

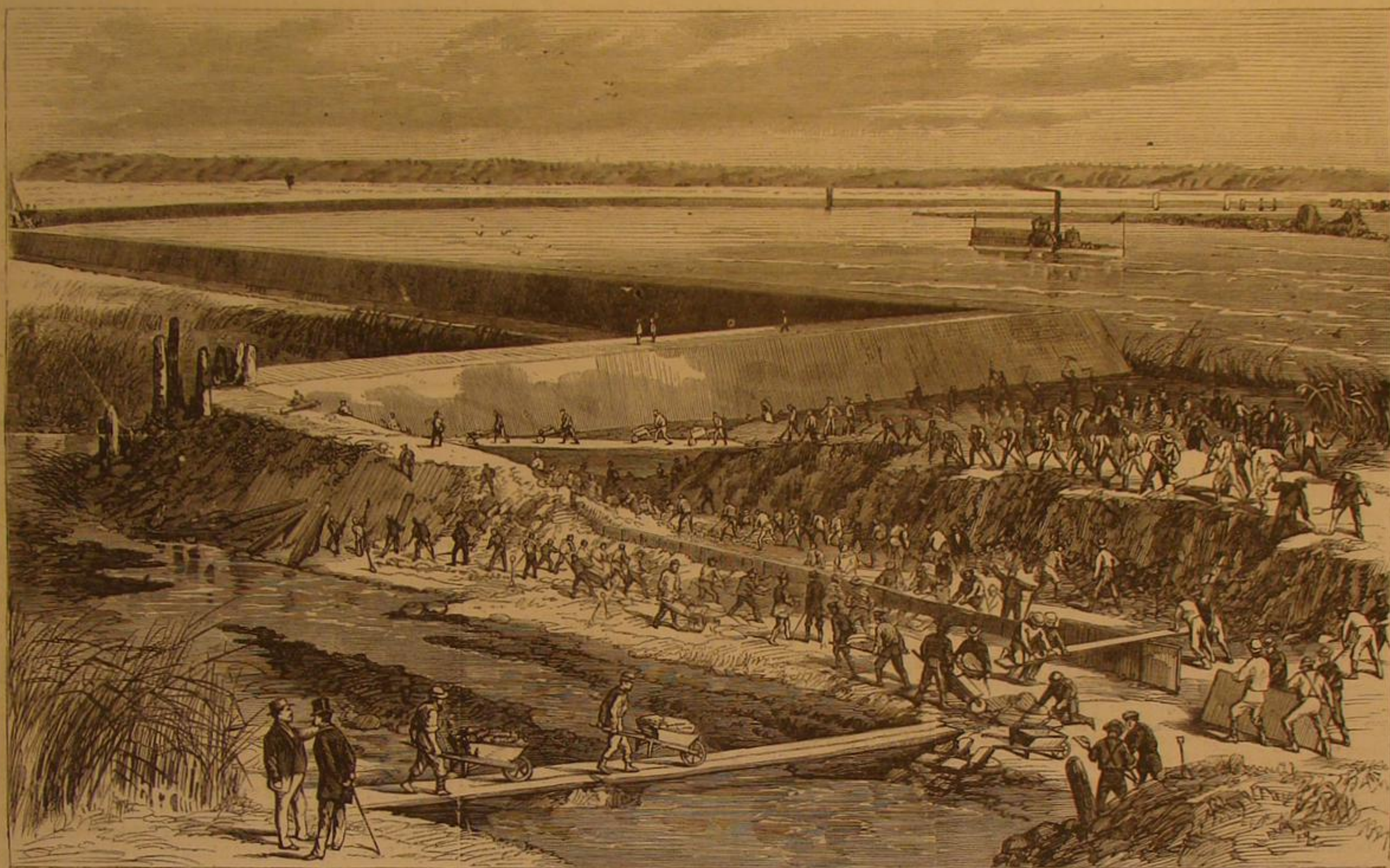
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DIKING AND DRAINING THE NEW JERSEY MEADOWS.



SETTING A PLATE.

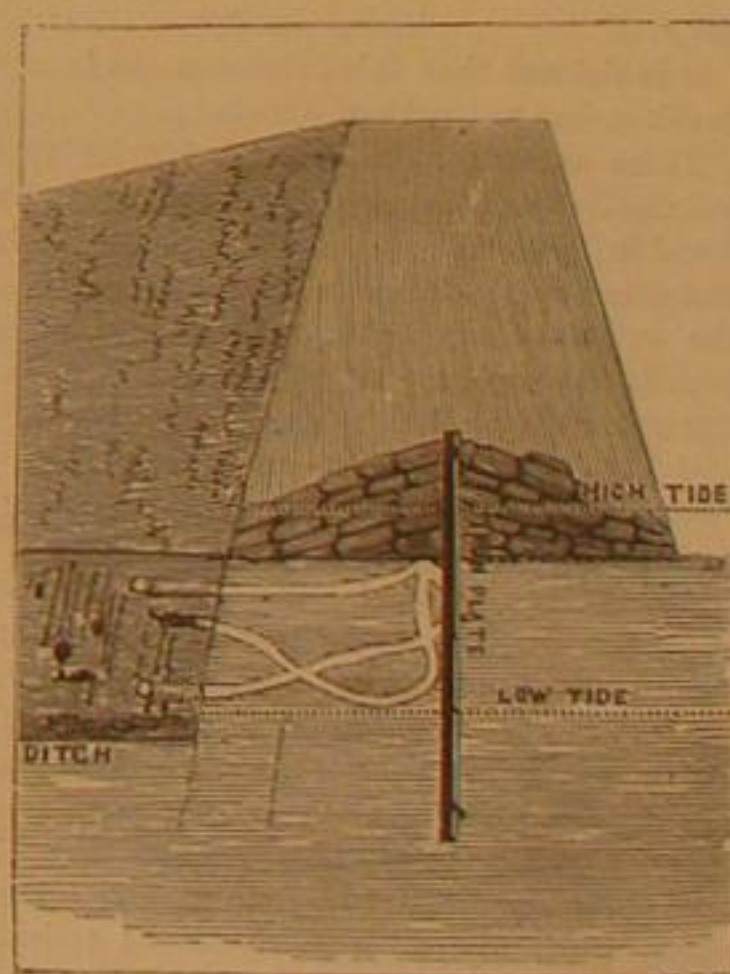
Diking and Draining Salt Marshes.

The draining of swamp lands is not a new idea. Such lands are not only unproductive of anything which can subserve any important purpose, but they are productive of numerous evils. Teeming with miasms, the home of mischievous and annoying insects they are blotches upon the otherwise fair face of nature. To render them fruitful, and productive of good rather than evil, is a problem for which a solution has been anxiously sought, but heretofore only partially obtained. No system applicable to all cases has been discovered, and only three methods have been adopted in the past to any great extent; viz., the slow process of pumping, ditching, and the erection of dikes or levees. These methods are not only expensive at the outset, but inefficient and costly to maintain. The dikes of Holland are embankments made with heavy timbers and filled in with stone, the surfaces being covered with bundles of flags and reeds fastened down by stakes. Also piles are driven into



CHISELING.

the sand and protected by planking, as well as by earth, turf and stones. In some places wicker work is used to cover and protect slopes, and the willow is cultivated extensively to supply the material for this purpose. In places of great exposure, walls of masonry with piles driven upon the side towards the sea, are used to protect the embankments from the action of the waves



SECTION OF EMBANKMENT.

The fens of Lincolnshire and the Bedford level are examples of the reclaiming of worthless and unproductive swamp lands and transforming them into fertile and productive fields.

These works are, however, not the results of private enterprise. In order to complete them, it was necessary to seek and obtain governmental aid.

An annual expense of \$30,000 each is required to keep the dikes of Helder and West Cappel, at the western extremity of the island of Walcheren, in repair. The annual expenditure in Holland for maintaining its dikes and the regulation of its water level is from two to two and one half millions dollars. Watchmen to patrol the dikes and to give the alarm when danger threatens, and engineers to apply the proper means in cases of emergency, are constantly employed.

As we have said, these measures are only partially successful. Water percolates through such artificial embankments.

Even if practically water-proof at the outset, the rats and land crabs soon destroy their integrity, and what they commence the action of the tides accelerates, and thus the necessity of constant watchfulness and repair arises. The want of an impenetrable case which should defy the whole tribe of borers, individually or unitedly, has caused the failures in the science of draining which have hitherto marked its progress.

The iron dike invented by Mr. S. B. Driggs, of New York, seems to put an effectual barrier in the way of these destructive agents. It is constructed by driving iron plates into the soil and joining them end to end, thus presenting an unbroken and impenetrable iron wall, which may be extended to any required length, and the durability of which is unquestionable. If, from causes not taken into account, repairs should ever be needed, the replacing of one of these plates is an operation quickly and easily effected.

The invention of iron dikes seemed to be singularly applicable to the drainage of the Newark meadows. Accordingly, Mr. Driggs, purchased and secured, notwithstanding difficulties arising from the various owners and the opposition of the Tide Water Co., of New Jersey, 5,000 acres of these lands. This Tide Water Co. had most exclusive and oppressive privileges granted to them by charter; one of which was the power to reclaim any land at will, and to tax the owner twelve dollars per acre in perpetuity. Mr. Driggs fought this scheme of extortion until he obtained the entire abrogation of their iniquitous charter. At this stage of proceedings, Mr. Driggs secured the hearty cooperation of Mr. Samuel W. Pike, of opera house fame, who saw sufficient promise in the system to give it his most earnest and hearty support. The work was now prosecuted with great vigor, and the result has been that owners of land only a few months since valued at fifty dollars an acre, have in some cases recently refused offers of enormously increased prices. The accompanying description, together with the cuts, will give a good idea of the nature of this improvement.

We have already said that these dikes are constructed with iron plates driven into the soil. The plates are so constructed and driven as to form a continuous wall. They are of cast iron, as thin and sharp at the bottom as the metal will run. They are made of sufficient width to reach both the high and low water marks, and are pressed or driven into the soil by any convenient power. The weight of workmen transferred by means of an ordinary fence rail, or blows upon the tops with stones, is sufficient in very soft mucky soils, while in stiff soils some superior force might in some cases prove necessary. The plates are so joined to each other as to prevent their overlapping, and the earth forced into the joints renders them sufficiently tight. When the turf is too tough and unyielding to drive these broad plates with facility, it is cut by a process called chiseling. After the plates are driven to a sufficient depth, a large and deep ditch is excavated on the inland side, into which other cross ditches empty. The earth thrown up over the iron wall forms a fine substantial embankment, covering the portion of the iron left exposed in driving. The bank is protected from the action of weather by grass and such creeping plants as have long interlacing roots.

To prevent oxydation, the iron used is refined so little as to be scarcely changed in character from the crude metal. It is well known that refining iron increases its tendency to oxydize, and it is claimed that the iron used for these plates will at least rust so slowly as not to materially affect their durability.

It is claimed that this improvement is applicable not only to dikes, but to banks of canals.

There can be little doubt as to its applicability to the reclamation of the large tracts of waste swamp lands to be found in Mississippi, Louisiana, Arkansas, Missouri, Tennessee, and other parts of the United States. Experience has proved the extraordinary fertility of lands thus reclaimed, and the benefit of iron dikes may thus prove to be a boon not only to our own country, but to the world at large.

POWERS OF THE COMMISSIONER OF PATENTS.

A singular case has lately arisen in the Patent Office, which from the frequent opportunities of its occurrence involves consequences of considerable general importance.

The owner of a patent applies to the office for a reissue, and is met by the answer that there appears upon the records of the office an assignment of the whole patent to another party, who has already obtained a reissue. To this he replies that the assignment is a forgery, and at the request of the office, substantiates his statement by satisfactory proofs, and claims that the Commissioner should at least again reissue the patent, and place him upon an equal footing with the forged assignee.

The Commissioner rejoins, that this is impossible. First, because he has no power judicially to consider the question as to who is the owner of the patent, aside from the records of his office, and, second, because the original patent having been surrendered by the fraudulent assignee, it has now no existence to be again surrendered for a reissue, and that the only remedy for the rightful owner is in the courts.

It becomes our duty to consider these questions in their order:

First—What are the powers of the Commissioner of Patents in determining who is the assignee of a patent upon the application by a person of that class for a reissue?

The provisions of the Patent Law upon the subject of reissues, in this instance, are as follows:

After detailing the prerequisites of a reissue, the act continues, "and in case of his (the patentee's) death, or any assignment by him made of the original patent, a similar right shall rest in his executors, administrators, or assignees." Act of 1836, §13.

The power here conferred upon the Commissioner to reissue a patent to the assignee thereof, necessarily invokes the power to determine who is an assignee. Of this there is no dispute, indeed the objectors in this case concede the right, though they insist that the Commissioner can have resort only to the records in his office for information.

Let us inquire, then, whether such is the limitation of evidence in this instance.

The powers of the Commissioner of patents are largely judicial. Questions of novelty, utility, adequate compensation, equivalent devices, and construction are under his constant supervision.

In no single case is he expressly limited by law to the information on hand in his office. Indeed by far the greater number of classes of questions presented to him, depend upon information wholly outside his records.

The Act of 1836 (sec. 11), provides, "that every patent shall be assignable in law, * * which assignment * * shall be recorded in the patent office within three months from the execution thereof."

What was the purpose of this enactment? Was the recording for the information of the Commissioner? Judge Story in a leading case in Massachusetts, where the effect of not recording an assignment was fully discussed, supplies us with the answer. The learned judge there says, "Why should an assignment be recorded at all? Certainly not for the benefit of the parties or their privies, but solely for the protection of purchasers who should become such *bona fide*, for a valuable consideration, without notice of any prior assignment." (Pitts vs. Whitman, 2 Story, 699). And this is the settled law to day. If, then, "Every assignment shall be recorded" "solely for the protection of purchasers," under what color of right can the Commissioner say that the enactment impliedly limits him to the record itself for evidence.

But again, the Act says, in case of the patentee's death, or any assignment by him, a similar right shall rest in his executors, administrators, or assigns.

Suppose a patentee dies, and his administrator applies for a reissue, must not the Commissioner determine if the party applying is the administrator; and in order to do this is he confined by any requirements of the Patent Law to any records in his office to determine the fact? Manifestly not, for there are no such records, the whole range of legal evidence which might be adduced in a Court of Justice is at hand to aid him in his decision. Primary and secondary evidence of all kinds in their appropriate places is open to his inspection. And if this is the case with an executor or administrator, why should we apply a different rule to the assignee who is mentioned by the Act in the same breath.

And again, many assignments are incapable of record, and yet it seems hard that such assignees, the legal owners of a patent, should be precluded from the benefit of a reissue by the fact that their assignments are not recorded, which will be the case if the Commissioner is limited to his record, such as assignees in bankruptcy, insolvency, or receivers. Or a veritable assignee may have lost or been deprived of his assignment, and may be unable either to procure a copy or a new original, yet it can hardly be the policy of the law to deny to him the whole benefit of his patent, by refusing to admit other legitimate proof of his ownership as a foundation for an application for reissue.

This very objection of being limited to the records of his office was made by the Commissioner in the analogous case of *ex parte* Dyson, decided on appeal from the patent office in 1860, and Judge Danlop then held that "the legislature has not said by what proof the applicant shall show that his invention claimed on reissue is the same invention made and intended to be patented on his original application. He is not limited by the statute to prove it by the specification, models or drawings, any legal proof to show it to be the same invention, whether found in the record or aliunde, ought to be received and weighed by the patent office. No authority is given to the patent office to limit the applicant's proof, if it is such as upon the law of evidence is held sufficient to prove facts before other legal tribunals." If, then, the applicant for a reissue is not limited to his specifications, drawings and model, upon the question of identity, why should he be confined to the record of assignments upon the question of ownership.

If, then, these authorities and illustrations have any weight, it would seem to be an undeniable proposition, that upon an application for a reissue of a patent, the Commissioner is not confined to the record alone to determine the legal ownership of the patent, but may resort to all those ordinary departments of evidence which afford themselves to every one charged with the decision of judicial questions, indeed, any other construction would lay the Patent Law open to the charge of depriving citizens of their right to a reissue (which is their property), without "due process of law."

This view is strengthened by referring to the provision of the law of 1861, (chap. 88), which provides "that the Commissioner of Patents may establish rules for taking affidavits and depositions required in cases pending in the patent office," supplying him with ample facilities for satisfying his mind of any doubts in this or similar cases, a provision evidently intended to apply to proceedings before the office different from the "contested cases" mentioned in section 12 of the Act of 1836, or the subsequent clauses of the Acts of 1861. It remains then, only to consider under this head the question whether the record can be contradicted by evidence aliunde.

The evidence being admissible as above shown, there is no rule which will prohibit its use in the correction of the record.

The rule of the common law which prohibits the contradiction of a writing by parol evidence is one of interpretation merely, when the only question at issue is one of construction,

but has no applicability to cases where the existence or authenticity of the instrument is disputed. (Greenleaf on evidence, §394. Act of 1839, or the subsequent clauses of the Act of 1861.)

We come, therefore, to the second question proposed, as an objection to the reissue under consideration.

Does the fact that the original patent has been surrendered by the fraudulent assignee form any obstacle to its reissue?

It is satisfactorily proven that the patent had been surreptitiously obtained from the owner for the purpose of surrendring. The surrender, therefore, was made by a person having no authority to make it, and was of consequence a nullity. It is one of the greatest absurdities to allege, that any person can, by falsely simulating another, rightfully deprive him of his property. But if no valid surrender of the patent was made, the proceedings upon the reissue to the fraudulent assignee were void, for a reissue can only be granted after a valid surrender (Act of 1836, sec. 13), and the original patent, therefore, still continues in force. In the case of French vs. Rodgers, decided in Pennsylvania, in 1851, Judges Grier and Kane held that "if a reissue was invalid for want of authority to make it, the surrender is ineffective for want of authority to accept it." Indeed, it has frequently been adjudged in the analogous case of the surrender of a patent, upon an insufficient basis of fact for a reissue, and the reissue being void in consequence, that the original patent continued in force, notwithstanding its delivery to the patent office. (Woodworth vs. Edwards, 3 Woodbury & Minot, 127.) The mere fact of possession by the office is nothing unless there was a valid surrender.

We have now seen that the surrender of a patent by a fraudulent holder is no bar to the legal title of the true owner. And that the Commissioner of Patents is not restricted to the records of his office in determining who is the assignee.

It would appear, therefore, to be his duty, upon being satisfied of the fact of the forgery of the assignment, by means of those ample provisions for securing evidence in cases before him, contained in the acts of 1839 and 1861, to reissue the patent to the party whom he is convinced is the rightful owner, thereby remedying the wrong that has been done him, at least so far as to place him on an equality with the wrong doer.

There are some badges of fraud upon the face of the forged papers in the particular instance before us, which need not be adverted to in this discussion of the general principles of the case; we will only remark in conclusion that it seems peculiarly appropriate, that where, as is at present the case, the door is left wide open for the perpetration of frauds of this nature, by the lack of any provision of the Patent Law for the identification of grantors and grantees of patents, prior to their assignments, that there should be a simple and summary method of correcting errors resulting from so manifest a defect.

THE GREAT AERONAUTICAL EXHIBITION.

The much talked of Aeronautical Exhibition, opened at the Crystal Palace, London, the 25th ult., with a large number of machines immediately and remotely connected with the subject of air navigation. Machines with wings, screw propellers, and tails, more or less in imitation of the structure of birds, seem to form the foreground of this collection of mechanico-ornithological devices. It is not our intention to reiterate the opinions in regard to the practicability of aeronautical machines, which have often been published in our columns. The exhibition inaugurated by the Aeronautical Society is a very good representation of the progress thus far attained. The secretary of the society in a communication to "The Engineer" says:

"It should be borne in mind, in the event of any ridiculous theory being illustrated in some of the objects now to be seen, that the study of aeronautics has been hitherto left to a class for the most part uneducated in mechanical laws, who have in consequence been wholly unable to give practical effect to their views, since they could neither themselves construct the apparatus they required, nor did there exist any organized scientific society from whose published proceedings they could gather confirmation or condemnation. Eminent naturalists, for instance, ignoring mechanical laws, have recognized as the main feature in the buoyancy and flight of birds, air cells and other peculiarities which render them of the same specific gravity as the atmosphere. The attempt to elucidate such a theory by any model would be quite as ridiculous as anything likely to be shown at this exhibition." Still it is hoped "if the ideas enunciated in some of the excellent papers read before the Society, do not result in some mechanical arrangements which shall to some extent be effective, that they will otherwise lead to more promising investigation."

The machines and devices exhibited are divided into seven classes: Class I. includes light engines and machinery.

In this class we notice

Rotary engine made of steel, one horse power; dimensions, two feet by eighteen inches, and one foot high; weight about sixty pounds. Motive power, gun cotton.

A one-horse power turbine injector steam engine, weighing less than twelve pounds, with inclined vanes showing its adaptation for aerial purposes, with rudder and gear for working.

Light engine and machinery for aerial purposes, about half-horse power. Cylinder two inches in diameter, three-inch stroke; generating surface of boiler, three and one half feet; starts at one hundred pound pressure in three minutes, works two propellers of three feet diameter about three hundred revolutions per minute. With three and a half pints of water

and eighteen ounces of liquid fuel, works about ten minutes. Weight of engine, boiler, water, and fuel, sixteen and one fourth pounds.

Aluminum steam engine.—Viscount de Ponton d'Amecourt, 36 Rue de Lille, Paris.

Working model of the Brighton oil engine (Dr. Money's patent). In this engine power is derived from explosion within the cylinder of inflammable gas or vapor mixed with atmospheric air. The vapor is produced by volatilization of certain liquid hydrocarbons, the heat resulting from the explosion being made available for this purpose.

CLASS II.—*Complete working aerial apparatus.*

Flying machine, which, being attached to the body, enables a person to take short flights.

Complete working aerial apparatus by muscular power.

CLASS III.—*Models.*

Model of a balloon, with a ring or belt attached which, in ascent or descent, is placed in an inclined position, relative to the axis of the balloon, the current of air rushing through the open side of the bell, urging the whole in that direction.

Model of the framework of a car, adapted to receive the machinery described in a drawing (class 5), the object of which is, by a system of levers, to raise the car two or three or more inches, according to the force required, which, suddenly dropped on to its supports, produces a rapid succession of jerks, thereby effecting descent without loss of gas.

Model of an improved balloon. By this model it will be seen that the car is done away with, and that a structure of bamboo or wicker work is to be built round the balloon, which is used as an ascending agent only.

Model of the aeromotive, constructed for rising in and steering through the air by the rapid rotation of a screw (one on each side of the machine), which, by creating a reaction in the air, overcomes gravitation, and thus rises. Fixed to the top is a parachute for gradual descent in case of accident. The aeromotive is propelled by a screw and guided like an ordinary vessel. The principle of the screw is the same as Rennie's conoidal.

Model of an aerial steamship, propelled by four wings, giving alternate stroke, and two screw fans, one of which is placed vertically for assisting in ascension, the other placed horizontally for propelling ahead, with internal space for gas.

Small model of a steam or hot air engine, chiefly constructed of vulcanized India rubber for aerial purposes.

Experimental model of a balloon, dispensing with gas and ballast.

Model in demonstration of a proposition to omit ballast in balloon ascents. By this proposition gas would be withdrawn from the balloon by an air pump, which would compress the gas into a chamber carried in the car when a descent becomes necessary. An ascent will be obtained by opening a tap, and thus allowing the compressed gas to escape from the chamber by a tube into the balloon. The advantages of this would be that the natural balance used by fishes would be applied to balloons, gas being reserved for use instead of escaping as now obtains.

Model of an aerostat or aerial float, eight inches long, twenty inches broad, and two inches deep, rendered rigid by inflation. When the two shorter ends are doubled together it assumes the form of an open boat or canoe, and will then balance itself in the air, and can be used as a parachute, for it will always descend with its convex side downwards, and in doing so may be propelled and steered in any direction. It is expected, however, that when made on a large scale, inflated with gas and propelled horizontally, it will support itself. The engine intended to be employed is an ammoniacal one.

CLASS IV.—*Working Models.*

INSIDE.

Working model to illustrate a mode of flying vertically by direct action on the air, without any screw motion in the wing. This machine will ascend in a vertical line.

Working model to illustrate natural flying, the wings being used to propel and sustain, the tail to sustain only. This model will fly horizontally for a short distance.

Working model of an air ship, lifting itself by motive power, and capable of being governed in every direction, based upon a system supposed to be not hitherto known, which enables it to work against any lesser currents of air; therefore a certain horizontal direction can be pursued, inasmuch as the cubic contents of the apparatus are comparatively little in proportion to its carrying powers. Each cubic foot of the space occupied by the apparatus is capable of carrying half a pound (Vienna weight).

CLASS IV.—*Outside the Main Buildings.*

A working model of an aerial machine, raising and sustaining itself in the air for several minutes, being worked by a power evolved from the combustion of materials similar to those used in the original fire annihilator, steam and gaseous products of combustion being intermixed within the boiler, and forced at high pressure into a rotary engine, turning, lifting, or driving fans.

CLASS V.—*Plans and Illustrative Drawings.*

In this class we notice only the following, chiefly on account of its absurdity. The expectation that a body floating in a current of air, and propelled by no other force, could be guided by sails, is a folly which our readers will appreciate without further remark.

Drawing and plan of an aeronautic machine.—This machine consists of an oblong frame of light wood, which supports a platform and tent for the aeronaut. To this frame are attached two spherical balloons, fastened at their center to the frame in the usual way. A light shaft supported on the lower side of the frame gives motion to the steering apparatus, which is worked by hand, and by which the aeronaut can change the position of the machine at will. There

are sails attached at the forward end of the machine by which it is expected an oblique course can be given to it.

CLASS VI.—*Separate Articles connected with Aeronautics.*

CLASS VII.—*Kites or other similar Apparatus proposed to be used in cases of Shipwreck, Traction, or in the Attainment of other Useful Ends.*

INSIDE.

A rough kite made of materials most likely to be found on board ship, suggesting to the unprovided mariner in peril of being driven upon a lee shore, a ready way of making a kite to be flown with 'two strings.' When about one third out, attach a small wooden weight to the second line; pay out again until the kite reach the distance required; then cut and let go the second line, which will swing to the shore, and communication is accomplished. On an uninhabited coast, attach the second line to the man swimming thereto. The inventor, John Neale, a working man, freely gives this very simple, rough, and common invention of "two strings to the kite" for the benefit of maritime populations of all nations, humbly requesting of all persons interested therein to extend, translate, and further advance the knowledge of the same.

Model apparatus for throwing a line of communication to persons in danger, either from fire or water.

OUTSIDE.

Rogers' patent projectile anchor and block, for launching life boats, etc., in rough weather, and for other life saving and useful purposes. Working model, scale $\frac{1}{16}$, with diagrams, to effect direct communication with a wreck on shore, or between a ship and the shore, or between two vessels at sea, or for assisting boats to leave the ship's side, when at anchor or in a rough sea, or for use in club hauling a vessel off a lee shore; also as a means of aid in case of fire occurring in high buildings.

An arrangement of kites showing Cordner's application to the saving of life, etc., from shipwreck, and to other purposes. This consists in applying to the saving of life and property from shipwreck, etc., a set or succession of kites, or several combined kites, so arranged that the power exerted by the several kites of a set shall be at one point or upon a single line, the line of the first or uppermost kite being attached to the adjacent kite, and the line of this to the next adjacent, and so on through all the series.

A patent kite and apparatus showing, by experiment upon a smaller object, how it is possible for a man to ascend the line of a kite by the draft power of another kite attached to a car. The exhibitor has himself ascended by these means to the height of several hundred feet.

The exhibition only confirms our doubts in regard to the practicability of aeronautic machines.

One difficulty which seems not to be fully appreciated by inventors in this field, we will briefly notice. It is the extraordinary velocity of air currents in proportion to the density of the medium. Did currents of equal velocity in proportion to density occur in water as occur commonly in air, no method at present known would enable us to navigate water. In extreme cases, birds, albeit adapted to flying as no human device can ever be, are driven miles by the force of winds, or compelled to take refuge from its fury.

MECHANICAL NOTES.

TO MAKE A "KNURL."

The "knurl," beading or milling tool, as it is variously named, is often called into requisition by the mechanic for the purpose of ornamenting the beads or swells of the work he is engaged upon. These knurls are generally purchased at some of the hardware stores, and are used by inserting them on the end of an iron shank, where they are free to be rotated by any moving body being held in contact with them. And if they be held rigidly enough they will make upon it a figure the reverse form of that upon their periphery. Knurls are generally made with about three forms of face—straight, hollow, and rounding—and these forms are cut with straight or beveled teeth, or designs of different degrees of coarseness.

If at any time the mechanic has one of these forms, a hollow for instance, which is suitable for beading a swell, and he wishes to produce the opposite of this, or a round faced knurl, he can turn up a steel blank of the required form and hold the hollow knurl against it until the form of its teeth is fully impressed in the surface of the blank. This then can be hardened and tempered ready to be used for the production of its reverse. In this way a sharp knurl may be used to produce a great number of others, or when they become dull by usage they can be restored by it to their original excellence.

But as it is often desired by the mechanic to make a knurl the teeth of which are required to be coarser or finer than any he possesses or can purchase, he can readily do it by first turning a blank to the form required, and then cutting a small screw with the same pitch of thread that the knurl is wanted to be, then cut grooves across it the same as a hob is made for cutting screw-chasers. Temper this screw and fit it to revolve in the lathe. Attach the blank knurl to a shank, the same as it is used in actual work, and hold it in a vertical position so that it will revolve by the action of the screw as it is held against it. The rotation of the screw will cause the blank to revolve, and a serrated surface will be formed upon it at the same time. While doing this it will be necessary to support the shank that carries the blank upon a T-rest.

If the blank knurl be made with a hollow face, the screw to cut it must of a necessity be of a size proportionate to the hollow; but if the blank be made with a flat or rounding form then it must be moved in such a manner that the screw

will cut every portion of the face evenly and alike, and this can be done by moving the handle that carries the shank, as it lays upon the rest up and down, and by so doing presenting the blank correspondingly to the cutting surface of the screw.

If ornamental knurls are wanted, the services of the die-sinker must be brought into requisition, who will produce a reverse of the ornament needed, and then reverses of this can be made in the manner mentioned, or they may be so made that they can be used upon the work without the necessity of using them as patterns to form working tools.

HOW TO MAKE METAL TUBES.

Tubes of metal are used for a variety of purposes, and in all large cities and towns are easily obtained of almost any size; but there are times when the mechanic finds it an impossibility to obtain what he wants of this kind of material, and he must manufacture a tube for himself. If the tube is required to be of two inches diameter inside, a narrow strip of metal is cut off and bent close about a mandrel or spindle of that size, until the ends just meet; this slip when straightened out gives the breadth of the piece which is to form the tube. Cut a piece of this breadth from the metal, taking care that the edges are exactly straight and the breadth uniform; brighten the surface for about a quarter of an inch by filing it at the opposite edges on the same side. Then place the piece of metal upon a spindle and with a mallet bend it round it until the edges come in contact and lie very close and even together, the brightened parts coming together on the inside and presenting a clean surface for the reception of the solder.

If the tube be exposed to the fire for soldering in this state, especially if the metal be thin, the heat would cause the suture to open, and it would be impossible to solder it; to prevent this, place loops of small wire, at an interval of about an inch or so apart, around the entire length of the tube, and twist them so as to bring the edge of the metal in close contact.

The tube so prepared is ready for soldering, and borax and spelter must be used for that purpose. The borax being previously burned or made to swell into a friable mass by exposure to heat upon an iron plate, is triturated with water to the consistency of cream, in which state it is rubbed along the inside of the tube upon the seam; upon the borax a portion of spelter solder must be laid. Place the tube over a good charcoal fire with the suture downward, until it becomes slightly red hot; at a cherry-red heat the borax will melt, and presently the solder will fuse, and as this fusion proceeds draw the tube along so as to expose every part of the line or joint to the action of the heat.

When finished remove the wires, and put it in a pickle of sulphuric acid diluted with water; after half an hour remove it, wash and scour it clean, and it is ready to be wrought as may be desired.

GRINDING CYLINDRICAL SURFACES.

The turning of long and slender rods in the lathe, so as to have them of a true cylindrical form, is quite difficult even when a back-rest is used; irregularities which are unobservable by the eye are easily detected by passing the rod between the fingers. Even short and thick rods, that are too rigid to spring under the action of the turning tool, are found to have slight irregularities, which may be accounted for by imperfections of the lathe or by the wearing of the tool, or from hard or soft places in the metal. It will be observed, then, that to produce a perfect cylindrical surface in the lathe is a matter of some difficulty, and the only method seems to be to turn the work as true as possible, and then complete it by grinding with some abrasive substance, as powdered emery, moistened with water or oil, which is the material generally employed.

The application of emery as an abrasive means for producing cylindrical surfaces is quite simple, as it is evident that the cylinder must be confined between surfaces the counterpart of these to be produced, and then well supplied with the abrading material; it is quickly revolved and operated upon until the requisite surface is produced. If a block of metal, as iron, steel, or brass, be bored with a hole of the size to which the rod is to be reduced, and one end of the rod made to enter this hole, both rod and aperture being supplied with oil and emery, it is evident that by moving the block in which the rod is inserted over the length of the work, it will be reduced so that it will correspond to the diameter of the hole. A block of lead or tin may be cast around the rod and supplied with emery and oil and operated as mentioned. This perhaps is the readiest way of forming a block, as it is easier to melt and recast the soft metal than it is to prepare and accurately drill the iron or steel block. The latter is useless unless of the proper size, but the former can be often remelted and used as a first.

For the use of the amateur an adjustable tool which may be recommended, consists of two cast iron or brass shells, cylindrical in form, and of a length sufficient to keep them steady upon the work. These shells have ears upon each side, and screws pass through these ears and confine the two parts or halves together. Two middle ears may be made with set screws to prevent the shells being closed beyond a certain point. To each of these shells handles are attached, so as to enable the operator to hold the tool and also to enable him to traverse it over the rod to be ground. The interior circles of the shells are made so that when the tool is placed around the rod it is much larger than its circumference, and this space is filled with molten tin, lead, or babbitt-metal. If a difficulty should present of the soft metal not retaining its place, several small holes may be drilled a little distance in the shells, and the metal filling these holes when cast will form a sufficient hold to retain it. By slackening the

set screws and tightening the binding screws, the size may be varied, to suit small variations of diameter in rods.

For the purpose of casting the lead or tin within the shells, the set screws are withdrawn and the binding screws are slackened so as to leave an opening of about a quarter of an inch between the flat faces of the shells. They are then placed edgewise upon a block or some level support, and a short cylinder or core of the same diameter as the cylinder to be ground is placed centrally in the aperture of the shells, and two slips of wood are placed so that they form a continuation of the circle where this circle is broken by the separation, and then the parts are firmly pinched together by the binding screws, the melted metal poured in, so that it fills the cavity, and encloses the core. The slips of wood serve to keep the shells at the required distance apart, and also serve to retain the metal, which otherwise would flow out at those places. It is almost unnecessary to repeat that the aperture of the shells should be much larger than the work to be ground, and the slips of wood taken out when the tool is to be used.

To keep the core centrally in the aperture of the shells, while the metal is being poured, it may have a portion of its length inserted in a hole in the block or board on which it is placed. If it be desired to cast the metal round the work itself, it may be so fixed and the metal poured. To prevent the flowing out and waste of the metal, all such points as would be likely to afford such escape are luted with clay, or even common putty such as is used by glaziers to fasten in windows may be used.

In using a tool of this character after the rod to be ground is put in rapid rotation, the tool is grasped with the hands and transversed backward and forward over the rod, and as the parts presented to its action are reduced the set screws are loosened and the binding screws are correspondingly tightened in order to decrease the circle and enable it to clasp the work with the requisite pressure. Adjust the tool and pass it over the rod until it continues to slide smoothly and with uniform resistance from one end to the other; oil and emery are to be applied during the entire operation.

It is advisable to make the grinding surface as near a counterpart of the cylinder as possible, and if a very perfect surface be desired, it would be well to reduce the inequalities with the application of one set of soft-metal castings, and then remove them and cast a fresh set with which to complete the operation.

Another application of this method is to fix the grinding tool in the tool-post of the lathe, and let it traverse the work from end to end, as it is rotated, keeping it supplied with oil and emery and advancing it to the work as it is reduced. In this case it is not necessary to encircle the cylinder or rod with a metal block, as an encircling of one third or one half the circumference is sufficient.

In some kinds of machinery it is necessary to accurately grind large rolls so that they may be perfectly true, and after these rolls are turned in the lathe as true as possible, they are mounted on their own bearings in a frame similar to that in which they are to be employed, and made capable of a slow rotation. A wooden cylinder supplied with a coating of emery is revolved with great velocity just in contact with the roll, which as it slowly turns is reduced by the quick-running emery wheel. The roll must revolve in a direction opposite to that of the emery wheel.

The same application may be made in the lathe, by slowly revolving the work and fixing the emery wheel in the tool post of the lathe and letting it traverse the work, the necessary speed being communicated to the grinding wheel from any convenient pulley.

