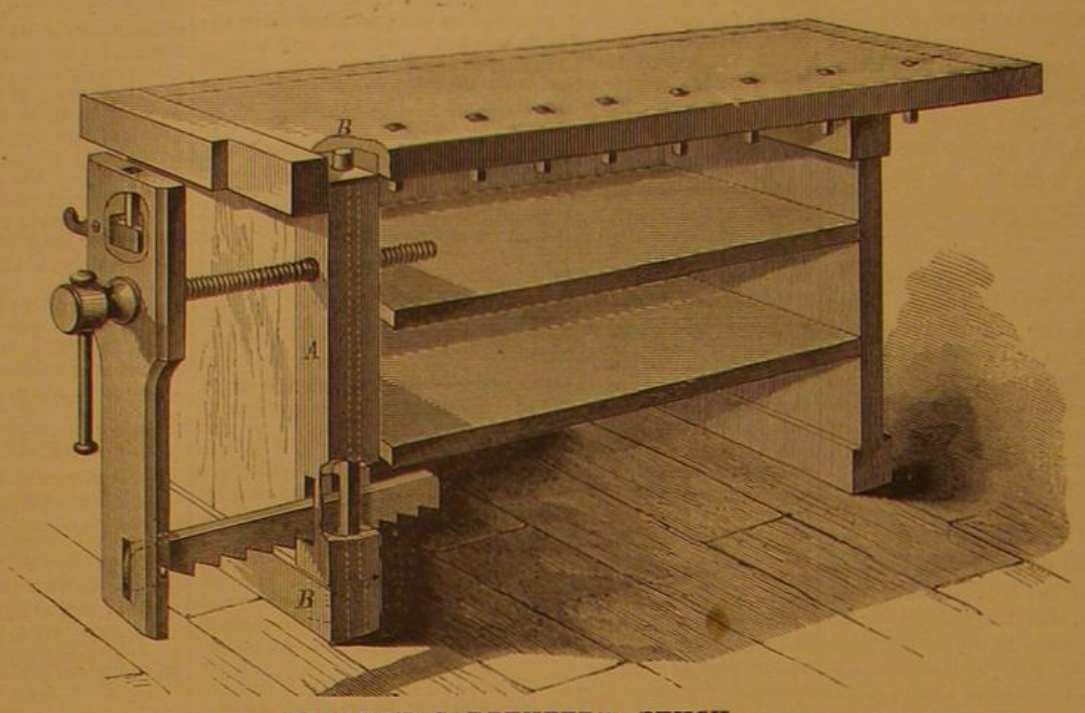
He accomplishes this by pivoting the port, A, which carries the nut of the vise, to the bench, as shown at B, so that the vise may be used either at the side or the end of the bench, as may be convenient for the work in hand.

The pivots are formed on the ends of a flat iron bar fitted into the body of the post, perforated for the reception of the nut, and slotted for the notched bar attached to the movable jaws of the vise.

The upper pivot or journal plays in a suitable bearing formed in a plate let into the under side of the table; and the lower one rests in a suitable step supported by a foot.

The advantages of this method of attaching vises to benches will be apparent to practical mechanics.

The improvement was patented through the Scientific American Patent Agency, Sept. 12, 1871, by Frederick Starke, whom address at No. 20, La Belle street, Dayton, Ohio.



STARKE'S CARPENTER'S BENCH.

Combined Safety Valve, Steam Governor, High Pressure Alarm, and Mercury Gage.

We may remark, by way of introduction to a full description of the construction of this apparatus, that the inventors hold that the method of marking the scales of steam mercury gages, by cold hydrostatic pressure, heretofore practiced, has led to error, from not taking into account the subsequent necessary expansion of the mercury column by heat. Without entering into the details of their method of graduating the scales of such gages, we will simply say that they obtain their column of hights from actual high pressure of steam, thereby approximating, as closely as may be, to the precise circumstances under which the gages must be placed in actual use. The scale is called geometrical because, in its marking, diagonal lines are drawn between vertical lines, showing geometrically the increase of pressure corresponding to different hights of the mercury column, expressed in inches and decimals of an inch. The pressures in pounds and atmospheres are also marked on the scale in vertical columns of figures, as are also the temperatures in degrees Fahrenheit, and hights of mercury in inches.

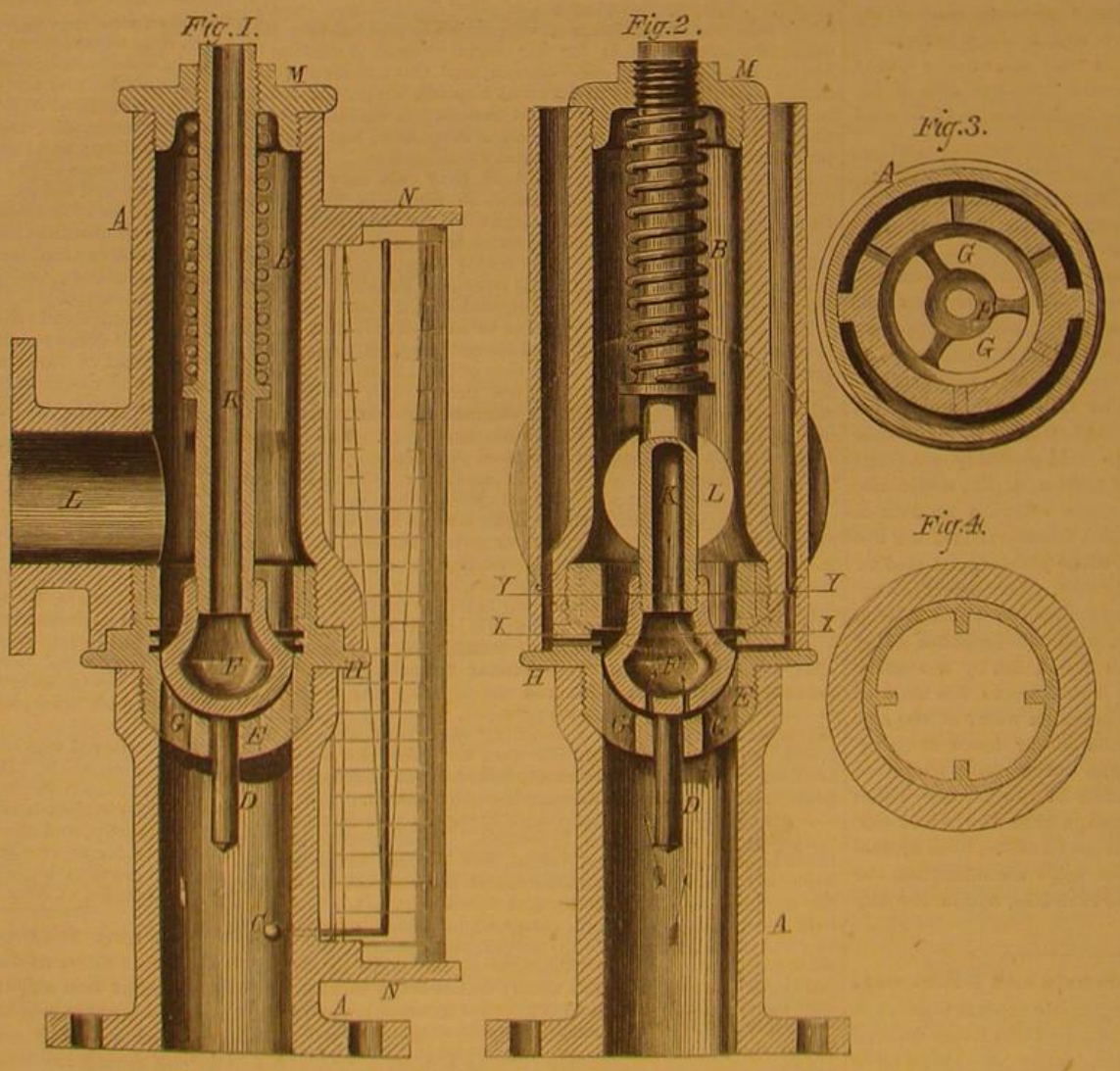
It is also held that the steelyard and weight can never act with the accuracy of a well tempered spring as a regulator of pressure upon a safety valve, where the spring is, as in this case, protected from the action of heat; and therefore the spring has been substituted for the steelyard, as indeed it has long been used on locomotives, and in some steam safety devices.

Combined with the gage there are three small pipes, opening to whistles or gongs, which give, respectively, indications that the pressure has reached that which the inspector has set the spring to carry, or five or ten pounds above that, according as one, two, or three of the signals are sounded. The first, or center pipe, described below, which will sound at a pressure somewhat below that at which the steam will blow off, gives warning to the engineer in charge and the fireman, that the latter is likely soon to raise too much steam, and thus prevents him from pushing the fire too far. As the other signals sound, should they be allowed to do so, they indicate nearer approaches to the pressure at which steam will escape from the safety valve, and thus, by warning the fireman to check the fire, prevent waste of fuel. Further increase of pressure raises the valve so as to allow the steam to blow off freely, all of which will become apparent on referring to the engraving, in which Fig. 1 is a sectional elevation, with scale attached; Fig. 2, a vertical section; Fig. 3, section through the line, X, and Fig. 4, a section through the line, Y.

The parts are as follows: A is a cast iron tube, with a cast top, screwed on or off by the inspector, and locked and sealed by him. The inside parts are of brass. B represents an annular space, in which the valve works freely, as described below, and without danger of locking, either by sticking in its seat or by the binding of the spring which governs the pressure. C is the mercury bulb, from which the tube extends laterally a little way, and then rises vertically along the middle of the scale, as shown. The tubes are made uniform throughout their caliber by drawing them over wire. D is a vertical guide attached to the valve. E represents the valve seat, made concave to correspond with the convex under surface of the valve, F, which is hemispherical in form, and is made hollow with small ports passing through it, by which, when it is slightly elevated, steam passes, the course of the latter being indicated, by the arrows, as passing through the ports, G, then through the ports in the valve or plunger, into the central pipe, K, to the alarm whistle or gong. H is the brass box for holding the thermometer and mercury gage; I is the side pipe which sounds an alarm, at a pressure, say of fifteen pounds under the blow off point fixed by the inspector. J is a side pipe, which sounds its alarm at, say ten pounds under the blowing off pressure. L is the waste pipe through which the steam passes when blowing off. M is the cast iron cap, which is screwed in over all and locked. N indicates the brass brackets for the attachment of the scale; and O the scale already described. The screw or steam governor, by which the tension of the spring is regulated, according to the age and estimated strength of the boiler, is not shown. The whistles, with the cap supporting them, are also not shown, the principles of the instrument being better indicated without them. The gage and scale are also covered with glass plate, bent into semi-cylindrical form, but not indicated in the engraving.

The whole forms a very compact and apparently reliable apparatus for the purpose intended.