This method is used for truing the hardened plugs of templates for gaging the caliber of rifle barrels, a wheel of corundum being employed instead of the emery wheel.—*Mechanic's Tool Book.*

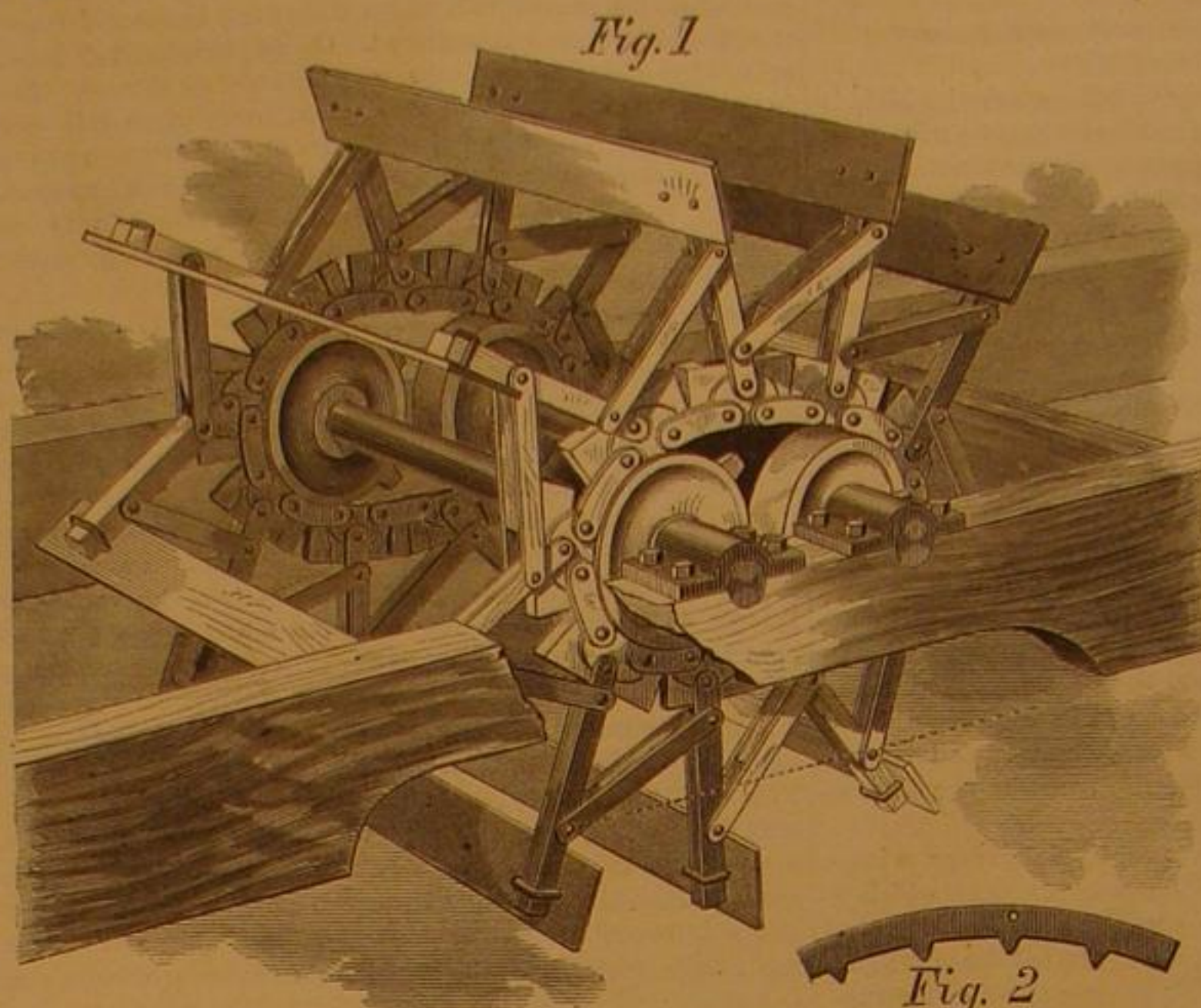
The Latest Novelty in Printing.

The foreign journals report that an American has taken out a patent in France for a style of printing which may be read in absolute darkness. We have not seen an account of the details of this invention, but have no doubt that the process is similar to that of certain photographs, which we described, Vol. XVIII, page 407, under the title of the "Latest Novelty in Photography." Nothing is easier than to print with an ink made of powdered phosphorescent substance mixed with some gum or varnish, as described on the page mentioned. Such a print may be either visible or entirely invisible by daylight, according as the color of the ink differs from or resembles the color of the paper upon which the print is made; but in order to render it visible in the dark, all that is required is simply to expose it for a few seconds to the sun, strong daylight, or to electric, calcium, or magnesium light; and, when after some time it becomes invisible, a renewed exposure to light will make it again visible. In this respect it has a great advantage over the luminous photographs which cannot be exposed to daylight except under the glass positive, as the whole surface of the paper is covered with the phosphorescent substance, and must therefore be preserved in the dark. The printing here described, however, improves and becomes more luminous the more it is exposed to light, as only the letters consist of the strongly phosphorescent substance, and the rest of the paper is in its natural condition, that is, it requires a very strong light to make it feebly phosphorescent.

SO-CALLED SODA WATER.—Most of the beverage sold as soda water has not a particle of soda in it, but is simply water with carbonic acid forced into it by using mechanical pressure, as that of a condensing syringe or a powerful force pump. Carbonic acid water is an agreeable and healthful drink, especially in hot weather, when taken in moderate quantities.

Improvement in Steamboat Wheels.

Many attempts have been made to produce a more uniform action of the buckets of a steamboat wheel on the water, to overcome the loss of power in lifting the water and to preserve the paddles in an upright position while immersed. For this, automatic and eccentric wheels have been contrived, and various devices have been experimented with to ensure a more continuous action on the water by the buckets. The engravings illustrate an attempt in this direction, which has been tested on tow boats and found by experienced boatmen to give very excellent results, one of them stating that the gain in effective power over other boats of equal capacity, but



GRANGER'S EXTENSION CHAIN PADDLE WHEEL.

with the common wheel, to be fifty per cent. The improved wheel has a longitudinal or horizontal diameter of more than double that of a true or circular wheel, of the same general diameter as the short diameter of the chain wheel.

Instead of a central axis to a round wheel, this has two axes, the rim or paddles forming an oval. Each of the shafts has guiding wheels for the chain which supports the arms on which the buckets are secured. The wheels on the driving shaft are furnished with projections, like those of any chain wheel, to fit into the interspaces between the side links and rivets, and insure the action of the chain. Each pair of links is connected to the adjoining pair by a piece that may be called a bridge, designed to support the chain with its buckets in preserving a segment of the arch forming the oval. To the center of these bridges are pivoted upright arms, on each side sustaining between them the buckets, and connected one to the other by diagonal bars, also pivoted, as seen in the large engraving.

This arrangement insures a perfect connection and uniform action between the parts, and gives a much longer contact between the paddle blades and the water than is possible by the ordinary circular wheel. To insure keeping the chains in place on the wheels, and to prevent sagging where the two shafts are at considerable distance apart, the bridge or connection shown in Fig. 2, is contrived. It is curved to suit itself to the radius of the wheel, and has projections on its inner side to engage with the spaces in the chains. The ends of these bridges are squared at such an angle that as they pass over the top they form a rigid arch, preventing all trembling, jar, or sagging, and working as smoothly as a belt over pulleys.

The principal device was patented through the Scientific American Patent Agency, some time ago, and an application is pending on other improvements by James Granger, whom address at Zanesville, Ohio.

The Suez Canal.

The financial descent of the Suez Canal to the level of the great Hamburg State distribution, etc., is a step from the sublime to the ridiculous, which we must regret, but which, taking all the circumstances into consideration, we can scarcely reprehend. A grand undertaking, commenced in the halcyon days of speculation, is found, as many others have been, to be impossible of completion with the amount of capital at first subscribed. In the meantime, such has been the flagrant abuse of the confidence reposed by both the English and French public, in most classes of financial operators, that money is no longer forthcoming, even for what may be considered as eminently safe investments, which, with all its merits, the Suez Canal is not. It is, however, an undertaking of that class, and has already progressed to that stage which gives it a kind of prescriptive right to capital, if capital can, by any fair means, be collected for it; and in the present proposition we recognize a more open and fair mode of procedure than that which failed last year to obtain more than a third of the £4,000,000 now said to be necessary for the completion of the canal. The *modus operandi* then was the very ordinary and exceedingly specious one of placing a nominal value on the self-constituted property of the company and proposing a species of mortgage on landed estates, consisting mainly of sandbanks situated either below or above water.

In the report which we published recently we find that the directors, who, like many other mortals, gain wisdom by experience, almost abstain from referring to this class of security for the advance which they ask from the public, and the spirit of their present appeal is one to the candor of which we can take no exception. They say that, from the extraordinary state of European financial affairs, even more than from the peculiar nature of their undertaking, special inducements must be put forward to obtain the capital which is absolutely necessary for the completion of the enterprise. That inducement they provide in the glorious uncertainty of the lottery, and to our mind not a few of the undertakings of modern

days would have been much more fairly dealt with if direct and open recourse to gambling, with all its sins, had been made, rather than the money drawn from a too credulous public by representations having very slender foundations in fact. It is curious that just at the moment when the directors themselves have, under the coercion of the times, practically thrown overboard the question of the ultimate remunerativeness of the undertaking, a rather more serious discussion than usual should have arisen on that very subject which is still quite as unfit for discussion with a view to absolute solution as it has ever been. The letters of Mr. Daniel A. Lange in the *Times* though evidently written in good faith, and containing a fair popular idea of the views of the directors on the future of the canal, is almost of necessity without any practical basis for the calculation of the future receipts and expenditure of the canal.

assuming it to be ready for traffic in 1869; in fact, the only matters of certainty which he puts forward are the facts that the interest and sinking funds for the present "loan" will amount to £360,000 a year, and that a margin of £800,000, when obtained, will pay 10 per cent on the original capital. When he computes the maintenance of the canal he makes a guess which may or may not prove to be correct, and a guess the truth of which no man living can affirm or deny, for the simple reason that the world has as yet no experience as to the cost of maintaining a canal through a sandy desert, nor any adequate experience in the maintenance of colossal ports amid coral reefs and shifting shallow banks. The probable revenue of the canal, though depending to a certain extent on the realization of the estimates of gross tonnage to and from India, depends far more on one condition of the carrying of that tonnage to which Mr. Lange has not alluded, viz., the proportion of it now carried, or which will hereafter be carried, by steam or in sailing vessels. That almost every merchant steamer trading to the East will pass through the canal when opened there is no reason to doubt, but the Eastern tonnage carried by steamers at present is a mere fraction of the aggregate of over 6,000,000 tons assumed as the total trade; and for sailing vessels, especially for that greater portion of the fleet which comes from the Indian Peninsula, the canal offers scarcely any advantages; in fact, they could not possibly avail themselves of it if a most extensive system of towage both in the Red Sea and the Indian Ocean be not organized for their assistance. The Red Sea, from the reefs with which it abounds, is perhaps the most dangerous navigation in the world, even for steamers, and sailing vessels have been known to take longer from Aden to Suez than the average voyage of an English clipper from Shanghai to the Thames. Now the tolls for passage through the canal, set down at 8s. per ton, will form no serious obstacle to the transit through it of any class of eastern goods, whether in steam or sailing ships, but steam towage is a very different matter, and will scarcely come to be counted in shillings a ton if sailing vessels are to be brought from Suez to points in the Indian Ocean where steady winds can be relied on. We think, therefore, that the future prosperity of the canal, assuming that it can be maintained at a reasonable cost, depends far more on the increasing employment of steamers for the conveyance of all classes of merchandise than upon any other condition that can now be foreseen. At present our experience of the working of unsubsidized steamers for long voyages is decidedly unfavorable. The case of the Indian trade will, however, be exceptional when the canal is opened, and the question of the shorter steam route competing with the longer sailing voyage will be one of great interest to solve.

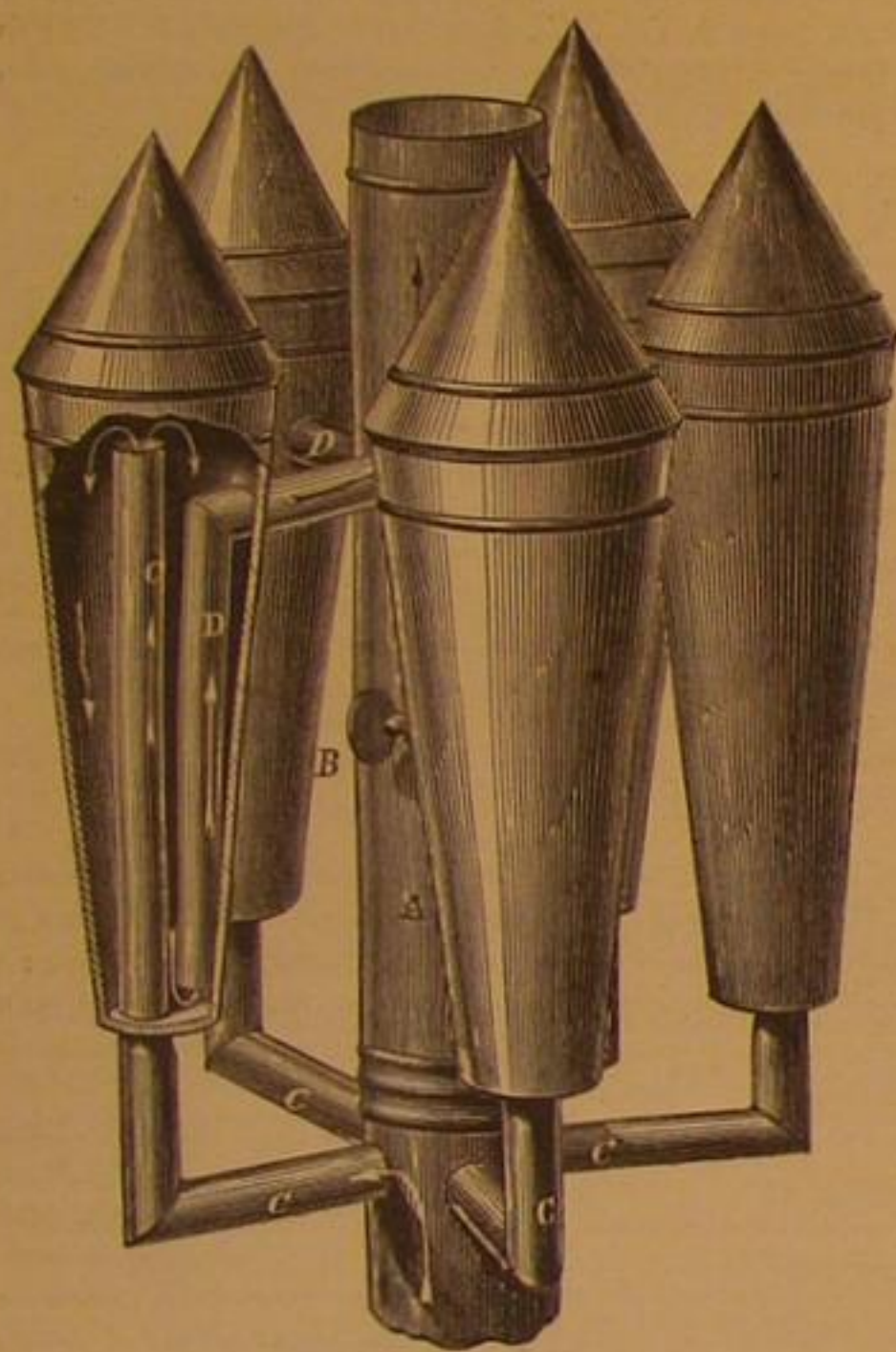
The steady progress of the works since the commencement of Messrs. Borel, Lavally & Co.'s contract is a matter on which we cordially congratulate the company. They have promised even less than they seem to be capable of performing, and the great enterprise to which M. Lesseps has devoted a life of energy was never more lucky than in its forced recourse to mechanical excavation, and in the fortunate circumstance that its machinery has been introduced and wielded by such able hands. The engineering world will be indebted to him whatever the commercial value of the canal.—*Engineer.*

LAKIN'S PATENT HEAT RADIATOR.

For the purposes of radiating heat, ordinary stoves, furnaces, and heaters present too small an area of the outer surface to properly warm the surrounding atmosphere, the heated gases being confined and compelled to climb the chimney, instead of loitering by the way and giving out their superabundant heat. Appliances for delivering this wasted carbon can be made useful and at the same time ornamental. Such is that seen in the accompanying engraving. A series of upright inverted cones of sheet metal, capped with cones, are arranged around the draft pipe and connected to it by tubes.

A is the central pipe, with an ordinary damper, B, which, when open, permits the gases of combustion to pass unimpeded to the chimney flue. Branch pipes, C, extend in angles or curves from the central draft pipe up into the inverted cones to near their tops. The heated air, being light, passes through these tubes and impinges upon the cone-like caps, from which it is deflected down and passes out through the tubes, D, open at the bottom, to pass into the central draft tube to the chimney, through apertures above the damper. The arrows show the direction of the heat currents. The heat gases impinge upon every side of the cone, and thus greatly enlarge the heating surfaces. If no additional heat beyond that of the usual direct draft is required, the damper, B, may be opened, when the course of the gases will be as in an ordinary stove pipe without any appliances, and the draft will be direct.

For base burning and slow combustion stoves, for offices,



stores, and for upper floors in private dwellings, and, in short, for all circumstances where the utilization of heat is a desideratum, this device is intended. It is constructed on scientific principles, and calculated for saving fuel and trouble. It was patented June 11, 1868, by J. A. Lakin, who may be addressed for state rights or for additional information at Thompsonville, Conn.

BRIDDAY'S IMPROVED ARTIFICIAL LEG.

The results of the late war have made unusual demands on the resources of surgical art in providing substitutes for natural limbs, and mechanical talent has been largely employed in manufacturing and improving these appliances. Yet with the best mechanical skill, we fall short of providing a perfect substitute for the natural limb. Every improvement, however, in these necessary aids to mutilated humanity should be welcomed and encouraged. That shown in the accompanying engravings claims to be superior to others now manufactured for the same purpose. It is the invention of B. Bridday of Detroit, Mich., to whom patents were granted, May 19th and 27th, 1868.

The device is intended as a substitute for the human foot and leg below the knee, and is believed to be simpler in construction, less in cost, and easier in operation than others in use. Fig. 1, is a sectional elevation, and Fig. 2, a plan view, of the foot with the leg portion removed at the ankle joint, and the foot partially broken away to show the mechanism of the toe joint. The pintle or centre of the joint is secured to the foot by means of two bolts, A, the nuts of which are seated in a recess, and with washers bear against rubber glands or flanges, B, or washers of some other yielding substance. From the same centre or pintle, rods, C, extend upward through the solid part of the leg, and are secured by nut, washer, and yielding cushion as are the bolts, A. Between the lower end of the leg and the bottom of the receiving recess in the foot are thick rubber springs, D, on either side of the hinge joint.

The part representing the toes is joined to the foot in a similar manner, except that the rubber spring or buffer, E, is placed above the joint. The nature of the connections is plainly shown in the engravings. The contiguous parts of

the joints are curved to permit free movement. The bottom of the foot may be covered with canvas, leather, or any other tough elastic substance, and the opening of the toe joint may be similarly defended, the coating serving to prevent the ingress of dirt and the too free action of the joint, which might throw the toe of the foot beyond the horizontal line, as it is raised from the ground in the act of walking. The rubber springs between the leg and foot are arranged to hold the two parts together at about right angles, but to yield in

Fig. 1

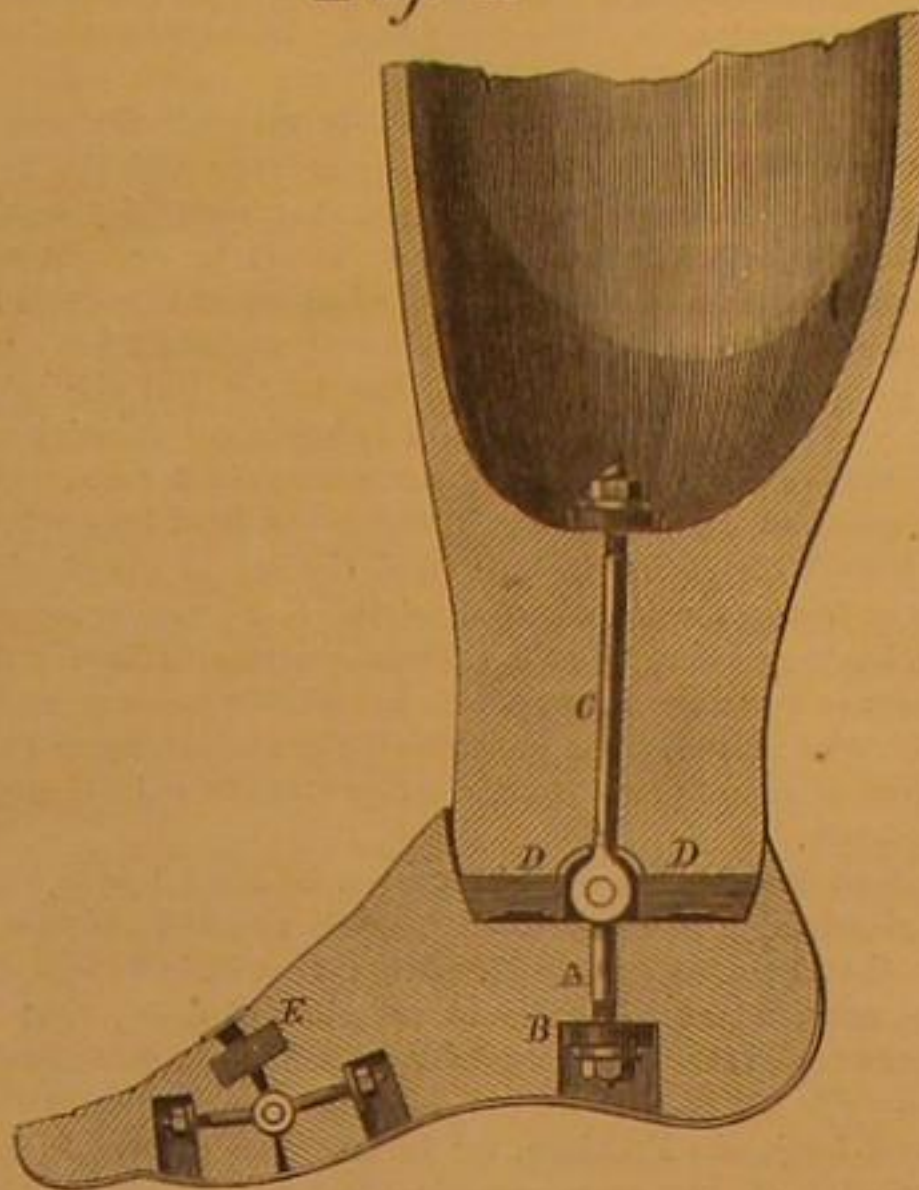
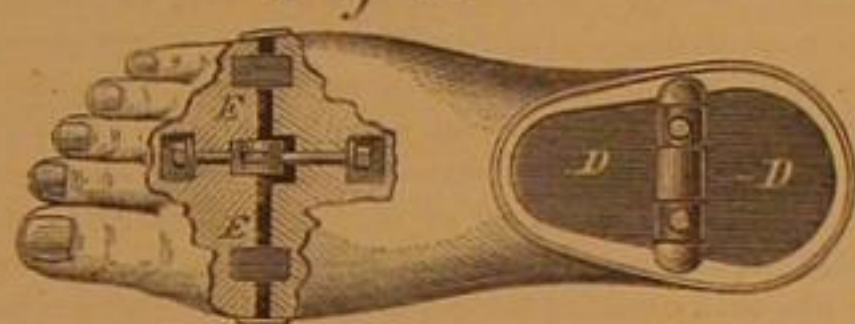


Fig. 2



either direction in the act of walking. A semicircular steel spring is interposed between the ankle joint and the lower end of the ankle, the ends of which bear upon the upper faces of the rubber to overcome and compensate for any wear or looseness in the joints of the straps or bolts, so that when the foot is taken up or set down no shock shall be felt, the spring pressing the parts away from each other when raised, and yielding when the foot comes in contact with the ground. The yielding washers or packings of rubber allow a slight lateral motion when walking over rough ground.

The whole patent, or State rights, may be obtained by addressing the patentee, B. Bridday, at Detroit, Mich.

Correspondence.

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

The Diamond Point Tool.

MESSRS. EDITORS:—No apology is deemed necessary for offering an article on this important tool. When properly made there is no tool more satisfactory, but in practice it is quite exceptional to find a good one. Hence it is to be inferred that the principles of its action are not completely understood by all turners and tool dressers.

To begin at the beginning, the tool should have the proper inclination forward for the lathe, and the work on which it is to be used, a tool for a light lathe and for small work requiring more inclination than one for a heavy lathe and large work, and a plainer tool but little inclination. These points, however, are commonly observed.

The next thing is to put the cutting side in its proper angular position. Fig. 1, is a horizontal section near the point of a good tool in cutting position, and Fig. 2, likewise of a bad one. The tools are supposed to be for feeding to the left, in the ordinary way. The corner 1, is the leading corner; 2, is the cutting corner; 3, the following corner; and 4, the back corner. 1, 2, is the cutting side.

Fig. 1

Fig. 2



Now in forging the tool the cutting side should be made to stand at a small angle with a horizontal line in the direction of the crossfeed, as in Fig. 1, not a large one as in Fig. 2. In other words, its position must be a little removed from that of the edge of a straight side tool, but there must be some angle, otherwise the tool ceases to be a diamond point, and becomes a half diamond, and must be inclined to the left to give it clearance. A true diamond point should not be so inclined, but only forward. Thus, it appears, that the cross section of the part drawn out to form the tool, should be a rhombus or diamond, and not a rectangle or square, in order that the cutting side may not form too great an angle with the transverse line.

The reason why a small instead of a great angle is required,

becomes obvious thus: In setting the tool, the point must be elevated to such a height as will give it the proper clearance. The clearance of the pointed and the clearance of the cutting side are two things, and the tool must be so formed that the cutting side will have its proper clearance when the point is elevated to the right height.

The shape must be such that the clearance of side and point will coincide in one position. When the angle of the cutting side is too great, the elevation of the tool affects too much the clearance of the cutting side. If it was made with no angle, but straight like a side tool, it is plain the elevation would not affect the clearance of the side at all, but only that of the point. The final adjustment is made by turning the tool in the tool-post to the right or left from a straight position.

The tool being forged it must be properly ground. The diamond point is a wedge for separating two portions of metal. Of course a thin wedge operates easier than a thick or blunt one. There is less disturbance of the molecules of the metal removed in the chip, consequently less heat, and the tool is not thereby burned away. It is not uncommon for a good tool to stand a whole day in turning wrought iron with a heavy chip and fast speed, without sharpening, except with an oil stone, in position, and making continuous spiral chips to the last.

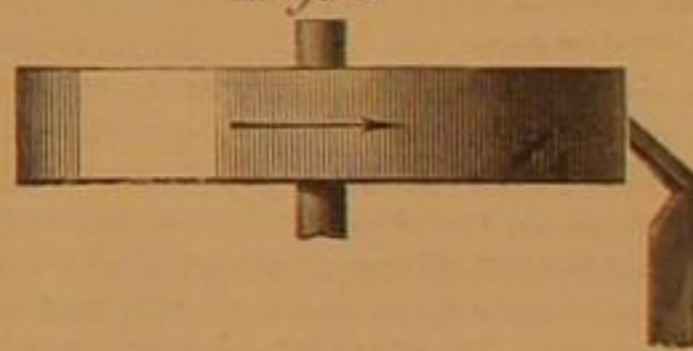
As this wedge is a powerful one, there is a tendency of the tool to move forward in the direction of the feed, which is performed with little power, so that the tool is liable, with improper management, to spring into the work and break. This is what frightens many workmen from using thin tools, but if properly made and handled, there is no danger in using very thin tools. Some men in attempting to grind a tool thin, grind the back corner low, but this does not make a tool thin, at least, not thin to any useful purpose. It makes the point slender and weak, so that it breaks off; then they are disgusted.

It is the following corner (marked 3 in the cut) which must be ground low to make a good thin tool.

In a planer tool, the back corner and necessarily the leading corner, should be left high compared with the cutting corner, to prevent the tool springing down into the work, and also to strengthen the point. In a lathe tool the leading and back corners may be ground somewhat lower. If left sufficiently high, the tool will make left hand spiral chips. It is best to grind these corners low enough to make straight or right hand spiral chips. In all cases the following corner should be ground low.

To grind a diamond point properly and easily, it is well to know the best place on the grind stone to apply it. The place recommended for grinding a tool according to these principles is shown by the cut. This is for a right hand tool, or one to

Fig. 3



feed to the left. The tool is to be held in nearly a horizontal position. To grind the back corner higher, of course the back end of the tool is held more to the right.

I think any one who tries it will agree that this part of the grindstone peculiarly facilitates giving the form to the tool which has been recommended. The ugliest ground tool is here speedily brought into comely form. H. W. P.

Newark, N. J.

Connecting Shafts by Pitmans.

MESSRS. EDITORS:—The learned Mr. Caxton, upon returning to his home and finding that his wife had given the name of Pisistratus to his son, exclaimed in tones of horror, "Good heavens, madam, you have made me a father of an anachronism!" Your correspondent from Delaware City, Del., whose communication appears on page 20, current volume, will probably find himself struck with similar horror when he finds himself the father of an absurdity.

To say that he succeeded in making a device work which could not by any possibility work, certainly entitles him to the credit of doing more than lies within the power of ordinary mortals. His device involves the absurdity that the hypotenuse of a right-angled triangle is equal to the altitude. To prove this I subjoin his drawing, having placed thereon the figure, A B C D E F G. The distance from A to D is equal to the distance from G to F. When the cranks have made a quarter revolution they would stand at the points, G and F, the pitman would then be on the line, A G, and its length, measuring from the centers of the crank pins, would be equal to G F. Its half, B C, would then be equal to the half of G F, which is equal to A C. Hence, to suppose rotation possible in such a contrivance is to suppose the absurdity that the hypotenuse, B C, of the right-angled triangle, A B C, is equal to its altitude, A C. All the motion that such a contrivance could possess would be the play consequent upon imperfect fitting.

Providence, R. I.

The Planchette.

MESSRS. EDITORS:—In your article on this interesting little instrument, it is stated that "makers claim that the wood

used in their manufacture is peculiar; and "in the center of the board we have occasionally seen a disk, having the appearance of German silver, but whether for use or ornament we are not informed." Some experiments I witnessed on the 4th will show that no peculiarity of wood is required, and that the disk of metal was, as you conjectured, for ornament.

The Planchette was made by my brother, of fine wood, the board of heart shape, and in size about 7x7 inches by 1/4 inch thick. The supports were a piece of lead pencil and two round, fine legs, about the diameter of a pencil, and 2 1/2 inches long, rounded and smooth at the base. Such a one can be easily made by any one who can handle a jack-knife. And as they are so easily made, it might be well to know whether it is patented.

One surprising feature in its operations is the smoothness with which it moves. There is no perceptible jerking or tremor about it, while a person compelling it to make figures finds it difficult to make circles or curves without having them full of angles.

From the time the hands were first applied it was about fifteen minutes before it moved, after which I noticed that at times all hands were withdrawn for a second, but when two hands (it would not move with but one hand) were applied, it would again instantly move off, as though it were charged with a power which only required certain connections to put it in motion.

Another fact which seems to indicate that the will has but little control over its operations was, that when all desired it to write it persisted in wild scribbling. It must, however, be acknowledged a good writer when it does attempt it.

H. ANDERSON.

Peekskill, N. Y., July 6, 1868.

Origin of Planchette.

MESSRS. EDITORS:—I observe an article in your paper entitled "What is Planchette?" It will cost you very little trouble to ascertain the birthplace and origin of Planchette, and you may even put your finger on the author of its being. I would send you the documents and the exact date if I had access at present to my library; but you can easily verify my statements. The fact is, Planchette was originally a purely imaginary affair and a mere literary creation, made entirely, wood, wheels, and pencil, by the author's own pen (not his hands), out of his own head. In one of the back numbers of *Every Saturday* you will find an article, copied from an English magazine, written after the manner of Swift's Gulliver or De Foe's Robin-on-Crusoe, giving the very first true and original account of Planchette. The author of that article created Planchette, and baptised her, and invented all her remarkable qualities. He begins his essay with a pretended dialogue, in which an American gentleman asks his English friend to come and see Planchette, which he explains to be a little instrument in extensive use, as a sort of oracle, in New York, Philadelphia, and elsewhere in the United States. Then follows a description of the instrument and a drawing, with an elaborate account of the wonders it performed. Remember, Messrs. Editors, that when this article was written no such thing as Planchette, neither the name nor the instrument, had ever been used or heard of anywhere in America. This is a key to the article which was merely intended as an imaginative essay, or, to say the worst, a hoax on the English public. I am certain the writer would be indignant if any one should accuse him of having intended to state facts, when he was so obviously producing an ingenious work of fiction. I said, at the time the article appeared here, that some simple-minded people, especially those whose pative simplicity took a spiritual turn, would not see the point of the hoax, and we should soon have Planchettes in abundance. A few months afterward, an enterprising gentleman in New York—a stationer, I think—advertised the first Planchettes ever seen in America. The literary gentleman who, with the view of writing a sensation magazine article, imagined Planchette and all her wonders, must be surprised to find her in actual existence, for sale at all stationers' in England and America, for he never dreamed that we, who could detect at once the fallacy of his opening statement, could possibly be taken in and hoaxed on this side of the water. He had placed the birthplace of Planchette in America, where it had never been heard of, merely to gull the English public. Here you have the beginning of Planchette—a mere hoax or literary invention; and it may help you to prophesy the end, or at least to guess "What is Planchette?" and who are her "reliable" disciples.

M. W.

The Mysteries of Planchette.

MESSRS. EDITORS:—Your article entitled "Planchette" has attracted my attention by its candor and evident fairness of intention—qualities rarely exhibited by the press when referring to this or cognate subjects.

Wonderful as are the phenomena termed spirit manifestations, no one, nor all of them, have seemed to me so strange as does the course of our scientific and religious people in relation to this matter. If they do occur, as claimed, they are outside of, and beyond the present known laws of nature, and, I think, demand the most careful scrutiny of that class which claim preeminence in knowledge. If they do not occur—if thousands upon thousands of otherwise intelligent people are the dupes of cunning impostors or the victims of wild hallucinations, it surely is the imperative duty of those to whom the religious culture of the people is confided to seek to discover the source of this delusion, and thus rescue these misguided ones from the effects of their folly.

Neither ridicule on the one hand nor denunciation on the other has checked the manifestations nor lessened the number of believers in their spiritual origin. Is it not time,

then, that fanaticism and bigotry were laid aside and common sense employed in the consideration of this subject?

If Planchette does move without voluntary action by the persons whose hands may be upon it; if, in thus moving, it writes words or sentences which are appropriate answers to mental questions; if questions resting in the minds of a spectator, unspoken, are correctly responded to through the instrumentality of this little toy; if, as recently occurred in Baltimore, the sudden death of a gentleman in a distant city is announced through Planchette in the evening and confirmed by telegraph next morning, then no question can be raised of guess-work or the law of chances; but at once the reflective mind asks, Whence comes the intelligence controlling Planchette?

If intelligence floated loosely about through the atmosphere, we might fairly suppose, in accordance with the theories of some of our scientific friends, that electricity would, occasionally, catch up a word that would be *apropos*, and transmit it to the wonder-seeking admirers of this little instrument; but even our most profound scientists have not yet claimed to have discovered that property of the mind known as intelligence in a state of independent detachment. It is always the emanation of some organized form. The only question that remains is, whether the intelligence thus manifested comes from some mind clothed in the physical form or from some disembodied spirit. Some man or woman who, having passed from the external world, still lives in the interior or invisible spheres, and has discovered the action of a law of nature, through which he or she can control the nervous or muscular system of the operator and write through Planchette.

If man does live in a world unseen by mortal eyes, after his pilgrimage on earth is ended, is it not rational to suppose that he preserves his identity; that he is, indeed, the same man, minus his external covering of flesh; that he possesses the same intellectual faculties and the same desire to exercise them that he did when in the physical form? Would Benjamin Franklin, for instance, be content in any description of heaven where his great powers of thought were repressed; where he could no longer make research into the laws and agencies by which God manifests himself in nature? Would Franklin be satisfied with an eternity of any form of praise to the Almighty which would preclude him from following up that initial experiment when the kite and the key were the only instruments he required to bring God's lightnings from the heavens? If Franklin is now living in the interior, or world of causes, is it rational to suppose that he has been surpassed in electrical science by his pupils who still dwell in the world of effects? Can we doubt, while Morse has been teaching men to make the electric fluid eloquent with messages of love and wisdom, as it traverses the material wires of our earth, that Franklin also has been experimenting with those subtler and more ethereal forms of matter pertaining to the invisible spheres? If Morse has taught men to play upon the telegraphic machine, and thus communicate with his fellow-man on the other side of the globe, is it irrational to suppose that Franklin, Morse's gifted master, with his superior advantages, has been able to teach the spirits of men to seize the electric currents and play upon that more delicate instrument, the human brain?

If the physically embodied or mortal man is compelled to throw his thought upon the fibers of the brain to be transmitted thence along the nervous chords to the organs of speech before it can find oral expression, or to the extremities of his fingers in order that it may be transcribed upon paper, is it unreasonable to suppose that disembodied men, or spirits, should seek to acquire knowledge of the law by which thought is thus transmitted, and take pleasure in its exercise?

I have been unable to perceive what there is in such an hypothesis to excite ridicule or justify denunciation. If it is correct, what a glorious field of discovery does it not open to the progressive human mind? If it is erroneous, still is it not worthy of the careful consideration of the most exalted intellect?

I had intended referring, in this article, to one or two incidents which have occurred in my presence, demonstrating the theory here presented, but fear to become too much extended for your columns.

WASH. A. DANESKIN.

Baltimore, Md.

Editorial Summary.

A RACE ANTERIOR TO OUR OWN.—The late Sir David Brewster, in his very interesting work entitled "More Worlds than One," in discussing the geological condition of the earth, inquires, "But who can tell what sleeps beyond? If we have followed the omnipotent arm into the infinity of space, may we not trace it under our feet in remoter times, and in deeper cemeteries? Another creation may lie beneath the earth's granite pavements—more glorious creatures may be entombed there. The mortal coils of beings more lovely, more pure, more divine, than man, may yet read to us the humbling lesson that we have not been the first, and may not be the last of an intellectual race."

THE Underground Railroad in London is set down as a success. The cost of construction, including the purchase of property, amounted to \$2,500,000 per mile. First and second class cars are run every four minutes. The locomotives consume their own smoke, and it is estimated that 200,000 people pass daily through the line. The work is being extended and before many months tunnels will be completed under the Thames, so as to connect the two sections of the city. It is reported that the frequent passing of heavy trains jars the buildings, and fears are being entertained for their safety.

This is very likely. The promoters of the proposed underground railroad of New York must necessarily show a good deal of pluck and endurance before they can complete their work.

SMALL-ARMS FACTORY, ENFIELD.—The accounts for the financial year 1866-67 show that there were fabricated that year at Enfield, and sent into store, 17,996 cavalry carbines, Richards' patent breech-loading; 8,160 muskets, smooth bore, with bayonets; 2,480 fusils ditto; 85,033 musket rifles, pattern 53, converted to breech-loaders on Snider's system; 10,012 short rifles, also converted, and 4,998 naval rifles ditto. The value or cost of the small arms and implements for small arms sent into store from Enfield in the year is estimated according to several modes of computation; by the lowest it is £187,021, and by the highest £206,420.

NORTON'S STAMP ERASER.—The *Troy Times* denies the story that Marcus P. Norton, of that city, has been awarded the sum of \$250,000 for the use of his Post Office stamp. It says that not a single dollar has been voted by congress for that purpose, and that it is not probable any appropriation ever will be made for it. We thought the story was false, and so stated in our last number.

POTH'S PATENT WHEEL HUB.—In the description of this device on page 40, current volume, we omitted to state that the threads on the two, different portions of the sleeve are of different pitch, making what is known among mechanics as the "differential screw," an application of which may be found on page 2, Vol. XV., SCIENTIFIC AMERICAN. The device is one of the strongest grips between two opposing surfaces yet discovered in mechanics.

It is stated that on the morning of July 15, at 2 o'clock, Prof. Retus, of Litchfield Observatory, Hamilton College, Clinton, N. Y., discovered another asteroid, which makes 100 now discovered. It had the appearance of a star of the 11th magnitude, and its position was 21 hours, 9 minutes, and 10 seconds in the right ascension of 16 deg. and 4 min. south declination, with retrograde southern daily motion of about 36 seconds of time and 6 minutes in arc respectively.

WE regret to announce the sudden death of Joseph T. Bodley, of the well-known firm of Lane & Bodley, iron founders and engine builders, Cincinnati, Ohio.

THE VALUE OF A CAVEAT.

The following decision of Judge Fisher will be read with interest, as showing that a properly prepared caveat may at any time be adduced as evidence of priority of invention:

SUPREME COURT OF THE DISTRICT OF COLUMBIA. Before Justice George P. Fisher. In the matter of the interference between the applications of A. Barbardin and of Scharit, Lyman, and Hudson for patent for improved mode of lighting gas. On appeal of Scharit & Co. from the decision of the Commissioner of Patents.

On the 16th day of January, A. D. 1868, Barbardin filed in the Patent Office a caveat setting forth the design and purpose of his improvement in lighting gas, and its principal and distinguishing characteristics, "agreeably to the provisions of section 12 of the act of Congress approved July 4, 1836, and praying protection of his rights till he might mature his invention. This caveat described the same invention for which a patent was prayed by Scharit & Co. in their application filed in the Patent Office on the 31st day of March, 1867; and under the provisions of the section above mentioned, notice hereof was given to Barbardin on the 10th of July, and action on the application of Scharit & Co. was suspended. Barbardin did not file his description, specifications, drawings, and model within the time prescribed in said twelfth section, to enable him to "avail himself of the benefit of his caveat" that is to say, in time to save him as the discoverer of the invention from the operation of the rule of law which awards to the inventor who first adapts his invention to practical use, the right to the grant of a patent, which is the chief office of a caveat; but he did file his application, with descriptive particulars, etc., on the 14th day of November, pending the consideration of the application of Scharit & Co.

On the coming in of Barbardin's application, the Commissioner of Patents declared an interference, as he would have had the right to do, and as, indeed, it would have been his duty to do even if no caveat had been filed by Barbardin, and even if, also, a patent had been issued to Scharit & Co. There is no objection on their part, and could be none as to the propriety of the declaration of interference. Ten days before the day first set for the hearing of the case upon the interference, viz., on the 27th of April, 1867, Barbardin notified Scharit & Co. that the caveat which he had filed had had the full effect of secrecy lifted from it, and was open to their inspection, and that the same would be produced in evidence to support the claim of Barbardin as prior inventor; and the receipt of no notice was acknowledged by Scharit & Co. Mr. Scharit was present at the hearing, and objected to this evidence—that it had not been put in at the proper time—but the Examiners held to the contrary, that it was within the time limited by the rules of the Office, and decided that it was conclusive and satisfactory evidence, showing that Barbardin had been the prior inventor. An appeal was taken by Scharit and others to the Commissioner of Patents, who affirmed the decision of the Board of Examiners.

From that decision an appeal is taken to me. The reasons of appeal are as follows:

1st, That said Commissioner of Patents held that the caveat filed by Arthur Barbardin could be received and considered as evidence of invention at the time of its filing, without other proof; whereas the said caveat having failed to perfect his invention and file his application within the time limited by law, after receipt of notice pursuant to the statute to do so, had lost and forfeited his right to use said caveat as evidence of invention, and he must, as other parties in interference, rely upon evidence *in vider* for proving priority of invention.

2d, Because priority of invention was awarded to said Barbardin contrary to law and the proofs.

These reasons of appeal raise two questions for my consideration, viz.: 1st, Was the caveat admissible in evidence for the purpose of proving Barbardin to have been the prior inventor.

2d, Was it overruled by countervailing testimony admitting it to be proper evidence of priority.

It is argued as an objection to the admissibility of the caveat itself, that the rules of the Patent Office require that when a "party relies upon a caveat to establish the date of his invention, a certified copy thereof must be filed in evidence, with due notice to the opposite party, as no notice will be taken by the Office of a caveat filed in its secret archives." Now the object of this rule is expressed on the face of it. It means to say that because a caveat is in the secret archives, where the law requires it to be "preserved in secrecy," and the Commissioner cannot, of his own motion, remove the veil of secrecy so as to acquaint the adverse party of that which is within its folds, therefore, if the caveat when placed in interference shall desire to use what is shown as evidence for his claim, he shall himself break open the seal and let his opponents know what he relies upon within it. This may be as well, if not better accomplished, by opening the original and filing it as evidence in the case. The object of the rule is simply to give the other side an opportunity to inspect the evidence, as he is supposed to know nothing of its contents. Until its secrecy was waived it was a confidential record of the Office; but as soon as its seal was broken by the caveat, it became a public record which the appellants were entitled to inspect, and taken by the Office of a caveat filed in its secret archives. But when it is taken from the secret archives to the public record or public files, and notice is given to the opposite party, the reason of the rule is ended and the maxim, "*cessante ratione cessat lex*," is applicable.

I apprehend no well-formed judge or court would think of holding that a copy of its own records was *videlicet* of a better character than the original record itself. I have therefore no hesitation in deciding that the original caveat was properly admitted in evidence.

As to the second question, as I find no testimony in the papers forwarded from the Patent Office except the caveat, I assume it to be true as stated by the Examiners in their decision, that the caveat was the only testimony in the case. Of course, therefore, it was conclusive of the issue joined between the parties. The decision of the Commissioner is therefore affirmed, and it is ordered that the patent issue to A. Barbardin.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

THE SAN FRANCISCO BULLETIN says:—One of the prominent executive officers of the Central Pacific Railroad has declared within the last ten days that this road will be finished to Salt Lake, and passengers will be transported over its entire length by the 4th of July, 1869. It is pretty certain, now, that there will be very little difference of time in the completion of the two roads. The prediction amounts to this in effect: That on the 4th of July, 1869, passengers will be able to travel by continuous rail across the continent, from San Francisco to New York. Strange as the proposition seems, we are not prepared to controvert it. The two great companies have surmounted the greatest obstacles which are to be encountered on their respective lines. Each has passed the summit of the highest intervening mountain ranges, and are now on the "home stretch." The coming winter weather will not interfere, as heretofore, with the progress of the work. Only a limited force could be used in the deep mountain cuts; but upon the plains and more open country, gangs of men can be distributed at various points. Brigham Young, it appears, has not only contracted to build a section of the road from Salt Lake eastward, but is likely to undertake quite as large a job for the Central Pacific Railroad, west of Salt Lake. President Stanford was in the latter point some days ago, and there is little doubt that arrangements will be closed with Young for such available help as he can furnish. A large shipment of railway iron, said to amount to 5,000 tons, is to be sent across the Isthmus, and a dozen ships are under charter to bring rails by way of Cape Horn.

It is announced in Southern papers that new and important discoveries in the manufacture of steel, the results of which are of such magnitude as almost to stagger belief, will be shortly made public. The steel is said to be made directly from brown hematite ore. The process is said to be endorsed by distinguished engineers.

AN EXCHANGE says:—More than four thousand gallons of coal tar, which had floated through a sewer from the condenser at the Manchester gas works, has been pumped from a small creek east of the work. A similar deposit, estimated to reach 200,000 barrels, has recently been found in Charles River near Boston.

It is rumored that a sixty-four gun man of war is now on the stocks of a private yard in New York, being built for the Spanish Government, to be used in a war against Peru and Chili.

AN EXAMINATION of the United States statistics of manufactures, shows a clear increase in wages in 1866, of upwards of 60 per cent as compared with the wages paid in 1860.

CHICAGO has 54 breweries, 29 planing mills, 12 grain elevators, 18 iron foundries, and 51 packing houses.

Recent American and Foreign Patents.

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

APPLE PARIING AND CORING MACHINE.—Isaac Rogers, West Chehalis, Oregon.—This invention has for its object to furnish an improved machine so constructed that apples may be pared, cored, and quartered, or cut into pieces with once handling, and which shall, at the same time, be simple in construction, not liable to get out of order, and will do its work fast and well.

TIRE FRAME ATTACHMENT.—N. H. Mead, Waterport, N. Y.—This invention has for its object to improve the construction of tire frames so as to make them more convenient and effective in operation, and which will enable the wheel to be detached and turned, when required, before the tire can get cold.

FIRE KINDLING.—J. Granter, Ch. Gagin, and Z. Granter, San Francisco, Cal.—This invention has for its object to furnish a simple, convenient, effective, and reliable means for starting or kindling fires in stoves, ranges, furnaces, and other places.

HAME FASTENER.—A. B. Woodard, Alfred Center, N. Y., and Samuel A. Woodard, Harnettville, N. Y.—This invention has for its object to furnish an improved hame fastener, simple in construction and effective in operation, drawing the hames closer together during the operation of locking, and holding them securely when locked.

HYDROSTATIC PUMP.—W. P. Callahan, Dayton, Ohio.—This invention relates to an arrangement whereby a forcing pump, which is used to operate hydrostatic presses in the process of manufacturing linseed oil and other similar operations where hydrostatic presses are used, is made and arranged so as to operate upon a number of presses, thereby saving much valuable time, and greatly facilitating and expediting the operation.

PUMP.—R. W. Cronse, Westminster, Mo.—This invention relates to the class of double-acting cylinder pumps, and consists in a new and improved arrangement of the valves by which power is economized, while the machine is rendered less complicated and less liable to get out of order.

CULTIVATOR.—A. P. Routh, Liberty Mills, Va.—This invention is an improvement upon the one patented by me April 30, 1867, and consists in an instrument which I attach to the standards that support the plows, and employ for the purpose of cutting and destroying the weeds and grass between rows of standing corn and other growing vegetables.

APPARATUS FOR FEEDING FUEL TO FURNACES.—J. G. McCormick, Louisville, Ky.—This invention is an apparatus for carrying fuel, coal, saw dust, etc., from a bunker to the furnace, and feeding it regularly, uniformly, and evenly over the length and breadth of the fire grate, under any number of steam boilers, at the same time. The machine is worked by the engine, and requires no care except in keeping the bunkers supplied with fuel to be used.

CALCULATING BALANCE.—Benj. W. Ogburn, Whites' Mills, Va.—The object of this invention is to provide a simple, cheap, and easily operated balance, which will indicate either the weight of an article or its gross price.

MACHINE FOR STUFFING HORSE COLLARS.—S. B. McCorkle, Greenville, Tenn.—The object of this invention is to construct a machine which will place the straw in the collar in such a position that its elasticity will be preserved and utilized, thereby producing a better collar than any heretofore made, whether by hand or machinery.

CHURN MOTION.—David Morris, Bartlett, Ohio.—This invention consists in the use, in connection with a device for imparting two strokes of the dasher to one revolution of a crank, of a supporting frame consisting of an upright having a foot which is provided at its extremity and underside or bottom with a screw-threaded tubular stem, which serves the double purpose of a guide for the dasher shaft and means of attachment of the frame to the lid of the churn vessel.

GANG PLOW.—J. F. Porter and A. Norton, Tidoute, Pa.—In this gang plow, each plow has a hinged colter which severs the weeds, roots, etc., and by which the plow is drawn forward; the heel of each plow is hinged to its standards, and a new supporting frame, and new means of attaching and adjusting the plows upon it, are employed, by means of all which improvements a lighter, neater, stronger, and more completely adjustable gang plow is produced, than has ever heretofore been brought into use.

GUNPOWDER.—Paul A. Oliver, New York city.—This invention relates to a new and improved gunpowder, the advantages of which are, that it can be made much more rapidly, with perfect safety, cheaper and stronger than the ordinary gunpowder now manufactured.

SELF-ACTING VARIABLE CUT-OFF.—Samuel Stanton, Newburg, N. Y.—This invention relates to an application of a governor to the slide valves of a steam engine, whereby a more equitable motion than usual is obtained, and the steam admitted into the cylinder at all times when the ports are fully open, whereby the "wire-drawing" of the steam occasioned by the latter passing through a partially-opened port is avoided, and the steam within the cylinder allowed to work under a pressure equal to that which it has in the boiler.

HORSE HAY FORK.—C. E. Murray, Sugar Valley, Pa.—This invention relates

to a horse hay fork, for unloading hay and mowing it away in barns or forming stacks. The invention consists in a peculiar construction of the fork, whereby a large amount of hay may be lifted or unloaded in a given time.

TRUSS.—Thomas S. Lindley, Medora, Ind.—This invention relates to a truss of simple construction, which may be manufactured at a trifling cost, and be applied in such a manner that the wearer may attend to any active business without any difficulty whatever.

DRESSING GRIND STONES.—Philip Leonard, Sharon, Pa.—This invention relates to a machine for dressing grind stones and wheels or cylinders of any mineral composition for grinding, polishing, etc.

CHAFING ROLLER FOR WAGONS.—James M. Mayhew, Providence, R. I.—This invention relates to a device for protecting the sides of wagons or other vehicles from chafing or wearing when the front wheel may be turned, and it consists in a hollow concave iron roller, secured to a holding frame, as hereinafter described.

BREAST STRAPS.—A. L. Hill, Decatur, Ill.—This invention relates to an improvement in breast straps, whereby several advantages are obtained over those in present use, to wit, much greater strength and durability, the avoidance of wear by the friction of the rings of the neck yoke on the straps, and a more ready means of detaching them from the hames and neck yoke.

BURGULAR FIRE ALARM.—William J. Biggar and John C. Blood, Conneaut, Ohio.—This invention relates to a circuit breaker for a fire alarm, designed to be connected with the apparatus of a magnetic burglar alarm, for which letters patent have been applied for by Wm. J. Biggar, John C. Blood, and D. M. Griswold, in connection with a device for breaking the electro-magnetic circuit by the entrance of a burglar through a door or window. This device for a circuit breaker is operated on by the heat of a fire that may occur in a room where it is placed, and thus give timely alarm through the agency of the magnetic signals.

HORIZONTAL RECIPROCATING STEAM ENGINE AND WATER.—Thomas Reese, St. Louis, Mo.—This invention relates to an improvement in horizontal steam water or pumping engines, whereby economy in both space and power is obtained, and it consists in an arrangement for supporting the cross head and piston, and producing a parallel motion without the use of the ordinary guides or ways.

COFFEE POT.—Benjamin Boardman, Malden, Mass.—This invention relates to an improvement in coffee pots, by the employment of certain means whereby the steam and aroma which arises from the coffee during the process of boiling is condensed and saved or not allowed to escape.

GANG PLOW.—George Wharton, Jerseyville, Ill.—This invention relates to a gang plow, and it consists in a peculiar construction of the same, whereby the plows may be operated (raised and lowered), by the device with the greatest facility, and also made to conform to the uneven surface of the ground, so as to operate or turn a furrow slice in a perfect manner, whether the ground be level, undulating, or more or less inclined.

IMPROVEMENT IN LANTERNS.—Andrew Whelden, South Dennis, Wis.—This invention relates to an improvement in lanterns, which are provided with lamps, more especially designed for burning petroleum and similar hydrocarbons, the flame of which is not very persistent, and is liable to be extinguished by a sudden upward and downward movement of the lantern.

LAMP BURNER.—Frank H. Fuller, South Boston, Mass.—This invention relates to improvements in lamp burners for burning kerosene or other oils.

CULTIVATOR.—G. W. Cook, Macon, Ill.—This invention relates to a cultivator, and it consists in a peculiar construction and arrangement of certain parts whereby the driver may either walk or ride, as he may desire, and be capable in either case of operating equally the shares and shovels and managing the team.

SECURING HEADS IN BARRELS.—Peter Rink and Jas. Docherty, Wertsville, N. J.—This invention consists in securing heads in barrels in such a manner that the heads may be secured in barrels and removed therefrom without disturbing the hoops, and, in case of shrinkage, the heads rendered capable of being expanded in order to insure a tight adjustment of them in the barrels at all times.

CLOTHES MANGLE AND IRONING MACHINE.—Joseph Seamans, Chicago, Ill.—This invention relates to an improved clothes mangle, and consists of a device for actuating the lower roller upward against the top roller, by means of a pair of levers and a weight.

WELDING FLUX.—J. R. Tryon, La Crosse, Wis.—The object of this invention is to provide a superior welding flux or compound for steel or iron, which operates to refine and toughen the metal at the welded surface, thereby securing a perfect junction.

HUB BAND FITTER.—Charles E. Stone, Amesbury, and Alfred Herbert, Salisbury, Mass.—The object of this invention is to fit the outer bands of carriage hubs in an expeditious and easy manner. It consists of a tool with which a continuous shaving is pared from the hub by simply turning the wheel on its axle and holding the tool in proper position upon the hub.

COMBINED DIAL AND PLUMBER.—H. G. Williams, Providence, R. I.—This invention relates to a method of forming tin or metallic boxes and covers for the same.

SPECTACLES.—Erastus S. Clapp, Montague, Mass.—This invention has for its object to provide spectacles for those who use them, which shall not require to be removed from the nose when the glasses are not needed, whereby much trouble and inconvenience are avoided.

HARVESTER SHARPENER.—Edwin L. Bushnell, Poughkeepsie, N. Y.—The object of this invention is to provide an instrument for sharpening the cutters reaping and mowing machines.

FURNACES FOR SMELTING ORES.—J. W. Shaeffer, Red Wing, Minn.—This invention relates to improvements in furnaces for smelting and reducing gold, silver, copper, and other ores, whereby many of the objections to the ordinary methods of reducing these ores are overcome.

PRINTERS' GALLEY.—Charles H. Lawrence, New York city.—The object of this invention is to construct a galley in such a manner that it will not be affected by shrinking. The frame is made of wood with its corners halved and mitered so as to make a good stiff joint, and is cut down its center along the inner side a depth of about two thirds its width, so as to receive a metal tongue, which is soldered to the lining. The lining is secured to the frame by screws which pass through the tongue into the frame, thus leaving the lining perfectly smooth and free from the heads of screws.

MAGNETIC BURGULAR ALARM.—Wm. J. Biggar, J. C. Blood, and M. Griswold, Conneaut, Ohio.—This invention relates to improvements in the construction and arrangement of an instrument for giving an alarm on the entrance of a burglar into a house, by means of a magnetic circuit, and consists in connecting copper wires with a battery to run through the house, and having circuit connections attached to the doors and windows, so that when a window or door is opened by a burglar the break of the circuit shall release a window from the magnet and thus act upon an alarm by striking a bell and lighting a fluid lamp or candle in the room where the instrument is placed.

VAPOR OR MEDICATED BATH.—Wm. Kent and Chas. Winterburn, Cincinnati, Ohio.—The nature of this invention consists in a box of peculiar construction, in which may be used medicated vapor baths, etc. It also consists in the combination of medicated baths with the vacuum produced in the aforesaid box. It further consists in the combination of electro-magnetism with a vacuum; also in the combination of vapor or medicated vapor baths with electro-magnetism produced in the said box.

LETTER BOX.—D. P. Jordan, 115 Randolph street, Chicago, Ill.—This invention relates to a new and improved letter box, and provides for the safe and convenient deposit of letters, papers, and other mail matter, separate receptacles being furnished for each, with hooks at the bottom to attach a mail bag into which the contents of the box are conveniently discharged through a trap door. The door is provided with a suitable lock, and the entire apparatus covered by a lid, to protect the contents from the weather. Patented July 7, 1868.

BROILING STEAK BY GAS.—H. Y. Lazear, New York city.—This invention relates to an apparatus for broiling meats or steaks by gas, or over a gas stove.

MANUFACTURING RAILS.—Wm. Haywood, and John Lees, Danville, Pa.—This invention relates to the manufacture of rails for railroads, of iron or steel, or iron and steel combined.

ANILINE DYE.—Benoit Bloch, Boultz, France, now temporarily New York city.—This invention relates to a gray dye, prepared from aniline oil.

SPUR AUGER BITS.—James Swan, Seymour, Conn.—This invention relates to an improvement in the manufacture of spur auger bits, and is designed to accomplish by means of dies what has hitherto been done by hand with skilled labor.

SOLES FOR BOOTS AND SHOES.—Baker Van Ansdall, Keokuk, Iowa.—The present invention consists in making the outside or wearing sole of a boot or shoe, of wood and a series of sections or parts from the ball of the foot to the back of the heel, whereby a flexible sole is obtained.

SPIRAL OR WINDING STAIRS.—Wm. J. Keim, New York city.—This invention consists in so constructing winding stairs that by one set of steps two or more separate stairways can be produced. The steps are made in the shape of straight bars, and secured around a central foot, that fits through the central hole, so that each end of the bar forms a separate step for a separate staircase, opposite to another step and staircase formed at the opposite side of the central post. In the same manner can treble and quadruple stairs be made, by using steps in which three or four arms radiate from the post.

MACHINE FOR WASHING PAPER STOCK.—J. E. Andrews, Coeyman's Hollow, N. Y.—This invention consists of a water tank provided with an agitating wheel and a hopper adjacent to the same into which the stock to be washed is placed and so exposed to the action of the floats on the wheel that it will be drawn down into the water thereby, where it is, after being sufficiently agitated, delivered to an elevating apparatus whereby it is raised out of the water and carried to any desired height and delivered from the same. The said tank is also provided with a means of supplying fresh water and discharging the foul water without carrying off any of the stock, and also with a screen for separating the kennels of grain that may be in the straw or small pieces of gravel or other similar matter.

SHIP WHEEL BRACKET.—Isaac N. Barker, Hillsburg, Nova Scotia.—This invention relates to a new manner of locking ships' steering wheels when the same are to be retained in certain position, and consists in the use of a bracket which is hinged to the deck of the vessel or to any other suitable stationary apparatus, and which is provided with a notch, which, when the bracket is thrown against the wheel, will fit around one of the spokes or handles of the wheel and thereby lock it and prevent it from turning.

PORTABLE CHAMBER CLOSET.—W. J. Lyman, East Hampton, Mass.—This invention consists in arranging an additional seat-lid, besides the ordinary perforated seat, the lid being hinged to the back of the apparatus, so that it can be folded up or down at will. The hole through the lid is smaller than that through the seat, so that when the lid is folded down upon the seat, the apparatus can be used by children, while it is otherwise fitted for adults.

STEAM PUMPS.—Wm. R. Thomas, Cat-saque, Pa.—This invention consists in an arrangement whereby the steam is made to actuate the valves without the intervention of valve gear, in constructing the cylinder with extensions from each head to serve for the pump cylinders, in the arrangement of projections from the piston to serve the purpose of the plungers for the pumps, and in an improved means of packing the pistons of the pumps.

EMBROIDERING MACHINE.—Jacob Elmhorn, New York city.—This invention relates to a machine for embroidering on gauze or other fabric, and consists principally in fitting the devices by means of which the stitches are made, in a swinging frame, and in stretching the fabric to be embroidered on a sliding carriage so that by these means the stitches can be made to follow any desired pattern that may have to be embroidered. It also consists in the arrangement of the needle and hook by which the stitches are made and in the devices for operating and adjusting the same, and for throwing them in or out of gear.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For services of experienced detectives to obtain evidence against infringers of patents, address Box 351, Newark, N. J.

The patent sweet fern and chemical lacing, as made by J. H. & N. A. Williams, Utica, N. Y., cannot be excelled in quality or great strength.

Gear-cutting engine for small work wanted. Address, with price, C. Williams, Jr., 109 Court st., Boston, Mass.

A partner wanted—a gentleman of integrity and Christian character—with a capital of \$50,000 to \$100,000, to invest in the perfecting of new machinery. Address L. H. Soule, Mt. Morris, N. Y.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

A young man who can furnish references from employer as to character capability, etc., desires a situation as sole workman in a repair shop, connected with a manufacturing establishment. For particulars address J. P. Link, East Arlington, Vt.

Agents wanted for Marshall's great line engraved portrait of Gen. Grant. Address Ticknor & Fields, Publishers Boston, and 63 Bleeker st., New York.

Parties away from the market can have a full description of one of the most extensive stocks of tools and hardware by sending for Wilkinson & Co.'s catalogue, price 50c., 2 Washington st., Boston.

Wanted—a machine to straighten sheet iron from No. 14 to 1/4 or 1/2 thick. Address L. H. Miller, 363 Balt. st., Baltimore, Md.

Universal filter well.—Drives and works successfully everywhere. Patented in Dec., 1867, by Oscar C. Fox, Georgetown, D. C.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glazier's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 61 Nassau st., N. Y.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' boiler powder (11 Wall st., N. Y.) 12 years a standard article for preventing incrustations. Beware of imitations and pretended agents.

EXTENSION NOTICES.

Isaac R. Trimble, of Long Green, Md., having petitioned for the extension of a patent granted to him, the 16th day of April, 1853, and antedated October, 1851, for an improvement in wooden splice pieces for railways, for seven years from the expiration of said patent, which takes place on the 16th day of October, 1868, it is ordered that the said petition be heard at the Patent Office Monday, the 25th day of September next.

Eben N. Horsford, of Cambridge, Mass., having petitioned for the extension of a patent granted to him the 10th day of October, 1851, for an improvement in compounds for neutralizing chlorine, for seven years from the expiration of said patent, which takes place on the 10th day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday the 25th day of September next.

Improvement in Machines for Harvesting Cane or Corn.

This corn cutter is a simple rectangular frame, on which are mounted the working parts of the machine. The whole is supported by two wheels, one a large driving wheel seen in front with the usual projections on its periphery, and the other a small wheel turning on a stud in the cutter bar. The cutting mechanism consists of two rotary knives, one driven by beveled gears on the shaft just in front of the driver shaft, the other turning free, and both being mounted on the cutter bar between the outer small supporting wheel and the frame. Between these cutters and the frame is a reel, on a nearly upright shaft which is driven by a worm on the forward shaft by means of a worm pinion, intended for bringing the stalks up to the action of the cutters. A corrugated roller driven by a belt from the front shaft serves to guide the stalks to a platform in its rear which receives the butt ends of the stalks as they are cut, the top ends of the stalks being received on an arm connected to a rock shaft on the rear portion of the machine. This rod with the platform sustains and collects the stalks until a sufficient number are collected to make a bundle, when the pressure of the driver's foot on the lever in front depresses the receiver and allows the rear ends of the stalks to drop to the ground when they are discharged ready for binding or carrying away in bundles. A weighted lever attached to the rock shaft brings the supporting rod back to position as soon as the pressure of the foot is withdrawn and the apparatus is ready for the reception of another bundle of stalks.

The inventor says: "Experience has demonstrated that in corn harvesters, as heretofore constructed, the point of the supporting arm, as it was thrown back into position for receiving the stalks, would become entangled with them and throw them into the gearing of the machine. To obviate this difficulty I extend the rear end of the support over the inside bar of the frame where it engages, by means of a stud and friction roller with a fixed grooved cam, attached to the bar, having at the upper end a rubber spring which permits the friction roller to pass it, but will not allow it to return by the upper track, but forces it down the lower track, by which means the point of the supporting arm is made to incline downward when discharging and is raised up and over the bundle upon its return to its first position." The inclination forward of the shaft carrying the reel and the downward inclination of the arms tend to bring the stalks to the action of the cutters and to raise the stalks if bent. The machine took the first premium at the Ohio State Fair in 1867.

Patented Oct. 9, 1866, and May 5, 1868 by J. F. Winchell, who has assigned his interest to the champion Corn and Cane Harvesting Company. Address for further particulars either J. F. Winchell, Pres't, Geo. C. Steele, Treas., or Levi A. Simons, Sec'y., Box 425, Springfield Ohio.

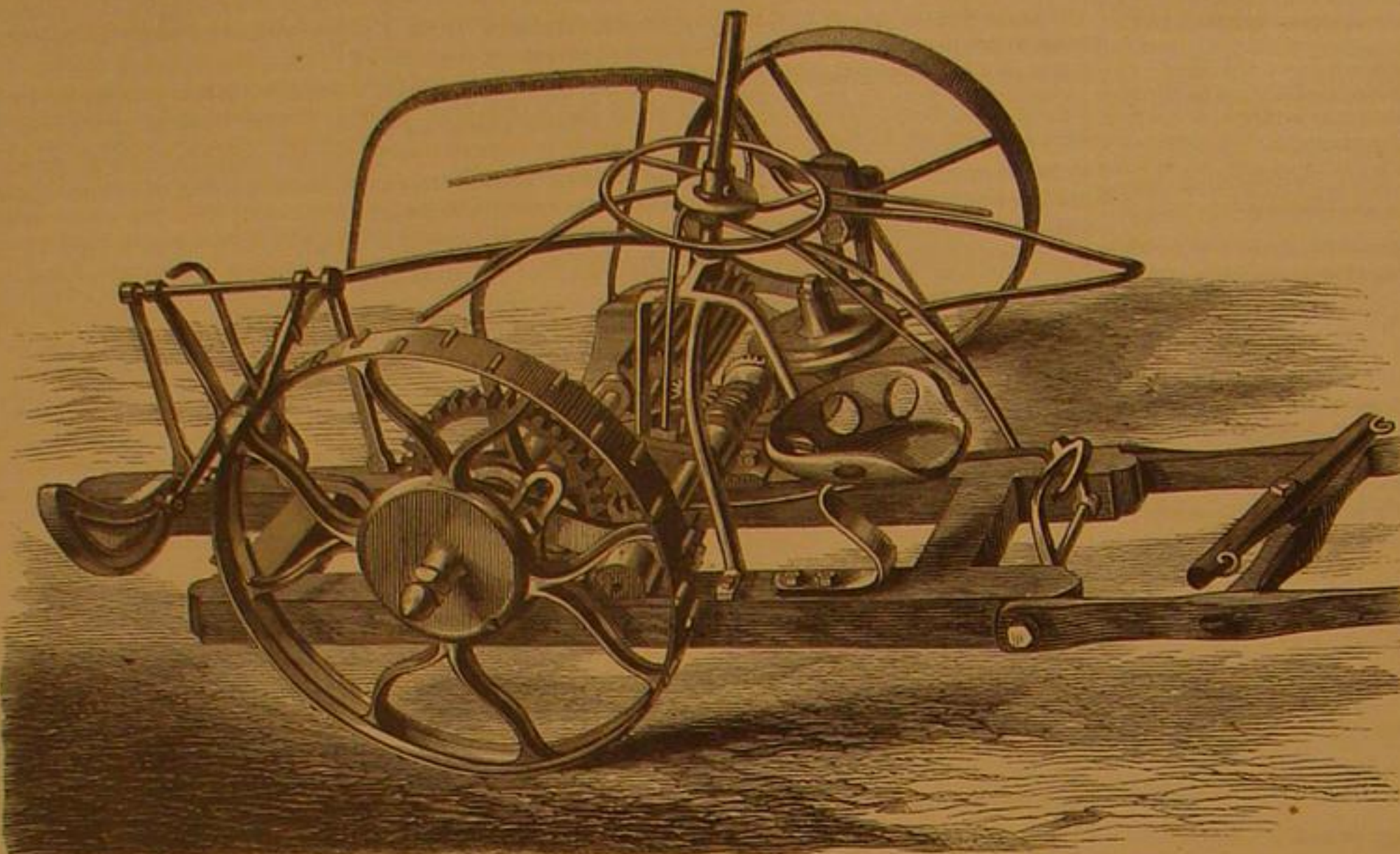
Device for Preventing the Escape of Sparks.

Where other fuel than anthracite is used, more or less of the debris of combustion—the unconsumed portions—is carried off with the smoke, and appears at the top of the chimney, fouling the surrounding atmosphere with dense clouds of dark vapor, or, as lively sparks, endangering all combustible materials around. The attachment of wire gauze to the top of the chimney is not always effectual, and it has been long desired that furnaces, burning light fuel, could be so contrived as to prevent these dangerous eruptions of ignited substances, and not only diminish chances of fire from this source, but conserve the fuel thus wasted. These objects are attempted in the device seen in the accompanying engraving.

Under the boiler, A,—an ordinary return flue, horizontal boiler—is the grate, B, there being, just beyond the first bridge wall, a pipe, C, extending across the boiler and furnished with a register at either end to govern the admission of atmospheric air. The pipe is perforated on its top, and partially around its upper side by small holes for the emission of the air to mingle its oxygen with the gases, ready to be inflamed. One or more wells, D and E, are sunk inside the brick work, forming the under flue or space, just back of the well that contains the atmospheric pipe, into which are suspended plates or pendant partitions, slightly curved forward at their lower ends for the purpose of arresting the solid components of combustion and depositing the heavier or less volatile par-

ticles. These pendant partitions may be made either of plate iron or of fire brick, as may be desired. One or more may be used, but, from experience, it has been found that one is enough on ordinary stationary engines. More may be required on steamboats and steamships, and on locomotives; to all of which this device is believed to be well adapted.

The products of combustion, in their passage from the fire-box to the chimney, come in collision with the drop partitions, impinging against the plates, the lighter portions being carried off by the current of the draft, and the heavier particles falling to the bottom of the well, from which they



WINCHELL'S PATENTED CORN HARVESTING MACHINE.

may be removed by the doors opening on the side of the wells. The inventor says, that after a trial of fifteen months he found but little debris in the bottom of the well, most of the fuel—the volatile portions—being consumed, and no show of sparks from the chimney, although the fuel used was mostly cottonwood, pitch pine, willow, and cotton seed and "motes," all light and inflammable fuel.

Patented through the Scientific American Patent Agency, June 2, 1868, by N. L. Carpenter, Natchez, Miss., who may be addressed for State or Territorial Rights, or any other information desired.

WATERING STREETS AND SIDEWALKS.

We have long been convinced that the practice of deluging uncleaned streets and sidewalks, not merely sprinkling them, is deleterious to the public health, and we are gratified that the matter has been brought to the attention of our Board of Health. A few days ago Dr. Stephen Smith called the attention of this body to the practice, stating that the rapid evaporation of the moisture carried with it into the atmosphere a large amount of poisonous organic matter calculated to breed disease. He suggested the use in the street-sprinklers of suitable disinfectants. Street-filth is far less deleterious when dry than when moist during the extreme heat of the summer months. Sprinkling furnishes one of the two conditions that are absolutely necessary before decomposition can take place, namely, moisture.

We would go a little further and suggest the rigid enforcement of the ordinance against the deposition of garbage, or

the streets. If they keep their back-yards, front areas, gutters, and a cross section of the street clean in front of their premises, the public authorities should see to the rest and give the people clean and cool streets. Even, however, if not watered, cleanly swept streets will prevent noxious exhalations and contribute to the comfort while they secure the health of the residents. A slight sprinkling of carbolic acid or of chloride of lime on the streets would aid in the work of disinfection.

Earthquake Waves.

An earthquake wave which followed the recent eruption in the Sandwich Islands, was transmitted to the Pacific coast and recorded on the government self-registering tide gauges at San Francisco and Astoria, in about five hours. On the 23d of December, 1854, a similar wave was transmitted from the coast of Japan to the Golden Gate in twelve hours and thirty-eight minutes. It will be recollected that this earthquake wave caused the wreck of the Russian frigate *Diana* in the port of Simoda, and great loss of life.

These facts, which are derived from the best authority, convey a very impressive idea of the tremendous power required to disturb the whole body of an ocean, for a distance of from three to five thousand miles, by a movement distinct from its ordinary tidal swing. It will be seen that the revulsion of the great tidal wave at Hawaii reached this coast, distant over two thousand miles, in five hours, and was observed along a stretch of shore

over thirteen geographical degrees in length.

These earthquake waves appear to have moved with a velocity of about 400 miles an hour; a speed which suggests the possibility of a more rapid means of transit over the waves than mankind possesses. Here is an opportunity for inventors. On land we move along almost equal with the bird; but the fishes sport under the prows of our fleetest vessels and laugh at our efforts to overtake them.

SHOULD A FARMER BE MORE THAN A FARMER?

We think he should. He should be a mechanic as well; should know something more than

To plow and to sow,
To reap and to mow.

He needs the ability to repair his tools; to understand how to keep his implements in proper condition without being entirely dependent on the blacksmith or machinist, to be able to do carpentering work, to patch and mend harnesses, to mend his tin ware, and do many other jobs which the denizens of towns and cities find it more convenient to turn over to those who make these repairs a specialty. He should have a room fitted for a workshop, with foot lathe and small forge, and all the appliances, on a small scale, of a combined machinist and carpenter shop. Working with these tools is a pleasant employment on stormy days when out-door labor is interdicted, and in evenings.

Trial of Mowing Machines.