For further information address S. B. B. Nowlan & Co., 202 Broadway, New York.



NOWLAN AND SPAULDING'S VERTICAL CUT-OFF STEAM SAFETY VALVE, STEAM GOVERNOR, FIRE SIGNAL AND GEOMETRICAL STEAM MERCURY GAGE.

Myers' Pneumatic Car.

A trial of this invention was recently made at Hyde Park, near Chicago, in the presence of about forty invited guests. The pneumatic car is, in fact, a locomotive engine driven by compressed air, contained in a large cylindrical tank mounted on four wheels, similar to those used on an ordinary horse car. The main tank is 7 feet in diameter and 16 feet long, made of boiler plate. Underneath this tank, and between the two axles, are a pair of ordinary cylinders and pistons, which drive an intermediate shaft that gears into a wheel on one of the axles. At each end of the car, or engine, and under the main tank, are two smaller reservoirs, 15 inches in diameter, both connected with the larger one. One of these smaller reservoirs has what is called a governor or regulator between it and the large tank. The cylinders draw their supply of compressed air, with which they are driven, from the smaller reservoir, and the object which it and the regulator are intended to accomplish is to keep the pressure, of the air supplied to the cylinders, uniform. In stopping the car or train, the valves are reversed, and the momentum is utilized to force air back again into the small tank. By this means not only is power economized, but the pressure in the tank which supplies the cylinders is increased above the ordinary working pressure, and is available in starting the car.

The other small tank to which we have referred has a check valve between it and the large tank. The object is to keep a small supply of air at the initial pressure, so that in case of emergency, such as getting off the track or other accident, there may be power enough to overcome the difficulty. The two small reservoirs are connected together with a pipe, having a cock or valve between them, so that the air contained in the one may be admitted into the other.

It will thus be seen that the arrangements and provisions for operating with compressed air have been made with much care, and the whole scheme looks quite promising.

The supply of air is of course compressed by a stationary engine and pump.

The advantages which are claimed for this system—which is especially intended for operating railroads on which horse power is now used—are that pneumatic power can be used on streets with less noise, without smoke and danger of explosions; that a pneumatic engine can be operated by a person with much less skill than is necessary in working a steam engine. There is of course, in compressing air, a loss of power due to friction, etc., but on the other hand it is claimed that one large stationary engine will work much more economically than many small locomotives. It is also thought that the waste due to the loss in compressing the air will be more than compensated for in the saving of wear and tear, repairs, etc., of locomotive boilers.

A public exhibition of the kind made recently affords but little opportunity for applying any severe tests, or of making any conclusive experiments; but although we went to it with some reluctance and with little expectation of finding anything of real value, we were obliged to revise our preconception and change our opinions. —*Railroad Gazette.*

S. R. Bailey & Co., Bath, Maine, by their patent machine for sawing around a log, lately sawed a board four feet long and fifty-eight feet wide.

Scientific American.

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HOMES FOR MECHANICS.

The tendency of modern times is towards the centralization of great manufacturing interests in large towns; and this naturally draws with it the class of population dependent upon mechanical labor for a subsistance. The great increase in the population of London, Paris, Berlin, and New York is an illustration in point. Unfortunately, factories and machine shops increase in proportions vastly greater than the accommodations for workmen. The former are built by men of large capital, while no one looks after the interest of the poor mechanic. Large sums are lavished upon improved machinery or architectural effects, but no one seems to think that anything need be done for the multitude of workmen the mills and factories necessarily bring with them. The natural consequence of all this is that the mechanic is badly housed, and falls a victim to the avarice of landlords, who take advantage of the neglect of the wealthy proprietors to provide homes for their men. The question has become a serious one in our large cities. In London it has lead to the introduction of early trains for the accommodation of laborers, thus enabling them to come to their work from a considerable distance out of town. Small houses, surrounded by a plot of ground large enough for a garden, and in the midst of green fields, have been built in great numbers in the suburbs of London, partly by charitable associations and partly by capitalists; and, in this way, the condition of a large number of people has been vastly improved. The example of Mr. George Peabody in London has been followed by capitalists until the benefits are felt by many thousands of people who were exposed to the worst features of the overcrowded city. By means of fast trains and suburban dwellings, the condition of the laboring poor has been greatly ameliorating; and as public attention is directed to the subject it is probable that other improvements will be made as fast as they are pointed out by experience. A somewhat similar agitation has taken place in Paris, but comparatively little progress has been made, as was conclusively shown during the recent Communist troubles. If the workmen had been in the suburbs, they would hardly have gone into a struggle that necessarily carried with it the destruction of their own homes, but, as they had no homes of their own to speak of, they took great delight in reducing wealthy people to their own destitute condition. The destruction of large numbers of houses in Paris by Baron Haussman, in furtherance of his scheme of beautifying the city, rendered many poor people houseless and occasioned an increase of rents to others. It was only by inventing some occupation for these people that they were kept quiet, and we have seen what became of them the moment this occupation was gone. The vast improvements in Paris have been almost exclusively conducted in the interest of wealthy people, and hence the question of what to do with the poor is one of the most urgent for the government to settle.

Between Berlin and New York there is great analogy. Both cities have grown with wonderful rapidity, and, in each, selfish speculation, in utter disregard of any higher consideration, has controlled the construction of new buildings. Wide streets have been laid out, and dwellings, with all the modern improvements, have been built on speculation; and the price of real estate has gone up more than a hundred per cent within a few years. In both cities, we also hear of showy manufactories and extensive warehouses; but the dwellings of the poor have been overlooked, and this class of population is huddled together in tenement houses and filthy streets. The remedy for this state of things in New York, as well as in Berlin or London, must be rapid transit. We must have some way of reaching the country in a few minutes. Instead of being confined to a small island, there is no reason in the world why we should not spread out over a radius of thirty miles. The interests of civilization, of good morals, of public security, of ultimate prosperity, demand that we should have rapid transit for the thousands of poor people who are drawn to the city by the requirements of labor and commerce.

At the rate we are now moving, we shall soon have a population made up of the very rich and the very poor; the middle class, the bone and sinew of the land, will be driven away, and the town will not be worth living in. While we are waiting for the construction of the much needed railroads, there is no question that it is the duty of employers to have some regard for the condition of their laborers; and, by a personal inquiry and inspection of their homes, they have it in their power to protect them in many ways. It may be found worth while to spend less money in showy manufactories, and to put the savings into suitable dwellings for mechanics. This plan is found to work well in the country. It is becoming more common than formerly for manufacturing companies in the country to lay out handsome grounds around their mills, and to build neat cottages for their workmen, which can be purchased, if the men choose, and paid for out of the savings of their wages. There are not a few such establishments scattered over New England, and if the mechanics living in tenement houses in New York could see how vastly more comfortable their brethren in the country are, they would hardly expose their families to the miseries and temptations of the city, but would flee at once to the green fields and healthy air of the country. The families of mechanics in the country are on an equal footing with their neighbors. The children meet on common ground; and, in the public school, merit and not artificial rank makes the aristocracy. We were recently present at a school examination in the country, and were gratified to see two children of poor mechanics carry off the prizes. The probabilities are, in the refined society of the country, that they will continue to win prizes until they become prominent citizens, and then they may safely go to town. Whether in the city or the country, there is no class of our citizens better entitled to comfortable homes than mechanics; and it is certainly in the interest of capitalists to see that they are amply provided.

THE ENGLISH PATENT SYSTEM.---WHAT WILL THEY DO WITH IT!

The British mind is tortured by the effort to solve two very grave problems. For a long time the entire inventive talent of that favored land has struggled to devise some means whereby passengers on railway trains—inclosed as we shut up puppies in crates for shipment—can communicate with the guards. Most complicated and ingenious methods have been proposed; but, alas! none have been without some fatal objection. The powers of air, earth, and water all fail in the hands of Englishmen, to transmit intelligence on a railway train. The bell cord which we uncivilized Yankees have found so simple and convenient, is so obnoxious to mischievous puerile Britons that this resort has been abandoned as hopeless, and so the Englishman may still be born, may die a natural death, be robbed or murdered between stations, cut-off from all intercourse with the external world. What will eventually be done with this problem, is a question that recurs as often as a fight or a robbery occurs in a railway carriage, or some woman gets frightened nearly to death by finding herself locked in with an insane person. But the appeal is made in vain. Plenty of suggestions follow, but nothing practical is forthcoming.

Another problem now engages the political economists of the realm upon which the sun never sets, and excites the interest of the engineering public, "What shall we do with our English patent system?" is the current question of the time, discussed at dinner parties, on street corners, in alehouses, at fairs, and we had almost said at funerals.

Mr. Macfie (we wonder if the last syllable of his name is pronounced like the interjection of same orthography) thunders whenever he can get a hearing, "Let us abolish it! Let us abolish it!" Mr. Ruskin, who has gained a literary reputation akin to that of Charles Reade, by expressing some weak ideas in a very forcible manner, gets off a string of poetical nonsense which does not much affect the main question in any way. The London patent agents jump to the other extreme, and declare, by resolution in public meetings that men have an exclusive natural right to hold and use their inventions *in perpetuo*. Mr. Nasmyth and Mr. Bessemer have talked common sense, and insist upon the limited patent system as answering the purpose for which such privileges are granted; namely, the securing public benefits by rewards to individuals conferring them. Sir William Armstrong has been obstructed in developing ideas by patents that have stood in his way, and henceforth he is an enemy of patents. M. Schneider thinks that if A does not invent an improvement today, B will do it to-morrow, and hence B's right to the invention is as good as A's.

The Select Committee of the House of Commons, before whom all these opinions have been aired, must have had impressed upon their minds the serious character of a question admitting of so many conflicting views. What will they do with it? In all probability they will do as has been done with the railway communication puzzle, leave the patent laws as they are, although the disposition of many seems to be to adopt our system of examination.

THE GOLD WEIGHT OF SUNSHINE.

Some years ago Professor John C. Draper published a description of an actinometer, in which the chemical power of the sun's rays was measured by the precipitation of gold. Though of great value to the agricultural interest of the country, such determinations have not yet been attempted to any extent; we therefore give a brief account of the process, in the hope that some of the gentlemen interested in our numerous agricultural institutions may be induced to devote their attention to a subject which, if properly developed, may enable us to make an estimate of the probable value of the crops of a locality, by determining the amount of actinic rays to which they have been exposed.

Draper's process is founded upon the fact that a solution of peroxalate of iron that has been exposed to sunlight throws down a precipitate of gold from the solution of chloride of gold, while the freshly prepared peroxalate that has been made in the dark has no such action.

The success of the operation depends on the freshness of the peroxalate, and the uniformity in the method of preparation and manner of exposing the solution to the action of the light. To ensure the first and second of these conditions, the solution was prepared every evening by dissolving moist pure peroxide of iron in a standard solution of oxalic acid, and raising the temperature to the boiling point. The excess of peroxide of iron was then separated by filtration, and the solution placed in the tube in which it was to be exposed to the light on the day following.