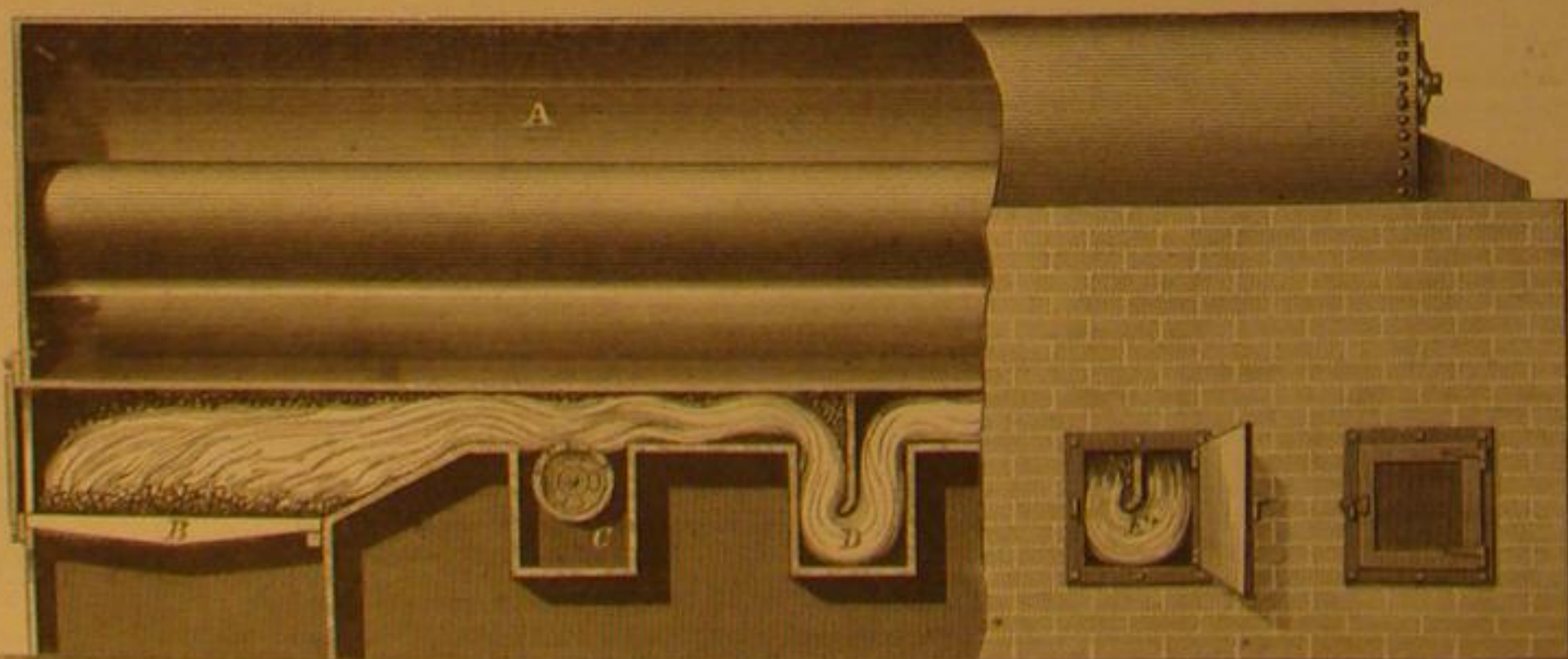
A large gathering of farmers assembled on the 12th of June, at Winchester, to witness a trial of English and American mowing machines, instituted by the Hampshire Agricultural Society. Seven machines, each drawn by a pair of horses, competed for the prizes. Mr. Wood, jun., who was over from America, and Mr. Cranstone, represented the machine of Walter A. Wood. The American Clipper mower was exhibited by the Reading Iron Works Company. Mr. Phillips, from Grantham, had charge of Messrs. Hornsby's Paragon mower. The partner of Mr. Samuelson, of Banbury, managed the Eclipse machine. Mr. Kearsley, of Ripon, was also a competitor. Mr. James Howard, of Bedford, entered the list for the first time with Messrs. Howard's new British mower. After the machines had gone a few rounds, it was evident to

the spectators that the first prize would fall either to Wood's American or Howard's British mower. At the completion of the plots the judges selected the two latter as the best, and ordered a second trial between them. The work of both was so perfect that the judge had great difficulty in coming to a decision. However, as the Americans finished the work in a few minutes less time, they placed Wood's first, and Howard's second, giving Messrs. Burgess and Key the third prize.—*London Artisan.*

STEEL RAILS.—A portion of the Philadelphia, Wilmington, and Baltimore Railroad is now being relaid with steel rails.

CARPENTER'S IMPROVEMENT IN STEAM BOILERS.

decaying vegetable or animal matter in the street. It is the practice on all streets inhabited by people who have any knowledge of the effects of decaying organic matter when exposed to the sun's rays, to carefully sweep the walks in front of their premises, and the street to nearly its centre every morning; the rest, that of collecting and removing the sweepings, are considered the business of the city authorities. The street being cleaned, a light sprinkling once or twice a day would effectually keep down the dust, and insure comfort and health; but cleanliness, not moisture, is what is needed and can be secured by the city authorities seconding the united individual exertions of residents on



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SEASONABLE HINTS--HOW TO KEEP COOL.

The intensely hot weather, succeeding weeks of chilling rains, comes with unusual severity. People drop stricken with death in the streets, they sink senseless as they sit at their desks or tables, and are found dead in their beds. A few suggestions for preserving life and health in such a season may not be amiss.

First, the external condition of the body. It should be kept scrupulously clean. Nightly bathing is almost a necessity. If a bath tub is not convenient, a sponge or bit of linen or cotton cloth, with a quart of tepid water, is sufficient. The water should not be cold spring, well, or aqueduct water just drawn, but that which has stood for twelve hours of daylight to absorb oxygen from the atmosphere. Better, perhaps, is a bath of warm water, as the reaction, after toweling, produces coolness and invigorates the body. Better take the bath after supper, before retiring, rather than in the morning before eating, as it will induce a pleasant sleep, and a bath when the stomach is empty is anything but healthful, empirics to the contrary notwithstanding.

Still air is perceptibly warmer than air in motion, although the thermometer may register the same degree of temperature in both cases. The reason is that the currents of air bear away the effects of perspiration, inducing a more rapid evaporation from the surface. For this reason the use of fans for producing an artificial breeze has common sense as well as custom to recommend it. A rapidly evaporating liquid applied to the exposed portions of the body induces a local and temporary coolness. Aqua ammonia (hartshorn) is excellent for this purpose. A little of this solution occasionally used on the hands and face will, from its rapid evaporation, carry off the perspiration and leave the skin cool. As sold at the druggists it is too strong; it should be diluted with four volumes of water. For clothing, wear some absorbent next the skin, thin or gauze flannel; eschew linen or bleached cotton; outside, these will do well enough. In the hat wear a wisp of green grass, cabbage leaf, or damp towel, when going out to brave the darts of fiery Sol. In the writer's experience as a campaigner in Virginia he found this to be an excellent preventive of *coup de soleil* when on the march, and compelled the practice by the men under his command.

Eating and drinking should be regulated in hot weather. In the winter one may eat and drink almost everything he pleases: he can digest almost anything. But when the system is enervated by excessive heat it is a necessity to attend carefully to the quality and quantity of food and drink. Fat meats, solid farinaceous food, as puddings and bread of Indian meal or wheat flour should be shunned. Fish, lobsters, clams, and oysters are not desirable food. Fresh vegetables and fruits, salted fish, meats, and smoked hams are healthy. Pure ice water is excellent: not, however, in large quantities, but taken a swallow at a time. The stomach does not need a load of ice-cold water, only the mouth and throat need lubricating. Drink slowly of ice water. Cold coffee and tea are no better than cold water, and iced milk is dangerous, as it is in any form highly heating. After all, however, any radical change of habit in eating or drinking will prove to be worse than useless. A very good substitute for stimulants is a cool drink made of Brown's extract of ginger with iced water sweetened. It is both cooling and stimulating.

Keep your house cool by shutting out during the day the external atmosphere. Close the blinds and keep the doors shut. Open every aperture to your chimneys and the scuttle on the roof. Thus you will have ventilation and at the same time diminish the nuisance of flies. Sunlight is a great health invigorator, but we can do without it for the short heated period.

Above all, do not get excited, indulge in no controversies,

preserve a calm exterior and a quiet mind. Have a clear conscience and a courteous manner, and the "sun shall not smite thee by day, neither the moon by night."

HEATING AND VENTILATION.

A correspondent sends us a drawing and a description of a steam heating apparatus, with a request for our opinion as to its merits. In an article published in the first number of the current volume, we discussed the subject of the supply of cold air to furnaces employed for warming buildings. The request of our correspondent has suggested some general remarks upon the relative merits of steam and hot air for heating purposes, from which he may sufficiently infer our views of the apparatus submitted.

There is a radical difference in the principles of heating by steam and hot air which cannot be overlooked in forming a true estimate of this subject. The heat supplied by steam apparatus is for the most part radiated heat, and that supplied by hot air is conveyed by moving particles, and imparted to the surfaces of bodies by contact. Persons in a room heated by hot air solely are, to use the words of Prof. Silliman, "immersed in a hot air bath, and require, consequently, several degrees more heat by the thermometer, for comfort, than when radiant heat forms a part of the means of an artificial temperature."

There is a prevalent notion that air parts with a portion of its oxygen in passing over the heated plates of iron in furnaces. The surfaces of these plates, however, absorb very little oxygen, after they have become in a measure protected by the coating of oxide which always forms upon them. This objection, therefore, only has force in regard to new furnaces. The air is, however, vitiated by the products of combustion, not not only of the organic particles which are always floating in it, but also of the fuel, the gases of which are generally imperfectly retained within their proper channels.

A prevalent error in regard to the use of steam pipes, etc., for heating, may be also noticed. It is thought by some that—to use a common phrase—"the heat is not so dry" as that obtained from furnaces. The phrase, properly speaking is a scientific absurdity. Heat is not a thing like a sponge to soak up moisture. But if it is construed to mean that the air is more moist when heated to the same degree by steam than when heated by hot air furnaces, an error is committed, unless in some cases special provision is made for keeping the air saturated with moisture by small steam jets or their equivalent.

The capacity of air for moisture increases with its temperature, and if the amount necessary to completely saturate it, is not artificially supplied, it will seize upon and appropriate moisture from all objects with which it comes in contact. The skin and the lungs are called upon to pay tribute, and chapped hands and faces, bronchial irritation, and increased sensibility of these organs must inevitably follow. A higher degree of heat is generally imparted to the air passing through the flues of furnaces than is effected by most kinds of steam apparatus. From this cause, and also from the fact that the organic particles are not burned by them, the air is more wholesome in rooms heated by steam than in rooms heated by hot air.

An entirely different plan for ventilation ought to be adopted when the fresh air admitted to rooms is cold, than when it is heated, as is the case with furnaces. In the latter case the pure air being heated, rises at once to the top of an apartment, and the air containing impurities settles to the bottom. An open grate with a fire reheats it and passes it through the chimney to the outside of the building without creating dangerous drafts of air, and is the best means of ventilating apartments. When cold air is admitted the impure air must be drawn off at the top off the room, but unless it is passed through heated flues the ventilation will be very imperfect. The admission of cold air is liable to create injurious drafts, and is therefore not to be recommended.

The plan of heating rooms by steam, and ventilating by means of grates and flues with an apparatus for supplying fresh pure and warm air to take the place of the air drawn off, and jets to keep it properly saturated with moisture, is probably open to fewer objections than any other.

EMPLOYER AND EMPLOYED.

Much of the disaffection between the employer and employed which leads often to acrimonious and unpleasant disputes, might be avoided by a more generous interpretation of the terms of the contract specified or implied between them. In many cases the employer makes his concern a disciplinary school the pupils of which are to be drilled to become as mere machines as the insensate mechanism they oversee or attend. A certain set of iron-bound rules, immutable and unchangeable as those of the Medes and Persians, is made to govern and control the help, with no opportunity for variation or adaptation to circumstance or person. The honest, conscientious workman finds himself, under this system, ranked with the careless, unjust, and selfish man who would feel a pride in "getting ahead" of his boss.

All this is wrong. Certain rules must, of course, be made and observed in order to insure a uniformity of work and a proper division of duties; but the rule that is necessary for him who, having no standard of right in himself, bows only to the law of force, is not the rule for the conscientious workman anxious mainly to protect and insure the interests of his employers. In the contriving of rules for the governing of mechanical establishments, the character of the men employed should be considered. No man should have his sense of manliness crushed or injured by being subjected to rules fitted only for the inmates of a penal institution. It not only

injures him morally, but it deprives his employer of his best efforts, as he cannot and will not work *con amore* when he knows he is under espionage or suspicion. Let employers treat their men as men and they will find it to be to their pecuniary advantage. Circumstances alone generally give them an advantage over their fellows.

OBITUARY--DEATH OF AN INVENTOR.

Dr. Wm. Thomas Green Morton, a native of Massachusetts, whose investigations in regard to the anæsthetic effects of ether upon the human system, and whose perseverance in its introduction against opposition and persecution has resulted in incalculable benefit to mankind, died suddenly in this city on July 15th in the forty-ninth year of his age. His name will stand inscribed upon the records of those whom the world never forgets, and it is to be greatly regretted that during a life devoted to the amelioration of suffering humanity he did not reap any substantial pecuniary benefit from his discovery. On the contrary, the injustice and personal abuse, which he suffered from those who desired not only to rob him of the honor to which he was entitled, but also of the pecuniary rewards of his discovery, were perhaps never exceeded, although they have too often been exemplified in the history of others to whose memory the world now pays willing homage.

A few months after his discovery he obtained a patent for it, which immediately called forth the denunciations of the medical profession, as being contrary to professional usage. The patent was also generally and persistently infringed, and notwithstanding the astonishing perseverance, and undaunted resolution with which he met his persecutors, he died without seeing his cause righted, although he had the satisfaction of knowing that his claims were recognized by most scientific men throughout the world.

He sacrificed a promising and lucrative business to his zeal in bringing his discovery before the public; and failing to secure any solid benefit from his patent, he applied in 1846 to Congress for relief. In 1849 he renewed his application, and although the Government had infringed his right without stint, and a committee composed exclusively of physicians reported strongly in his favor; no further action was taken at that time. In 1852 a bill was reported appropriating \$100,000 to him on condition that he should surrender his patent, which was defeated. In 1853, another bill for his relief met with the same fate, and still another in the following year failed to pass. Undeterred by failures, Dr. Morton applied himself to other measures for establishing the validity of his patent, and securing to himself his just rights, but in 1860 his patent expired and he failed to obtain a renewal. Such are the rewards which an ungrateful country pays to genius. His subsequent efforts during the war, when the merits of his discovery were daily and hourly demonstrated in thousands of cases on the field and in the hospital, failed in securing any appropriation for his benefit, and he died unrequited, save in the consciousness of the great good he had bestowed upon his fellow men.

SWINDLING PATENT AGENTS.

In a recent number we called attention to the fact that an obscure Patent Agency firm, in Washington, were using the frank of the Hon. John A. Logan, to circulate, free of postage, their business pamphlets. Since that date we have had other complaints of this abuse of a privilege that ought to be sacred, but which is perverted in many instances, thus defrauding the Post Office Department of its just revenues. We cannot believe that the Hon. Mr. Logan is knowingly a party to this fraud. We are more inclined to the opinion, judging from the pamphlet before us, that the Patent Agency in question is a swindling concern that has either forged the signature of Mr. Logan, or by surreptitious means has obtained possession of envelopes bearing his frank. Under any circumstances it is a fraud, and we trust that Mr. Logan, whose name is thus compromised, will look sharp after the parties who are using it to defraud the Post Office Department of its revenues. There is a class of professed Patent Agents hovering about the Patent Office, with empty hands and empty pockets, who are ready to extend to inventors advice and assistance for the merest pittance. Destitute alike of professional skill and honesty, they are Micawbers, always "waiting for something to turn up," but woe to him who chances to fall into their hands.

Inventors and patentees who receive business cards and circulars under the frank of a Member of Congress, may safely conclude that there is some cheating in the game.

BUSINESS AND SCIENTIFIC MEN.

Business men are apt to feel something like contempt for men of letters and science. It is not to be denied that they are often visionary, impracticable, and unskilled in business details. On the contrary, men devoted to science are apt to entertain a similar feeling toward business men, and to look upon them as sordid in their motives and superficial in their views. In some cases there may be grounds for such an opinion. There are many things in the very nature of successful business which are incongruous to a man whose life is among books. Accustomed to deliberate upon all subjects, he fails appreciate the rapidity with which a man of business considers practical questions, and the sharp, decisive answers, and the blunt, out-and-out way in which he expresses opinions, seem, therefore, inconsiderate and hasty. Nothing could be further from the truth. A good business man's opinions are always well considered, and his answers are short because he has not time for words. Decide they must be, for vacillation is fatal to success in any business. Neither is it true, that, because a

man has devoted himself to scientific pursuits, he is unfitted to judge of the merits of practical questions. The misfortune of these mutual misconceptions is, that studious men are apt to transfer their contempt to money as the cause of what they think the faults of business men, and the latter look upon abstract science as the parent of business incompetency. That this is an extreme view is often demonstrated by the correct estimate of general affairs shown in the opinions of bookish men. Great executive ability, the power to systematize and organize large business operations, the tact to control men, and properly dispose the talents of employes so as to develop the highest degree of efficiency, cannot be obtained by the study of books. Such ability is rare, and is the mark of a superior mind, whether it is accompanied by adjuncts of high scholarship or otherwise.

Either to rely solely upon wealth, or to despise it, is an extreme and narrow view of its true worth. It alone will be found a false resource in years when business must, perforce, be laid aside, and the mind is left to feed upon nothing but the retrospections of a selfish life. Neither can the resources of science blunt the keen edge of poverty, nor compensate for the lack of that personal ease and dignity which accompany pecuniary independence. The illustrious Franklin was an example of a man, who, by a proper estimation of the true value of both learning and wealth, and a life wisely adjusted in accordance with it, secured himself against bodily want, and the restlessness of mental inactivity. How few there are who, like him, can practice economy without avarice, or pursue learning without assuming pedantic arrogance.

THE WORCESTER COUNTY FREE INSTITUTE OF INDUSTRIAL SCIENCE.

We understand that this novel experiment in education is about to commence its career under the most favorable auspices. It owes its existence primarily to the beneficence of Mr. John Boynton of Templeton, Mass., who placed \$100,000, in the hands of his friend David Whitcomb of Worcester, for the purpose of founding a school of industrial science. The design of this school was specially to provide an institution for the proper education of those intending to become mechanics, farmers, manufacturers, merchants, and public school teachers.

Among the studies to be pursued were enumerated mathematics, surveying, levelling, physics, and mechanics; mechanical engineering, civil engineering including drawing, design and modelling; architecture, applied chemistry, metallurgy, geology applied to mining and agriculture, bookkeeping, French, and the science of teaching. In connection with these studies it was provided that there should be lectures with experiments, the practical application and use of tools and instruments, and the working of machinery. The school was to be for the youth of Worcester county and was to be free; but only persons between the ages of fourteen and twenty-one years who should pass a satisfactory examination were to be admitted as pupils. In special and urgent cases however this rule might be relaxed so far as to admit a person over twenty-one years of age. Scholars not belonging to Worcester county might also be admitted upon the payment of a moderate sum for tuition. The privileges of the school were to be confined to males only if such should appear to be the more advantageous course.

The munificent gift of Mr. Boynton, was supplemented by the gift from Mr. Stephen Salisbury, of a lot upon which to erect the proposed buildings, and a building fund of \$50,000 contributed by the citizens of Worcester and vicinity. Mr. Ichabod Washburn, who from the first took a deep interest in the success of the enterprise, bestowed upon it a large machine shop and equipment, built specially for this purpose, endowed it with a working cash capital of \$5,000, for the first year to which is to be added the interest of \$50,000 annually during his life, and at his death the principal is to become a permanent fund secured to the institute. Mr. Salisbury not content with having furnished a site for the buildings and having contributed \$22,000 to the building fund and \$10,000 as a fund for books and apparatus, added a crowning gift of \$50,000.

A handsome granite building has been erected, and the machine shop of brick stands adjacent. The school is to be opened in November next, and we wish it and its liberal founders, long life and prosperity.

THE GLACIERS OF SWITZERLAND.

To the traveler in Switzerland, apart from the grandeur of the mountain scenery nothing is more interesting than the gigantic glaciers which form in the elevated gorges between the snow-clad mountains. It is scarcely possible to estimate the extent of the Swiss glaciers, but they are supposed to cover upwards of 1,500 square miles, and vary from 80 to 600 feet in thickness. When viewed from an elevation, the general appearance of a glacier is that of a torrent tumbling through its sinuous bed, to precipitate itself into the valley below, but which has been suddenly stopped by some mysterious agency.

The glacier terminates at the lower extremity in a promontory of ice, thrusting itself into cultivated valleys, and from its base issues a stream of water through natural arches formed in the ice. The Rhine and the Rhone, and many other smaller rivers, derive an everlasting supply from these wasting and ever forming glaciers; and it is a singular fact that these frozen masses have a regular motion. They advance noiselessly and imperceptibly in the direction of the declivity, carrying forward rocks and other substances on the surface, which can be traced from year to year and almost from day to day, all depending upon the mildness or severity of the weather.

Glaciers are not peculiar to the Alps, but have been observed in the Andes. During the summer months tourists through the Alps watch with deep interest the fall of avalanches of snow from the sides of the Jung Frau and Mont Blanc, the reports of which resemble the sound of distant artillery.

Hay Making.

Alas for the poetry of farming! All the songs of milk-maids must be listened for in the old English poets. The whetting of the mower's scythe is almost over—quite over—on my farm! Instead of that one hears the sharp rattle of the mower, and sees the driving man quite at his ease riding round and round the meadow, for all the world as if he were out airing! Whereas, heretofore, two acres would be counted a large day's work; now, ten and twelve are easily accomplished.

Nor is the contrast less remarkable in all the after work. When I was a boy I was placed in line, with all the men that could be mustered, to shake out the hay with forks; and after a few hours all hands were called to go over the ground and turn it. To do this rapidly, and yet so the bottom side shall really come to the top was no small knack. Now, a *tadder*, with one man riding, will literally do the work of ten men and do it far better than the most expert can. Have you ever seen a *tadder*? I have got now a perfect one. The grass rolls up behind it and foams, I was going to say, like water behind the wheels of a steamer. The grass leaps up and whirls as if it were amazingly tickled with such dealings.

The result is, that unless the grass is very heavy, and the weather very bad, you may cut your hay in the morning and get it into your barn before night, in far better condition than it used to be when it required never less than two, and generally a part of three days to cure it.

But I have forgotten the *Horse Rake*. Instead of the old-fashioned, long handled rake, and the five or six men, pulling and hauling to get the grass into windows, that same fellow, with that same horse, rides his luxurious rake, and in a fifth part of the time formerly required, puts it into equally good shape. Indeed, having if it has lost its poetry, has also lost its drudgery. A man can now manage a hundred acres of grass easier than he formerly could twenty. The only thing that remains to be made easy is pitching on and off the load. It is true that horse forks have been invented, but I have never seen any that did their work well; and in my barn at any rate the old work of pitching and mowing remains; and if you wish to know what fun is, get on the mow, under the slate roof of my barn, on a hot day, and let Tim pitch off hay, as he will if I give him the wink. You will have to step lively, and even then, you will often be seen emerging from heaps of hay thrown over you, like a rat from a bunch of oakum. And then it is so pleasant, when a man is all a-sweat, to have his shirt filled with hay seed, each particular particle of which makes believe it is a flea, and wiggles and tickles upon every square inch of your skin, until you are half desperate!

It is the 2d of July, and my grass is all cut, and the last load is rolling into the barn while I write. How sweet it smells! How jolly the children are that have been mounted on top of the load; and their little scarlet jackets peep out from their nests while Tim stands guard and nurse. A child that has not ridden up from the meadow to the barn on a load of hay, has yet to learn one of the luxuries of exultant childhood! What care they for jolts, when the whole load is a vast and multiplex spring? The more the wagon jounces the better they like it! Then come the bars, leading into the lane with maple trees on each side. The limbs reach over, and the green leaves kiss the children over and over again. So would I, if I were a green leaf, and not consider myself so green after all! And so the load rolls slowly up the hill. There is no such a thing as momentum in an ox. He is always at a dead pull and at the very hardest. But the children like it! The slower, the longer is the ride! Let them take all the comfort they can. By and by they will be grown, and own fine carriages, and roll in style through the streets. But there is many a fair face that rides in a silk lined coach, with a sad heart, and would go back if she could, oh how gladly, to her joyous ride on a load of hay!—H. W. Beecher, N. Y. Ledger.

A New Sensation—The Elephant Beetle.

A Nevada paper is responsible for the following beetle story, which goes ahead of anything we have yet read in the fish or snake line. It appears that, in addition to the plague of a plurality of wives, Utah is also afflicted with a visitation of the elephant beetle. A person who returned from the neighborhood of Salt Lake last week, saw myriads of them covering the earth with their shining brownish-black bodies, and destroying everything which they met in their path. Even small animals, he was informed by the ill-fated residents, did not escape the voracity of these hordes; their bodies were crowded upon and worried and wounded cruelly with the powerful antennae until they fell down exhausted by their struggles and loss of blood, when they were fastened upon by thousands and devoured. The entire carcass of a sheep was eaten and the bones picked clean in two minutes and a quarter; and it is said that a dead ox would be gobbled up by them in a quarter of an hour. So ferocious are these giant beetles that mothers are afraid to let their little children go out of the house unattended by a grown person. In their frequent bloody contests the wounded are devoured on the instant. Our informant says they are about four inches long, with legs three inches long; their antennae are stiff, sharp, and fully four inches long; they have a short tail, armed with a power-

ful horn, and their shells are so hard that the weight of a man will scarcely crush them. They are very frisky at times, and jump with the agility of fleas. No other species of the beetle possesses their faculty of uttering a loud sound, which, made by thousands of them at once, resembles the braying of a band of jackasses. Their noise terrified the horses of our informant and his companion, which could not be kept upon the plain, so great was their fright. On one occasion, while they were riding in a valley that was black, with beetles, and crushing them under their horses' hoofs, when their hard cases would crack with a report like a rifle, the fierce insects showed a disposition to attack the horses, and fairly drove them out of the field. We were informed that a scientific man in Salt Lake City was collecting specimens of this formidable elephant beetle for transmission to the various learned institutions of the country.

It is very likely also that the elephant beetle may soon be exhibited on Broadway, immediately after the excitement about the "headless rooster" passes off. We want enough of them at least to imitate the bray of one jackass.

The Commissionership of Patents.

Senator Trumbull has engrafted the following amendment upon the third section of the bill to authorize the temporary supply of vacancies in the Executive Departments: "That in case of the death, resignation, absence or sickness of the Commissioner of Patents, the duties of said Commissioner, until a successor be appointed, shall devolve upon one of the Examiners-in-Chief in said office, to be designated by the President." The object of this is to legislate the incumbent Chief Clerk of the Patent Office, who is acting as Commissioner, out of office, and to give the President a chance to appoint Mr. Foote, Senator Henderson's father-in-law, now one of the chief examiners in the Patent Office, Commissioner of Patents. Senator Henderson has been for some time urging the President to make the appointment, but Mr. Johnson has failed to comply because he has understood that Mr. Foote could not secure confirmation from the Senate. Mr. Trumbull's arrangement, however, obviates the difficulty, and it is understood that the President will appoint Mr. Foote Commissioner of Patents should the bill pass. As there are some disagreeing votes between the two Houses, the bill will probably go to a Committee of Conference, and as several members of the House are fully aware of Mr. Trumbull's object, the amendment it is thought will be defeated.

We find the above piece of information in the telegraphic summary of the *Daily Tribune*. We do not perceive any necessity for arranging a legal trap in order to catch the Senate in advance of a nomination. If the President desires to appoint Judge Foote, to the vacant Commissionership, let him do so boldly and without any reference to Senator Henderson or anybody else. Judge Foote would make an excellent Commissioner, and we do not see any reason for his rejection, even though his daughter may have espoused Senator Henderson. We learn the bill has been defeated in the House.

Gen. Stout Acting Commissioner is filling the office acceptable to both Inventors and Solicitors.

The duties of the office he thoroughly understands and we hope no further effort will be made to appoint a commissioner until the President and both Houses of Congress can agree upon some person well qualified for the office.

PAPER MATERIAL.—Notwithstanding the multifarious efforts made to find materials for paper, the manufacturers of this article in the east of France are in such want of materials that they have combined to offer as a prize a model of the value of £160 to any person who produces and applies any economical filamentous matter, which, in the form of pulp, may serve for the manufacture of paper, and which, when mixed with three fourths of rags, shall make a paper of as fine a quality as if made of rags alone. Medals of considerable value will also be given for the best processes for decolorizing and bleaching rags; for the best size for paper; for the best process for neutralizing the electricity developed in the paper while it is in the machine; and for a complete and exhaustive statistical work on paper manufacturing industry in the principal countries of Europe and America. Probably the okra plant, mentioned on page 38, current volume, would fulfill the conditions required.

"If one would appreciate the inventive genius of Americans, they should read weekly the *SCIENTIFIC AMERICAN*, which is largely devoted to descriptions of the various useful and curious inventions and discoveries of the day. Take the last number, for illustration: There will be found some fifty or more recent discoveries and inventions noticed—from a blast furnace to a mop; from a carriage wheel to a horse collar; from a hellometer to a vegetable masher; including new and curious electric machines, watch manufactures, pliable glass, gage punching machines, and scores of other interesting and important matters. Let no reader suppose that this is a mere puff for the *SCIENTIFIC AMERICAN*, for it is no such thing. We pay for the copy which we read, and owe the editors and publishers nothing but good will."

[We copy the above friendly hit from the *Evening Traveller*, published in Boston. We thank our cotemporary for the notice, and shall endeavor to pay up in full hereafter.—Eds.]

THE hands in the gas works at Philadelphia are on a strike, and the city is in danger of being left in darkness. The hands demand an increase of 25 per cent on former wages. The utmost economy in the use of gas will not insure its lasting for more than three days, when, if the matter is not adjusted, there will be a dark state of things.

OFFICIAL REPORT OF
PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JULY 14, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a Patent, except for a design.....	\$10
On issuing each original Patent.....	\$20
On appeal to Commissioner of Patents.....	\$20
On application for Reissue.....	\$20
On application for Extension of Patent.....	\$20
On granting the Extension.....	\$20
On filing a Disclaimer.....	\$10
On filing application for Design (seven years).....	\$10
On filing application for Design (fourteen years).....	\$15
On filing application for Design (twenty years).....	\$20

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

79,800.—FASTENING FOR BOOT.—A. A. Abbot, Boston, Mass.

I claim the within described fastening, consisting of the spring bottom, C, in combination with an eyelet, B, or its equivalent, substantially as described.

79,801.—SELF-LOCKING BOLT FOR METER SAFE.—Alonzo W. Adams, New York city.

I claim, 1st, The bolt, A, and the devices attached thereto, or equivalents, as shown in d described.

2d, The safe or guard-casing, with its devices thereto attached, or equivalents as shown and described.

3d, The combination of the bolt, A, with the safe or guard-casing, as represented in the specifications and in fig. 4 of the drawings, or any equivalent for the same.

79,802.—MACHINE FOR SEPARATING LIGHT FROM HEAVY PARTICLES OF LITHARGE, PAINT, ETC.—W. Atwood, Cape Elizabeth, Me.

I claim 1st, The combination of the fan wheel, f, tube, g, and rotating drum, b, as and for the specified purposes.

2d, The combination of the spout, a, with the rotating drum, b, as and for the purposes set forth.

3d, In combination with the fan wheel f, tube, g, and drum, b, all operating as described, the deposit-chamber, c, for the purposes described.

4th, Separating the dust from the coarser particles of litharge, etc., by means of a current of air forced through a rotating drum, etc., and carrying the said dust particles into a deposit chamber, substantially as described.

79,803.—ROTARY STEAM ENGINE.—J. S. Barden, Providence, R. I.

I claim, 1st, The combination of the piston, C, the shaft, B, the cylinder, D, the reciprocating valve piston, G, its cylinder, F, and tapered stemmed valves, b, b', arranged and provided with steam passages of induction and ejection the whole being substantially as and so as to operate as described.

Also, the arrangement of the steam passages, f, g with the pistons, C, D, the cylinder, D, and the shaft, B.

Also, the arrangement and combination of the fan, E, and its branch passages, k, k', with the steam chambers, c, c'.

Also, the arrangement of the valves, b, b', the rods, c, thereof, and their passages, as shown in figs. 2, 3, 4, 5.

Also, the valve-piston, G, constructed of the shell, r, and body part, q, made and arranged together as set forth.

79,804.—SCROLL FOR WATER-WHEEL.—J. L. Beers, McAllisterville, Pa.

I claim the arrangement of the gate, D, and bar, C, with the adjustable tongue, B, and the throat, A, as and for the purpose specified.

79,805.—CAR BRAKE.—Wm. P. Blades, Baltimore, Md.

I claim the brake block, B, constructed with the slotted cavity, in combination with the supporting bolt, D, made with a neck or bolt to pass through brake car, and when pivoted to the block by the same link which supports the whole, substantially as described.

79,806.—REVENUE STAMP.—G. W. Bowlsby, Monroe, Mich.

I claim, 1st, A blank stamp having no fixed value while in the hands of the Government, and the inspector's certificate, C, for forming a connection between the stamp and the amount of tax on the face of the stamp for a specific package, the value of the stamp depending mostly upon said estimate, and partly upon the class name of the stamp.

2d, A stamp made, and the value fixed by the Government, for a particular individual package, as shown in figs. 2, 3, 4, 5.

3d, A stamp made in separate and independent sections, mechanically, substantially as described, for the purposes named, or for other similar purposes.

4th, A stamp, the mechanically independent sections of which are of different colors, for the purposes named.

5th, Making the different sections or portions, as described, of the same stamp vehicles for the necessary entries of inspection and reinspection, and continuing and carrying a history on their face of the movements, ownership, duty, proof, weight, measure, and, or other matters of record pertaining to the article taxed, as an ever present means of detection, an auxiliary in reinspection, and also a partial cancellation.

6th, A stamp whose sections have duplicate and corresponding entries upon their faces, to be separated, substantially as and for the purposes described.

7th, The numbering of the different stamps, and also the sections of the same stamp, by various series, for further means of detection, reference, cancellation, record, and identification.

8th, The entry of official countersignatures upon the face of the stamp and its sections in successive series, or by intermediate steps, for the purposes named.

9th, The continuous cancellation of the stamp by the process described.

10th, The final resumption of the stamp coupons, and then of the stamps proper, by the Government.

11th, A stamp whose face history is connected with an official book record as the home office, and also with the inspectors or assessors' book, for the purposes specified.

79,807.—HOT WATER TANK ON COOKING STOVE.—Albert Brown, Troy, N. Y.

I claim a hot water reservoir, having a descending or driving flue therein substantially as and for the purpose herein specified.

Also, the projecting horizontal flue, E, for forming a connection between the stove and reservoir, its flues and exit pipe, substantially as set forth.

Also, the suspension of the reservoir by the stove-pipe projection or hump, substantially as described and as represented in fig. 1.

Also, the boiler hole or holes, g, over the flue space, E, in combination with the hot water reservoir, substantially as set forth.

79,808.—FIRE PROOF SAFE.—H. H. Bryant, Boston, Mass.

I claim, 1st, The combination of one or more vessels adapted for containing a liquid suitable for generating steam, with a safe which has its chamber of deposit made steam tight against the steam which is generated from the water in said vessels, substantially as and for the purpose herein described.

2d, The arrangement of water or fluid vessels with steam valves, applied either within the door of the safe, or immediately around the receptacle, E, or both within the door and around said receptacle, substantially as and for the purpose described.

3d, Providing the water vessels with air valves, substantially in the manner and for the purpose described.

4th, The combination of both air and steam valves with the water vessels applied to a safe, substantially as and for the purpose described.

5th, The arrangement of the valves in or on the water vessels or chambers in such a manner that some of the valves will operate, in whatever position the safe may assume during a fire, substantially as described.

6th, The combination of water or other fluid with a solid absorbent substance, as a filling for a vessel or a chamber used in a safe or other similar fire proof structure, substantially as and for the purpose described.

79,809.—FIRE-PROOF STRUCTURE.—H. H. Bryant, Boston, Mass.

I claim in combination with a safe or other structure of a similar nature, the use of one or more vessels or chambers, used as steam or air generators, and that are provided with a suitable number of pipes, a, arranged substantially as and for the purpose set forth.

79,810.—MACHINE FOR ATTACHING SPANGLES TO HOOPS OF SKELTONS.—Albert Carter, Forttreville, Conn.

I claim the swinging gate, a, opening, e, and fence, b, substantially as and for the purposes specified.

79,811.—MUSTARD PLASTER.—B. I. Crew, Philadelphia, Pa.

I claim a plaster, composed of mustard deprived of its fixed oils, and mixed with a solution of India-rubber, or other material insoluble in water as set forth.

79,812.—RAILROAD SWITCH.—James Dampman, Lebanon, Pa.

I claim 1st, The bent switch-rail, C1 C2, and straight rail, C, in combination with the former has the tapering extension, N, applied to it by means of rods, f, f', springs, e, e', and the latter has the frog, B', and pointed rail-extension, P, applied to it, substantially in the manner and for the purpose described.

2d, The frog, B', and pointed rail-extension, P, constructed and adapted to serve the purposes substantially as described.

3d, The switch rod, b, constructed with removable shoulders, j, j', and with removable gripping jaws, j', and screw threads and retaining nuts, substantially as described and shown.

79,813.—GRAIN SEPARATOR.—L. H. Davis (assignor to Casho and Company), Newark, Del.

I claim 1st, The longitudinally vibrating star-shaped screen, F, provided with rectangular perforations, f, in the riser of the star, as and for the purpose set forth.

2d, The combination as set forth, of the longitudinally vibrating star-shaped, rectangularly perforated screen, with the ratchet ribs, c, whereby the star is caused to vibrate backward and the grain forward.

3d, The combination, substantially as set forth, of the star-shaped perforated screen, with reciprocating rakes, i, which return the grain to the front of the machine after passing through the screen.

4th, The combination substantially as set forth, of the threshing cylinder, longitudinally vibrating, rising and falling star-shaped perforated screen,

and reciprocating rakes, with the fan and second longitudinally vibrating shaking shoe, for the purposes specified.

5th, The combination as described, with the fan, H, troughs, k, k', and adjustable back board, k', for the purposes set forth.

79,814.—CORN PLANTER.—Geo. Dickerson, Harveysburg, Ohio.

I claim, 1st, The general arrangement of the bracing and adjusting bolts, P, e, e', and S, sheath, B, tube, K, covers, D, D', and roller, E, all constructed and employed as described.

2d, In combination with the above parts, the relative arrangement of the horizontal trigger, L, retracting spring, N, and cam wheel, H, h', when constructed as specified.

79,815.—PICK AND PICK-AXE.—E. P. Dickie, Morristown, N. J.

I claim the twist-pointed pick or pick-axe, herein described.

79,816.—CLOSING VULCANIZING FLASKS.—Horace M. Edson, Mount Vernon, Ohio.

I claim the screw of brass or other suitable metal, which, screwed down through a nut in the top of a vulcanizer, will close the flasks inside of the vulcanizer, as above described, and the steam tight packing box around the screw, to prevent the steam from escaping from the vulcanizer during the process of vulcanizing.