Uniformity of exposure was obtained by placing the tube in a small box, blackened in the interior, and with an opening one inch square on one side. The opening was turned toward the polar star, and the contents of the tube thus exposed to a diffuse daylight under conditions that could be rigorously reproduced each day.

In the evening, the contents of the tube were treated with a carefully prepared pure solution of chloride of gold, and the precipitate collected on a filter, dried, ignited, and weighed when the weight of precipitated gold indicated the amount of change the sunlight had produced in the solution of peroxalate of iron. To save time, the solution of peroxalate to be used the day following was prepared in the intervals that occurred during the performance of the last described operation.

HOW MANY HOURS OUGHT TO CONSTITUTE A DAY'S WORK!

This question has been temporarily answered by the Trades' Unions. We say temporarily, because the public has no guarantee that if the eight hour system be generally conceded by employers, further reduction will not ultimately be demanded. And it cannot be denied that if every adult and youth of sufficient years were an actual producer of something useful or pleasureable to mankind, the present average standard of comfortable living might be maintained with much less than eight hours' labor per day from each person.

The supposition that each healthy individual, old enough to work, should employ himself or herself in actual production, involves a total reconstruction of society, the extirpation of drones from the hive of humanity, in short, a revolution of such magnitude that it is well nigh hopeless, at least for centuries to come, and will probably never be reached without fierce conflicts between vested interests and those who would subvert them.

For the present, therefore, the daily labor must obey the commercial laws which regulate the prices of everything bought and sold in general market, as both mental and physical labor now is.

There is, however, an unreasonable extent to which men in exceptional cases are made to labor, which, although in accordance with the law of supply and demand (else the consent to excessive work would not be obtained) is still, because exceptional and excessive, a fit subject for reform, and, if need be, for that wholesome legislation by which extortion in commercial transactions is controlled.

Two most prominent instances of excessive labor are to be found in the English steam railway service, and in the American street tramway or horse railway service. In both these instances, the labor demanded is of the most exacting nature; so much so, indeed, that it is difficult to conceive how men can be secured at the prices paid for the performance of such work. That men have by misfortune, or by bad habits, so exhausted their resources that they are glad to get even such employment, is not a moral justification of the greed that willingly fattens upon the misfortunes of others.

One Mr. M. T. Bass has philanthropically spent much time and labor in investigating the general condition of the employés under the railway management in England, and some facts thus brought to light are published in the issue of *Engineering* for Sept. 1st. A mere glance at these statements will suffice for our present purpose.

"Engine drivers," as they are called in England, ("engineers," as we call them in America,) are sometimes called upon to perform 28 hours of continuous labor, while guards often perform duty from 18 to 40 hours without rest. On some occasions these overworked servants do not remove their clothing from one week's end to another. Signal men are commonly employed for 12 consecutive hours, during which they have, at busy stations, no time to take food. In addition to this, they are compelled once a fortnight to work a night shift, in which their labor is prolonged to 18 or 19 hours.

Such are a few facts. Is it any wonder that such overworked eyes, hands, and intelligences sometimes err in the performance of duty, and that shocking accidents occur as the result of their neglect?

On American steam railways, the hours of labor required are not so protracted; but on our horse railways the conductors and drivers are shamefully overworked. Sixteen hours a day, with meals eaten upon the car, and with scarcely a moment to sit down in all that time, except for perhaps four or five minutes at the end of trips, is not an uncommon thing on these roads; and this is for seven days in the week. Such are the demands made, upon the men in their employ, by the horse railway companies in New York.

It is common to find among these men, varicose veins, swelled feet and limbs, ulcers, etc., caused by protracted standing. Their case is truly a hard one, and is rendered the more trying from the impatience and often injustice of the travelling public. Many men seemingly take delight in abusing a man who has no redress against abuse except what will risk his situation, and a situation must be worth something to a man who is willing to perform such service.

These abuses are perhaps not generally known to the public; if they are, they are looked upon with an equanimity astonishing in a proverbially sympathetic people. Such a life, as these conductors and drivers lead, is no better than abject slavery; but what shall be done about it? Clearly, when men not only accept such labor, but are glad to get it, there is something to justify the complaints made by the working classes of the unequal distribution of labor and its rewards.

It is true that these men cling to commercial centers, rather than accept unknown, though really easier vocations, in agricultural districts. Without skill in any particular occupation, they have drifted into their present one, and dread to leave it, as apprehensive of a worse.

The ignorant and weak always become a prey to intelligent rapacity; and as there is no help for this except in special legislation, it is to be hoped that the moral sense of the community will place a check upon the avarice of the corporations who extort such labor, and thus better the condition of their employés, by either securing them equal pay for fewer hours' work, or, by reducing their wages, compelling them to seek other and better fields of employment, which they now seem afraid to enter.

THE VALUE OF PROPERTY IN PATENTS ILLUSTRATED. RECENT IMPORTANT PATENT DECISIONS.

We publish in another column the decisions of Judge McKennan, of the United States District Court, in the great suit of Wetherill *et al versus* the New Jersey Zinc Company, and the suit of the Pennsylvania Salt Manufacturing Company *versus* Thomas and *versus* Barry for infringement. In both instances the patents were sustained, and the judge, in making his decisions, gives some interesting views in reference to what constitutes patentability in inventions.

One of these decisions seriously affects the prosperity of the large and money making corporation known as the New Jersey Zinc Company. This concern has for several years enjoyed a highly lucrative business in the manufacture of zinc white. But the present decision will perhaps sweep the company out of existence. We understand that the damages for infringement, which the Master must necessarily report in favor of the plaintiffs, cannot be less than one million eight hundred thousand dollars, which represents the actual net profits accruing to the Company within a few years from the use of the Wetherill patent.

The stock of the company at once declined nearly to nought, in New York, when the foregoing decision was made known.

This case is but one of many instances that illustrate the great value of property in patents. The courts in all cases construe them liberally, and as far as possible, aid the patentee in obtaining what the patent laws were expressly designed to give him, namely, encouragement and reward for discovering and promulgating new inventions.

FAIR OF THE AMERICAN INSTITUTE.

We have received a letter from one of the managers of this exhibition, denying the statement, made in a recent issue of this journal, relating to want of a suitable entrance upon Second Avenue, and claiming that sewers are being constructed on the north, east, and south sides of the building, which would render such an entrance unserviceable, if provided. The facts are that the sewer in Second Avenue was completed for some distance past the Rink, before the opening of the Fair; and that there is no entrance suitable for ladies on that side of the building. The statements made in regard to the opposition to construction of such an entrance, on the part of a manager largely interested in the Third Avenue railway, were made on the authority of one of the members of the American Institute, who claimed to be personally cognizant of the facts in the case, having, as he said, himself brought the matter before the managers, and been met with the opposition alleged.

The attendance this year is said to have been better than at any previous exhibition. We are glad this is so. There is no reason why these displays should not prove profitable, both to the Institute and the public; but in order that they should reach their full measure of usefulness, the managers must not disregard wholesome criticisms of the press, made in no carping spirit, but solely with a view to aid in bringing these up to a standard which will not suffer in comparison with that of any other industrial exhibition.

EARTH CLOSETS.

The progress of the earth closet system is indicated by the fact that no less than five different manufacturers exhibit earth closets this season. Of these, four show patented articles of elegant styles, and evidently very efficient design. Each exhibits quite a variety of finish, and the collection forms an interesting feature of the exhibition.

A collection of ornamental

BRASS AND COPPER WORK,

shown by Harell & Hayes, Paterson, N. J., elicits high praise, for the artistic design and beauty of finish of the articles exhibited, which comprise a great variety of sheet brass and copper ornaments for locomotives, steam fire engines, etc. They are perhaps as fine specimens of brass spinning as have ever been exhibited.

ATLANTIC CABLE OF 1856.

The only remaining piece of this cable is placed on exhibition by the Stevens' Institute of Technology, at Hoboken, N. J. It is an interesting relic of a remarkable event in the history of the world, and its value will increase with the progress of time. We judge there are about 150 feet of the cable on the reel. The contributions of the Stevens Institute have added much to the interest of the fair. Among them is to be seen a

PRIMITIVE STEAM ENGINE,

with tubular boiler, constructed by Mr. Stevens, the founder of the Stevens' Institute, and used, in competition with Fulton, on the Hudson and Connecticut rivers. The propulsion was obtained by twin screws. It is a queer looking affair, and might be loaded entire on a common dray, and drawn away with ease by a single team of horses.

Close by this relic stands Hall's Machine for Refitting Valves, recently illustrated and described at length in this journal. It attracts much favorable comment. It is shown by C. F. Hall & Son, 21 Murray street, New York.

In this part of the building also stands a

RED GRANITE SHAFT,

taken from a quarry, situated on the bay, at the mouth of Chandler's River, in Jonesborough, Maine, on a good harbor, accessible by vessels of all sizes. The quarry contains about two hundred acres. Its highest elevation is about one hundred and fifty feet above the level of the sea. The shaft is beautifully polished, and is very handsome. As an ornamental building material, or for ornamental architecture, it is unsurpassed by anything yet discovered in this country. It is exhibited by S. V. French, 176 Fulton street, New York.

In the line of

SEWING MACHINES,

all the leading manufacturers are well represented. We notice a new machine, exhibited, we believe, by the Carpenter Sewing Machine Needle Company, 95 & 97 Liberty street, New York, which has a very unique and ingenious drop wheel feed. It is the invention of Miss Carpenter, the inventor of the self threading needle, described and illustrated in these columns some time ago.

We also notice a very highly finished and apparently very efficient sewing machine for stitching on boot soles, shown by the Goodyear Boot and Shoe Sewing Machine Company, 194 Broadway New York. Specimens of the work done by this machine are very fine indeed. It has not been our good fortune yet to see the machine in operation; but, as a specimen of ingenious mechanism, it will repay minute examination.

In the extreme rear of the building are placed two improved rock drilling machines, of different styles, designed for different kinds of work. The machines are of the kind known as diamond drills, and are shown drilling various kinds of stone, from very hard to very soft rock. The machines are shown by the American Diamond Drill Co., 61 Liberty street, New York, and as they will shortly form the subject of an illustrated description in the SCIENTIFIC AMERICAN, we will defer a discussion of the details of construction till that article appears. The machines drill hard rock with great rapidity, and attract a crowd of admiring visitors whenever they are at work.

At the front end of the building, Mr. William A. Walker, looking glass silverer, 28 Prince street, New York, exhibits a number of large vertically and horizontally bent mirrors, which give such disturbed images of persons approaching them from various directions as to keep an amused crowd in constant spasms of fun. A person approaching one of these mirrors sees himself elongated and attenuated to the highest pitch of physical emaciation, and steps from it before another to discover that he has suddenly grown into Falstaffian proportions. Some curious optical effects highten the fun of the thing, and it is really pleasant to witness the delight of the children in this comical corner. We presume this is the man who furnished the wag of a landlord out West with a mirror, at the entrance of his dining room, which made his guest look very thin and elongated as he entered for his meals, and he, to his astonishment on coming out, beheld himself in a mirror at the opposite side of the room with proportions so large he wondered how he got through the door.