79,817.—STOVE PIPE DAMPER.—L. S. Enos, Almond, N. Y.

I claim the serrated latch, C, as constructed and arranged, in combination with the stove pipe damper, B, substantially as and for the purposes herein set forth.

79,818.—TOOL SHARPENER.—Samuel Farrenburg, Taylorsville, Ind.

I claim, 1st, The arrangement of the wheel, E, cranks, F, F', pitmen, G, G', stones, H, H', slides, I, I', rests, L, L', and binders, M, M', upon the table, A, and operating as set forth.

2d, The adjustable rest, L, and binder, M, for supporting the tool to be sharpened, substantially as and for the purposes above set forth.

3d, The rest, N, against which the person working the machine may lean substantially as and for the purposes above set forth.

79,819.—ELECTRIC MACHINE.—A. L. Fleury, New York city.

I claim, 1st, The above described electric machine, composed of the non-conductor casing, A, isolated plates, C and D, and battery of plates, f, f', etc., arranged substantially in the manner set forth.

2d, The battery of plates, f, f', with perforations and exciting points, g, g', connected together, or any other perforated plates, wire cloth, or equivalent, when arranged together and operating in the manner and for the purposes specified.

79,820.—CHIMNEY COWL.—J. W. Foard, San Francisco, Cal.

I claim the ventilator, composed essentially of the pipe, A, and cowl, C, united by the connection-pipe, B, the cowl having the expanded end, c, to receive the air to create the current and the elongated cylindrical or parallelepiped discharge end, c', for the purpose described, all the said parts being constructed and arranged to operate together, substantially in the manner specified.

79,821.—CHURN.—J. C. Gilbert, Galesburg, Ill.

I claim the revolving bowl, B, with perforated dashers, H, H', K, and small lid, F, on the main lid, when the several parts are constructed, arranged, and used to operate substantially as shown and described.

79,822.—ATTACHING PAD HOOKS TO PADS.—Geo. D. Gillett, Meriden, N. Y.

I claim in combination with the pad hook, B, the hook, c, and shoulder, b', with or without the shoulders, b, b', as herein shown, and for the purpose described.

79,823.—LAMP CHIMNEY ATTACHMENT.—F. N. Gisborne, and Herbert Allan, London, England.

We claim, 1st, Our improved apparatus for regulating the supply of air to the flame of a lamp or burner, when constructed and arranged substantially as herein described and set forth.

2d, The combination of a diaphragm, F, with an opening valve placed above it, substantially as described and herein set forth.

3d, The combination of the compound bar, d, the tapered valve, c, and perforated plug, a, the whole used in connection with a lamp or gas chimney, substantially as described and for the purposes specified.

79,824.—DISH COVER.—H. S. Goff, and F. M. Goff, Middle-town, Conn.

We claim, 1st, The arrangement of the cover, B, of the dish, upon one or more vertical pieces, A, so that it slides up or down, and can be fastened up or down upon the dish at pleasure, substantially in the manner described and shown.

2d, The arrangement of the flange hinged at the top of the cover, and operated by the spring, G, so as to form a lock, substantially as shown.

79,825.—BIT STOCK.—A. D. Goodell, Florence North Hamp-ton, Mass. Antedated July 3, 1868.

I claim 1st, A bit-stock in which the clamp is formed of the two pieces, D and D', operated by a collar, B, arranged and constructed substantially as shown.

2d, The adjustable socket C, operated by the collar, A, substantially as shown.

3d, The device for attaching the head, consisting of the split screw, E, a, around a neck formed in the journal, and screwing into the head, substantially as shown.

79,826.—STEAM HEATING APPARATUS.—Chas. C. Hall, Portland, Me.

I claim 1st, The open boiler, b, constructed and operating as herein set forth and for the purposes described.

2d, Combining the air and steam heat within the boiler, by the means of the plunger, c, for the purposes set forth.

3d, The minute perforations, i, in the tops of the radiators, as and for the purposes described.

4th, The arrangement of the radiators, e, and connecting tubes, f, for the purpose of distributing the steam therein, as described.

5th, The steam distribution apparatus, as herein described, in which the liability to accident or explosion is obviated, by the prevention of steam pressure as herein described.

6th, The steam heating apparatus, as herein described, which is automatic, that is, when the supply of water and the pressure of steam are regulated by the apparatus itself, without the necessity of any care, as herein described, by means of outlet, b, regulator, p, pipe, c, and waste pipe, m.

79,827.—FRUIT GATHERER.—O. Court Hamilton, and Harvey McKinney, Turd Creek, Pa.

We claim 1st, The combination, substantially as set forth, with a partly open box, of jaws, hinged near the edges of the open-jaw, which jaws when closed, complete the box, and thus prevent the spilling of the fruit.

2d, The combination, substantially as set forth, with the receptacle and jaws, of the expanded internal strips, to prevent the crushing of the fruit or the clogging of the jaws.

79,828.—ROTARY STEAM ENGINE.—Caleb Harrison, Milwaukee, Wis. Antedated June 27, 1868.

I claim an engine consisting of the serrated disk, B, mounted in a case provided with the two steam passages, L, L', and valve, H, and having the shaft, D, provided with the endless screw, P, engaging in the wheel, F, all constructed and arranged to operate as shown and described.

79,829.—HARROW.—Anthony Hochstein, Williamsville, N. Y.

I claim the combination of the adjustable teeth supporting beams, B, independent of each other, and set screws, b, b', substantially as and for the purposes herein set forth.

79,830.—WORKING THE PEDALS OF PIANO-FORTES, ETC.—R. H. Hooper, West Roxbury, Mass.

I claim, 1st, The pedal levers and treadles, when constructed substantially as shown, and used with the pedals of a piano or other similar musical instrument, all substantially as and for the purpose described.

2d, The pedal levers and treadles, in combination with the fixed foot stool, A, all constructed and used substantially as described.

3d, The pedal levers and treadles in combination with the stool bar, B, when constructed and used substantially as described.

79,831.—MANURE FORK.—Jacob W. Horst, Annville, Pa.

I claim, 1st, The fork D G E, pivoted to runners, A, A', and provided with latch bar, C, substantially as described.

2d, The use of sled runners, A, A', constructed substantially as described, and adapted for handling the fork, substantially as set forth.

79,832.—MACHINE FOR WASHING LEATHER.—Adolphus Howard, Wellsville, N. Y., and George F. Howard, Chicago, Ill., assignors to Geo. F. Howard.

We claim, 1st, In a machine for washing leather, the application and use of split brooms, substantially as and for the purposes herein described.

2d, In a machine for washing leather, by the means, substantially as set forth, of a combined rotating wheel, D, D', or its equivalent, in combination with the radial arms or disks, C, upon the shaft, G, for the purpose and substantially as described.

79,833.—MACHINE FOR SIZING HAT BODIES.—Wm. H. Hoyt (assignor to him and Nathan Seely), Bethel, Conn.

I claim, 1st, The combination of the vibrating or swinging segment, D, and the correspondingly formed bed, a, a', bined or pivoted at N, it being elastically supported by the spring, O, substantially as herein described and for the purpose set forth.

2d, The handle, B, shaft, E, springs, S, S', and swinging segment, D, when arranged as described and for the purpose specified.

79,834.—PLOW.—Abram C. Jacques, Leavenworth, Kansas.

I claim, 1st, The adjustable frame, F, and roller, G, to determine and guide the width of the furrow, substantially as and for the purpose described.

2d, The projecting horizontal plate, E, and the vertical spur cutter, d, on the plow point, as and for the purposes herein set forth.

79,835.—WINDOW SASH STOP.—James G. Jewell, Washington, D. C.

I claim, 1st, The combination of the metallic socket nail, s, with the tooth, F, the socket nail to be made with a sharp point where it penetrates the wood, so that it may be driven into its proper place, like a nail or tack, having an angular groove in its head, in which the tooth, F, rests when the window is locked down.

Also, the corrugated groove, i, in the disk or wheel, A, in combination with the rubber ring or band, B, so as to prevent the rubber from slipping when in use.

79,836.—STOVEPIPE DAMPER.—John Johnson, Atkinson, Ill.

I claim a stove damper consisting of one center plate, A, made of a circular rim, a, and five wire sleeves, with arms, c, c', and two outside perforated plates, B, and C, of oval shape, arranged and used together as described, substantially as and for the purposes herein set forth.

79,837.—CAR SEAT.—C. P. Kimball, Portland, Me.

I claim, 1st, Locking or securing the seats of cars so that they cannot be turned or reversed, either separately or all together, without operating the lever or brake, c, in the manner and by the means, substantially as set forth.

2d, Operating or reversing in horizontal planes the seats of cars by means of a rack and lever or rack and gears, substantially as and for the purposes herein set forth.

3d, Reversing all the seats on one side of a car simultaneously by one lever or brake, as and for the purposes herein set forth.

4th, Arranging the seats of cars so that each one of the separate chairs or

seats will turn independent of the other, substantially as and for the purposes herein set forth.

79,838.—MACHINE FOR DRESSING STONES.—Francis L. King, Worcester, Mass.

I claim, 1st, The arrangement of the grinder blocks, U, U', so as to leave a hollow space in the center, and the conveyance of sand and water to the hollow space left by this arrangement of the stone in the grinder boxes by means of the upright hollow shafts, D, D', and their hoppers, M, M', or their equivalent.

2d, The collars, O, O', or their equivalent.

3d, The slots in the shafts, D, D', with the set screws, C, C', or their equivalent, when combined with the shafts, D, D', gears, O, C, self-adjusting frame, L, rotary grinder boxes, N, N', and reciprocating carriage, I.

4th, The sectional grinder boxes, N, N', the inner frames, e, e', the knobs, d, d', the set screw, c', or its equivalent, arranged and operating substantially as and for the purpose described.

5th, The cutters, e, e', combined with the rotary grinder boxes, N, N', and the carriage, I, arranged and operating substantially as and for the purpose specified.

6th, The self-adjusting frame, I, the shafting, R, R', the gears, S, S', and T, racks, P, P', the slide bearings, b, b', arranged and operating substantially as and for the purpose described.

7th, The bearing chains, X, X', pulleys, shaft, Y, ratchet wheel, W, intermediate gears, p, p', pawl, r, arranged and operating substantially as described, when combined with the grinder boxes, N, N', self adjusting frame, I, collars, O, O', and shafts, D, D'.

8th, The chains, I', I', pulleys, k', k', weights, m', m', used for the purpose described, when combined with the self-adjusting frame, I, grinder boxes, N, N', collars, O, O', and shafts, D, D'.

9th, The scroll grinder, with its hollow cone in the center, as represented in figs. 6, 7, and 9, made and operating substantially as described.

79,839.—SPRING BED BOTTOM.—B. F. Kingman and M. V. B. Shepard, Chicago, Ill.

We claim a bed spring fastening consisting of the metal strap, C, and loop, D, the former having a nib, E, for holding the spring in place, and a slot, H, through which said loop passes, and the latter having projecting flanges F, G, fastened to the ends of the strap, C, and bearing against the inside of the same, substantially as and for the purpose herein specified.

79,840.—SUPPOSITORY MACHINE.—A. M. Knowlson, Troy, N. Y.

I claim, 1st, The mode or manner herein contained, described, and set forth, for the manufacture or formation of suppositories from the medicated material, while in a cold or solid state or condition, substantially as herein described and set forth.

2d, The combination of the plunger, B, with the suppository molds, a and G, each being arranged with the supply tube or cylinder, A, in the manner and for the purposes substantially as herein described and set forth.

3d, The employment of the frame, H, having combined therewith the mold or die, G', the supply channel, c, and the cap, I, containing the vent, e, each being arranged in the manner and for the purposes substantially as herein described and set forth.

4th, The arrangement and combination of the die or mold, a, with the cap, E, in the manner and for the purposes substantially as herein described and set forth.

79,841.—RADIATOR.—J. A. Lakin, Thompsonville, Conn.

I claim the peculiarly shaped radiators herein shown, open at the lower ends, and connected in pairs by means of the pipes, B and B', substantially in the manner and for the purpose herein shown.

79,842.—CAST IRON CAR WHEEL.—George G. Lobdell, Wilmington, Del.

I claim a cast iron car wheel having a hollow rim, with transverse strengthened ribs, a, where the flanged side of the said hollow rim is made straight, and at right angles, or nearly so, to the said internal ribs, as set forth, for the purpose specified.

79,843.—FRUIT JAR.—Wm. A. Loder, Rochester, N. Y.

I claim a sealing ring for fruit jars formed from a strip or strips of paper or other flexible material, coated on the inside with gum or wax, for covering the joint between the cover and jar, as herein set forth.

79,844.—HOT AIR FLUES IN STOVES.—C. K. Marshall, New Orleans, La. Antedated July 4, 1868.

I claim, 1st, Constructing the pipes, D, of fire clay, soapstone, or other like material, with a tapering flue, substantially as described, and for the purpose specified.

2d, Constructing the stove, A, with openings, a, b, in combination with the pipe, having elbows, d and d', when the same are constructed of fire clay, soapstone, or other like material, and arranged so as to operate substantially as described and for the purpose specified.

79,845.—COAL GRATE AND STOVE.—C. K. Marshall, New Orleans, La. Antedated June 27, 1868.

I claim, 1st, The tile, C, with its internal grooves, c, c', in combination with the pipes, E and F, and the grate equivalent, B, when the same are constructed and arranged substantially as described and for the purpose set forth.

2d, The tile, C, with its internal grooves, c, c', in combination with the pipes E and F, and damper, G, when the same are constructed and arranged substantially as described and for the purpose set forth.

3d, The arrangement of an open fire grate, of an open fire grate, a hollow triangular tile, D, when the same is connected with openings in the side of the grate, substantially as described.

79,846.—STAIR RODS, ETC.—Wm. M. Marshall, Philadelphia, Pa., assignor to himself and J. B. Alexander, Washington, D. C.

I claim, 1st, The use of glass tubing, when supported by metal or other casing, mountings in relief, of metal or other material, or the rabbeted supports, of metal or other material, substantially as described and for the purposes specified.

2d, The filling of silvered or gilded glass tubes with plaster, cement, or their equivalents, combined with wood or metal rods, substantially as described and for the purpose set forth.

79,847.—EYE CRP.—Benj. K. Maltby (assignor to Charles R. F. Slick), Cincinnati, Ohio.

I claim the use of tubes that serve as receivers for exsuffiating the air around the eye, in combination with spectacles, with or without magnifying power, designed to elongate the eye, and by proper use to prevent and also to cure long-sightedness.

79,848.—REFINING AND SMELTING ORES.—James P. McLean, New York city. Antedated July 3, 1868.

79,858.—MACHINE FOR MAKING WOODEN BOXES.—Reuben

Ramelli, Rindge, N. H.
I claim in combination with the former block or its equivalent, the groove or grooves, d, for winding the nail points, substantially as set forth.
Also in combination with the block, c, the jaw block, e, with its clamping or guiding jaw, g, and the spring, h, substantially as set forth.
Also in combination with the jaw, e, and the block, c, the adjusting screw, k, substantially as set forth.

79,859.—PADLOCK.—David F. Randall, Chicopee, Mass.

I claim, 1st, The arrangement of the detent, O, in the curved depression beneath the heel of the shackle, so that the detent cannot be removed without detaching the shackle from the body of the padlock, as set forth.
2d, The combination of the padlock body, formed as described, slotted and serrated bolt, B, spring, H, detent, O, and shackle, C, with the elongated and rigid key shank, T, the whole constructed and operating substantially as described.

79,860.—TEA KETTLE.—Ezra Ripley, Troy, N. Y., assignor

to himself and W. C. Davis & Co., Cincinnati, Ohio.
I claim, 1st, A tea kettle with a cylindrical vessel having a hinged ball and a hinged cover, the cover being pivoted, and made flat, or so shaped on top that the cover forms a convenient shelf for supporting and warming other culinary vessels of larger diameter than the cover.

79,861.—DETACHABLE MUZZLE FOR SHOT GUNS.—S. H.

Roper, Roxbury, assignor to the Roper Repeating Rifle Company, Amherst, Mass.
I claim a contracted ring or ferrule, substantially as described, attachable to and detachable from the muzzle of a shot gun by means of a screw joint, for the purpose of diminishing or increasing the scatter of the shot, substantially as shown and described.

79,862.—DOOR STRAIGHTENER.—O. C. Ross, Penfield, N. Y.

I claim the device for straightening doors consisting of sections, D D, connecting laterally at b, and engaging at the extremities with lugs, C, C, by means of angles, f, g, and ribs and slots, h, h, substantially as herein set forth.

79,863.—STEAM ENGINE.—W. G. Savage, Knoxville, Iowa.

I claim, 1st, The arrangement of the lever, S, and spring, x, with the shaft, F, and wheel, G, by which means the motion of the engine is reversed, substantially as set forth.
2d, The combination of the valve, C, with the head, A, having a hub, B, and the cylinder, D, with its steam press, B, a, constructed and operating substantially as set forth.

79,864.—GUDGEON FOR BOOM.—Charles Sayward, Gloucester,

Mass.
I claim the arrangement of the swivel, hinge, yoke, and bolt, the swivel intervening between the boom and the hinge, substantially as and for the purpose specified.

79,865.—GRINDING PLATE FOR GRIST-MILL.—Henry Shaw

and William D. Leavitt, New Orleans, La.
We claim the combination and arrangement of the cast iron grinding plate, B, having diamond shaped projections, A, the unyielding, non-conducting paper packing, C, and back plate D, all constructed and secured together in the manner and for the purpose herein described.

79,866.—FURNACE FOR MELTING METALS.—William Shea

and L. D. Harvey, Harvey, Mich.
We claim the putting of pipes into cast iron plates, substantially as and for the purpose herein set forth.

79,867.—JOURNAL BOX.—William Sherburne, Charlestown,

Mass.
I claim, 1st, The bolt, E, constructed as and for the purposes above described.
2d, The bolt, E, in combination with the jaw, m, and oil box, B, substantially as and for the purpose above specified.

79,868.—TYPE WRITING MACHINE.—O. Latham Sholes, Carlos

Golden and Samuel W. Soule, Milwaukee, Wis.
We claim, 1st, A circular annular disk, C, with radial grooves and slots, or grooves alone, to receive and guide the type bars or hammers, so that they inevitably and necessarily will strike the central point with perfect accuracy, when made and operated for the purpose, as described.
2d, The combination of a circular, annular, radially slotted or grooved disk, with type bars fitted therein, and pivoted thereto, when made operated for the purpose, as described.

79,869.—BRIDGE BLOCK.—J. R. Smith, Springfield, Mass.

I claim, in combination with the wrought iron locks, D D, connecting the heads, a, of the chords, the cast iron block, filling in closely around the joints, substantially as and for the purpose herein described.

79,870.—WATER WHEEL REGULATOR.—Hervey D. Snow,

Bennington, Vt.
I claim the adjustable stops, g, g', in combination with the pawls, r, a, ratchet wheel, f, and fange, t, moved by a connection to the governor, substantially as set forth.

79,871.—HARVESTER.—Welcome Sprague, Farnham, N. Y.,

assignor to himself and Bernard H. Menble. Antedated June 30, 1868.
I claim so constructing a reaping machine that the grain, after it is cut by the knives or cutters, will be collected and formed into a rope, or equivalent, and in that shape be left, in the rear of the machine upon the ground.

79,872.—CARD CYLINDER.—Joseph M. Stone, (assignor to

himself, George L. Davis and John A. Wiley, North Andover, Mass.)
I claim a card cylinder, formed of a thin shell, with three or more spiders or sets of arms in the same, all cast in one piece, substantially as described, as a new manufacture.

79,873.—HOISTING GATE.—George Stowe, Braceville, Ohio.

I claim, 1st, The supporting bars, B and C, constructed with a slot, and operating substantially as described and specified.
2d, The grooves, D and E, in the ends of the tire box, constructed and operating as herein described.

79,874.—HARNESSE BUCKLE.—W. H. Taylor, Baldwinville,

N. Y.
I claim the combination of buckle and loop, substantially as and for the purpose specified.

79,875.—OIL, TOBACCO, AND OTHER PRESSES.—Enoch Thomas,

Craigsville, Va.
I claim, 1st, The combination and arrangement of the double setting toggle levers, E, E', and F, F', with the follower frame, D, and the reciprocating frame, I, substantially in the manner herein described, and for the purpose specified.
2d, The combination and arrangement of the sectors, J, J' and J'', rocking shaft, H, H', and eccentric wheels, L, L', in relation to each other and to the reciprocating frame, I, toggle levers, E, E', and F, F', substantially as herein described, and for the purpose specified.

79,876.—WEATHER STRIP.—James H. Thomas, Lynn, Mass.

I claim the combination of the flexible elastic roll, D, with the short cylinder, K, K', &c., and the spindle, H, arranged substantially as described, and for the purpose set forth.

79,877.—LATHE REST.—William Thompson, Worcester,

Mass.
I claim connecting the nut, E, to the poppet block, C, by means of a screw passing through a slot in the side of the rest, B, in the manner herein described.

79,878.—FILE CUTTING MACHINE.—Thomas E. Thurston

(assignor to himself and James Kearney, Newark, N. J.)
I claim, 1st, A file, having the part, a, cast or forged therewith, in combination with parts, b, b', and c, all combined and arranged in the manner and for the purpose set forth.
2d, The improved adjustable stem, D, the improved parts, E and F, the file cutting machine, which has thereon the improved part, a, all constructed substantially as hereinabove set forth.

79,879.—LOCK BOLT.—George Washburn, New York city.

Antedated June 27, 1868.
I claim, 1st, The combination and arrangement of the slide bolt, C, provided with the rack, E, the case, G, piston, F, and shaft, H, provided with the bolt, I, and collar, a, all operating as described, for the purpose specified.
2d, The key, J, provided with the thumb lever, I, having the pin, g, attached in combination with the shaft or arbor, H, of the piston, F, said shaft having the hole, f, substantially as and for the purpose specified.

79,880.—GANG PLOW.—Jas. T. Watkins, Santa Clara, Cal.

I claim, 1st, The plow, H, in combination with the blocks, E, E', the holding screws, I, I', by which the plows are adjusted, and the wedges, a, a', constructed and arranged substantially as described.
2d, The blocks, E, E', mounted upon the axle, C, C', and the bent arms, J, J', with the set screws K, K', for regulating the depth of the furrows, substantially as described.

79,881.—HARVESTER RAKE.—Cyrenus Wheeler, Jr., Au-

burn, N. Y.
I claim, 1st, The construction and arrangement of the chain chaves or pulleys, whereby it is adapted to serve as the rotating head to which the rake and reel arms are pivoted.
2d, The arrangement of the endless chain and the driving and guide pulleys for driving the rake, arranged on one side of the drive wheel, from a shaft, the rake arm or track made in one piece with the plate or yoke, and attached to the rake rollers, substantially as described.
3d, M, being the friction rollers, located in recesses or chambers formed in the rake and reel arms.
4th, Linking the rake and reel arms together in pairs, in such manner that the angle of relation of the arms may be varied by adjusting the point of connection of the links therewith at either end.
5th, The rake and reel arms provided with lugs or ears, having set screws for adjusting the height of said arms in passing over the platform.
6th, The guiding chaves or pulleys in front of the drive wheel, around which the rake driving chain passes, made adjustable for the purpose set forth.

79,882.—WASHING COMPOUND.—H. K. White, Conneaut

township, Pa.
I claim the above described composition for washing and cleansing clothing and other goods, compounded in about the proportions specified.

79,883.—APPARATUS FOR MOVING HEAVY BODIES.—Charles

Whittaker, Milwaukee, Wis.
I claim the portable hoisting apparatus consisting of a frame, A, mounted on wheels, with a series of vertical screws, E, with the bars, F, and stirrups, G, arranged to be operated by bevel gear attached to the horizontal shafts, H, all substantially as described.

79,884.—PORTABLE FENCE.—Henry Willard, Ripon, Wis.

I claim the adjustable brace, C, the mortised posts, A, the hook, D, and the pin, B, the whole arranged and combined with the fence in the manner substantially as and for the purposes shown and described.

79,885.—WINDLASS.—Geo. L. Woods, Newburyport, Mass.

I claim the arrangement of the capstan, C, shaft, d, gears, f, f', and the bevel gears, g, h, h', in connection with the windlass, r, when constructed and operated as and for the purpose set forth.

79,886.—FRED RACK.—Morgan Workman, Washington

township, Ohio.
I claim in the construction of a feed rack, the arrangement of the removable troughs, B, and hinged cover, b, substantially in the manner and for the purpose as herein shown and described.

79,887.—LAMP.—Ferdinand Adt (assignor to himself and

Turner), Wolcottville, Conn.
I claim a reflector placed between two or more deflectors, and within the chimney, so as to reflect the light from the flames in the manner specified, and in combination with such deflectors and reflectors, the air tube, f, for the purposes set forth.

79,888.—INKING APPARATUS FOR COLOR PRINTING.—Thos.

L. Baylies, Richmond, Ind., assignor by mesne assignment to the American Patent Chromatic Printing Press Company.
The combination of the central hub, B, a series of adjustable inking bars, D, E, and a clamp for securing the bars at the ends without the intervention of any intermediate lateral supports, substantially as set forth.

79,889.—FRUIT CAN.—Charles Becker, John A. Ross, and

Jacob Siemernagel, Allegheny City, Pa.
We claim the arrangement of the corrugated lip, D, shoulder, o, flange, i, and recess, s, constructed, arranged, and operating as herein described and for the purpose set forth.

79,890.—MANUFACTURE OF FRUIT CANS.—Charles Becker,

John A. Ross, and Jacob Siemernagel, Allegheny City, Pa.
We claim the method herein described for forming and providing fruit cans with an inner flange, for the purpose set forth.

79,891.—THRILL-COUPING.—Henry M. Beecher (assignor to

H. D. Smith & Co., Portland, Conn.)
I claim the invention of shaft connection, as made with the lips, a, a', to its base, and in other respects substantially as described and represented.

79,892.—MANUFACTURE OF GLASS.—Leon Bemelmans and

Laurent De Gize, Atlanta, Ga.
We claim, 1st, The process, broadly, of manufacturing window and mirror-glasses, of whatever thickness and size, by pressing the molten glass between two parallel and polished plates, whatever may be the mode of pressing employed.

79,893.—MANUFACTURE OF GLASS.—Leon Bemelmans and

Laurent De Gize, Atlanta, Ga.
We claim a machine called window and mirror-glass-molding machine, heretofore described, or any other substantially the same, and which will produce the intended effect.

79,894.—CIRCUIT CLOSER.—William J. Biggar and John C.

Blood, Conneaut, Ohio.
We claim the combination of the board, A, the brass and iron strips, m, n, the sliding bolt, e, the spring lever, c, and the posts, b, b', with the insulated wires, a, arranged and operating substantially as and for the purpose herein set forth.

79,895.—ELECTRO-MAGNETIC BURGULAR ALARM.—William J.

Biggar, John C. Blood, and Del M. Griswold, Conneaut, Ohio.
We claim the combination and arrangement of the magnets, B, B', armature, C, pivoted frame, D, wheel, E, provided with pins, d, and catch, r, hinged lever catch, b, bell, K, hammer, H, handle, m, spiral springs, s, e, catch, p, swinging holder, N, rubber roller, O, and M, lamp, L, weight, F, cord, J, shaft, G, wires, c, and connections and breakers, all substantially as and for the purpose herein shown and described.

79,896.—APPARATUS FOR INSULATING TELEGRAPH WIRES.—

Samuel C. Bishop and William W. Marks, New York city.
We claim the combination of the dies, B, C, with the feed roller, a, when the back or male die, B, is perforated for the passage, in a separated manner, of duplicated wires, and so arranged, relatively to the feed of the insulating material through the orifice, a, as that the wires in their passage to and through the feed die, C, are caused to travel in a plane which is transverse or at right angles to the feed orifice, a, substantially as and for the purpose herein set forth.

79,897.—KNITTING MACHINE.—Charles W. Blakeslee, Water-

town, Ebenezer D. Beecher, Westville, and Anthony G. Davis, Watertown, Conn.
We claim the combination, with the needle-actuating cam, of an endless belt or chain for driving it, substantially as set forth.

79,898.—SPECTACLES.—Ernest S. Clapp, (assignor to himself

and Isaac Chinery, Montague, Mass.)
I claim, in combination with a spectacle frame, the rod, D, with glass rings and clasps attached thereto, and made adjustable, substantially as and for the purpose herein shown and described.

79,899.—MACHINE FOR MAKING ROVING.—Nathan F. Clark,

(assignor to himself and George H. Cook, Lawrence, Mass.)
I claim the combination and arrangement of the tube, F, and bobbin rest, D, constructed as described, with the bolster A, the tube, F, having the oil passages, b and c, for conveying the oil to the surface of the spindle and to the ends of the bobbin, substantially as and for the purpose set forth.

79,900.—JOURNAL BOX.—Richard Colborn and George W.

Gould, Norwich, Conn.
We claim, 1st, The combination with the bottom, A, the top, B, of the box, of the end grooves, C, C', longitudinal grooves, b, g, cross grooves, e, e', and the wicks, m, b, with or without grooves, i, d, substantially as and for the purposes set forth.
2d, The combination, with the parts, A and B, of the end grooves, C, C' longitudinal grooves, b, g, cross grooves, e, e', and wick, m, substantially as and for the purposes herein set forth.

79,901.—EMBROIDERING MACHINE.—Jacob Einhorn, (assignor

to himself and Jacob Engster), New York city.
I claim, 1st, The arrangement of the embroidery mechanism, substantially as described, in a jointed, swinging horizontal frame, D, so that ornamental designs may be produced without moving the fabric after each stitch, substantially as herein shown and described.
2d, The longitudinally adjustable frame, B, in which the fabric is held, in combination with the jointed swinging frame, D, made as set forth.

79,902.—MEAT CUTTER.—C. A. Foster, Fitchburg, Mass., as-

signor to himself and Harlan P. Derby.
I claim, 1st, The combination of the chopping knife, its slotted arm, H, and sliding blocks, I, with the grooved horizontal frame, D, E, so that ornamental designs may be produced without moving the fabric after each stitch, substantially as herein shown and described.
2d, The combination of the chopping knife, its vibratory arm, and the grooved or slotted wheel for actuating the same, with their supporting frame arranged to overhang or extend beyond the revolving mechanism, substantially in the manner and for the purposes shown and described.

79,903.—FIRE KINDLING.—Charles Gaudin, Zoe Granier, and

Jules Granier, San Francisco, Cal.
We claim forming a fire kindling ball upon the end of an inflammable wick for the purpose of ready ignition, as herein shown and described.

79,904.—FAGOT OR PILE FOR MANUFACTURING RAILROAD

RAILS.—William Hayward and John Lewis, Danville, Va.
We claim the "pile," as represented in the drawing, either with or without the part, A, substantially as shown, and for the purpose set forth.

79,905.—MACHINE FOR MAKING WIRE HEDDLES.—Emil T.

Bertie and Richard Thompson, New York city.
We claim, 1st, Arranging the head stocks, b, b', which support the inner or

adjacent ends of the cylinders, a, a', in the manner described and for the purpose set forth.

79,906.—FRUIT PICKER.—Leander Hotchkiss, Torrington, as-

signor to Eliza Turner, Wolcottville, Conn.
I claim a fruit picker formed of a jointed segmental ring, that closes upon the fruit in the act of pulling or cutting the same off, substantially as set forth.

79,907.—MILK CAN.—George A. Huggins (assignor to himself

and H. W. Shepard, Mansville, N. Y.)
I claim the sheet metal body, A, and cast or malleable bottom, B, when the latter is grooved so as to form a seat for the former, and at the same time furnish an outer rim for the protection of its lower edge, when the same are combined and attached, substantially as described as and for the purpose specified.

79,908.—LOOM.—John P. Humaston (assignor to himself and

Hamilton E. Towle), New York city.
I claim, 1st, The combination of the pivoted and vibratory shuttle carriers with connecting rods and levers, receiving and imparting their movement from a single revolving cam shaft directly to said lay and shuttle carriers, substantially as herein shown and described.
2d, The construction of the two shuttle carriers, vibrating on an axis common to both, which, when the same are provided with shoulders or jogs, acting in the manner and for the purpose set forth.

79,909.—WAGON SEAT.—Almon Hunt and C. C. Chapman,

Macomb, Ill.
We claim the springs, B B', cross pieces, b, c, hooks, b', pins, d, and seat, C, the whole being combined and arranged as described.

79,910.—INKING APPARATUS FOR COLOR PRINTING.—Joshua

Hunt, Richmond, Ind., assignor, by mesne assignments, to The American Patent Chromatic Printing Press Company.
I claim the combination of the type bed, B, the two forms, and the type inking rollers, E, G', and the adjustable cam tracks, I, I', when so constructed and arranged in relation to the ink distributing rollers, that different colored inks, first disposed in bands on the type inking roller, or on part thereof, shall be transferred simultaneously to the lines of type, and a single color be also transferred to the other form, so that by two impressions, the sheet or the form being reversed, two completed jobs may be printed in which the letter press is printed in more than two colors, and the border in one color, substantially as set forth.

79,911.—PASSENGER REGISTER.—Thomas S. Huntington and

A. Fulton, Bellefontaine, Ohio.
We claim, 1st, The hinged or pivoted levers or arms, D, when used for operating a register or indicator, in connection with the rotating disk, C, and cams, d', d', substantially in the manner and for the purpose herein set forth.
2d, The combination of the revolving disk, C, the fixed cam, F, and the levers or arms, D, substantially in the manner and for the purpose set forth.
3d, The combination of the cam, E, and the fixed cam, F, for the purpose of operating the arms, D, in the manner and for the purpose set forth.

79,912.—MACHINE FOR PUNCHING AND SHEARING.—Michael

A. Lagana, Brooklyn, N. Y., assignor to himself, John Dalley, Robert Russell, and Andrew Mercere.
I claim, 1st, In combination with the punch, C, the plate carrying bed, A, arranged to slide crosswise of the punch, and provided with tracks or teeth, I, J, on opposite edges of it, reverse pawls, g, h, connected by arms, g, h', with a vibrating shaft, H, slotted levers, g, h', in connection with said pawls, and beam lever, g, for throwing either pawl in gear with the bed, or disconnecting both therefrom, to reverse or stop the motion of the bed without changing or arresting the movement of the punch, essentially as specified.

79,913.—MACHINE FOR PUNCHING AND SHEARING.—Michael

A. Lagana, Brooklyn, N. Y., assignor to himself, John Dalley, Robert Russell, and Andrew Mercere.
I claim, 1st, In combination with the punch, C, the plate carrying bed, A, arranged to slide crosswise of the punch, and provided with tracks or teeth, I, J, on opposite edges of it, reverse pawls, g, h, connected by arms, g, h', with a vibrating shaft, H, slotted levers, g, h', in connection with said pawls, and beam lever, g, for throwing either pawl in gear with the bed, or disconnecting both therefrom, to reverse or stop the motion of the bed without changing or arresting the movement of the punch, essentially as specified.

79,914.—APPARATUS FOR FEEDING FUEL TO FURNACES.—

John McCormick, Louisville, Ky., assignor to himself and M. W. Ferguson. Antedated July 3, 1868.
I claim, 1st, The arrangement of the double acting screw, c', within cylinder, b', when constructed and used substantially as and for the purpose specified.

79,915.—RAILROAD TELEGRAPH ALARM.—G. Natcher, Sid-

ney, Ohio, assignor to himself and I. Marks & Co.
I claim, 1st, A telegraphic alarm for railroads, which is capable of indicating at each station the progress of the train along the track, and also of giving a suitable alarm along the entire track, both in front and rear of said train, by means of the signal boxes, F, gongs, G, hammers, H, levers, J, taps, K, K', and rods, O, or their mechanical equivalents, the whole being arranged and operating substantially as herein described, and for the purpose set forth.

79,916.—AXLE BOX.—Benjamin M. Pearne and Leroy Coville,

Oxford, N. Y.
We claim the combination of the metallic box, B, and bands, C, C', with the axle, A, when said box has a central depression, and is enlarged at each end for the bands, as set forth.

79,917.—GANG PLOW.—John F. Porter and Alonzo Norton,

Tidona, Pa.
We claim, 1st, The hinged coupler, I, attached to the plow, and operating as described.
2d, A plow, so constructed and operating that the draft is mainly or wholly upon the point, as herein set forth.

79,918.—BUCKLE FOR SUSPENDER.—Augustus Pototsky (as-

signor to Fish, Clark & Flag), New York city.
I claim the combination, in a buckle, of the two members thereof with a spring stud upon one member, and with the slotted stop plate upon the other member thereof, substantially as before set forth.

79,919.—ADJUSTABLE BARREL HEAD.—Peter Rink and James

Dachery, Westerville, N. J.
We claim the bevel edge, C, grooved upon each side to receive the edges of the parts, a, b, of the barrel head, the short beveled wedge, D, rebated upon its under side to fit between the said parts, and rest upon their upper sides, both wedges secured together and tightened in the head by means of the beveled wedge, E, all constructed, arranged, and operating as herein described, for the purpose specified.

79,920.—RAILROAD CAR STOVE.—John K. Sax and George

W. Kear, Kingston, Pa.
We claim, 1st, The door, M, provided with the eccentric spring latch, O, and sunk in from the surface to protect it from breaking in time of accident, substantially as and for the purposes above set forth.
2d, The combination of the base, A, pan, B, and the valve, revolving grate, P, and cog gearing, and perforated pipe, C, and the grate, Q, and the door, M, all constructed and forming a cylindrical stove for railroad cars, and operating as specified.

79,921.—COFFIN.—Bernard Smith (assignor to "American

Burial Case Company," Cincinnati, Ohio.)
I claim constructing a burial case substantially in the manner herein described, with the outer edge of the flange, D, flush, or nearly so, with the sides, H, H', of a body, A, whose upper portion is set in, as and for the objects designated.

79,922.—SCOOP AND SIFTER.—E. J. Smith & F. B. Perkins,

Chicago, Ill., assignors to E. J. Smith.
We claim the combination of the sifter, J, rod, E, coil spring, B, and curved rod, G, substantially as and for the purpose herein set forth.

79,923.—LOOM FOR WEAVING PALM LEAF.—John C. Smith,

Chicopee, assignor to himself and L. D. Hills, Amherst, Mass.
I claim, 1st, In combination with a reciprocating web carrier, the feed trough and oscillating box, constructed substantially as and for the purpose set forth.
2d, In combination with the feed trough and oscillating box, the sliding weights, D, substantially as and for the purpose set forth.