Of greater interest and importance, though not so amusing, are the specimens of

SAND ENGRAVING

on glass shown by the same exhibitor. This curious process has already formed the subject of several articles in the SCIENTIFIC AMERICAN, so that we only need repeat here that the engraving is accomplished by showering the glass with sharp sand, the sand being driven by steam or compressed air jets, the parts which it is desired not to cut being protected from the sand by paper patterns, lace, stencil plates, etc. A very good general effect in ornamentation is very cheaply obtained in this way, the engraved portions resembling etchings quite closely.

CHEMISTRY.

If any one were to take the present exhibition of the Institute as affording a good representation of the applications of chemistry to the arts, he would go away with a very erroneous impression of the importance of this branch of knowledge. Chemistry is, in fact, more conspicuous by its absence this year than it is by its presence. Still, there are a few good things, and of these it may be well to speak. The number of processes and trades in which chemistry plays a part unknown to the popular mind is always great in any exhibition of works of industry, and the Fair of the Institute this year affords no exception. Of some of these we can speak further on.

A PATENT PERFUMER.

A good many years ago, Professor Daebereiner discovered a property of spongy platinum to glow when exposed to a current of hydrogen gas, until it became so hot as to ignite the gas. Somewhat later it was found that a brilliant red hot surface of platinum would accomplish the same purpose; finally, a heated coil of platinum wire, suspended over ether, was found to continue to glow as long as any vapor was given off, and if the same coil were hung over boiling ammonia, into which was passed a current of oxygen, the hydrogen of the ammonia was made to unite with the oxygen with an explosive force. Numerous practical applications have been made of these discoveries, and one of the neatest is exhibited by Mr. Otto Boldemann, of No. 148 West 14th street, New York, under the name of the Magic Perfumer and Deodorizer. Proof spirit, scented by some essential oil, is put into a cup covered with mica or glass, and a thin piece of platinum, cut into various fancy patterns, after having first been made red hot, is suspended over the liquid. Immediately the vapors of the alcohol begin to rise, and, as they impinge on the metal, are partially decomposed, thus keeping the foil red hot, presenting in the dark a beautiful glow of fire without any perceptible cause. It is a pretty philosophical toy, such as every teacher would like to possess; and certainly accomplishes its object of disseminating perfume in a very economical way. It is a pleasure to see a well known experiment of the class room brought down to supply the wants of every day life, and we hope that the Magic Perfumer will receive due attention.

STEEL DIRECT FROM IRON.

Steel is generally made from iron, so that the label in this instance affords but little information. It is probable that iron is immersed in cyanide of potassium, and that the decomposed cyanogen imparts the property which is possessed by steel. The process was tried in a modified form, for casting steel cannon at the time of our war, and it has been applied to the conversion, of sheet iron, scrap iron and certain tools into steel. It is not intended as a substitute for the Bessemer invention, nor for the cementation process so long in vogue, but has its value for small articles.

It is always well to have a short explanatory label attached to an exhibition of an article of this kind, so as to enable persons to acquire some information; and if the visitor is in that line of business, he is pr tty sure to want to know more, and will naturally apply to the inventor.

EXTRACTION OF TIN FROM CLIPPINGS.

This is one of the most important processes on exhibition, and, if it successfully accomplishes its object, may be set down as having solved a problem that has occupied the attention of chemists and metallurgists for many years. A good many patents have been taken out for utilizing tin scraps, some of which have successfully accomplished the object for the particular locality where the works were erected. It may be well to speak of a few of these, before proceeding to describe the method now on exhibition.

Stannate of soda, a valuable article in dyeing, is prepared by rolling the scraps into spirals, and subjecting them in wooden tanks to the action of sulphur and caustic soda. From one hundred pounds of scraps, twelve to fifteen pounds of the stannate are obtained, worth 18 to 20 cents a poound. The iron is economized in the preparation of a polishing powder for glass, or in the manufacture of steel, or for other purposes.

Another process employed in New York was to subject the scraps to a high heat in circular iron baskets, and thus to melt off the tin, and allow it to run into suitable receptacles.

Still another was to dissolve off the tin, and afterwards recover it from the solution. And the scraps have been used in the smelting of phosphorus ores, especially phosphate of lead. An English chemist separated the tin from the iron by means of soda, lye, and litharge; also, by employing a mixture of caustic alkali and chromate of potash. Nitric and muriatic acid, also the amalgamation processes, have been patented; and sulphuret of calcium has been substituted for the same compound of sodium. Instead of amalgamation, the fusion of the tin by throwing the scraps into a melted bath of lead, and thus producing a solder, has been tried. These are not all of the patented processes, but must suffice for present purposes. They have some of them been described in former numbers of the SCIENTIFIC AMERICAN.

In the new plan, proposed by Dr. Ott, the tin is dissolved off the iron by muriatic acid, and is afterwards precipitated by means of zinc. Some nitric acid is added to facilitate operations. Any zinc that may fall into the vat is removed by mechanical means, and the pure tin is afterwards melted into ingots or sheets ready for use.

A full and interesting account of the process is given by Mr. A. Harnickel, in the *Iron Age*. According to this article, the importation of tin plate into the United States amounts to 700,000 boxes per annum. The waste from this is set down at 25 to 30 per cent, and the writer estimates that within radius of 70 miles from New York "30 tuns of clippings can be procured daily, equal to 9,000 tuns per working year of 300 days. The saving of such an enormous loss as this may well attract the attention of capitalists, and it is to be hoped that the new invention may prove successful.

SELF FEEDING BATTERY.

A good many persons have tried this, but with doubtful success. The apparatus on exhibition, called the "Himmer battery," employs sulphate of copper, by putting it into an inverted bottle, so arranged as to be self feeding. It would be difficult to regulate the quantity in this way, and that is an objection to the contrivance. We have read of a recent German battery where this difficulty has been overcome.

HORSFORD'S BREAD POWDERS.

This is a first class chemical discovery, and we were glad to see so many persons acquiring information how to use the phosphates instead of the saleratus powders, which are the bane of American kitchens. No family that has ever used Professor Horsford's baking powders would be willing to go without them. There are few things more useful than the phosphates, and nothing, short of poison, more dangerous than saleratus.

THE ZINC WHITE PATENT DECISION.

The recent decision in the United States Court, referred to dsewhere, and for which we are indebted to the Philadelphia *Inquirer*, is a matter of great interest to all owners of and applicants for patents. Though directly aimed at the New Jersey Zinc Company, it pecuniarily concerns all the manufacturers of zinc oxide in this country, as it is only in the United States that this pigment is made direct from the ores. The Lehigh Company, however, have some arrangement with the patentee. This industry is now becoming one of great importance, and it is well that the modes and process of carrying it on should be upon a firm basis, and that these to whom the credit is due for its origin should receive their just reward. It is one of those many instances constantly occurring which show the importance of having the application for a patent properly prepared, so that, however infringed upon by wealth or power, justice will in the end be done to the right inventor.

The damages involved are said to amount to about $1,800,000, as Wetherill claims that the difference between making zinc oxide by his process and the pretended process of Burrows is two cents per pound. The product of the New Jersey Zinc Company has been often as high as 5,000 tuns per year; hence if there be such difference, the "savings and gains" on that amount must evidently be very large. Injunctions have been served on all the other zinc making companies. From the length of time this case has been before Judge McKennan, the care in collecting evidence by both parties, the great wealth and influence of the defendants, it is probable that the decision is given only upon the most mature thought and thorough examination of the whole matter, and will be sustained, even should it be carried to the Supreme Court.

English Telegraph Message Blank.---Postal Card.

The *Home Journal*, in a recent number, described the message blank of the British postal telegraph system. A copy of the form lies before us. It is so arranged that the message appears in lines of five words each, the charge for the message being printed at the ends of each line. It is a simple and convenient device, calculated to save the time of both the sender and operator, and prevents overcharge. We are indebted to Mr. Morris Phillips, of the *Home Journal*, for this specimen, and also for a specimen of a postal card so much in use in England at the present time. The card is about three by five inches in size, and tinted with a tasteful color, one side having a halfpenny postage stamp imprinted on the right hand upper corner, the whole surrounded with a neat border, and bearing the British coat of arms. This side is for the address, and the reverse side is for the written message or note. No envelope is used, the card serving as note sheet, envelope, and postal stamp, and is delivered anywhere within the United Kingdom of Great Britain, Ireland, and the Channel Islands for half a penny—one cent. The report of the first six months' sale has just appeared, which shows that 58,485,960 cards were sold in that time by the government; total value, nearly £122,000.

TO MAKE CARBOLIC ACID PAPER.—Carbolic acid paper, which is now much used for packing fresh meats, for the purpose of preserving them against spoiling, is made by melting five parts of stearine at a gentle heat, and then stirring in thoroughly two parts of carbolic acid; after which five parts of melted paraffin are to be added The whole is to be well stirred together until it cools; after which it is melted and applied with a brush to the paper, in quires, in the same way as in preparing the waxed paper so much used in Europe for wrapping various articles.

THE ALABAMA AGRICULTURAL AND MECHANICAL ASSOCIATION announces its annual fair, to be held in Pickett Springs Park, Montgomery, on October 31st, and four following days. A list of premiums, amounting in all to $20,000, is offered for successful operation in all branches of agriculture and mechanical trades, as well as of domestic industry and the fine arts. Mr. M. L. Woods is the secretary of the association; and our readers will find detailed information in our advertising columns.

A COTEMPORARY has the following rather severe hit on the San Francisco Academy of Science: "The bone work of a whale recently stranded on the beach at San Francisco, is being wired together for exhibition. The owners secured the services of the Academy of Science to get the bones into their proper places, but at the end of the first day the members were paid off and discharged. It has since transpired that they got the creature's head on the wrong end, and had rejected several sections of the backbone, claiming that the animal had more vertebræ than the books allowed him.

SHARP WORK.—A merchant in Manchester, England, recently wanted 1,500 pieces of printed calico, of a particular pattern, for shipment to America. At 5 o'clock one evening he went to Harpeney, three miles from Manchester, to see a cotton printer, who undertook to print the 1,500 pieces in three colors, and to have them packed in cases ready for shipment by noon on the following day. This was done, and at 3 o'clock the goods were at Liverpool, and at 5 o'clock they were on board a steamer, going down the Mersey on her way to New York.

THE splitting machine, for shoe pegs, which are now manufactured so extensively in this country, and exported to Europe, was invented thirty years ago by S. K. Baldwin, of Laconia, N. H. A pointing machine for the manufacture of the same article was invented twenty years ago by A. H. Baldwin, of the same place. It is said that neither of the Baldwin machines have been improved upon since they were first introduced to the public.