79,924.—MACHINE FOR WEAVING PALM LEAF.—John C. Smith,

Chicopee, assignor to himself and L. D. Hills, Amherst, Mass.
I claim, 1st, In combination with a reciprocating web carrier, the feed trough and oscillating box, constructed substantially as and for the purpose set forth.
2d, In combination with the feed trough and oscillating box, the sliding weights, D, substantially as and for the purpose set forth.

79,925.—MACHINE FOR WEAVING PALM LEAF.—John C. Smith,

Chicopee, assignor to himself and L. D. Hills, Amherst, Mass.
I claim, 1st, In combination with a reciprocating web carrier, the feed trough and oscillating box, constructed substantially as and for the purpose set forth.
2d, In combination with the feed trough and oscillating box, the sliding weights, D, substantially as and for the purpose set forth.

79,926.—MACHINE FOR WEAVING PALM LEAF.—John C. Smith,

Chicopee, assignor to himself and L. D. Hills, Amherst, Mass.
I claim, 1st, In combination with a reciprocating web carrier, the feed trough and oscillating box, constructed substantially as and for the purpose set forth.
2d, In combination with the feed trough and oscillating box, the sliding weights, D, substantially as and for the purpose set forth.

79,927.—MACHINE FOR WEAVING PALM LEAF.—John C. Smith,

Chicopee, assignor to himself and L. D. Hills, Amherst, Mass.
I claim, 1st, In combination with a reciprocating web carrier, the feed

strip of wool while the same is being drawn into the shed, and thereby tend to prevent it from twisting or turning.

79,924.—LAMP.—David M. Smith, Orange, N. J., assignor to Benjamin F. Small, New York City.

I claim the safety lamp body, formed of a tube, and constructed substantially as hereinafter set forth.

79,925.—TOOL FOR FITTING BANDS ON HUBS.—Charles E. Stone, Amesbury, and Alfred Herbert, Salisbury, Mass.

We claim the handle, B, curved at c, c, and adjustable pivoted to the extension, C, of the handle, A, by means of the set screw, a, fitted into either one of a series of holes, b, b, formed in said arm, C, substantially as and for the purposes herein shown and described.

79,926.—APPARATUS FOR THE MANUFACTURE OF WHISKEY.—Hiram Vaughn, Thomas Charwell, E. H. Childress, and G. A. Webber, Nashville, Tenn. Antedated July 2, 1868.

We claim 1st, The process heretofore described of manufacturing whiskey, or any kind of spirit whatever, by the employment of pipes, pumps, hydrometers, gages, padlocks, substantially as described.

2d, The manner herein described of employing pipes, pumps, hydrometers, gages, padlocks, as set forth.

3d, The method of working said pumps, pipes, hydrometers, either by steam or other power whatever, and using them in combination with gages and padlocks, in the manner and for the purposes set forth.

79,927.—PAPER RULING MACHINE.—Charles F. West, Boston, assignor to J. F. Tapley & Co., Springfield, Mass.

I claim, 1, Combining, with a ruling mechanism, the wheel, o, provided with lifter surfaces or pieces, for effecting the rise of the pens at the proper times, when the wheel is arranged in relation to the ruling cylinder substantially as described.

2d, Making the lifter pieces, w, adjustable within the circular grooves, v, when held in position, substantially as set forth.

3d, Arranging the wheel, o, with its axis at right angles to that of the ruling cylinder or bed so as to be driven by frictional contact therewith, substantially as set forth.

4th, Combining, with the wheel, o, and cylinder, b, arranged in relation to each other, as described, mechanism for arresting the rotation of the wheel, and for effecting its release, substantially as and for the purposes specified.

79,928.—CLINCHING NIPPER.—John B. Wilder, (assignor to himself, W. H. Shepard, and George A. Higgins) Mansville, N. Y.

I claim, 1st, The cutters, b and bi, when the same are applied to a pair of clinching nippers that they can be operated substantially as described, as and for the purposes specified.

2d, The cutters, b and bi, jaws, a and a', and shoulder, e, when the same are arranged substantially as described, as and for the purposes specified.

79,929.—ELECTRICAL BATH.—Charles Winterburn and William Kent, Cincinnati, Ohio.

We claim the application of electricity to the human body while the latter is in *ex vivo*.

79,930.—HAMES FASTENER.—A. B. Woodward, Alfred Centre, and Samuel A. Woodward, Hornellsville, assignors to themselves and Orson Mosher, Hornellsville, N. Y.

We claim an improved hame fastener, formed by the combination of the strap, A, strap, B, lever catch, C, lever catch, C, and spring, E, or equivalent, with each other, said parts being constructed and arranged substantially in the manner herein shown and described.

79,931.—BEER COOLER.—John Agate, Pittsford, N. Y.

I claim box, b, divided into several compartments, H, in combination with the tanks, C, and connecting pipes, I, operating conjointly, substantially as and for the purposes shown and described.

79,932.—CHECK AND DRIVING LINE.—C. M. Alexander, Washington D. C.

I claim the check lines, A, A', made continuous, and connected to or forming a part of the driving line, B, and operating upon the mouth of the animal with one or two bits, substantially as specified.

79,933.—INFLATED RUBBER GOODS.—George M. Allenton, New York City.

I claim the separate covering of cloth, felt, or similar material, in combination with the enclosed india rubber article, as and for the purposes set forth.

79,934.—LIFE PRESERVER.—George M. Allenton, New York City.

I claim an annular inflatable elastic rubber life preserver, substantially as specified.

79,935.—MACHINE FOR WASHING PAPER STOCK.—J. E. Andrews, Coeyman's Hollow, N. Y.

I claim 1st, The combination with the tank, A, of the wheel C, provided with the floats, C1, screen, C2, and hnb, a, substantially as and for the purpose described.

2d, The combination with the tank, A, of the chute, E, cylinders, D and D', and endless chains, provided with the rakes, substantially as and for the purpose described.

3d, The combination, with the endless chains, provided with rakes, of the guides or ways, F, substantially as and for the purpose described.

4th, The combination, with the water tank, A, chute, E, and rakes, b, of the screen, G, substantially as and for the purpose described.

79,936.—ROSE FOR DOOR KNOBS.—William H. Andrews, New Haven, Conn.

I claim the combination of the plate, d, constructed with the flange, a, with the plate, A, formed from tin or similar hard metal, as described, and when the flange, a, extends up through the central perforation of the plate, A, substantially as and for the purpose set forth.

79,937.—PROPELLING VESSELS.—B. T. Babbitt, New York City.

I claim the combination of the tubes, c, b, open at both ends, with the jet-tubes, d, arranged to project within the former intermediately of their length, and with their jet orifices facing either open end of said larger tubes, substantially as shown and described.

79,938.—GAS EXPLOSIVE ENGINE FOR CONDENSING AIR.—B. T. Babbitt, New York City.

I claim 1st, A motor or power generator, operating to compress or force air or gas by the reciprocating action in an automatic manner, of a weighty and independent piston or projectile, free from constant connection with outside working parts, the same being started or set in motion by any suitable explosive force or expansion of gas or vapor under heavy pressure, within a tube or cylinder provided with suitable openings for producing the necessary explosion or starting impetus to the piston, and for reception and discharge of the fluid which it serves to compress, substantially as specified.

2d, The combination of intermittently revolving or other equivalently operating many chamber magazines at opposite ends of the tube or cylinder, A, suitable powder feeding vessels or chambers thereto, and wires or conductors, a, a', for operation in connection with the wire or wires from a battery to explode the charges at opposite ends of the cylinder alternately, essentially as and for the purpose or purposes herein set forth.

3d, The combination, with the loose or independent piston, E, operating as described, of rods, H, or their equivalents, and suitable mechanism for giving in an automatic manner, or by the action of said piston, the necessary impetus to the latter at starting, or by gases expansion or explosion, substantially as specified.

79,939.—GAS EXPLOSIVE ENGINE FOR CONDENSING AIR.—B. T. Babbitt, New York City.

I claim, 1st, A motor or power generator, operating to compress air by gas by the rotary travel or action, within a cylinder or annular chamber, provided with one or more abutments and suitable inlet and outlet passages of a loose or detached and independent piston, having imparted to it at intervals power to rotate and condense in momentary by any suitable explosive force or expansion of gas or vapor, substantially as specified.

2d, The combination of a loose or independent piston operating within a cylinder or annular chamber, substantially as described, with a sliding abutment or abutments in such manner, and said parts or devices being so constructed as that the piston in its rotation is caused to open and operate the abutment or abutments by contact with the same, essentially as and for the purpose or purposes herein set forth.

79,940.—SWITCH FOR STREET RAILROADS.—Gilbert L. Bailey, Portland, Me.

I claim the construction and arrangement of the spring, S, levers, 7 and 8, friction rollers, 5 and 6, and treadle, 11, all substantially as and for the purposes described.

79,941.—BOOT AND SHOE SHANK.—August Bertram, New Albany, Ind.

I claim the right and left shoe shanks, A, B, of the form shown, when the same are made entirely of wood, and inserted between the upper and lower surface of the sole, so as to be imbedded in the leather, substantially as herein described, and for the purpose specified.

79,942.—ANILINE DYE.—Benoit Bloch, Soultz, France.

I claim a dye, composed of the ingredients herein named, and treated in the manner substantially as set forth.

79,943.—COFFEE POT.—Benjamin Boardman, Malden, Mass.

I claim the cup or condensing chamber, D, constructed and applied to an ordinary coffee pot, A, in the manner substantially as and for the purpose herein set forth.

79,944.—SNAP HOOK.—William H. Bousier, Paris, Ill.

I claim a snap hook for harness, having hook, A, spring, B, shield, D, and thumb piece, E, constructed, combined, arranged, and operating substantially as specified.

79,945.—GLUE POT.—James Bragdon, Boston, Mass.

I claim, in combination with the glue pan or vessel, d, the water-containing vessel, e, made with the conical bottom, l, and the steam chamber, j, and having beneath it the inclined flue, i, for escape of the smoke from the lamp, all substantially as shown and described.

Also, in combination with the conical bottom, l, and flue, i, the vertical flue, m, substantially as shown and described.

Also, in combination with the conical bottom, l, and flue, i, the lamp, b, having a packed tube, g, substantially as shown and described.

79,946.—HAND LOOM.—James L. Branson, Cincinnati, Ohio.

I claim, 1st, The winding dog, E, in combination with the ratchet wheel and chaps, substantially as and for the purpose described.

2d, The rigid connecting wire, S, combined with the strap, O, and picker block, A, substantially as and for the purpose described.

79,947.—STEERING WHEEL STOP.—Isaac N. Bunker, Weymouth, Mass.

I claim, 1st, Arranging a notched hinged bracket, D, in combination with the steering wheel, A, substantially as and for the purpose herein shown and described.

2d, Providing the bracket, D, when the same is made and operating as described, with springs, c, c, substantially as and for the purpose herein shown and described.

3d, The bracket, D, when provided with a lip, d, substantially as and for the purpose herein shown and described.

79,948.—HAYSTER CUTTER SHARPENER.—Edwin L. Bushnell, Poughkeepsie, N. Y.

I claim, as a new and improved article of manufacture, the rhomboidal shaped cutter sharpener, substantially as described, and for the purposes set forth.

79,949.—FORCE PUMP FOR HYDRAULIC PRESS.—W. P. Callahan, Dayton, Ohio.

I claim, 1st, The combination of the pumps, as shown, with check blocks and valves, arranged to operate in connection with hydraulic presses, substantially in the manner set forth.

2d, The pump, F, in combination with the pumps, D and E, the stop valve, J, and the check valves, P, substantially as and for the purposes described.

79,950.—DOUBLE ACTING HINGE.—James H. Carkeet, Montgomery, Ala.

I claim the pivoted arm, h, provided with two clutches, J, J, so arranged that either one side or the other of the hinge may be clamped, while the opposite side is free to operate, thus allowing the door or shutter to swing in or out as may be desired, substantially as described.

79,951.—INSULATOR.—A. H. Castle, Ann Arbor, Mich.

I claim the insulated bracket, A, with a core, E, formed solidly with said bracket, the angular traverser notch, H, by which the hook is covered by the projections, C, D, in the manner and for the purposes specified.

79,952.—ELEVATED RAILWAY.—Robert A. Chesebrough, New York City.

I claim an elevated railway, composed of inclined planes or sections, arranged substantially as described, in combination with elevating platforms at the junctions of the sections, and operated by stationary motive power to establish continuity of the sections, as herein set forth.

79,953.—LUGGAGE SUPPORTER FOR SADDLES.—William Chine, Boston, Mass.

I claim, in combination with a saddle, an adjustable supporting arm, substantially as and for the purpose set forth.

79,954.—ORE CRUSHER, GRINDER, AND AMALGAMATOR.—John A. Collins, Virginia City, Nevada.

I claim, 1st, The combination and arrangement of the cylinders, C, crushing wheels, D, axle, and central plate, F, with arms projecting downward, and supporting said axle, substantially as described.

2d, The combination and arrangement of the driving plate, G, on the shaft, H, the friction rollers, N, on the arms of the revolving plate, L, and the stationary plate, K, above it, substantially as described.

3d, The combination and arrangement of larger rollers, S, with smaller, S', within the cylinders, C, the former rolling upon the latter and upon the cylinder, but the latter or smaller rubbing and grinding against the cylinder, as described.

79,955.—BLEACHING APPARATUS.—Elizabeth A. Combs, Monroe, Wis.

I claim the fire pot or furnace, D, in combination with the box described, all constructed substantially as and for the purposes specified.

79,956.—CULTIVATOR.—George W. Cook, Macon, Ill.

I claim the connecting of the standards, F F, of the plow beams, E E, by cross bars, c, c, as shown, in combination with the crank shafts, I I, chains, d, pulleys, J, and treadles, H H, all arranged and applied to uncultivated frame, A, substantially as and for the purposes set forth.

79,957.—TOOTHED WHEEL.—John Cowell, Ansonia, Conn.

I claim, 1st, The combination of a detachable tooth with the corresponding mortises in the rim of the wheel, when constructed with a recess in one face of the tooth, so as to lock on to the corresponding face of the mortise, and secured by the key, d, substantially as set forth.

2d, The combination of the plate, C, and its set screw, f, with the key or keys, d, so as to secure the keys, substantially in the manner herein set forth.

79,958.—LAMP CHIMNEY.—Robert R. Crosby, Boston, Mass.

I claim the abrupt or nearly right angled enlargement of the chimney, as represented in fig. 3, arranged in relation to the lamp burner, substantially as and for the purposes herein specified.

79,959.—PUMP.—Rufus W. Crouse, Westminster, Md.

I claim the combination and arrangement of the cylinder, A, plunger, D, induction, I, and eduction, E, when connected by the apertures, C, C1, C2, C3, and the passages, F F', provided with the valves, c, c' c' c', all the said parts being constructed, arranged, and operating together, substantially in the manner and for the purposes set forth.

79,960.—FIRE PLUG.—James P. Cummings, Newport, Ky.

I claim, 1st, The stuffing box, guide, and stop, k, in combination with the block, n, and rod, g, substantially as described.

2d, The stop, d, and waste hole, e, formed in one of the legs of the valve in the manner and for the purposes set forth.

3d, The combination of the valve, f, with the waste hole, e, in the stock, and the valve seat, b, to operate in the manner and for the purpose specified.

4d, The stuffing box, guide, and stop, k, and block, n, as arranged in relation to the valve, c, substantially as described.

79,961.—CORN SHELLER.—Milton Day, Baltimore, Md.

I claim the combination, in a corn sheller, of two palms, B, H, each having three or more fingers or tines, b, b, to embrace the cob, with the springs, C, C, and flanks, d, d, when the latter are permanently secured to the rim, all constructed and arranged substantially as described, and for the purposes specified.

79,962.—CORN SHELLER.—Milton Day, Baltimore, Md.

I claim a corn sheller, having a series of palms, B, B, each having feeding threads, f, f, on their inside, when the same are so arranged that they afford protecting tines, b, b, to receive the cob, and are in combination with the fingers and springs, C, C, and the whole are made to operate substantially as described.

79,963.—POCKET SIGNAL DEVICE.—J. J. Detwiller, Greenville, N. J.

I claim 1st, A metallic signal cap, A1, grooved spirally for attachment to a stick or support cup as and for the purpose set forth.

2d, The combination of two or more cups, A1 A2 A3, tapered and grooved as herein described, to make them relatively interchangeable, for the purpose specified.

3d, The spiral socket, C', constructed and adapted to receive and hold the cups, A1, as and for the purpose set forth.

79,964.—SAW-SET.—Isaac Estell, St. Lewis, Mich.

I claim the arrangement of the slotted bottom plate, A, arm, H, screws, I and G, and the saw, D, constructed as described, and operating substantially as and for the purposes herein set forth.

79,965.—TAPE MEASURE.—A. J. Fellows, New Haven, Conn.

I claim the combination of the case, A, with the plate, b', click spring, d, d', and the arm, e, and knob, f, when the whole is constructed, arranged and fitted for use, substantially as herein described.

79,966.—STEAK MASHER.—Richard Flynn, West Brookfield, Mass.

I claim the employment in a steak-mashing machine, of the rolls, A, A, the teeth of which are arranged so as to form a continuous spiral from one end to the other, and which rolls being geared together so as to rotate in opposite directions, while their spirals run in the same direction, as shown and set forth.

79,967.—DISCHARGING APPARATUS FOR HARVESTER.—J. S. Fowler, Dayton, Ohio.

I claim, 1st, The slatted gates, G G G, constructed and operating substantially as and for the purposes set forth.

2d, In combination with the slatted gates, G G G, the rack, H, sliding bar, K, and levers, F and I, constructed and operating substantially as specified.

79,968.—WATCH.—M. N. Frederick (assignor to himself and C. S. Mosely), Elgin, Ill.

I claim, 1st, The stud or post, B, having a bearing through the plate, C, and box, D, thereby holding the drive-wheel, A, firm and steady, substantially as described.

2d, In combination with the stud or post, B, and drive wheel, A, the screw, T, constructed substantially as described.

3d, The double wheel, E, in combination with the wheels, A, J, and the vibratory bar, E, provided with spindles, b, arranged to operate substantially as specified, and for the purposes set forth.

4th, The spur wheel, H, in combination with the box, D, and post plate, C, when arranged so that the bearing of the spur wheel is partly in the box and partly in the plate, substantially as set forth.

5th, The plate, E, and toothed wheel, L, with the wheel, L, and main-spring arbor when arranged substantially as specified.

79,969.—LAMP BURNER.—F. H. Fuller, South Boston, Mass.

I claim, 1st, The wick tube, D, made in two sections, when the upper section is fitted over the lower, and the lower section is provided with the parts of the burner for facilitating its use, as herein set forth.

2d, The lamp burner, constructed as described, and consisting of the perforated conical ring, B, and cap, A, supported on stands, C, projecting from the upper section of the wick tube, and the conical perforated disk, F, rim, E, and part, G, attached to the lower section of the wick tube, all arranged as herein shown and described, for the purposes specified.

79,970.—APPARATUS FOR DECORATING AND CLEANING CEREALS.—William Walker Gibson, Edinburgh, North Britain.

I claim the employment of a revolving drum for decorating cereals, upon the surface or periphery of which strips or blades of glass, porcelain, or like material are fixed and arranged, substantially in the manner shown and set forth.

79,971.—SCREW THREADING MACHINE.—Ezra Gould, Newark, N. J.

I claim, 1st, The arrangement, herein described, of the driving wheel, F, concentric spindles, G C, and sections, a, b, for the purpose set forth.

2d, The combination of the lever, K, and slide, L, secured one to the other, by a pivot, h, which moves in a slot, I, with the lever jaw, m, frame, A, and head block, J, all constructed, arranged, and operating substantially as and for the purpose described.

79,972.—ELECTRO-MAGNETIC TEMPERATURE ALARM.—John H. Guest, Brooklyn, N. Y.

I claim, 1st, The spring axis, on which the armature swings, in combination with the hammer and bell, as and for the purposes set forth.

2d, The spring circuit breaker, i, and adjusting screw, a, provided with a head or button, in combination with the armature and spring axis, b, for the purposes and as set forth.

3d, The alarm thermometer, formed with the horizontal circuit closer and its adjusting arm, in combination with the case enclosing the adjustable parts as set forth.

79,973.—ELECTRO-MAGNETIC BELL AND FIRE ALARM.—John H. Guest, Brooklyn, N. Y.

I claim, 1st, A pair of magnets and armatures, arranged and acting in the manner specified, in combination with a hammer and bell, the former being attached to the lever of the armature, for the purposes and as set forth.

2d, An expansive corrugated disk and hinged arm, forming a thermal circuit closer, substantially as set forth.

3d, The adjusting screw, T, in combination with the thermal circuit closer, as and for the purposes set forth.

4th, The pendulum and spring, in combination with the circuit wires and notched disk or slide, to close the circuit as specified.

5th, The two springs, 12 H, connected with the circuit wires, in combination with the pusher, q, for the purposes and as set forth.

6th, The plate, r, screw ends, a, and nuts, t, constructed substantially as specified, in combination with the circuit wires, to form a designating or disconnecting apparatus in a fire or burglar alarm, substantially as set forth.

79,974.—FOOL HOLDER.—Jacob W. Haskell, Boston, Mass.

I claim the combination of the tube, e, bearing the mortise headed bolt, d, with half boxes, h, h, when the tube and boxes are connected with a feather

and a spline, and are otherwise arranged, substantially as and for the purposes set forth.

79,975.—FEATHER RENOVATOR.—Charles E. Hendrick, Chicopee, Mass.

I claim, 1st, Three or more valves, D D D, rod, E, nut, N, in combination with the receiver, C, the whole arranged and operating substantially in the manner herein shown and described for the purposes set forth.

2d, The swinging valve, D, with the spiral spring, t, substantially as described, and for the purposes set forth.

79,976.—MACHINE FOR SHAVING RATTAN.—Levi Heywood, Gardner, Mass.

I claim the arrangement of the knife, M, constructed and operated substantially as described.

Also, the arrangement of the knives, d, in combination with the presser rolls, 11", and operating screw, B, all constructed and operating substantially as set forth and for the purpose stated.

79,977.—BREAST STRAP.—A. L. Hill, Decatur, Ill.

I claim, 1st, The breast strap, constructed as described, and consisting of the strap, C, to which the plate, D, having ribs, d, is rigidly secured, when said strap is provided at each end with a hook, B, B, all arranged and operating as and for the purpose described.

2d, The ribs, d, on the exterior surface of the bar, D, when used in combination with the strap, and applied to the strap or straps, C, for the purpose substantially as set forth.

79,978.—TRACE BUCKLE.—Henry Hise, Chicago, Ill.

I claim, 1st, The combination of the plate, B, provided with one or more inclines, a, with a clasp, C, arranged and operating substantially as set forth, and for the purposes specified.

2d, A plate, B, when constructed so as to be secured upon a trace, and provided with one or more inclines, a, in the manner described.

79,979.—SAW HANDLE.—Charles W. Hubbard, Pittsburg, Pa.

I claim a new article of manufacture, to wit, a saw handle, consisting of the part, J, provided with a recess, f, for the nut of the bolt, B, and with a groove adapted to the end of the saw blade, said handle and its part, J, being made substantially in the form herein described and represented.

79,980.—MACHINE FOR GRINDING SAWS.—Charles W. Hubbard, Pittsburg, Pa.

I claim, 1st, Providing a saw grinding machine with an unjointed thin metallic belt or endless apron, substantially as herein described and for the purpose set forth.

2d, Providing the bearing roller, A', so that it can be deflected to correspond to the desired taper of the saw blade, substantially as herein described and for the purpose set forth.

3d, Providing the shaft of a grinders with a flange provided with a socket joint, substantially as herein described and for the purpose set forth.

79,981.—CATCH FOR MONEY DRAWERS.—Saunders Hubbell, Jr., West Salem, Ohio.

I claim the combination and arrangement of the levers, A and B, the fulcrum support, C, and spring, m, or its equivalent, in the manner substantially as described, and for the purposes specified.

79,982.—CAR COUPLING.—Frederick A. Hull, Belvidere, Ill.

I claim the combination and arrangement of the tubular draught iron, B, the bars, D, E, the spring, S, and the link, I, and pin, b, arranged and operating substantially as specified and shown.

79,983.—NEEDLE FOR SEWING MACHINE.—George M. Isbell, Farmington, Conn. Antedated July 3, 1868.

I claim, 1st, A sewing machine needle, as specified, with the flattened body, the circular edge to the hook, the longitudinal opening in the hook, and the curvature or swell at the back of the hook, as and for the purposes set forth.

79,984.—ATTACHMENT FOR BALANCING POLISHING WHEELS.—Horace K. Jones, Kensington, Conn.

I claim the combination of the ring, A, and weights, a, constructed and arranged as herein described, with a polishing wheel, for the purpose of balancing it, substantially as specified.

79,985.—SPIRAL OR WINDING STAIRS.—William J. Keim, New York City.

I claim an arrangement of winding steps, constructed in such a manner as to give two or more flights within the same space, substantially as described.

79,986.—BELT SHIPPER FOR LOOMS.—L. J. Knowles, Warren, Mass.

I claim, 1st, The combination, with the shipping lever, D, applied to one end of the shipping rod, C, of the inclined guide rod, c, substantially as and for the purposes set forth.

2d, The combination, with the shipping lever, and slotted and notched guide piece in which it moves, of the dog and ears for actuating said lever, and the rotating and longitudinally sliding rod upon which the same are mounted, together with the spring, f, and lever, D, the said parts being arranged for joint operation, as herein specified, so that the movement of the lever, D, shall cause the shipping lever to be drawn in either direction, as required.

79,987.—ANIMAL AND BIRD TRAP.—A. T. Latta, Camden, S. C.

I claim, 1st, The weighted and pivoted door, c, cord, d, pulley, c, platform, a, and catch, f, all constructed as described, and combined and operated in the manner set forth.

2d, In combination with the above, barrel, g, arm, h, bent lever and catch, f, the whole being operated in the manner and for the purpose set forth.

79,988.—PRINTERS' GALLEY.—Charles H. Lawrence, New York, assignor to himself and N. P. Tyler, Barrytown, N. Y.

I claim the lining, c, having the metal tongue, b, in combination with the frame, a, bottom, d, and screw, e, applied in the manner and for the purpose substantially as herein shown and described.

79,989.—GAS HEATER.—H. Y. Lazear, New York City.

I claim, 1st, The Y-shaped trough, E, and the flange, E', by which the flame is divided, and the grease protected from burning and smoke thereby prevented, substantially as described, in combination with a gas steak broiler.

2d, The annual space, B, and the orifices, h and i, substantially as and for the purposes set forth.

3d, An apparatus for broiling steak by gas, whereby the steak is broiled or cooked simultaneously on both sides, or where the sides are equally exposed to the flame and heat, substantially as shown and described.

79,990.—MACHINE FOR DRESSING GRINDSTONES, MINERALS, &c.—Philip Leonard, Sharon, Pa.

I claim the adjustable frame, B, fitted in a frame, A, as shown, in combination with the sliding frame, C, provided with the tool stock, C', arranged for a lateral movement, substantially as and for the purpose set forth.

79,991.—TRUSS PAD.—Thomas J. Lindley, Medora, Ind.

I claim the wooden pressure pad, B, having an inserted lead centre, C, and attached to the strap, A, all arranged substantially as and for the purpose set forth.

79,992.—STOVE PIPE.—James C. Loup, Galveston, Ind.

I claim the sliding pipe, B, for making connection of stove pipes to the flue and shutter, H, for closing the aperture in the roof when the pipe is not in use below the roof, as described.

79,993.—GRAIN SEPARATOR.—Elijah Lucas, Winslow, Ind.

I claim, 1st, The polygonal shaped wire sieve, B, provided with shafts, d, d, metal strips, e, e, and wires, i, i, constructed and operating substantially as and for the purposes herein set forth.

2d, The reversible chute, F, in combination with the rod, f, and the lever, G, substantially as and for the purposes herein set forth.

79,994.—PORTABLE CHAMBER CLOSET.—William J. Lyman, East Hampton, Mass.

I claim the arrangement and combination, with each other, of the box, A, cover, B, seat, C, platform, E, vessel, F, additional seat, H, and receptacles, I, all made and operating substantially as herein shown and described.

79,995.—CHAFING ROLLER FOR WAGON.—James M. Mayhew, Providence, R. I.

I claim the construction of the chafing roller, C, upon the longitudinal rod, a, having its bearings in the ends, C', of the side pieces, A, which are recessed to receive the elastic cushions, e, e, bearing against the ends of said roller, all constructed and described for the purpose specified.

79,996.—SHACKLE BEARER.—John W. Mayhew, San Francisco, Cal.

I claim the manner of supporting and bracing the bearer ring, A, by means of the back brace, C, formed and shaped as herein described, and secured to the tread of the shoe in the manner set forth, in combination with the side braces, D, of the particular shape and construction described, having fork shaped ends.

79,997.—HORSE COLLAR STUFFING MACHINE.—S. B. McCorkle, Greenville, Tenn.

I claim, 1st, A machine for stuffing horse collars, so constructed and operating that as the plunger enters the collars, its forks, a, will have its prongs in a horizontal plane, for the purpose described.

2d, A machine for stuffing horse collars, so constructed and operating that the plunger partially rotates as it moves back and forth, in order that its prongs, a, may lie in a vertical plane as it catches the straw, and in a horizontal plane as it delivers the straw into the collar, substantially as described.

3d, The combination of the plunger, A, having the fork, a, with the arm, e, and bent guide rod, H, when the several parts are constructed to operate in the manner described.

79,998.—DOUBLE CORN PLANTER.—William McLucas, Reinholds, Ohio.

I claim, 1st, The tube, H, when the same is constructed with angular openings and supplied with a plug, h, in such manner that the same can be actuated by the driving wheel, D', or controlled by the upright lever or needle, h'.

2d, The foot lever, G', when in combination with suitable mechanism, and the universal casters, f, f', when the same is so constructed and arranged substantially as described and for the purpose specified.

79,999.—TIRE FRAME ATTACHMENT.—N. H. Mead, Waterport, N. Y.

I claim the combination of the pivoted lever, C, adjustable toothed bar, E, slotted cap plate, F, and toothed bar, G, with each other and with the frame, A, substantially as herein shown and described, and for the purpose set forth.

80,000.—WASHING MACHINE.—Cyrus Miller, Des Moines, Iowa.

I claim the box, A, cylinder, D, and adjustable board, E, when said cylinder is provided with a series of corrugated states and brushes, as described, and the board, E, with corresponding brushes, to operate substantially as set forth.

80,001.—CHURN MOTION.—David Morris, Bartlett, Ohio.

I claim the frame, consisting of the upright, A, foot, B, and screw threaded stem, a, the latter serving the double purpose of a guide for the dasher shaft means of attachment of the frame to the lid of the churn vessel, in combination with the screw and nut, c, slides, g, g', pitman, F, and dasher shaft, i, the whole arranged and operating in the manner and for the purpose specified.

80,002.—HORSE HAY FORK.—C. E. Murray, Sugar Valley, Pa.

I claim the frame, composed of the diverging prongs, a, a, and head, b, in

3,095 and 3,096.—CENTER PIECE.—Henry Berger New York city. Two Patents.

3,097.—IMITATION BRAID FOR BONNETS.—S. A. Blake, Milford Conn.

3,098.—CLOCK CASE.—Paschal Converse, New Haven, Conn.

3,099.—PARLOR STOVE.—J. B. Geyser (assignor to Mitchell, Stevenson & Co.), Pittsburgh, Pa.

3,100.—BOTTLE.—John Hart, Lancaster, Pa.

3,101.—FLOOR OILCLOTH PATTERN.—R. Hoskin, Brooklyn, assignor to E. C. Sampson, New York city.

3,102.—TRADE MARK.—D. D. Mallory, Baltimore, Md.

3,103.—ARMY AND NAVY EMBLEM.—John P. Reynolds, Salem, Mass.

3,104.—CARPET PATTERN.—R. R. Campbell (assignor to Lowell Manufacturing Company), Lowell, Mass.

3,105 to 3,107.—STOCKING FABRIC.—T. Dolan, Philadelphia Pa. Three Patents.

3,108.—KNIFE HANDLE.—R. H. Fisher, Beaver Falls, Pa.

3,109.—FIGURE.—Carl Muller (assignor to Nicholas Muller), New York city.

3,110.—FORK OR SPOON HANDLE CALLED "BRIDAL."—Geo. Wilkinon (assignor to Gorham Manufacturing Company), Providence, R. I.

3,111.—KNIFE OR FORK HANDLE CALLED "IVY."—George Wilkinon (assignor to Gorham Manufacturing Company), Providence, R. I.

3,112.—KNIFE OR FORK HANDLE CALLED "ELIZABETHIAN."—Geo. Wilkinon (assignor to Gorham Manufacturing Company), Providence, R. I.

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1,588.—APPARATUS FOR MARKING OR DIRECTING BOXES AND PARCELS.—
Wm. W. Beecroft, New York city. May 14, 1887.

1,589.—EMBROIDERING APPARATUS FOR SEWING MACHINES.—Singer Manu-
facturing Company, New York city. June 10, 1888.

1,912.—CEMENT.—Chas. D. Peaseley, Hildeford, Me. June 11, 1868.

1,918.—GOVERNORS FOR STEAM AND OTHER ENGINES.—D. la Forest Chase,
Boston, Mass.—June 12, 1888.

1,920.—TREATING QUARTZ AND SILICIOUS SUBSTANCES TO OBTAIN HYDRATE
OF SILICA, AND APPLYING THE SAME.—A. L. Henry, Boston, Mass. June
12, 1868.

1,928.—ANCHOR.—F. Wittram, San Francisco, Cal. June 12, 1868.

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Vol. XIX.—No. 6.
[NEW SERIES.]

NEW YORK, AUGUST 5, 1868.

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Improved Portable Railway.

The main principles upon which depend the movements of all wheeled vehicles are the same, whether like the locomotive and wheelbarrow the wheel is secured to the axle, or runs freely upon it as in other vehicles; the rotation of the wheels takes the carriage forward. But in the device illustrated in the accompanying engravings everything is re-

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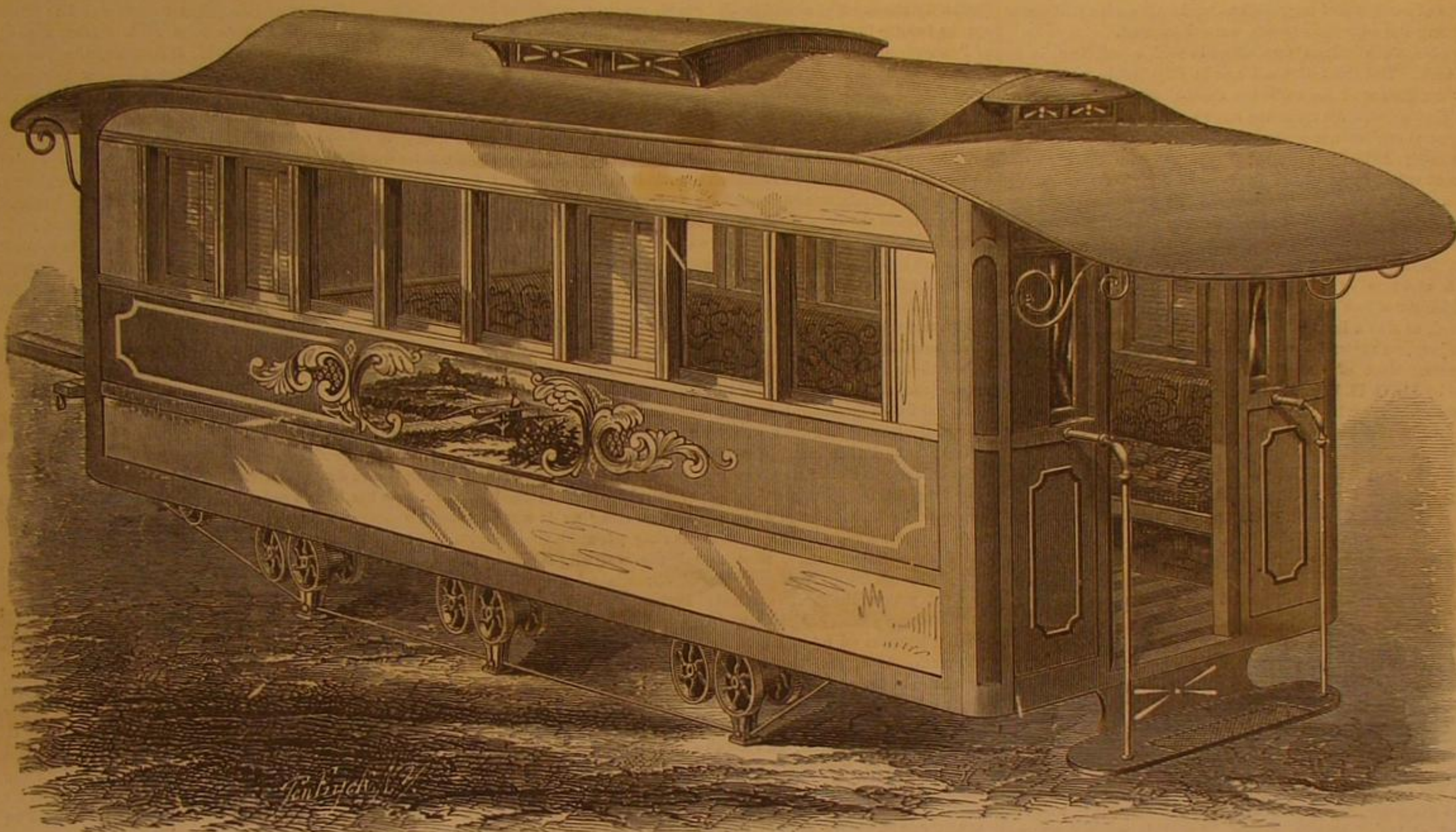
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Patented through the Scientific American Patent Agency, Oct. 22, 1867; an other patent is pending on improvements. All communications for information, etc., to be sent to J. K. Glenn, 141 Broadway, New York city. Foreign patents are already secured.

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GLENN'S PATENT DEVICE FOR THE PROPULSION OF LAND VEHICLES AND FOR VESSELS.

versed; the carriage moves forward on its wheels, the latter turning against the carriage instead of against the ground. The contrivance is very simple and quite unique.