Examples for the Ladies.

Mrs. J. S. Bingley, Poughkeepsie, N. Y., has used her Wheeler & Wilson Machine over 15 years; brought up and educated her family by stitching shirt-bosoms, the bindings on to leathern cap-fronts, and making coats, vests, pantaloons, and doing all kinds of family sewing; averaging sometimes $5 and $6 per day.

The Human Hair.—Burnett's Cocoaine, for healthful purity and excellence, is unsurpassed.

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.]

1.—HEATING SURFACE OF BOILERS.—Will some one give us, through your paper, a simple rule for finding the heating surface on tubular and locomotive boilers?—C. and H. A.

2.—PENCIL LEAD.—Will some of your readers please inform me how pencil lead is prepared, and what the ingredients are?—H. J.

3.—SKELETON LEAVES.—How can the tissues of leaves be removed without injuring the skeletons?—J. V. M.

4.—SOLDERING FOR GALVANIZED IRON.—Do any of your readers know a good solder for soldering galvanized iron, that will not break easily like the ordinary tinman's solder, that is, half tin and half lead?—A. B.

5.—CRYSTALLIZATION OF STEEL.—Do you think that the steel in band saws has a tendency to crystallize on account of the change from a curved to a straight line that takes place in running around pulleys?—J. L. G.

6.—BLUING PISTOL BARRELS.—Will some one be so kind as to inform me of the process or composition to give pistol barrels that beautiful blue that they give in the factories to new ones?—M. M.

7.—COKE FROM BITUMINOUS COAL.—I wish to know if there is a successful way of burning bituminous slack coal into coke in the open air on the ground?—A. M. S.

8.—UNDERGROUND SURVEY.—How can I survey an underground level or horizontal entry where there is an iron track, without the needle being affected by the track?—A. M. S.

9.—PRIME COAT OF PAINT FOR WOOD WORK.—In repainting an old house (outside), should I first apply a good coating of petroleum or other cheap oil to be absorbed by the boards? Would such an application save paint, or make the paint less liable to crack or peel off? If so, what sort of oil would be preferable? Would a like application to a new picket fence make it more durable, or would it make paint hold better on it? Is coal tar, as a preservative of fence posts, applied hot to the end that goes in the ground?—L. G.

10.—FRENCH POLISH.—Will some one please inform me how to make French polish for polishing veneered work?—W. B. W.

11.—CLOTHES WRINGER.—How can I keep a common clothes wringer (I mean the rollers) from cracking?—W. D. F.

12.—MANUFACTURE OF ZINC PAINT.—I have on hand a ton of sulphuret of zinc which I wish to convert into paint. Can any one inform me of the best mode of doing it?—E. M.

13.—GLUE.—Will some one inform me of the manufacture of glue—how it is boiled, how it is tested, and the stock used for the different grades? I want a good practical answer.—T. C.

14.—BLEACHING.—I wish to know the manner of using antichlorine—hyposulphate of soda—as a means of destroying the chlorine left in cotton and linen goods after bleaching.—J. W. G.

15.—COMPOSITION FOR TEMPERING STEEL.—I wish to inquire if there is anything in use that is better than water or oil for tempering cast steel. If any reader knows of such a composition, I would like to be informed of it.—J. T. B.

16.—LIQUID GLUE.—In the SCIENTIFIC AMERICAN, Vol. XXIV., page 408, "Answers to Correspondents," under the heading "Liquid Glues," F. L. J., of Ark., says that the best liquid glue he knows of is made as follows: Take of gum shellac three parts, caoutchouc (India rubber), one part (by weight), dissolve the caoutchouc and shellac in separate vessels, in ether free from alcohol, applying a gentle heat; when thoroughly dissolved, mix the two solutions, and keep in a bottle tightly stopped. Now I have been trying for two months to do as he says, but after dissolving the caoutchouc and shellac in separate vessels, when I put them together, the compound immediately forms into a solid ball, and remains so. Will F. L. J. please inform me what is wrong, as I have consulted a very good chemist without being able to learn?—H. W. M.

17.—CLEANING BRASS.—I want to know if there is not something that can be used to clean and polish brass work, on steam engines etc., that does not require so much elbow grease. The following is the *modus operandi* I go through to have the desired effect: I first spread thinly over the hot brass what is known among railroad men as sperm (large thick candles that are used to light coaches). I then saturate a rag or piece of waste with coal oil, and wash off the sperm and wipe dry. I then take another piece of waste and saturate with lard oil, then sprinkle on flour of emery or rotten stone, and scour all the brass, hot and cold, with this. I then wipe all nice and dry, and polish with lamp black or rotten stone. I feel satisfied that there are other preparations for cleaning brass than these that will do it quicker and better. I once saw a preparation sold on the streets of Cincinnati for cleaning brass and silver ware. It was a red looking stuff like brick dust; it would make brass look as white as silver. There is also a preparation for putting on brass to keep it from tarnishing, called "lacker" I believe. I do not care so much for this as I do for the cleaning process. I will be many times obliged to any of your readers who can furnish the desired information. I will pay a reasonable price for any recipe that will do the work satisfactorily.—G. N. K.

Business and Personal.

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

The Oil used on all the Machinery at the A. I. Fair is from Chard & Howe, 134 Maiden Lane, New York. Ask them how it works.

Grindstones—1000 Tuns to select from—Mitchell—Phila.

Grindstones—"How to use them"—Sent free—Mitchell—Phila.

Machinists' Grindstones—J. E. Mitchell, York Ave.—Phila.

Sign Factory—The largest Metal Sign Factory in the world. Orders solicited. Rates low, and work executed with despatch. R. A. Adams, 132 South 5th Avenue, New York.

Wanted—A first class Miller for White Lead Works. Address, with references, &c., White Lead Company, New Britain, Conn.

A Chemist, a practical man, wishes a position; capable of taking charge of some department. Address Chemist, P. O., Box 63, N. Y.

Wanted—The best Shoe Peg Machine made,—also, 2d hand Ward Spoke Lathe. Send description & price to HUBD & BRO., Urbana, O.

See Advertisement of Havens' Circular Saw Tables.

Patent Steel Measuring Tapes, manufactured by W. H. Paine, 116 Freeman St., Greenpoint, N. Y. Send for Circular.

Walrus Leather, for Polishing Steel, Brass, and and Plated Ware. Greene, Tweed & Co., 18 Park Place, New York.

Repertory of Arts.—For sale, a complete set of the Repertory of Arts, handsomely bound, half calf, uniform size, with general indices comprising five series and 113 volumes. Perfect in every respect. Embracing Inventions, Discoveries, and Improvements in Arts, Manufactures and Agriculture, with Engravings—from 1795 down to 1856. Apply to MUNN & Co., office of the SCIENTIFIC AMERICAN.

Turkey Boxwood pieces for Sale, suitable for engravers and fancy turners' use. Address Stephens & Co., Riverton, Conn.

Manufacturers of Steam Pumps will please send Descriptive Circulars and Price Lists to Joseph Capps & Sons, Jacksonville, Ill.

Patent Felt Floor Carpeting. C. J. Fay, Camden, N. J.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St. Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Gear Wheel Moulding Machines—Paget's Blocks and Gipsy Winches (English Patent). Hamilton E. Towle, 176 Broadway, New York.

Improved Mode of Graining Wood, pat. July 5, '70, by J. J. Callow, of Cleveland, O., enabling inexperienced grainers (" without the long required study and practice of heretofore") to produce the most beautiful and Natural Graining with unequalled speed and facility. Send stamp for circular.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin. $4 00 a year. Advertisements 15c. a line.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours F. Sage, Cromwell, Conn.

Best Oak Tanned Leather and Vulcanized Rubber Belting. Greene, Tweed & Co., 18 Park Place, New York.

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Arny, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Blake's Belt Studs. The cheapest and best fastening for Rubber and Leather Belting. Greene, Tweed & Co., 18 Park Place, N. Y.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News or the United States. Terms $4 00 a year.

Diamond Carbon, of all sizes and shapes furnished for drilling rock, sawing and turning stone, conglomerates, or other hard substances also Glazier's Diamonds, by John Dickinson, 64 Nassau st., New York.

Glynn's Anti-Incrustator for Steam Boilers—The only reliable preventive. No foaming, and does not attack metals of boilers. Price 25 cents per lb. C. D. Fredricks, 587 Broadway, New York.

The Greenleaf Grate Bar saves fuel and lasts much longer than the ordinary bar. Address Greenleaf Machine Works, Indianapolis, Ind.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

Answers to Correspondents.

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.

A GENERAL REPLY TO A LARGE NUMBER OF CORRESPONDENTS.—H. says he has a 6 horse power, in connection with a two story building 30 feet square, and wants manufacturing business to occupy his premises.—H. R. G. wants to know the cheapest and best shot gun and rifle combined; also, wants our opinion of the Veeley rifle.—R. D. wants an ice machine.—J. M. S. wants a spoke lathe, wants us to tell him the price, where made, and how much it will do, all at the earliest possible moment.—W. F. F. wants a good work on horseshoeing.—J. H. S. wants a machine that will cut guttapercha into very small pieces with but little trouble.—J. M. desires to purchase a paper bag machine.—W. A. P. wants a shingle machine that cuts with a knife.—F. C. calls for information as to the best manner of setting a boiler 22 feet by 42 inches, with two 16 inch flues; fuel, gas coke.—L. P. asks if any of the concrete or asphalt pavements have proved satisfactory.—J. G. H. asks for reliable parties to sell a patent.—J. M. asks for information about drilling artesian wells, tools required, and the address of parties who make the machinery. Wants the information for a missionary friend who, he says, lives in "Cyria."—W. A. wants to know where he can get a good machine for bending plow handles of oak wood.—T. L. C. asks us to tell him who make wind mills.—G. T. C. asks for a list of trades where an apprentice can get his board and small pay for first year; also, how much powder a No. 11 shot gun, 28 inches long, ought to burn; also, what a small hand printing press with type and outfit costs.—A. J. H. wants the manufacturers address of the toy horse.—W. S. B. asks us to tell him which of the many lightning rods we consider the best.—L. S. wants us to tell him which, knitting machine we think is the best.—C. B. asks where to purchase a good telescope.—J. B. B. asks where he can procure an odometer.—C. T. G. wants to know if there is anything better for roofs than charcoal tin; also, if we know the merits of the patent continuous roofing.—J. H. W. calls for the best book of architectural designs for cottages.—M. A. asks about asbestos roofing.—E. L. asks for our opinion, confidentially, about the merits of a corn sheller, and a combination rule instrument.—D. W. A. wants to know who makes the best and latest improved chair making machinery.—A subscriber asks where Stuart's annealed wire is made.—I. J. M., wants the best works on steam engines and boilers; also, on mechanics, agriculture, stock raising, etc.—S. C. C. asks where "Webster's patent zinc metal paint" can be obtained.—F. wants to know if Howard & Co., Waltham Watch agents, are responsible.—E. P. N. wants detailed drawings of the monitor roof cars.—C. & F. want to find parties who supply a pure article of plumbago.—G. C. H. wants the best spring or weight power for churns. . . . . .