The principal engraving represents a perspective view of a street car built on this plan; it has a very strong frame and is really elegant in form. The sides of the frame are of parallel rails meeting at the ends in a curve, so that the form of the continuous rail is a flattened oval. The rail, A, which is of a double angle section as seen in Fig. 2, is of steel and is firmly bolted to a rim of wood, B, thus making a side framing of unusual stiffness. To this the sides, roof, and floor may be secured in any manner desired. Running on this endless rail are a series of trucks placed at equal distances apart and connected by steel rods, C, Fig. 3, thus forming an endless chain. As those on each side of the car are separate from those on the other side, their action is independent; this is important in turning curves. The large wheels, D, have their peripheries in bearing with the outside of the rails, and are held in close contact by means of the small or keeper wheels, E. The frames of these trucks extend some distance beyond the outside rim of the wheels, D, and form a series of feet, F, which, as the trucks move over the rails or the rails and car are moved over them, come alternately to the ground and support the weight of the vehicle. The bottom of the feet may be made of any width to adapt them to the nature

will be the same. As the wheels revolve the carriage moves forward, each truck with its foot coming down from the top portion of the rail and seating itself on the ground in front of and under the vehicle, and it thus remains upright supporting the load until the body of the car or wagon has been

Fig. 2

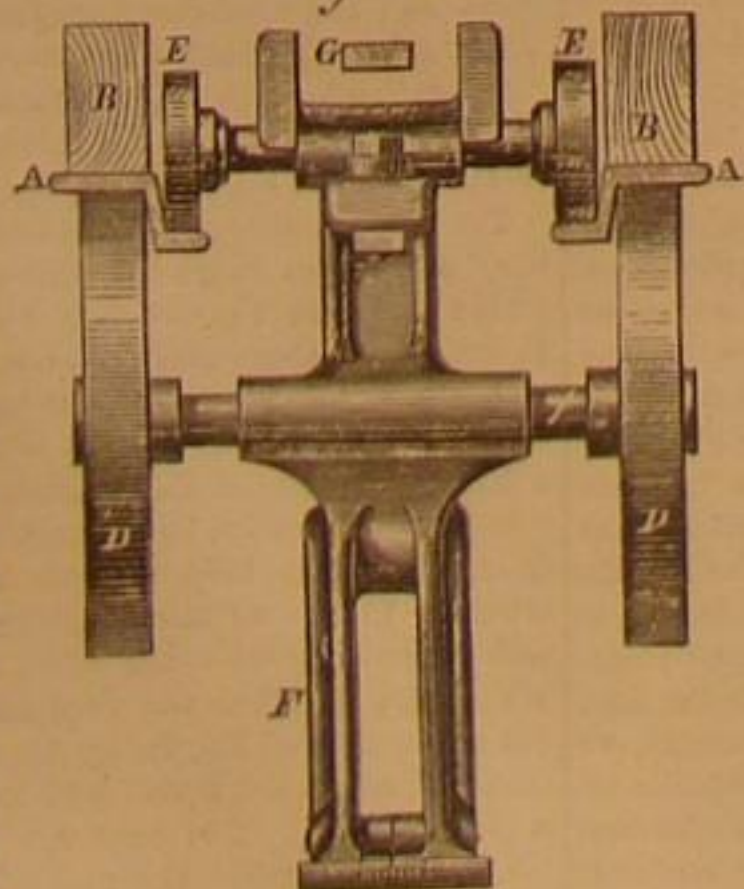
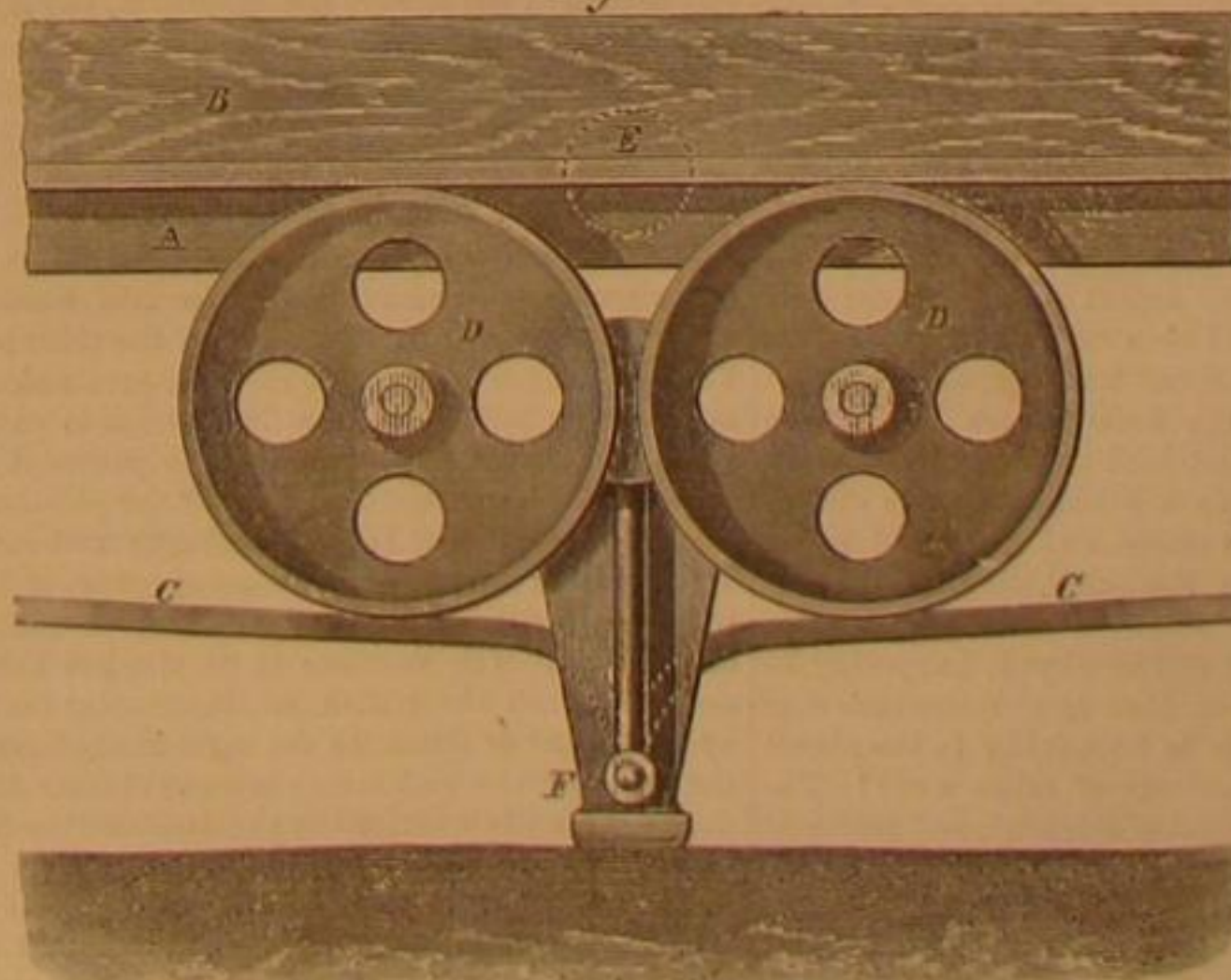


Fig. 3



borne over it, when it is taken up at the rear over the curve and goes forward over the top to repeat the movement.

For the purpose of turning curves the spindles upon which the wheels, D and E, revolve are made longer than the bearings so that the body of the carriage may slide or be steered to one side or the other. This steering is effected by means of guide rods—a section seen at G, Fig. 2—which when oper-

continued the use of petroleum oils for illumination and have returned to the dingy candles. We suggest to our inventive readers that they study up the subject of candles and try to produce something new in this line which shall yield a bright and steady light suitable for railroad purposes. Such a device is needed, and we believe it to be within the compass of invention.

SUNLIGHT AND MOONLIGHT.

The following interesting report of a lecture by Prof. Morton, at the Academy of Music, Philadelphia, we copy from our esteemed cotemporary, the *Philadelphia Photographer*:

Assuming that his hearers were acquainted with the general laws governing the emission and reflection of light, Prof. Morton proceeded to explain the difference between regular and diffused reflection, illustrating this point by an original and singularly pleasing experiment. A large mirror was set midway in the stage, facing the audience, who could see themselves reflected on its anode surface. Over this mirror, an assistant, at a signal, let fall a delicate white veil, when at once there appeared, as if just within the surface of the glass, a phantom-like figure, which was then seemingly wrapped up in the veil, as that was rolled together, and appeared to fall with the falling tissue, as it was dropped to the floor. The appearance of this experiment was most beautiful and excited much attention. The lecturer then explained the method of its arrangement, in which a lantern, with a glass photographic picture placed at one side, and throwing an image obliquely on the mirror, played of course, an important part.

Various illustrations projected on the screen, from photographs of statues and mirrors, and landscapes with still water reflecting the adjacent objects, were then used.

To give such things due effect in such a building, is no easy task. The front of the stage is fifty feet in width, and the most distant of the audience more than one hundred feet from that point. An immense screen and powerful illumination are therefore necessary. The screen employed was of wet muslin, forty feet square, lowered into its place at the moment when required. To cover and illuminate brilliantly such a surface (sixteen hundred square feet), no ordinary lantern would suffice, and, accordingly, Professor Morton has had one constructed by Mr. Zentmayer, with condensers eight inches in diameter, and of three-inch focus, with which pictures of corresponding size are used. Thus, an objective of low power may be employed and loss of light avoided, as also a larger ignited surface of lime utilized without injury, on account of the corresponding increase of size in all parts. Most of the pictures used on this occasion were made by Mr. O. H. Willard, photographer, who also operated the lantern, and whose skill was equally well illustrated by the pictures produced and the style of their projection. Some of the transparencies were, however, made by Mr. O. G. Mason, of New York, from Mr. Rutherford's negatives, and others again, by Mr. J. C. Browne, of Philadelphia, all gentlemen whose skill is well known to our readers.

After the illustrations of reflection above mentioned, came a series of moon photographs, intermixed with copies of lunar maps, and a number of admirable imaginary views of lunar scenery, from drawings prepared by Mr. James Hamilton, our eminent artist, who is so widely known by his marine pieces, and who can produce more apparent motion and commotion on canvas than any one living, we believe. These views were of the most impressive description, especially one of the lunar volcano, Copernicus, and its vicinity.

The direct lunar photographs by Mr. Rutherford, were also most effective. Thus, we beheld, to our great delight, a moon, round and full-orbed, as bright as the original luminary, but rolling on to the screen as a globe of thirty-five feet in diameter, her mountains and volcanic cones, and extended plains distinctly visible. And this was not a mere picture skilfully painted, but a veritable reflection of that orb. The moon's own face photographed by powerful lenses, and magnified by Mr. Rutherford, whose skill in this department is unrivaled.

The lecturer described and named the various plains, and peaks, and hilly ranges, as though he had just returned from an exploring expedition to these Rocky Mountain regions. We had the Ocean of Tempests, and Seas of Showers, of Serenity, of Vapors, and of Clouds (still called seas, though now known to be arid land wastes), defined and designated, while the heights of the peaks, the depths of valleys and volcanic craters, were indicated as clearly as those of any earthly elevations or depressions accessible to the foot of the surveyor.

The planet Mars appeared, not as a brilliant speck or point of light, but as a vast round silver shield, with the marks of seas and continents distinctly traced. Another photograph, taken an hour later, and lo! the aspect of the planet had altered. A great snow-storm had been sweeping over it. Its majestic mountains and plains had been draped in a winding sheet of frozen rain, and the dark wastes had become white, and the deep seas alone retained their original sombre hue. Think of a snow-storm in a distant planet, watched, and followed, and fixed on glass plates, and presented to an audience sitting comfortably in the opera-house of the city of Philadelphia.

The magnetic telegraph can tell us what is happening in distant parts of our globe, but here is a messenger who comes to us, and tells us what is happening in the planet Mars, more than thirty five millions of miles away! The storm signal is hoisted on the coast of England, and mariners know that a tempest is up and at work on the broad Atlantic, and may soon be looked for, howling along the chalk cliffs of the island, and thundering into its bays; but the telescope, and the photographer with his baths and plates, here reveal how a tornado of sleet and snow is sweeping across the plains and oceans of the planet Mars.

Attention was next directed to the sun. His spots were, by means of photographic art, shown to be gigantic rents made in the robe of fiery cloud masses which compass the orb; just as wild cyclones or great rotary storms might tear and rift the rain clouds which cover our sky, twisting them

round and making tempest circles, with radii of thousands of miles. The rotary motion of these sun-storms could be distinctly traced in the several photographs made at different periods of their progress, and the laws which regulated their motion investigated and determined.

To illustrate the effect of such a temperature as that shown to exist in the sun upon some familiar elements, and to explain why these should occur as vapor in his atmosphere, the lecturer placed himself with a powerful oxyhydrogen blow-pipe upon a platform secured to one of the stage straps, and was raised to a considerable height, from which point, by burning a thick rope of steel wire in the jet, he caused to pour down a broad sheet of scintillating sparks and minute globules of boiling iron, which spread over the floor and rolled toward the footlights with an effect never to be forgotten by one witnessing it.

The fixed stars as suns of other systems were next noticed, and in connection with some of the peculiarities which they exhibit, the subject of persistence of vision was introduced and illustrated by several beautiful experiments, among which the most remarkable was a large wheel, five feet in diameter, carrying six Geissler tubes of great size, through which, while in motion, flashes of electric light were passed from an induction coil, made by Mr. Ritchie, of Boston, (probably the most powerful in the world, having produced sparks twenty inches in length), belonging to the University of Pennsylvania. This apparatus produced the appearance of a star with countless colored, vibrating and ever-changing rays.

The final and perhaps most impressive experiment of the lecture was, however, that illustrating the composite character of white light and the difference between its effect as an illuminator and those of monochromatic light.

The drop curtain was lowered for a few moments, to allow of some scenic changes, and during this time the lecturer explained the subject in hand to the audience, and by aid of two large groups of chromatic burners, fed with spray of chemical solutions, produced lights of contrasting colors on opposite sides.

The curtain then rising displayed a brilliant palace scene, illuminated by several lime lights, judiciously placed. At a signal there then marched in a troupe of brilliantly costumed masks (consisting of students of the University, who had volunteered for the occasion), bearing banners with appropriate colored devices.

The effect of this march was most striking, the tramp of the advancing columns, the rushing flutter of the banners crowding the stage, and the blaze of gaudy colors in the bright white light, formed a spectacle as pleasing as it was novel and unexpected. The masks having grouped themselves around the stage, at a signal the white light was turned off, and from six large sets of chromatic burners a flood of yellow light was emitted. Instantly the brilliant array became a troupe of ghastly phantoms, clad in gray, and bearing banners with black and white devices.

The amount of yellow light was so great as to illuminate the entire house and reduce the audience to a concourse of sombre-clad spectres. The lights were then changed several times. This experiment was by far the most impressive thing we have ever seen, and by the precision with which everything was managed, reflects great credit on all concerned in its production.

MANUFACTURE OF MALLEABLE IRON IN SCOTLAND.

In No. 1, of the current volume, we gave a condensed account, from the *Ironmonger*, of Cast Iron Working in Scotland. We herewith give, from the same source, a description of the manufacture of malleable iron, as conducted in that country.

The conversion of pig-iron into malleable by the "puddling" process was commenced in Scotland about forty years ago, when a number of workmen from England and Wales were brought into Lanarkshire for the purpose of instructing the Scotch ironworkers. The first attempts, however, to establish this branch of trade, were not successful, and it was not until 1836 that it was fairly started. There are now nearly 400 puddling furnaces and 50 rolling mills in operation, which, in 1867, produced 143,000 tons of malleable iron, valued at £1,000,000.

THE PUDDLING PROCESS.

The places in which the process is carried on are nearly all constructed on the same plan. The mill consists of a vast roof supported on iron pillars, so that the sides are quite open. The puddling furnaces are built at intervals along one or two sides of the mill; and the floor, which is paved with iron plates, is crowded with machinery, a powerful steam-engine occupying the centre. The work of the puddlers is probably the severest kind of labor voluntarily undertaken by men. The puddling furnace is a compact structure of fire-brick cased in iron. It consists of three parts—the fireplace, the hearth, and the flue. The fireplace is on the left hand side, and is separated from the hearth, which occupies the central place, by a low wall or ridge. To the right of the hearth is the flue, the entrance to which slopes downward from the hearth, so that when a fire is lighted in the fireplace, the flame is drawn close over the hearth in its passage to the flue. Each furnace requires two men to work it. One of these is the puddler, who has all the responsibility, and the other his assistant, who performs the portions of the work in which only slight skill is required. The quantity of pig-iron operated upon at a time is about four hundredweight, and is called a charge. One charge is got out of the furnace every two hours, and the work goes on night and day, from one week's end to the other, Sunday excepted—the men taking the night and day shifts by turns. After a charge is withdrawn, the furnace undergoes some slight preparation before another is put in.

A coating of "bull dog"—a material prepared from the slag of the furnace—is laid upon the hearth, to fortify it against the intense heat. The pig iron, which has previously been broken into pieces of convenient size, is then thrown in, and the doors of the furnace are closed and sealed up with cinders. Intense heat is then generated. In about a quarter of an hour after the furnace has been sealed, the iron shows signs of melting, and an aperture in the hearth door about six inches square is opened. The puddler looks in at the opening, and determines whether it is time to disturb the iron. So soon as he sees the finer angles of the iron begin to melt, he thrusts in a stout rod of malleable iron, and moves the lumps of metal about, so that the entire mass may be equally heated. The puddler's assistant takes a turn at this part of the work; and during its progress the heat is occasionally moderated by means of the "damper," or by dashing small quantities of water upon the iron. At frequent intervals, the puddling bar is withdrawn and cooled by being dipped into water. The iron dissolves gradually on the hearth, and after a time begins to heave and bubble, innumerable jets of flame bursting forth all over its surface. The desired chemical change is now going on. The hot air from the furnace sweeps over the iron and carries off a great part of the carbon, sulphur, phosphorus, and silicon contained in the pig iron. Care must be taken to prevent the metal from becoming too fluid; and as soon as it attains a pasty consistency the heat is moderated. Meantime, the puddler uses his rod vigorously; and as the metal now begins to "dry," the labor of moving it about is increased. The metal at length seems to curdle and become granular. As it then ceases to give off carbonic oxide, the heat of the furnace is again raised, and the particles of metal begin to adhere together. From this point the chief puddler undertakes and completes the operation. As the metal agglutinates, it becomes very difficult to move. The puddler has to exert himself to the utmost; and he dare not relax his efforts for a single minute, else all the previous labor would be worse than lost. Though the perspiration trickles from his face and arms, and oozes through his scanty clothing, he must toil on. His eye is never removed from watching the contents of the furnace; and the expression of anxiety on his face indicates that the operation has reached a critical point. When the metal has attained a certain degree of consistency, the puddler divides it into five or six heaps. He then works each heap into a "ball" or "bloom." The door of the hearth is opened, and one after the other the balls are drawn out with a large pair of tongs and dragged over the floor to the "shingling" hammer. As the balls are drawn from the furnace they have a spongy appearance, and slag and other impurities trickle from them. The operation we have described occupies, on an average, about two hours, and the quantity of unrefined pig-iron required to make a ton of puddled iron may be stated at from 23 to 25 cwt.

SHINGLING AND ROLLING.

It is the puddler's duty to convey the "balls" from the furnace, and to place them one by one on the anvil of the "shingling" hammer. Before the invention of the steam hammer, a somewhat clumsy contrivance was used for squeezing the slag out of the puddled iron, and beating it into shape. Now the steam hammer is everywhere employed for that purpose. When a puddler lays a "ball" on the anvil, he waits to see the result of the first blow, and from it he is enabled to judge of the quality of his work. The "shingler" then steps forward and takes charge of the "ball." His feet and legs are encased in iron armour, his body is covered by a stout leather apron, and he wears a mask of the same material. One stroke of the hammer makes apparent the use for this warlike attire, for it sends out in every direction jets of liquid fire, which patter against the legs of the workmen, and would inflict fearful injuries were they to come in contact with the skin. The manipulation of the ball under the hammer is severe work, and requires great expertness. The "shingler" uses a pair of tongs about four feet in length, and with these seizes the ball and turns it on the anvil every time the hammer ascends. He so manages that it assumes the shape of a brick, and the operation occupies only two or three minutes. The "shingler" passes the metal, yet at white heat, to the "rollers," who pass it through a series of grooves in a pair of solid iron cylinders. By this means it is drawn into bars of the required size.

The iron produced by the above process is called "puddled bar," and it has to go through another operation before it is suited for even the commoner purposes of the blacksmith. In order to produce what is known in the trade as "common iron," the puddled bars are cut up into short lengths, and a number of these are laid in a heap of sufficient size to make a bar of any stated dimensions. They are then placed in a "re-heating furnace," and exposed to a free circulation of heat. In about half an hour the iron becomes heated to what is known as the welding point, and is then removed and passed through the cylinders as before. When the rolling is completed, the bars are taken away by boys, and cut to the desired length by means of a circular saw, which passes through the metal with astonishing rapidity and with a hideous noise. The bars are then straightened on an iron plate, stamped with the maker's name, and allowed to cool. From the moment the iron is taken out of the re-heating furnace until the bars are ready for the market, the utmost expedition is required on the part of the workman; and their operations, especially when witnessed at night, form one of the most interesting sights connected with the manufacture of iron. When a finer quality of iron is required, another welding and rolling are given to it. These repeated heatings, however, entail a considerable loss of material—equal, we believe, to eight or ten per cent for each heat. In making

the best quality of malleable iron, it is usual to refine the pig-iron before putting it into the puddling furnace. The refining is done in a furnace especially constructed for the purpose, and the process consists in fusing the iron with coke, and thus ridding it of a large proportion of its impurities.

Correspondence.

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

The Microscope.

MESSRS. EDITORS:—The microscope has revealed in nearly every department of science, much that before its invention and present high degree of perfection, was entirely concealed from the most careful observer. It has opened new fields of thought, has disclosed new truths, and has unlocked many of nature's mysteries. Its revelations of the character of the earth's crust, of the wonders of the vegetable kingdom, and of the marvelous structure of animal organisms are grand and imposing. Information so valuable should be rendered more popular and generally useful; and is it not important to consider the best means of accomplishing this desirable result, and of creating a taste and love for the investigation of nature by this valuable instrument? While the present mode of study, each individual pursuing his own investigations or giving individual instruction, is well adapted for the few it is not applicable to large classes. It is evident that could the microscopic representations be of such a character as to admit a simultaneous view by all present, their usefulness would be greatly enhanced.

What means are there, then, of exhibiting to audiences the results obtained by the microscope? Photography has recently come to the aid of the educator and has enabled him to faithfully represent many natural objects and phenomena. It has enabled the microscopist also, to a certain extent, to make his observations more public. The stereopticon, which has of late years become indispensable to the lecturer on scientific subjects, has developed a new use of photography as it has been made to enlarge the photographic views, and has adapted them directly to class illustration. It is an aid also to the microscopist, but as it mainly exhibits the external appearances, and the microscope reveals not only these, but the more minute and delicate internal structure, it is inadequate to faithfully show the full capabilities and manifold uses of this noble instrument.

Something more is needed. The earnest educator is not content to stop here but desires a more satisfactory arrangement to illustrate microscopic objects, something that will not only enlarge the views, but will enable an audience to see them simultaneously. Can not some of your numerous inventors devise an instrument to be attached to the stereopticon, to subserve this important purpose by projecting upon a screen a greatly magnified image of any transparent specimen which has been prepared for the microscope, in the same manner that the stereopticon exhibits the photograph.

Philadelphia, Pa.

Opaque Glue.

MESSRS. EDITORS:—I see, page 39, a recipe of a correspondent for making opaque glue, which is as injurious to the glue as the bone dust proposed for that purpose in a former number. Bone dust being gritty and not uniting with the glue, spoils it entirely. I find by analyzing a specimen of very white opaque glue of excellent quality, that the white substance is nothing but carbonate of lime very finely divided, probably introduced in the form of the so-called Paris white. I find in trying the mixture of this substance with glue, that it has two effects beneficial to the manufacturer: first, in giving a dark colored glue a lighter shade and thus presenting an appearance of a higher priced article, and second, in adding to the weight of the glue by the addition of a substance only about one tenth of its value. The beauty of this adulteration is that the sticking qualities—which are of course the only ones the consumer cares for—are not in the least deteriorated, but on the contrary seem improved.

P. H. VANDER WEYDE, M. D.

New York city.

Western Archaeology.

MESSRS. EDITORS:—Your reference in No. 1, current volume, to the researches of Dr. W. De Hass, in the rich mound field in Illinois demands a more lengthy notice. These explorations are the most important and extensive yet made in the West. They promise results of the utmost value to the science of archaeology. Dr. De Hass has prosecuted these researches with great zeal and industry. His present field of operation is one of the most extensive in the United States. It incloses several groups of mounds numbering in all over 200, arranged with system, care, and judgment. The mounds have been regarded by some scientific men as natural, but these investigations have determined beyond a doubt their artificial character.

The relics of art discovered are numerous and interesting, and embrace a great variety of stone implements, weapons, and ornaments. Among them are some of an agricultural type, unlike any similar implements discovered in this country or Europe. These prove that the original occupants of the fine alluvial opposite St. Louis were agricultural as well as hunters and fishermen. These implements, of which quite a number have been secured from mounds and other ancient depositories, and the adjacent plains, are of flint. Two types prevail, one from five to fifteen inches in length and three to

four inches in breadth; the other shaped like our domestic hoe. These are well and artistically made. The cutting edges of all show fine polish by attrition in the soil. One of them which I have examined is of a fine variety of quartz almost approaching chalcedony.

These early inhabitants of the West had attained great proficiency in working stone. The flint art also flourished in much perfection, among them. They manufactured a great variety of utensils. They were all hand-made and generally sun-dried.

The collection of relics from mounds made by Dr. De Hass, is very extensive, and is a valuable acquisition to the archaeological collections of this country.

Agricultural Machinery for South America.

MESSRS. EDITORS:—Our farmers in this part of the world are not satisfied with either the Sickle Cradle, Reaping machine, or Header; but they want a machine which will thrash, winnow, and bag the grain at one operation.

We have some of Mr. Fowler's agricultural machinery here; some of them are on the two engine arrangement, each having the power of self-propulsion. They move over the headlands one on either side of the land under operation; the plow being pulled alternately back and forth by the engines which are 14-horse power each. I am told there are similar machines used in Australia, but worked by horses. We want, in this case, a machine which can be worked by such engines as above mentioned.

I think no land could be imagined more suitable for the use of agricultural machinery than this country. The surface is slightly undulated with hardly a break to interrupt the rapid progress of the implement. The climate is also very favorable to produce abundant wheat crops. But the greatest advantage perhaps we have here is that the berry gets quite seasoned in the fields, so that it can go at once into the elevator without the risk of heating.

I presume that taking into consideration what has been said about our farmers, the engines, the machines in Australia, the climate, the formation of surface, and the seasoning of the berry, you will have a very clear idea of what we require here.

If you can inform me through your valuable paper or otherwise, of any similar machine already invented, or present the idea to your inventors for consideration, you would confer upon us here a favor and open a market for your manufacturers.

Rosario, Argentine Republic,
South America.

Boiler Foaming.

MESSRS. EDITORS:—Please find inclosed our subscription for renewal. We find your paper of invaluable service, and do not think we can too highly appreciate its known merits, containing, as it does, many valuable suggestions of no small importance to our business. We beg to lay before you one of our troubles, in the hope and belief you may aid us.

We have two boilers horizontally set, having each two fifteen-inch flues and connected by a steam cylinder or cross pipe about fifteen feet from the front of the boiler. From the center of this, or from a point over the space between the boilers, rises a pipe with a safety valve attached and a branch pipe leading steam to an engine cylinder twelve by twenty-four inches making eighty revolutions, placed eighty feet from the boiler, and having a very regular motion.

From the end of the cross pipe over the boilers leads a steam pipe of the same diameter as the other—two and a half inches, to a steam cylinder of the same dimensions, twelve by twenty-four inches—placed ninety feet from the boiler, and making one hundred and fifty revolutions per minute. The steam or leading pipe in both cases being boxed and packed with sawdust to prevent radiation of the heat and condensation of the steam.

These are the conditions; now for the facts. The first engine works water occasionally, three or four times a day; but stopping the engine will stop this trouble for some time; but the other—that at ninety feet distance—works water from the boilers in such quantities as to make the engine almost useless and this whether the water is high or low in the boilers. Water comes out freely from the exhaust pipe even when the lower gage barely shows water in the boiler, and water blows out also from the safety valve in large quantities even when the upper gage cocks are perfectly dry.

We have always used water from one source, an open well, the water of which is also used for drinking purposes; it appears to be clear spring water.

[From the statements given above we should judge that the water was changeable, as the overflow is intermittent. Another point for consideration is that the steam is taken off from the boiler at about over the first bridge wall, the hottest point, or where steam is made most rapidly; hence the water is carried up with the steam mechanically. If the cross connection or steam drum was placed immediately over the front end of the boiler or some eight feet further back than its present position, we think the condition of the steam would be improved and no water would be carried off with it. A float of wood or metal suspended in the boiler would probably be effectual in preventing foaming. It should be some two inches less in diameter than the diameter of the boiler at the water line. It should be secured by wires directly within the connections, the wires being of sufficient length to allow it to float on the surface of the water on the line of the lower gage cock.—EDS.]

How to get the Right Shape of the Moldboard of a Plow.

MESSRS. EDITORS:—Many years ago I used to run a cast-iron plow that "wouldn't scour" through the mucky soil of

our western prairies. I had to carry along a wooden paddle for cleaning off at the end of each furrow, and I found the moldboard encumbered with a coating of dirt varying in thickness, but assuming curvilinear concave and convex lines that were always the same in the same soil. The thought occurred to me, that if the plow had been shaped like this clod of dirt upon it, it would have scoured, and saved me the trouble of carrying the "spatula."

Let the plow maker make any kind of rough plow; take it to the kind of soil adapted to his market, and run a furrow; then mold his patterns from this, with the dirt on, and I think he will "get a fit."

Lyons, Iowa.

TRENTON, N. J., Box 136, July 20, 1868.

MESSRS. EDITORS:—I am a young, unmarried man, active, energetic, used to business, with good references, etc., and a cash capital of about \$10,000.

I would be glad of an opportunity to purchase whole or part interest in a really good thing. If, therefore, you ever give me a list of your patents, and such information as I may ask for, I shall be obliged to you, and shall be ready to make a fair offer, if anything suits. Yours, etc.,

WM. H. HIGGEE.

[The proprietors of this paper don't engage in the sale of patents, therefore the above writer cannot be accommodated at this office. We presume, however, that some one of our 35,000 subscribers has a patent he is willing to part with for ten thousand dollars.—EDS.]

How to Engineer a Claim through Congress.

The Washington correspondent of the Cincinnati Times says:

"Another widow lady has been pressing her claims before Congress, and has also been successful. Her name is Martha M. Jones, and she is the administratrix of Samuel J. Jones, her husband, who obtained a patent some years ago for an improvement in zinc paint, which patent his widow desires to have extended. She is possessed of indomitable perseverance, is good-looking, intelligent, and highly educated. She stated her own case to the House Committee on Patents, and the bill she was interested in passed the House and went to the Senate. She knew if it was not attended to quickly, it would go over to the next session, and perhaps might not be acted upon for a year or two. Consequently, on Wednesday afternoon, she took a position in the marble room, and sending her card to various Senators, succeeded in gaining an interview with each one, for as one would come out to converse with her she would request him to send out another, and in this way she stated her case to all personally. She was a lady of winning ways, and worked upon the susceptibilities of the grave and dignified Senators till she succeeded in gaining all in her favor except Senator Willey of West Virginia, who stoutly opposed the bill. He was alone in his glory, however, for when the vote came to be taken he was the only one opposed, while all the rest were in favor of the bill, which of course passed, and the lady went on her way rejoicing. In the course of the debate Senator Willey 'twitted' his fellow Senators for being captivated with the intelligence and vivacity of the lady who had so eloquently pleaded her own case, which little piece of sarcasm caused quite a laugh among the 'the grave and dignified' legislators, all of whom 'acknowledged the corn,' and Reverdy Johnson frankly admitted that he felt a great admiration for the lady. The most amusing part of the debate was Senator Willey's effort to prove inconsistency upon the lady in her statements before the Patent Committee, of which Willey is a member. In her written statement she set forth that her beloved husband, Samuel Jones, was deeply distressed in mind one night, and could not sleep. About midnight he jumped up, exclaiming, 'I have it! I've got it!' meaning he had solved the problem of his invention. She begged him to come to bed, but he walked the floor all night, and in the morning made a practical test of his invention, which succeeded even beyond his expectations. This was all very pretty, but Senator Willey insisted upon it there was a material discrepancy in the statement, inasmuch as the Samuel Jones aforesaid had applied for and obtained a patent in England for the same invention two years before this affecting incident occurred. It was no use talking, however, against the appeals of a good-looking and interesting widow; so the worthy senator had all the opposition to himself, and came off 'second best.'"

TELEGRAPH LINES.—In the report upon the Universal Exposition of Paris, prepared by M. Neumann, in the name of the Austrian Commission, it is shown that the telegraphic lines of the whole world have a total length of 47,235 geographical miles. There are in Europe 8,000 telegraph offices, and 4,000 in the other continents. No less than 1,300,000 hundred weights of metal have been used for the conducting wires, and the expenses of establishing all the lines are estimated at nearly \$42,000,000.

AURORA WORKS THE TELEGRAPH.—During the recent displays of the magnetic storm, or Aurora Borealis, which was an object of wonder and admiration, the telegraph operators at Valparaiso and Fort Wayne, Indiana, curious to test its effect in working telegraph lines, disconnected the batteries from the line and put in ground wires, when they got magnetism sufficient to work the instruments quite well, enabling them to communicate with each other.

THERE will be another concession of prices for dispatches over the Atlantic cable after the 1st of September. The rate will then be \$13 50 in gold for ten words between any part of Great Britain, and New England and New York.

THE AMERICAN CERVUS.

We are in receipt of a copy of an interesting paper read before the Ottawa Academy of Natural Sciences, May 21, 1868, by Hon. J. D. Caton, late Chief Justice of Illinois, upon the different species of Cervus in America. Dr. Caton remarks that "having had considerable facilities for the last six or eight years to make careful observations upon the common or Virginia deer and the Wapiti deer or elk, he has yet made but a beginning in the observations necessary to an exhaustive scientific comprehension of the subject. From this we may appreciate how great is the work to be done before the scientific world shall have accomplished the task of laying before mankind a full knowledge of the quadrupeds of America.

"The most approved work we now have on this subject is that by Audubon and Bachman. They accomplished, perhaps all they promised—that is, a classification of the quadrupeds, with a few anecdotes of the most important to amuse us. Wherever they have attempted to go beyond this, (at least in the cases of the two species named,) they have fallen into many errors, some of which, it will be necessary to notice and correct.

"The most marked difference in physiology between the deer and the elk is found in the coat or outer covering of hair. The deer, unlike most other animals, sheds its coat twice a year; and it is a little remarkable that Audubon and Bachman have neglected to mention this interesting characteristic, which is so well understood by every frontiersman, and must have been well known to them. In the spring, about the time other quadrupeds shed their winter coats, the common deer is divested of the costume of heavy, tubular hairs which has protected it through the winter season, which is succeeded by a thin, rufous colored coat, much firmer, shorter, and more solid than the one of which it has just been divested. As he parts with his winter coat, his fat also leaves him. He has less spirit and vivacity, is more solitary in his habits, and altogether seems to be in poor health. These characteristics are observed while he continues to wear his red coat, as it is called. This is not confined to either sex or any age, but is universal, as well with those which have been emasculated as to the perfect animal. It is not attributable to the parturition of the female or the growth of the horns of the male. It is observed equally with the wild deer of the forest and those partially domesticated in parks.

"The characteristics of the hair of the elk are almost identical with that of the deer, but the most striking distinction between the elk and the deer is the fact that while the latter has two coats a year, as already described, the former, like most other quadrupeds, has but one pelage. The fawn of the elk, however, which, when young, has a spotted coat, something like the fawn of the deer, though much less brilliant and beautiful, when about three months old, like the fawn of the deer, sheds this more ornamental coat, and takes on one of the hue which he is always after to wear, except that it grows a shade darker each year, until it is two or three years old.

"Until very recently the horns of the cervine group have been supposed to be distinguished from those of other ruminants by two striking characteristics: first, that the horn is perfectly solid; and second, that it is deciduous. It has been recently proved by Mr. A. D. Bartlett, superintendent of the Gardens of the Zoological Society of London, that we have in this country, an intermediate link between the solid horned and the hollow horned ruminants. This is the Prongbuck, or Rocky Mountain Antelope, of which I have hitherto been able to procure but one specimen for my parks, which I unfortunately lost after about six months, and before I had time to make those careful observations upon it which are necessary to a proper comprehension of the subject. This beautiful animal has long been known to have a hollow horn, but Mr. Bartlett, by observations upon the buck in the Society's gardens, discovered that the membrane between the shell of the horn and the core, at the proper season, commences to grow, lifting the shell from its seat, until finally it drops off, leaving the pith covered with a thick vascular membrane, coated with a coarse hair, not indeed at all resembling the soft, delicate velvet on the growing horn of the Cervus family, still precisely answering to it. This membrane continues to grow until finally it matures into a new and perfect shell, becoming divested of its coat of hair and vascular appearance. In London the horns were dropped on the 7th of November. Probably in their native wilds this operation is deferred until the spring, else the frosts of winter would destroy the new growing horn.

"From some cause, not yet thoroughly investigated, there is great diversity among the deer as to the time of shedding the horn, ranging from the first of December to the first of March. It is not so with the elk. They all shed during the month of April, or as soon as they are able to crop a little fresh vegetation, when the new horn immediately commences its growth, scarcely three days elapsing before it has made a suitable start. About the same time, also, the horn of the deer commences its growth. The description of the progress of the one will answer for that of the other, only the horn of the elk usually matures, so far as to disengage the velvet, a few weeks earlier than that of the deer.