The above are *bona fide* enquiries taken at random from hundreds that we are constantly receiving from all parts of the country—mostly from subscribers to the SCIENTIFIC AMERICAN. It is impossible for us to attempt to answer them, either by letter or in our paper. Answers to some of them can be found, if the writers will take the trouble to consult the back pages of the SCIENTIFIC AMERICAN. Manufacturers of the various articles may secure these customers, and obtain others by inserting short advertisements in our paper. For every person who writes us for an article, there are perhaps a hundred others who want the same thing, that do not write to us, but are on the lookout for the proper advertisements. As to the merits of various articles, we cannot undertake to advise our correspondents, but we say to them that, as a general rule, the best goods are those that are advertised in the SCIENTIFIC AMERICAN.

CONDENSATION OF STEAM IN LONG PIPES.—In answer to query of Y. S., in the issue of Sept. 2nd, I would say that I had occasion recently to make a test of the difference in pressure of steam through an inch pipe, 300 feet long, running entirely exposed through an open planing mill. The pressure on the boilers was 75 pounds. The test gage at the other end showed a pressure of 70 pounds, making a difference of 6 pounds. The gage on the boiler had been used over a year, and doubtless showed a little more pressure than there really was.—F. G. C., of Vt.

FALLING BODIES.—The formula given by T. E. N. E. on page 218 of the SCIENTIFIC AMERICAN, in reply to J. E., would make the impact of 1 lb. falling 2 feet appear to be 11·34 foot pounds. Whereas, it has been found by actual observation to be 50 pounds. If J. E. will multiply the weight by the velocity at end of the fall, and the product by 4·426, he will have the true impact.—D. A. M., of N. Y.

SUBSTITUTE FOR BRASS.—In answer to query No. 8, signed F. W., in the SCIENTIFIC AMERICAN of Sept. 2nd, I would say that I have found Williams' Diamond Metal a very good substitute for brass, especially for boxes and other wearing parts of machinery. In appearance it resembles very much the metal called Parson's white brass. It can be melted in a common iron ladle, and will take a very good polish.—D. P. D., of N. Y.

CISTERN.—Let W. H. W. put two ounces of permanganate of potassa in his cistern. It will render the foulest water sweet and pure.—B. F. D., of Neb.

COIL IN BOILER.—I have used the same coil as M. S. M., query 27, Sept. 30, and always had trouble until I placed the check valve between the pump and the coil, since when the coil has always had water.—G. A. Y., of N. Y.

O. S. M., of Va., says: I believe that in the manufacture of white lead, carbonic acid gas is generated, and that the inhalation of this is one of the causes of injury to the health of the workmen employed in its production. Could not this gas be gotten rid of by taking advantage of its weight, and boring holes in the floor to allow its escape? . .

Answer. Undoubtedly carbonic acid gas would run through holes in the floor of an apartment in which it was generated freely, but it is not carbonic acid that injures workmen in making white lead. It is the absorption of the lead into the system that does the mischief.

M. H. B., of Mass.—The friction of water in a pipe only one-half inch in diameter, and 800 feet long, would be very great, and as you say the water has to be lifted 23 feet, we do not think an atmospheric pump would answer the purpose. A powerful force pump at the lower end of the pipe would probably succeed measurably, but the pipe is of too small diameter for its length. To get a satisfactory delivery, it ought to be one inch in diameter at the least.

J. H. M., of Mo.—The specimens of iron ores sent have every appearance of being valuable for making steel. We advise you to have them subjected to critical examination and assay which will definitely determine their value. You had better get Professor Draper, 429 Lexington avenue, N. Y., or some other competent chemist to make an analysis for you.

H. A. B., of Ill.—We cannot point out your difficulty without knowing the exact method of procedure you adopt. We judge you melt your lead first and then add the tin. Melt the tin first and sprinkle its surface with a little powdered sal ammoniac, then add the lead, and we think you will succeed.

R. A. P., of Mass.—You will find a complete series of articles on beet sugar making, with illustrations, in Vol. XX. of the SCIENTIFIC AMERICAN.

H. H. V. L., of N. Y.—You can use melted lead for drawing the temper of the small steel articles you refer to.

S. & S., of Miss.—The internal pressure in the bottom of the shell of a steam boiler is not less than on the top.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

AMERICAN INSTITUTE FAIR.—G. F. D.
BOILER EXPLOSIONS.—D. E. H.—F. L.—J. C.
CANAL BOATS.—S. H.
MARINE GOVERNORS.—T. S.
RAILWAY BRAKES.—W. L.
TENSILE STRENGTH OF IRON.—M. D. C.
THE EARTH'S MOTION.—J. B.
THE MODALITY OF THOUGHT.—A. S. G.
VICES.—W. J. W.
ANSWERS TO CORRESPONDENTS.—F. F. P.—J. A.—M. M.
QUERIES.—A. L. S.—C. C. C.—F. D.—S. E. J.

NEW BOOKS AND PUBLICATIONS.

THE COACH MAKER'S INTERNATIONAL JOURNAL. Edited and published by Mr. I. D. Ware, 411 Chestnut street, Philadelphia, Pa.

This No. of the Journal commences its seventh volume with a new suit of type throughout, and makes a decidedly elegant appearance. It is one of the best of the special trade publications, and has our best wishes for its future success.

CAPTAIN ALSTEN'S SEAMANSHIP. New Edition. Revised and enlarged by Commander R. H. Harris, R. N. With a Treatise on Nautical Surveying by Staff-Commander May, F.R.G.S. Also, Instructions for Officers of the Merchant Service, by W. H. Rosser. With Two Hundred Illustrations. New York: Wiley & Son.

To any who wish to become learned in nautical lore, this book will prove just the help requisite for the purpose. To those who intend to follow the profession of a seaman, it would seem to be a very valuable work, in fact, a complete catechism of seamanship, including even the small but important particulars which are essential to complete accomplishment in any profession, but the lack of which in a seaman immediately stamps him as a "lubber." The revision of the work has adapted it to modern improvements in the build and rig of vessels; and, though the work is written with special reference to English ships, it cannot fail to be useful to American seamen.

THE CARRIAGE PAINTER'S ILLUSTRATED MANUAL: Containing a Treatise on the Art, Science, and Mystery of Coach, Carriage, and Car Painting. Including the Improvements in Fine Gilding, Bronzing, Staining, Varnishing, Polishing, Copying, Lettering, Scrolling, and Ornamenting. By F. B. Gardner. 16mo. Cloth. Price $1. New York: S. R. Wells, Publisher.

The character of this work being sufficiently set forth in its title, as above, we have only to add that its practical nature must render it a very useful treatise to painters in general, but more especially to the particular class of painters which the title indicates.

APPLICATIONS FOR EXTENSION OF PATENTS.

MOWING MACHINE.—Silas E. Jackson and Morgan P. Jackson, Boonville N. Y., have petitioned for an extension of the above patent. Day of hearing, December 13, 1871.

LOCOMOTIVE FURNACE.—G. S. Griggs, deceased.—An application has been made for an extension of the above patent. Day of hearing, November 29, 1871.

LOCOMOTIVE ENGINE WHEELS.—G. S. Griggs, deceased.—An application has been made for an extension of the above patent. Day of hearing, December 13, 1871.

INDIA RUBBER DOOR MAT.—Edwin M. Chaffee, Providence, R. I., has petitioned for an extension of the above patent. Day of hearing, January 31, 1872.

SEEDING MACHINE.—William Coggeshall and Bennet B. Warner, Massillon, Ohio, have petitioned for an extension of the above patent. Day of hearing, December 13, 1871.

MACHINE FOR ROLLING CORNICES.—Asa Johnson, New York city, has petitioned for an extension of the above patent. Day of hearing, December 6, 1871.

METHOD OF GOVERNING THE CUT OF CIRCULAR SAWING MACHINERY.—A. C. Martin, Cincinnati, Ohio, and William H. S. Ewell, of same place, administrator of M. M. Wombaugh, deceased, have petitioned for an extension of the above patent. Day of hearing, December 6, 1871.

REAPER AND MOWER.—Thomas I. Stealey, Middletown, West Virginia has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

BORING MACHINE.—Lafayette Stevens, Elmira, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

ELECTRO MAGNETIC SPEED GOVERNORS.—George M. Phelps, Brooklyn N. Y., has petitioned for an extension of the above patent. Day of hearing, December 20, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

MUNN & CO., 37 Park Row

Inventions Patented in England by Americans.

September 12 to September 16, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.

BRAKE.—G. Westinghouse, Jr. (of Pittsburgh, Pa.), London, England.
RUBBER COATING.—G. T. Chapman (of New York city), London, England.
COTTON, ETC., PRESS.—A. Baldwin, New York city.
DYEING FABRICS.—T. Sampson (of Providence, R. I.), Birmingham, Eng.
ELECTRO-MAGNETIC ENGINE.—E. Gassett, Boston, Mass.
ELECTRO MOTOR.—S. Jones, E. D. Lawrence, New York city.
LAWN MOWER.—G. L. Chadborn, T. Coldwell, Newburg.
SPINNING MACHINE.—S. M., H. M. Williams, D. A. Douglass, Coldwater, Mich.
STUFFING BOX AND PACKING.—E. W. Brown, Boston, Mass.
TELEGRAPH.—G. L. Anders, Boston, and E. B. Welch, Cambridge, Mass.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished free.

Practical Hints to Inventors.

MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, have devoted the past twenty-five years to the procuring of Letters Patent in this and foreign countries. More than 50,000 inventors have availed themselves of their services in procuring patents, and many millions of dollars have accrued to the patentees, whose specifications and claims they have prepared. No discrimination against foreigners; subjects of all countries obtain patents on the same terms as citizens.

How Can I Obtain a Patent?

is the closing inquiry in nearly every letter, describing some invention, which comes to this office. A positive answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

Construct a neat model, not over a foot in any dimension—smaller, if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, New York, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible, and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

Preliminary Examination.

In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of $5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

Caveats.

Persons desiring to file a caveat can have the papers prepared in the shortest time, by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & Co., 37 Park Row, New York.

To Make an Application for a Patent.

The applicant or a patent should furnish a model of his invention, if susceptible of one, although sometimes it may be dispensed with; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

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A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications. Address MUNN & Co. 37 Park Row, for full particulars.

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OFFICE IN WASHINGTON—**Corner F and 7th streets,** opposite Patent Office.

Recent American and Foreign Patents.

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

POTATO DIGGER.—To the cranked axle of a hand cart is pivoted the bent handle of a fork or digger. The cart box is divided longitudinally in the middle, so that the cranked part of the axle has play between the two sections. In using the machine the cart is drawn along over the rows, and when in proper position over a hill of potatoes, the operator holds it fast by pressing the handles down upon the earth, thereby pressing spikes, which project from the handles, down into the soil; he then seizes the handle of the fork or digger, and draws it forward till the cranked portion of the axle is in a horizontal position. He then raises the handle into a vertical position, and plunges the tines of the fork down into the earth. Then, using the handle as a lever, he raises the mingled earth and roots, and separating the earth by a few shakes, tosses the potatoes into the cart box, and so proceeds from one hill to another along the row. Mr. Franklin Jones, of Terre Haute, Ill., is the inventor of this mathine.

MEDICAL COMPOUND OR LINIMENT FOR RHEUMATISM.—John W. Helms, of Bainbridge, Ga.—This is an improved liniment for rheumatism, neuralgia, toothache, sprains, bruises, paralysis, etc.; and it consists of the liniment prepared of various ingredients in a peculiar manner.

LEADER PIPE COUPLING.—John Demarest, of Mott Haven, N. Y., assignor to himself and Jordan L. Mott, of same place. This is a new method of arranging couplings or brackets for holding cast iron leader pipes upon houses. It consists in a cast metal coupling having a suitable hole through it vertically for the pipe, and made in two parts, one of which, being attached to the building, has the other attached to it so that it may be readily taken off at any time for repairing the pipe or putting in a new section, and admit of doing this without disturbing the other sections or taking them down, as has to be done with the present mode of fastening the leader pipe. Besides having the advantage stated in regard to putting up and taking down the pipe, the arrangement of the coupling is simple and economical as to the quantity of metal used, and presents a neat and symmetrical appearance.

CURTAIN FIXTURE.—Joshua D. Legg, of Long Eddy, N. Y.—The roller is arranged to be revolved and held in position in the same manner as the ordinary curtain roller. Tapes are attached to the roller at one end, and to the lower end of the curtain at the other end. Two other tapes are attached to the roller and to the top or other end of the curtain. These tapes are so attached to the roller that when one pair is being wound around the roller the other pair will unwind, as, for instance, when letting down the top and raising the bottom of the curtain, and *vice versa*. By this arrangement the curtain may be dropped down, so as to cover the lower half of the window, or raised up so as to cover the upper half, or extended over the entire window, or be rolled up around the roller, as may be desired.

GANG PLOW.—This is a combination of various devices to form an improvement upon a plow patented July 27, 1869, by Hoell S. Smith, of Tremont, Ill., the same inventor being the author and patentee of the present improvement, which consists of certain peculiarities of construction, whereby, in three horse plows, the middle horse can walk in the furrow; and also in supplying a guard to hold the plow beam and sustain lateral strain.

MEDICAL COMPOUND OR LINIMENT.—Thomas B. Randell, of New York city.—This is a new mixture for the cure of rheumatism, neuralgia, lumbago, bruises, sprained swollen joints pain in the chest, and other similar diseases and affections. This liniment is rubbed into the skin as near as convenient to the parts affected. The phosphorus it contains is claimed to enter the osseous structure, and give strength and vigor to the same, asafetida aiding in its ready absortion by the system.

SAWING MACHINE.—Christian O. Hansen, of Ferguson, Mo.—This invention consists in the adaptation of a rotary sawing machine to the employment of the saw mandrel as the driving shaft of a scroll saw, the power being applied by the saw driving gear, and the scroll saw and its adjuncts being detachably connected to the sawing machine to admit of adjusting it either for scroll or circular sawing, or for other work. The saw frame may be adapted for employing the mandrel as the spindle of a tenoning lathe; also for the application of a boring and planing mandrel, and also for the application of a turning lathe attachment, and boring attachments.

DRILL CHUCK.—Pompeius Philippi, of Beardstown, Ill.—This invention relates to a new way of giving end play to drill bits while in the act of being centered and thereafter; and consists in allowing a slight but constant lateral play to the chuck, within which the shank of the bit is made fast. By means of a flanged plate or cap the chuck is secured to the end of the mandrel by screws. The end of the mandrel is provided with a hemispherical cavity, which the end of the chuck is made to fit. The globular end of the chuck not only fills the cavity in the end of the mandrel, but extends out from it, and is of greater diameter than the socket portion of the chuck. The cap is made to slip over the socket portion of the chuck, and to fit a portion of a ball, so that, when it is screwed up to the flange on the end of the mandrel, or secured in its proper position, the chuck will be held to the mandrel, but not tightly, the globe or ball being allowed to turn, so that the point of the drill will adjust itself to the center. A pin or lug on one side of the ball, is placed in a recess formed in the cap and mandrel, by means of which the chuck is carried round with the mandrel.

COTTON GIN ATTACHMENT.—Hiram P. Harrell, of Roxobel, N. C.—This invention is an attachment to cotton gins for crushing the cotton seed as it discharged from the breast of the gin. It consists in attaching rollers to the gin, arranged so as to receive the seed and crush it as it leaves the breast of the gin. These crushing rollers are revolved, either by means of the driving belt of the gin, or in any other suitable manner. Gear wheels on the shafts of the rollers, cause them to revolve with a uniform motion. The inventor does not confine himself to any particular mode of supporting or driving the crushing rollers; but connects them with the gin so that the seed will be crushed thereby as it drops from the breast of the gin. Aprons or guides are used for conducting the seed to and from the rollers; and scrapers are arranged to constantly clean the rollers, should the crushed seed and oil adhere to them.

HORSE HAY FORK.—Jacob H. Carothers, of Pine Grove Mills, Pa.—This invention is an improvement in horse hay forks, of the class in which a lever or link is employed for causing the prongs or teeth to clamp or compress the hay between them. It consists in a peculiar construction and arrangement of parts, whereby a very compact and apparently efficient implement is secured.

MACHINE FOR PULPING WOOD FOR PAPER STOCK, ETC.—Benjamin F. Barker, of Curtisville, Mass.—This invention relates to improvements in machinery for converting wood into pulp for use in the production of paper, and has for its object to insure the proper action of all parts, and simplify their construction and the arrangement of driving mechanism. It consists in a new form of stone, whereby centrifugal force is utilized for retaining the wood in contact with the grinding surface a longer time than it otherwise would remain. The invention also consists in the use of adjustable guides, whereby the blocks of wood are held to and caused to be fed against the grinding surface in the desired manner. There is also an attachment for grinding splinters and small pieces apart from the larger blocks, but on the same stone and in a new general combination of parts for the purpose specified.

WINDMILL.—Isaac Lehmer, of Lima, Ind.—This invention has for its object to furnish a simple and effective means for making the fans or wings of a windmill self adjusting, so that they will adjust themselves as the wind varies in force, by turning their edges more or less to the wind, as may be required. It consists in the construction and combination of rods, a spring, and a sliding wheel with the wings or fans and with the shaft, in such a way that as the movement of the fans or wings increases in rapidity, the centrifugal force thus engendered moves the fans or wings outward, which turns the edges of said fans or wings toward the wind, thus checking their movement. As the velocity of the movement decreases, the springs draw the fans or wings inward, which exposes more of their side surfaces to the wind, the fans or wings being thus self regulating. The fans or wings may also be adjusted to regulate their movement, or to turn their edges toward the wind, and hus stop them, by moving the sliding wheel.

GATE.—William Hathaway, of Northbridge, Mass.—The hinge post of this gate has a projecting cap piece. The end of the top rail of the gate rests on the cap, and lower rail rests on an ear projecting from the gate post below, and the pintle of the hinge passes through the top rail, cap, bottom rail, and ear. The hinge is formed in this manner, which allows the gate to swing in either direction while supporting it in the most substantial manner. A cap on the latch post has a recess therein for receiving the catch in the end of the top rail. A latch piece receives the slat rail next to the top. This passes through a long mortise in the end piece, so that it can be moved up and down therein, and play is given it at the other end, which allows of that motion. This rail is thus arranged for and operates as a latch.

PAD FOR STAIR AND OTHER CARPETS.—Edward H. Bailey, of Brooklyn, N. Y.—This invention consists in excluding moths and noxious insects from carpets by means of a pad formed of one or more layers or sheets of paper, surrounded by cotton batting or wadding, and a bag or outer case of cotton, linen, or other suitable cloth or material, the case being tightly sewed up so as to inclose the batting. The paper is impregnated with the essence of oil of sandal wood, or with the essence of oil of cedar, for rendering not only the pad but the carpet under which the pad is placed moth and insect proof; the odor of the wood will permeate the carpet, and render it moth, worm, and insect proof.

CUTTING APPARATUS FOR HARVESTERS.—Marshall Harrison, of Laclede, Mo., assignor to himself and Jefferson Mize, of same place.—In this invention the rear ends of the movable cutters are pivoted to a supplementary spacing bar. The object of this is to connect the series of cutters in such a manner that, if either one of the pivots by which they are connected to the sliding bar and stationary rib should give way, the operation of the tooth will not be prevented but allowed to go on as usual. In this way many of the usual stoppages in cutting, by which all the hands that follow the harvester are delayed in their work, are entirely obviated.

CLAMP FOR MAKING PICTURE FRAMES.—Leonard A. Johnson, of Candor, N. Y., assignor to himself and John O. Frost, of same place.—This invention relates to a new machine for holding the pieces of a picture frame in place while the joints are being cut by a saw, and, subsequent to such sawing, for holding the glued pieces in close contact. To the top of the frame of the machine are pivoted four oblong slotted frames or plates, whose pivot pins project from them into apertures of the table, and to which are attached corner blocks or followers, each of which has a button projecting from its lower face into the slot of the plate, wherein it can slide but not work up and down, being held in place by a projecting rib, or countersunk in said plate. Above the plate, each corner piece constitutes a block with a rectangular recess in one edge. The blocks are held by ropes or cords that pass through a central aperture of the table, connected with a block under the table top. A short cord connects this block with a lever or treadle, which can be set higher or lower at either end. The pieces which are to constitute one picture frame, are held in place by the corner blocks or followers which are drawn against the jointed ends of the pieces, by the cords drawn down by means of the lever. The joints are then cut by means of a fine saw, which is guided in a slit of each block, to work in the desired angle. The ropes are so adjusted that they make the picture frame square at every angle, the confining blocks being self adjustable. There is a projection on one side of every block for the back of the saw to rest on, to prevent the saw from cutting deeper than just through the frame. After the joints are in this manner completed, the pieces are removed and properly glued, and then replaced in the machine, and firmly held together by means of the lever; the frame can then be finished. The ropes are not in line with the miters of the picture frame, but all meet at a common center, so that the strain will be equal on each side of the corner of the frame, the sides being of different lengths. If the frame is made equilateral, the ropes will also be in line with the miters. The table has several apertures for permitting the adjustment of the plates to the holding of larger or smaller picture frames.

CARPENTER'S PLANE.—Henry N. Frederick, of Hancock, N. Y.—The face of the planing iron has a toothed portion, into which mesh the teeth of a segment. This segment is formed at the lower end of a lever, that turns on a pin whose bearings are in the sides of the plane. By swinging the lever on its pivot, the iron will be set up or down, as may be desired. A slotted lever pivoted to the plane can be clamped by means of a thumb screw to lock the iron in any suitable position. Other means for thus securing the lever and iron, may, however, be substituted for lever and screw.

LUBRICATOR FOR PICKER SPINDLE IN LOOM.—Thomas Parker, of Shelby, N. C.—This invention consists in a new way of applying lubricating material to a picker spindle. A wick is confined in a tubular screw, inserted into the top of the picker. The upper portion of the tube is enlarged, forming a cup, which allows the upper portion of the wick to spread and absorb oil. The lower portion of the wick is more compressed; but not so much so as to prevent a sufficient quantity of oil from passing through it for lubricating the spindle with which it is in contact. As the picker is thrown by the picker staff over the spindle at each throw of the shuttle, the spindle will be constantly lubricated when there is oil or other lubricating liquid in the wick.

TUBE EXPANDER.—Charles H. Clark, of Laramie, Wyoming Ter.—A central feed screw or roll is made tapering, from its forward to its rear end. The thread of the screw is made wide, strong, and with parallel sides, and has a shallow groove formed in its center to receive the bead of the small rollers, placed in slots in a cylindrical frame, with their faces resting against the screw. The rollers are perforated longitudinally to receive a wire, the ends of which enter notches in the frame, where they are secured in place by open spring rings, placed in grooves in the outer surface of the said frame. This construction allows the wires to be conveniently removed, and the ends of the rollers ground off to receive the longitudinal extension caused by the great side pressure to which they are exposed when in operation, and which would soon cause them to bind in the frame. Upon one, two, or more of the rollers is formed a bead, in such a position as to form a bead in the tube at the water side of the tube sheet. The bead at the end of the tube is formed by concave rollers pivoted to a ring, which, when at work, rest upon the edge of another ring upon the rear part of the tubular frame, which is prevented from turning by a tongue and groove. This ring is forced forward to feed the rollers to their work by a nut which fits upon a screw thread cut upon the rear part of the frame. The screw thread cut upon the inner surface of the tubular frame is made deep, so as to mesh into the thread of the screw or roll, even at the smallest part of the screw.

AUTOMATIC TRAP FOR WASH BOILERS.—Henry R. Robbins, Baltimore, Md.—This invention consists in a device intended to be placed on the bottom of a wash boiler, and operating to gather up water under steam pressure and to conduct it upward through a vertical pipe having an elbow at its top from which the water is ejected with much force and played in a stream within the boiler, upon the clothes, thereby assisting materially in cleansing the same.

COTTON CULTIVATOR.—Richard H. Purnelle, Beulah, Miss.—This invention consists in the combination, in one mechanism, of a barring off mechanism, a scraping mechanism, a cutting out mechanism for bringing the plants to stands, and a throwing on mechanism for heaping soil upon the stands.

COMBINED PLOW AND STOCK FOR CULTIVATORS.—Martin Kennedy, Chicago, Ill.—This invention relates principally to a stock so constructed as to receive different implements, such as a share and mold board for a single plow; two mold boards, one on each side, both constituting a double plow; two beams armed with shovels and constituting a cultivator; and a point to be used when the double mold boards and cultivators are employed.

EGG PACKING BOX.—Nathan L. Jauney, Wilmington, Del.—This invention relates to packing eggs held in little bags, which depend from perforated shelves, which shelves are supported horizontally in a box at suitable distances one above another by means of a partition whose ends enter vertical grooves in the sides of the box, the eggs supported in each shelf being covered with a piece of cloth which extends beneath the bottoms of the aforesaid partitions.

WHEEL CULTIVATOR.—John A. Viars, of Sherman, Texas.—This invention relates to a new and useful improvement in agricultural implements; and consists in a construction, arrangement and combination of parts whereby the plows or teeth may be raised or lowered, or made to penetrate the ground as much or little as may be desired. One or more plows may be used at one and the same time, arranged in any manner, so as to be raised and lowered. Pivot wheels or casters allow the machine to be turned in the field at pleasure.

APPARATUS FOR UTILIZING WASTE HEAT.—Ben James Hobson, Covington, Ky.—The invention consists in a peculiarly advantageous arrangement of two supplementary drums, connecting tubes, and entrance and exit flues in an enclosing or main drum, whereby a maximum area of heating surface is provided within a given space.

FLOOR CLAMP.—Thomas S. Urie, of Hubbardston, assignor to himself and George H. Cagwin, of Carson City, Mich.—Two bent bars are pivoted together so that they resemble in form a horse shoe, jointed in the middle of the bend. To one of the sections or bent bars is attached a gripping device, which seizes the beam or joist, and the other bar is forced against the floor board, to be clamped by means of a lever and toggles.

DITCHING MACHINE.—David Whitesell, of Mattoon, Ill.—Wheels, provided with disks having annular cutting edges on their peripheries, cut the sides of the ditch. A double mold board plow, having horizontal cutting edges, extends out to a point in line with the disk cutters. A rotary cutter, placed between the two sides of the mold board, cuts through the grass sod of the furrow slice and divides it into two equal parts. These three instrumentalities cut the soil at all necessary points. Auxiliary mold boards, for receiving the soil from the double mold board and forcing it outwardly beyond the sides of the ditch, are employed. These are hinged, by arms, to a standard, rigidly attached to the beam. By suitable mechanism, the mold boards are lifted from the ground, and the point of the plow is raised when desired.

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119,449.—CAP BLOCK. R. Cook, T. Hanford, New Hartford, N. Y.
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119,465.—PAPER PULP.—M. L. Keen, Jersey City, N. J.
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119,484.—STEAM ENGINE.—W. H. Ward, Auburn, N. Y.
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119,666.—KETTLE.—D Stewart, Phila., Pa.
119,667.—BRICK MOLD.—R. Stuckwisch, Terre Haute, Ind.
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119,680.—OVEN.—A. Willson, Buffalo, N. Y.
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119,682.—IRON CASTINGS, ETC.—R. Yeilding, New York city.
119,683.—COG GEARING.—L. R. Faught, Phila., Pa.

REISSUES.

4,573.—MILK COOLER.—A. E. Baldwin, Newark, N. J.—Patent No. 93,583, dated August 10, 1869.
4,574.—CLOTHES WRINGER.—C. A. Cummings, F. M. Swallow, Worcester, Mass.—Patent No. 34,295, dated February 11, 1862.
4,575.—STEAMING CLOTH.—L. M. Heery, Hinsdale, Mass.—Patent No. 115,300, dated May 23, 1871.
4,576.—BOBBIN WINDER.—C. H. Palmer, New York city.—Patent No. 105,365, dated July 12, 1870.
4,577.—BINDING BOOKS.—J. L. Rile, New York city.—Patent No. 115,896, dated June 13, 1871.
4,578.—EXTRACTING OIL, ETC.—L. S. Robbins, Rye, N. Y.—Patent No. 75,980, dated March 24, 1868.

DESIGNS.

5,296.—AGITATOR.—E. Bostick, Fort Wayne, Ind.
5,297.—WIRE FENCE.—M. Dupuy, New York city.
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5,299.—PARLOR ORGAN CASE.—L. K. Fuller, Brattleborough, Vt.
5,300.—CARPET PATTERN.—J. Magee, New York city.
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5,302.—COUPLING.—H. Newby, Avondale, Ohio.
5,303.—HOOD.—C. Rich, H. Crow, M. Rich, New York city.
5,304.—HINGE.—C. Suedekum, Newport, Ky.
5,305.—STEAM ENGINE.—A. A. Wilson, New Haven, Conn.
5,306.—COUPLING.—D. E. Wolff, Welsh Run, Pa.

TRADE MARKS.

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455.—COFFEES, ETC.—Butler, Earhart & Co., Columbus, Ohio
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457.—LABEL, ETC.—S. Crump, New York city.
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459.—CONDITION POWDER.—C. Garlick, Montreal, Canada.
460.—NECK TIE SHIELD, ETC.—W. H. Hart, Jr., & Brother, Phila., Pa.
461 to 463.—WHISKY.—Mills, Johnson & Co., Cincinnati, O.
464.—PREPARED COTTON.—Patent Elastic Felt Co., New York city.
465.—MEDICINE.—A. F. Shannon, Quincy, Ill.
466.—POLISH.—W. S. & T. S. Witherspoon, T. Wern, Fairview, W. Va.
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468.—REED ORGAN.—J. Estey & Co., Brattleborough, Vt.
469 to 471.—PAINT.—Holden, Tascott & Co., Chicago, Ill.

EXTENSIONS.

RICE CLEANING MACHINE.—W. Ager, of Washington, D. C.—Letters Patent No. 18,177, dated September 15, 1857.
CARRIAGE PROP.—C. Thomas, of Boston, Mass.—Letters Patent No. 18,254, dated September 22, 1857; reissue No. 1,331, dated August 26, 1862.
EDGE PLANER.—I. A. Dunham, of North Bridgewater, Mass.—Letters Patent No. 18,237, dated September 22, 1857; reissue No. 4,454, dated July 4, 1871.
GAS GENERATOR.—J. Butler, of New York city.—Letters Patent No. 18,184, dated September 15, 1857.
HORSE POWER.—G. E. Burt, of Harvard, and A. & G. F. Wright, of Clinton, Mass.—Letters Patent No. 18,232, dated September 22, 1857.
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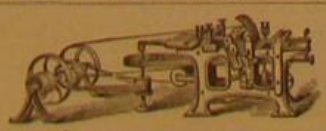
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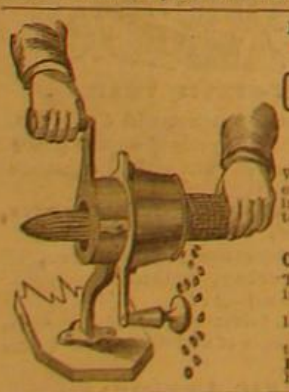
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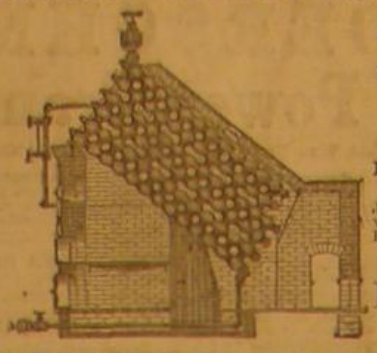
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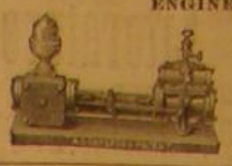
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