In both species the first horn appears when they are about one year old, and usually the first horn is what is called a spike—that is, it has no prong or antler. In specimens which are dropped early in the season, the first horn attains a considerable size, and so far matures as to shed the velvet before winter sets in, and, in some cases, more commonly with the elk, a prong puts out, frequently four or five inches in length. Judge Caton states that the number of branches upon the horns of the deer are not an index to his age as has been

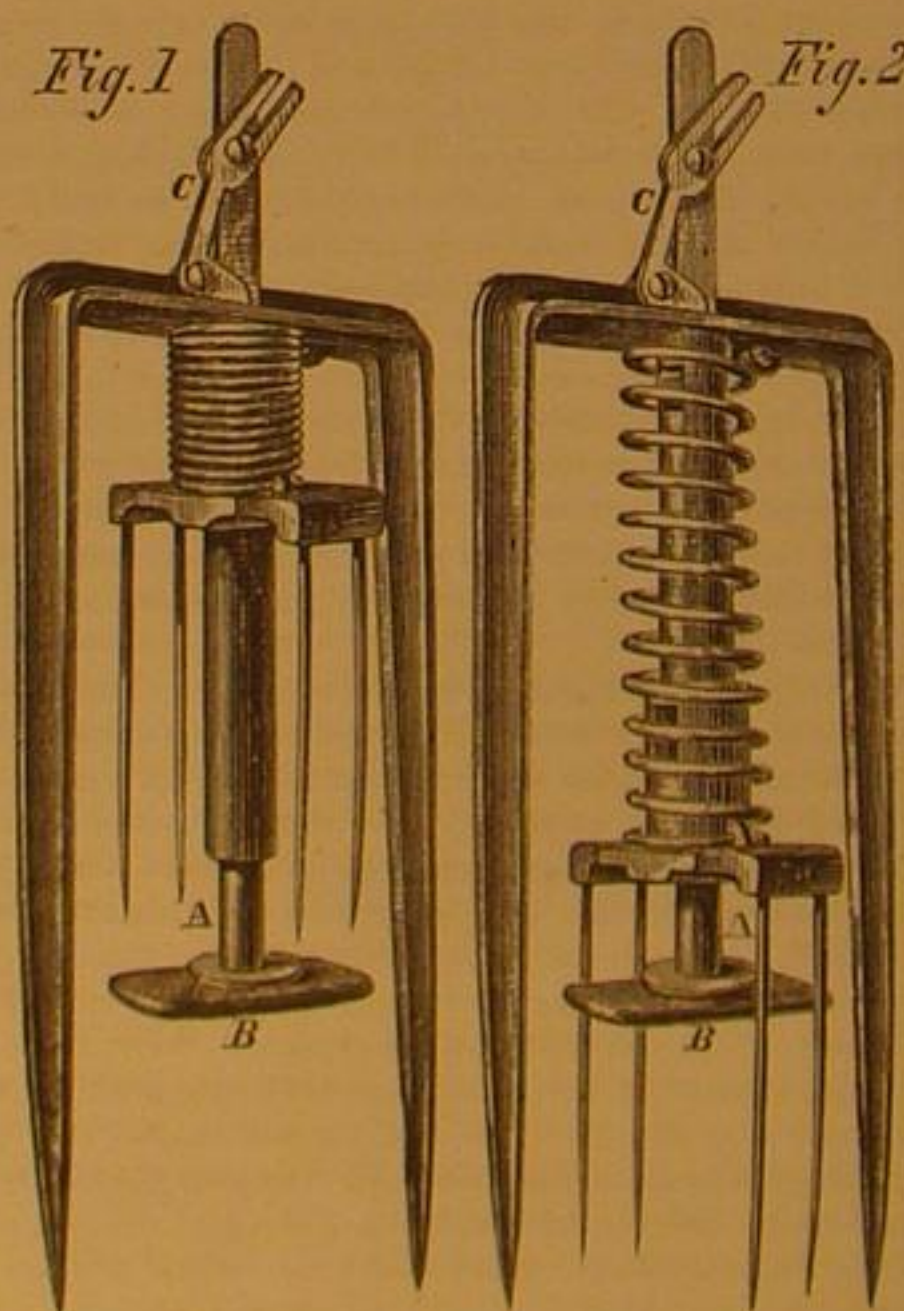
supposed. He also disputes the assertion of Audubon and Bachman, that the castration of a buck will preserve his horns for many years, and that when they are finally dropped there is no subsequent growth. On the contrary if the operation be performed on either species when the horn has become hard, whether immediately after the velvet is shed or in mid-winter, invariably the horns drop off within thirty days, and the seat of the horn remains naked till the following spring, when a new horn commences its growth at the same time that the growth of the horn commences on the perfect animal.

We have not space to notice in detail many other interesting facts contained in this paper. We will however add the remarks of Judge Caton in regard to the splendid elk which was presented by him to the Commissioners of the Central Park, New York, and which attracts such universal attention from visitors.

"When I presented him to the Commissioners his head was ornamented with two large protuberances two and a half inches in diameter, covered over with points, some of them nearly one inch long, while on one side two shafts projected nearly four inches long, and on the other was one not more than five inches long. What changes have taken place with this interesting specimen since, I do not know, but I am sure it would have been an interesting study for a naturalist to have watched them carefully. This specimen was exceedingly domestic, docile and playful, and was never happier than when two or three children were hanging about his neck, scratching his head or smoothing down his soft, glossy coat. He would never allow me to take a stroll by myself in the park. Yet he was ever a welcome companion; although, if I sat down in the deep shades of the glen to enjoy the silent solitude and the perfume of the wild flowers, he was soon searching my pockets for a bit of cake or a crust of bread, or a nubbin of corn. I have seen him but once since, and then at a distance, for the gentlemen in gray uniforms would not allow me to approach the fence for a near interview with my old pet, but he still remembered my voice at a distance of sixty feet, and came as near to me as the enclosure would allow. I know not if two years and a half of separation have destroyed his taste for human society. It is to be regretted that his fitness and manifest fondness for it could not have been more indulged than is probably practicable where he now is. It may be I did Billy a great wrong in sending him to the Metropolis, where his many excellences, I fear, have not been duly appreciated."

POLLEY'S PATENT MOLE TRAP.

It is a common belief among gardeners and farmers that the mole is destructive to seeds and the roots of growing plants, at least they claim with more show of truth, that his burrows admit water to the roots, which rots and destroys them. The inventor of the trap here shown believes he has secured a perfect preventive to the mole's devastations by the utter destruction of the animal.



It consists of a fork supporting between its tines the operative device; this is simply a fixed inner tube forming part of the cross bar of the fork, over which slides a shorter tube having a cross piece attached to its bottom containing a number of points or spikes for transfixing the animal. A spiral spring, bearing at one end on the cross piece and at the other against the inside of the cross bar of the fork actuates the cross piece with the sharp spikes, sending them down with great force, when the catch which holds them in a set position is disengaged.

Traversing in the inside tube is a stem, A, having at the bottom a rest, B, that remains on the surface of the mole ridge when the trap is set, as seen in Fig. 1. This stem extends up through the top of the trap where it is connected by a sliding pin with a slot in the angular catch, C, the lower end of which is held by a similar pin in the internal pipe, and pivoted to the cross piece of the fork.

In operation the forks are pressed into the ground on each side of the mole path, and the trap set, the rest, B, remaining on the upper surface of the path. A slight pressure of the

animal as he passes to or from his nest will disengage the catch and release the spring, when he will be impaled on the spikes.

Patented through the Scientific American Patent Agency, by C. Polley, May 19, 1868. Communications may be addressed to the inventor at Sinking Spring, Highland Co., Ohio, or to the manufacturers, Ball & Marlay, Hillsboro, Ohio.

The Age of Bronze.

Mr. Thomas W. Kingsmill, Sec. of the North China Branch of the Royal Asiatic Society, states that the use of bronze for cutting instruments still obtains in China and Japan. He says:

Without entering on the vexed question of whether or not there ever was a Bronze Age in any part of the world distinguished by the sole use of that metal, it is a fact that in those two countries, to the present day, in the midst of an Iron Age, bronze is in constant use for cutting instruments, either alone or in combination with steel. The principal seat of the manufacture is in the Canton province, where every schoolboy may be seen with a clasp knife made of a sort of bronze; case, spring, and blade being all made of this material. To form the cutting edge of these clasp knives, a thin piece of steel is let into the bronze blade; but knives made entirely of bronze, and occasionally ornamented and riveted with copper are not uncommon; I have met with them as far north as Shanghai. In Japan I have seen similar implements. But though the use of bronze in these countries has thus survived to the present day, there is abundant evidence that that at a former date it was much more prevalent. Thus up to the Han dynasty, about the Christian era, the ordinary coins of the country were made of brass or bronze, in imitation of knives and swords; showing, apparently, that in the earliest ages, when the use of some medium of exchange was found essential, the weapons in common use presented themselves as the readiest currency. The word in use by the Chinese for their copper, or rather bronze currency (the alloy being properly a mixture of copper, zinc, and tin), which is the only actual coin in circulation, is T'sien, a precisely similar sound to the verb "to cut;" the phonetic in the written character in both cases representing two spears. Nor is historical evidence of the prevalent use of an alloy of copper for weapons of war at an ancient date wanting. Thus Woo, the founder of the Chow dynasty, B.C. 1121, reviewed his army on the plain of Muh; in his left hand he is represented as carrying a weapon of yellow metal. Although Dr. Legge supposes this means ornamented with gold, the simpler interpretation seems the best. About the same time, among the precious articles displayed at the funeral of King Ching, we find red knives, and cloths ornamented with foo, explained in the "Ur-h-ya," a book of Confucian date, as denoting figures of axes, from the wooden handle being black when "compared with the glittering head and edge"—a comparison which seems unlikely to have suggested itself were the axes formed of iron or steel. In "The Tribute of Yu," however—a book to which a high antiquity cannot be denied, however we may differ about its authenticity—we have a glimpse at a still earlier stage of civilization; but it is strange that here, as well as at the present time, no material seems to have been in exclusive use. Among the articles of tribute from the several provinces, we find constant mention of stone arrow-heads and other implements, of the three grades of metals supposed, with good reason, to be gold, silver, and copper, and, in one place, of iron and steel. I have once or twice seen in China socketed bronze weapons, like the Celts' of Europe, stated to be very ancient, but have only succeeded in obtaining one as yet. I have seen no stone axes, though possibly the present scepter of official authority derives its traditional shape from the Stone Age.

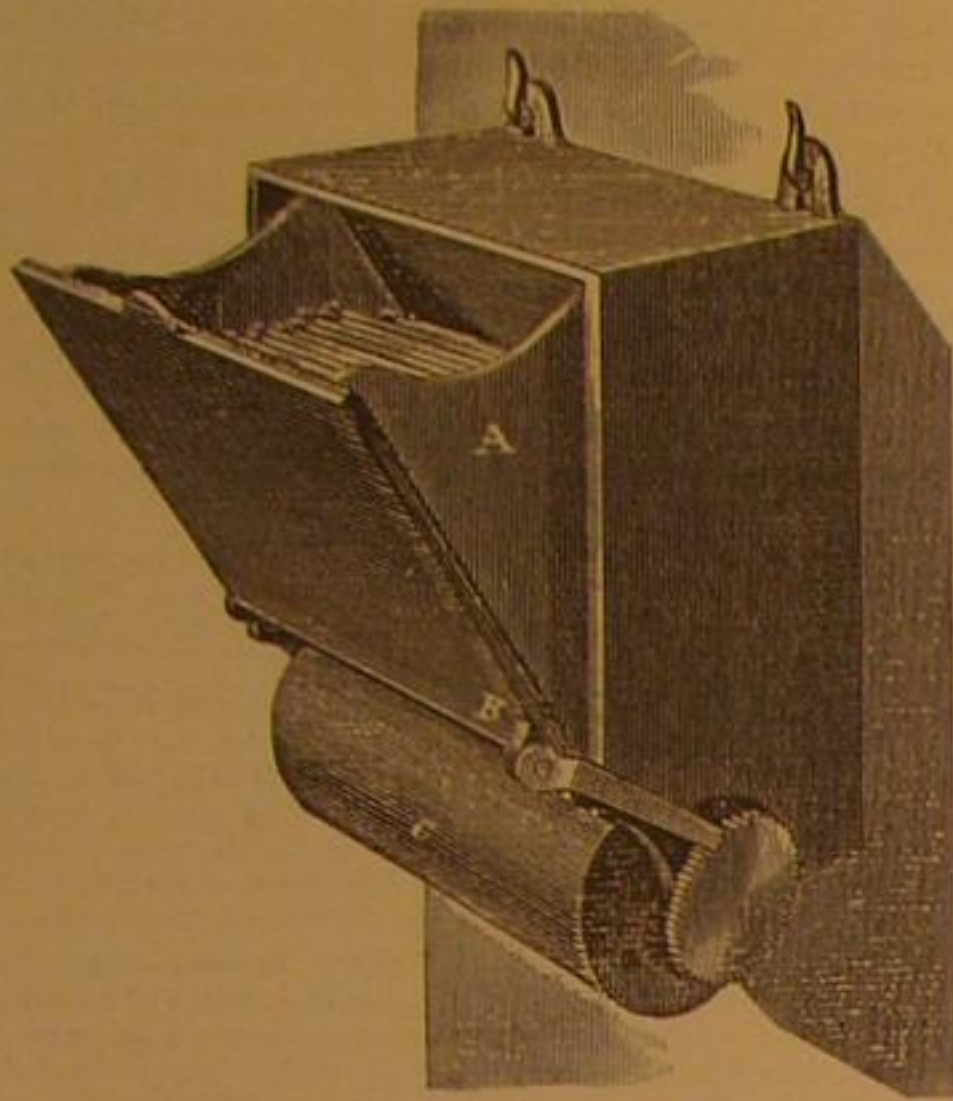
Manufacturing Ozone on a Large Scale.

We mentioned, page 38, that one of Wilde's electro-magnetic machines is used in a large sugar refinery. It indeed bleaches the sirup, but does this not by the direct power of the electric current but by the formation of ozone, which is a most powerful bleaching agent; being, according to Faraday, oxygen in a peculiar, active condition, or according to Bunsen a compound of hydrogen with 3 or 5 atoms of oxygen, in which compound, following a universal chemical law, the oxygen is very loosely combined and enters more readily into new combinations than simply uncombined oxygen. The apparatus is made by a steam engine of 15 H. P. The coils are four feet high, ten inches thick, and contain each thirty pounds of copper wire. The armature makes not less than 15,000 revolutions in a minute, and the light produced is so strong that the unprotected eye cannot look at it; concentrated with a lens at a distance it ignites combustible substances like sunlight, and the heat may be felt at a distance of one hundred and fifty feet. The working expense, including that of the steam engine, is said to be from fifteen to sixteen cents per hour. In Manchester it is successfully used for photographing at night. Such a powerful source of electricity, producing a large quantity of ozone from the moist atmosphere can be used for many other manufacturing purposes. Besides ozone is a powerful disinfectant, and such a machine may be useful in places inhabited by a great number of persons, as hospitals, asylums, and the like.

THE MARYLAND INSTITUTE EXHIBITION.—The Twenty-first annual exhibition of the Maryland Institute for the promotion of Science and Art, will be held at Baltimore in October next. The spacious Institute building has been refitted and will be used for the display. These exhibitions have always been very successful, and the coming one will no doubt sustain their former reputation. See advertisement in another column.

HOYT'S PATENT MATCH BOX.

Match safes are not always correctly designated; some of them are not safe. Beyond this, some of them are not handy in using, and hold so few matches that they require very frequent replenishing. Matches have become so much a common necessity and so cheap that we use them without a thought as to their value—except when we are deprived of them—when one or two matches under some circumstances are worth almost their weight in silver. But when matches are plenty many are wasted for want of a proper frictional surface on which they may be ignited. The little device shown in the engraving is designed to obviate these difficulties. It can be hung against the wall or secured to anything upright.



The match receptacle, A, is pivoted at B to the body of the safe, opened by means of a thumb piece at the top of the lid, and closed by a spring concealed inside. When the thumb or finger releases the lid after opening, the spring promptly shuts it. The outward and inward action of the lid partially rotates a roller, C, at the bottom of the device, coated with quartz or emery, and turned by a pawl attached to the lid and a ratchet on the axis of the roller. This partial rotation presents perpetually a new surface to the end of the match for igniting purposes. The receptacle may be made large enough to contain the contents of several boxes of matches, and the roller will last for years with constant use without re-covering.

The patent for this improvement was issued June 31st, 1868, through the Scientific American Patent Agency, to Alfred Hoyt, and all communications on the subject should be addressed to him at 199 East 26th street, New York city.

The Torpedo Trade of Long Island.

Few people, even of those residing where the work is carried on, have any adequate idea of the extent to which the business of torpedo making (not the contrivances which blow up ships, but the little explosive pellets which delight the souls of children) is prosecuted in the town of Southold, L. I. During the past month, preliminary to the great national holiday, which is always a season of extreme activity in the torpedo trade, the steamer *Escort* has taken to New York, on almost every trip, a large number of barrels packed full of torpedoes, put up in packages of one hundred. On several occasions she has had on board, shipped by makers in Greenport and Southold village, over 10,000,000.

It is estimated, says the *Greenport Watchman*, that the total number manufactured in the town during the past year is between 110,000,000 and 120,000,000. They are sold to wholesale dealers, who ship them to all parts. So long as they are kept dry, torpedoes do not deteriorate by age, but, on the contrary, the volume of sound is increased. They range in price from thirty cents per thousand, or under, at which they are sometimes sacrificed by poor and needy makers, in the winter season, to forty and fifty cents in the summer. Formerly the Southern States used to be one of the best markets for the sale of torpedoes, but the war changed all that.

The manufacturers in Greenport consume annually a large amount of silver, mostly American coin, in preparing the fulminating powder which explodes the torpedo on coming in contact with any hard substance. The premium on silver, joined with the high price of alcohol, tissue paper, and other material, at one time reduced the profits of the business to so low a figure as to cause a partial suspension, but it has since improved considerably. The makers are mostly Germans, and are an industrious, frugal class, whose labor adds constantly to the wealth and prosperity of the town.

Drooping Ears of Animals.

Darwin, in his treatise on animals and plants, under domestication says:

"Our domesticated quadrupeds are all descended, so far as is known, from species having erect ears; yet few kinds can be named, of which at least one race has not drooping ears. Cats in China, horses in parts of Russia, sheep in Italy and elsewhere, the guinea pig in Germany, goats and cattle in India, rabbits, pigs, and dogs in all civilized countries, have dependent ears. With wild animals, which constantly use their ears like funnels to catch every passing sound, and especially to ascertain the direction whence it comes, there is not, as Mr. Blythe has remarked, any species with drooping

ears except the elephant. Hence the incapacity to erect the ears is certainly in some manner the result of domestication; and this incapacity has been attributed by various authors to disuse, for animals protected by man are not compelled habitually to use their ears. Col. Hamilton Smith states that in ancient effigies of the dog, 'with the exception of one Egyptian instance, no sculpture of the early Grecian era produces representations of hounds with completely drooping ears: those with them half pendulous are missing in the most ancient, and this character increases, by degrees, in the works of the Roman period.' Godron has also remarked that 'the pigs of the ancient Egyptians had not their ears enlarged and pendent.' But it is remarkable that the drooping of the ears, though probably the effect of disuse, is not accompanied by any decrease in size; on the contrary, when we remember that animals so different as fancy rabbits, certain Indian breeds of the goat, our petted spaniels, bloodhounds, and other dogs, have enormously elongated ears, it would appear as if disuse actually caused an increase in length. With rabbits, the drooping of the much elongated ears has affected even the structure of the skull."

Prevention of Disease.

Dr. A. L. Wood, in the *Herald of Health*, makes the following excellent remarks upon the prevention of disease:

Disease consists in the obstruction, depression, or perversion of those vital changes and transformations throughout the system which, in their normal condition, constitute health. Disease is simply disturbed physiological or healthy action caused by non-observance or disregard of the laws which govern the human organization in respect to diet, air, exercise, rest, water, clothing, sleep, etc., and may be prevented by obedience to those laws. This being an incontrovertible fact, how necessary is it that people should understand these truths, that they may obey the laws of their being, and thus escape the penalties of their transgression. The principal means by which this knowledge must ultimately be diffused among the masses, is through the common schools—by placing Physiology and Hygiene among the principal branches of education, and thus early impressing upon the youthful mind a knowledge of himself, of the uses of the different parts of his body, and of the means which he must take to preserve its health, strength, and vitality. When this is done, sickness and premature death will rapidly diminish throughout the land; apothecary shops will not occupy, as now, the most desirable corners, and by day and by night, and on Sundays, dispense their deadly drugs to a deluded people, but will be converted into fruit stores to furnish to all who wish the purest, best, and most healthful food to nourish and strengthen "the human form divine;" doctors of all the different schools, whether regular, irregular, or defective, whether Allopathic, Homeopathic, Hydropathic, Eclectic, Botanic, Spiritual, or what not, will find their occupations "passing away" and will soon see the necessity of their learning some other trade by which to earn their bread. When Physiology and Hygiene are taught as thoroughly in our schools as Reading and Arithmetic are now, people will seldom be sick, and when they are, they will know enough to treat themselves, without the aid of doctors or drugs.

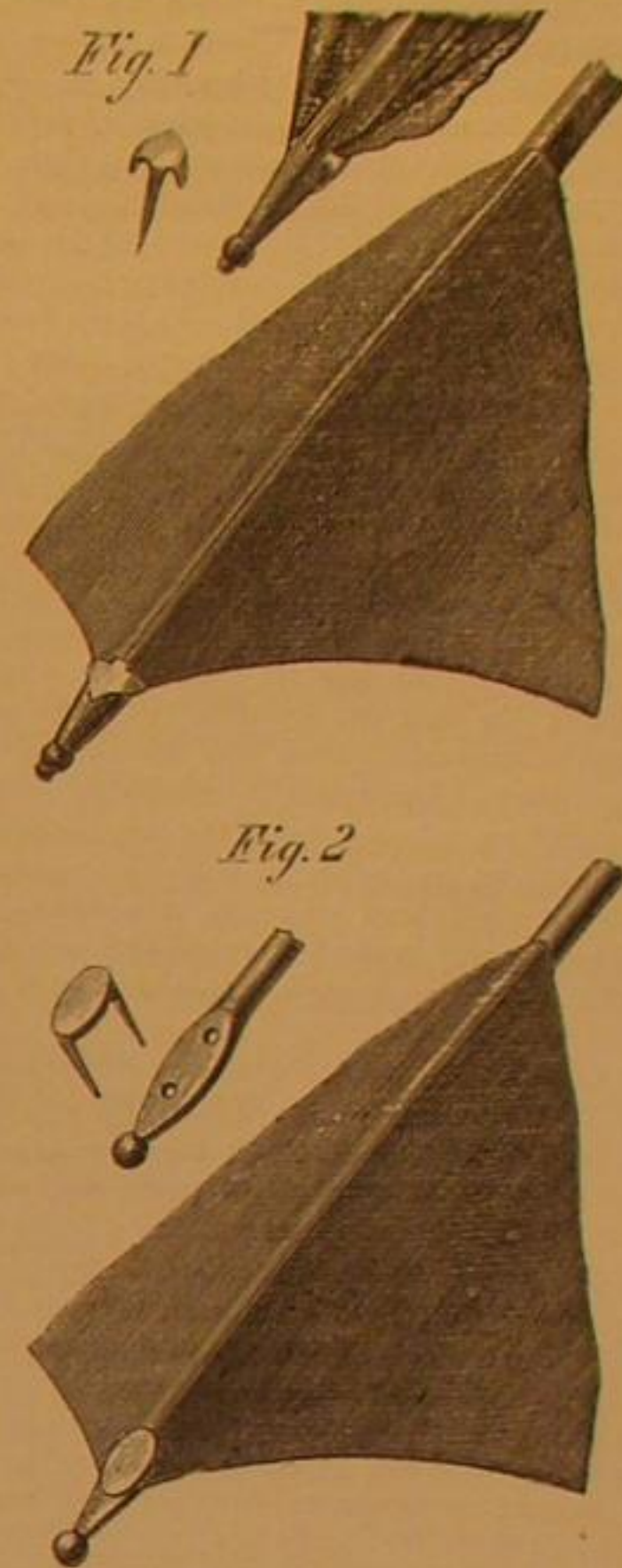
Manufacture of Artificial Diamonds.

The French publication, *La Propagation Industrielle* publishes a description by M. Caliste Saix of his method of producing colorless, colored, or black diamonds. The system is based on the principle that when a current of chlorine or of hydrochloric gas passes through cast iron in a liquid state perchloride or protochloride of iron is formed, both of which vaporize, the carbon contained in the cast iron remaining in both cases perfectly intact, because the chlorine cannot directly unite with it. The crystallization of the carbon is then within the general rule, for in a body which is dissolved and capable of crystallization, crystallization takes place each time that the dissolving agent evaporates, the size of the crystals depending always on the slowness of the operation. 1st. To obtain colorless diamonds, a current of dry chlorine must be brought to the bottom of the crucible, containing the cast iron, by means of a bent tube of china or fire-clay. No organic coloring matter resists the action of chlorine, so that the perchloride of iron in evaporating leaves the carbon to become a colorless crystal. 2dly. When it is desired to give the crystal a blue, green, pink, or yellow tint it is only necessary to mix with the cast iron certain metallic oxides in sufficient quantity, such as those of chromium, cobalt, and others, or their salts, which will give these colors. 3dly. To obtain black diamonds, hydrochloric gas must be brought to the bottom of the crucible in the same manner as for colored or colorless diamonds. Protochloride of iron will be formed, which is volatile, but in this case the carbon will remain black, in consequence of the presence of hydrogen. This explains the fact of all diamonds having the same chemical and mineral properties, and why in nature the black diamond is found in the greatest quantity, because its formation in alluvial soils requires only the presence of sulphuric acid and marine salt, whereas the others require the presence of particular oxides which are often wanting. To obtain all these varieties of diamonds special furnaces are not necessary; the crucibles must be covered to prevent the oxidation of the cast iron, which might change the carbon into carbonic oxide, and diminish, in consequence, the yield of the operation; these crucibles should be provided with a small tube, reaching outside the furnace, which will enable the chlorides resulting from the reaction to be gathered. When the liquid cast iron has been almost completely evaporated out of the crucibles, the diamonds can be removed without disturbing the crucibles, and by means of solvents any cast iron which might be adhering to them can be removed; the operation of

cutting will thus be shortened for there will be no more oxidized particles to remove, and the crucible will be ready for a fresh operation. According to M. de Saix one kilogramme of cast iron will yield at least sixty grammes of diamonds. The cost price of the colorless diamonds will be about 20f. per sixty grammes, which, at the current price, would be 75,000f. The cost of the black diamonds will be under 5f. per sixty grammes, representing a value of 14,200f.

PIERCE'S DEVICE FOR FASTENING UMBRELLA COVERINGS.

The covering of umbrella and parasol frames is usually secured at the tip of the stay rod by sewing, which is not always neat and seldom effectual, the umbrella often giving



out at this point before being otherwise much worn. The object of the little device herewith illustrated is to afford a cheap, secure, and ornamental fastening of the covering to the tips of the stay rods. It is of two forms: Fig. 1 showing a clasp with one point passing through the covering and the rod and clinched on the inside. Fig. 2 gives a more elaborate form of the stay with two points, both passing through the material of the covering and the rod, which is flattened for ease of workmanship. When in place the clasp presents an elegant appearance on the outside, as it may be silvered or lacquered to any color to suit the shade of the cover.

The patent was issued to G. Willis Pierce, June 16th, 1868, who may be addressed Box 10, P.O., Charlestown, Mass.

Curious Incident.

A very pretty and curious incident illustrative of the reasoning powers possessed by inferior animals, recently occurred in the case of a canary bird. The door of the bird's cage was occasionally left open, that he might enjoy the freedom of the room. One day he happened to light upon the mantle shelf whereon was a mirror. Here was a new discovery of the most profound interest. He gazed long and curiously at himself, and came to the conclusion that he had found a mate. Going back to his cage he selected a seed from its box, and brought it in its bill as an offering to the stranger. In vain the canary exerted himself to make his new found friend partake, and becoming weary of that, tried another tack. Stepping back a few inches from the glass, he poured forth his sweetest notes, pausing now and then for a reply. None came, and moody and disgusted he flew back to his perch, hanging his head in shame and silence for the rest of the day, and although the door was repeatedly left open, he refused to come out again.

Alaska.

Humboldt tells us that in Siberia, as for example at Yakoutsck, lat. 62½° N., at Bogolowsk, lat. 60° N., the soil remains continually frozen to a great depth, the surface only thawing in summer to the extent of three or four feet. In one case diggings were carried down 350 feet without passing through the frost. Now, as nearly one half of our recently acquired possessions of Alaska are situated above the latitude of 60°, it becomes an interesting question whether the soil is not a mass of perpetual ice, like the Siberian lands. If so our miners will have a tough time of it in digging for precious metals, sinking wells, etc.

MELTED alum mixed with burr stone reduced to the consistency of sand, is the cement used for filling holes in burr stones. If the holes are large coarse pieces of burr stone may be used at first, finishing with the finer material.

ALGEBRA—MATHEMATICS FOR MECHANICS.

Horace Greeley, in his "Recollections of a Busy Life," says of one of the schools which he attended in early life, that "he was glad that algebra had not been introduced into it to clog the brains and occupy the time of pupils which might otherwise be better employed."

This remark, published in a medium having so large a circulation as the *New York Ledger*, will reach the eyes of thousands of young men, and may, perhaps, be the means of creating in them a distaste for this important branch of mathematics. It is a common error with men whose attention has been long fixed upon any particular field of mental effort, to disparage, and under estimate the value of any branch of science which does not immediately bear upon their favorite pursuits. We can readily appreciate Mr. Greeley's views upon the subject of algebra when we call to mind that his life has been devoted to the study of political, agricultural, historical, and statistical science, and those collateral subjects immediately connected therewith.

To advise any young man at the outset of his career, not to look to anything higher than mediocrity in his profession or occupation, would be evil counsel. To teach him that the means of distinction, approved by the experience of all the eminent men in that profession are over estimated, and are to be neglected by him, is equivalent to just that advice. Mechanics and chemistry are the main motors in the machinery of modern civilization and progress, and algebra and geometry can no more be dispensed with in the acquisition of a proper knowledge of mechanics in the present state of that science, than a knowledge of the English language could be in the acquisition of that kind of information which is Mr. Greeley's forte. In fact, the symbolic language of algebra needs first to be mastered before the student can read the standard text books which relate to mechanical subjects.

We do not intend to here attempt the demonstration of the value of algebra, as applied to the study of mechanics, or to show in what way algebraic language, on account of its simplicity and power, aids in the attainment of a true conception of the laws of nature. It is enough that the fact is sustained by universal experience.

The age in which uneducated genius could achieve distinction in engineering is past. A Trevethick or a Stevenson would, in this age, as surely remain in obscurity as they arrived at eminence in the past, and no young man who has an ambition to become anything more than a mere operative can afford to neglect study, especially the sister studies of geometry and algebra. It is true that there is "no royal road" to knowledge, and that the aid of a good instructor can remove many difficulties; yet these sciences can be, and have been mastered by young men unable to procure the aid of competent teachers, and in hours which are too often devoted by young mechanics to frivolous and unprofitable amusements. The writer has, in his own experience, to attribute as much of whatever success he has been able to reach to an early knowledge of geometry and algebra as to any other cause—a knowledge attained in spite of its exclusion from the very poor educational facilities afforded by just such a school as Mr. Greeley describes.

AMERICAN MECHANICS ABROAD—THE HAVRE EXHIBITION.

A correspondent of the *New York World* gives some of his views of the marine exhibition at Havre, France, from which it appears that but for the contributions from the United States and Great Britain, the marine portion of the show would be rather insignificant. Among the American contributions are Massey's leakage alarm gage and his boat-detaching apparatus. A description with illustrations of the first may be found on page 249, Vol. xvi, *SCIENTIFIC AMERICAN*, and of the other on page 260 of the same volume. Both had been thoroughly tested in actual use in this country before being exhibited in France, and with the most satisfactory results. The *World's* correspondent says:

"One of the most interesting and useful articles of its kind exhibited here is also an American invention, known as Massey's leakage alarm gage. This article is a most valuable appendage to any vessel, for it is important to know betimes that the vessel in which some hundreds of passengers are sailing is leaking, and it is very much to know that something is going wrong as early as possible then. The sooner the better, as there is the most hope of a remedy, if it is possible one can be applied. It is valuable in a small vessel as well as a large one, for though there be only a few lives on board they are precious. In this apparatus a float is actuated by the water in the hold, and its movements are indicated by a pointer on a dial face, which is graduated from one foot up to as many feet as is desirable. As the water rises from a leakage the float is elevated, and with each degree the hand moves and a bell is automatically rung. The warning is thus made audible as well as visible, and even in actual distress, when the pumps are set to work in earnest, there is a certainty in the knowledge thus afforded of whether human effort or the adverse element is gaining the victory, and which assurance cannot be otherwise than of the highest value, either as an encouragement to continue exertions or as a paramount indication of the necessity of quitting the wreck at all hazards. This is, as we said, a valuable invention, and worthy of an American brain. A French attempt to develop the same idea is a century behind it in detail.

The same parties exhibit Massey's boat-detaching apparatus, which for its simplicity and certainty of action, and the benefits derived from its use in time of peril enabled the Congressional Committee to place it at the head of the list of forty-eight competitors. Forty-three were thrown out altogether, and of the five remaining Massey's was classed first."

Chlorine for Rats.

A correspondent of the *Turf, Field and Farm* gives the following: "At the commencement of this season I had a number of very choice and valuable pigeons in a large loft situated over a coach house and stable. The flooring was very old, and numerous rat holes communicated with the space under the flooring and above the ceiling of the stabling below. Attracted by the corn, the rats came and took possession of this space. My choicest birds were eaten alive by these most carnivorous of the rodentia. I was in despair. I had tried poison, traps, etc., with only partial benefit, and I had serious thoughts of selling off my stock of Columbids and taking to eagle owls, bull terriers, skunks, opossums, or some animals to which rats are not obnoxious. At last, after deep cogitation, I determined to try a chemical remedy—namely, chlorine, a gas so potent and destructive to animal life that I knew that, if I could apply it advantageously, it must necessarily prove effectual. Fortunately, it is much heavier than atmospheric air, so there was every probability of its flowing down the holes if it once entered into them. I therefore took a Florence oil flask, adapted a piece of glass tubing to its mouth by means of a perforated cork, and to the glass added a short length of india-rubber tubing. In the flask I put an ounce of manganese and an equal weight of common salt, poured on a wineglass of water, and then added gradually an equal quantity of strong oil of vitriol (sulphuric acid). The cork and tubes being adjusted, the apparatus was ready for action. A spirit lamp applied to the flask liberated a stream of chlorine, a gas which, if breathed, except when diluted with many thousand times its bulk of air, is absolutely irrespirable.

"All the rats' holes having been covered over, one after another was opened, the india-rubber tube introduced, and a stream of Chlorine directed down each. The space between the floor and ceiling must have been filled with a mixture of chlorine and air that no could have breathed and lived. Since that time I have seen no rats. Old and young have alike disappeared. Should a stray adventurer make his appearance I shall repeat my inexpensive remedy, and am now congratulating myself on having, for the present at least, extirpated the enemy.

"I would suggest that in those instances in which crickets, ants, cockroaches, etc., are concealed in places where they are difficult of dislodgment, the chlorine treatment might be applicable.

"I am aware that the weak odor of chlorine given out by chloride of lime has been successfully employed in driving away insects; but no animals of any kind could withstand the action of the gas liberated in quantity as I have described. I may state that chlorine is prepared with equal readiness from a mixture of manganese and hydrochloric acid (spirits of salts), salt not being required when this acid is used. It may also be liberated in large quantity without the necessity of applying heat, by pouring any acid on chloride of lime; but in this case the evolution of gas is sudden and unmanageable, so that the plan is not as well suited for the purpose as either of those in which manganese is used."

Bees in Mexico and Honduras.

The famed bees of Olancha are kept round the farms houses in hives, which are only hollow logs of wood which the swarm has occupied in a wild state, which is cut off and suspended in the corridors of houses with a hide thong, a small hole at one end giving ingress and egress. The honey of this bee is contained in little bags or bottles, two inches in length, ranged in rows along the hive; but the cells for the young occupy the central parts. Fourteen distinct species of the apis are known in Olancha, one of which (*Oloferitas*) makes a small nest, or hive, of capsules, with a waxy covering like isinglass, filled with a delicious fluid generally used in medicine. From Wells' Notes we judge this last species of apis is the same as that producing the fine honey of the Island of Jamaica, which never cloy, and is of such aromatic flavor as to be in special demand for presents to Europe, and that the common domestications in the *parais* of Honduras appear to be the same as the Yucatan *apis* or *angelitos* mentioned by Humboldt, and nearly agree with that described at large in Beechey's California Voyage of 1824-7, known in science as *melipona beecheii*, and brought by the California Admiral from the vicinity of San Blas to England, a hive of which was presented to the great Swiss aparian, Huber, in 1828.

These bees are smaller than ours, and the hives contain a smaller number of the insects; but the Mexican insect, which is stingless, is raised with very little trouble, and all the honey can be taken out twice in the summer without disturbing the bees, as they are widely separated from the brood cells and honey sacks or bottles, and the active little workers continue on in their labors as if nothing had happened. The Mexican bee masters assert that their species have a sentinel always placed over the entrance of each hive, which is relieved every few hours, to keep a lookout for the armies of black ants, their worst enemies. Several of the hives of the Angel bees were carried to San Francisco from Mexico, in 1853, but we know not what was done with them, though bee swarms were then selling from a \$100 to \$200 a piece.

NEW METHOD OF CHARGING RETORTS IN GAS WORKS.—A machine has been invented in England by which a large system of retorts may be charged by a number of scoops operating at the same instant. The plan has been practically tried at the Alliance Gas Works in Dublin, and it is well spoken of. A new retort house has been built capable of working 300 tons of coal in a day, and containing 270 double retorts, or 540 mouth pieces, the charging and discharging of which is done by two of these machines.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

BOGGS GOLD DUST.—Mr. H. M. Raynor, manufacturer and dealer in platinum, 718 Broadway, New York, has kindly submitted to us a specimen of counterfeit gold dust, made from grains of platinum, coated with gold or bronze. He has taken from Mr. H. G. Torrey (son of the Chief Assayer) at the United States office, Wall street, some 500 ounces within four months. For a year and a half past, small parcels have occasionally been offered for coinage at the office, and been examined and their character detected by the experienced assistant, Mr. Charles Graham. The grains are small and flatish, an excellent imitation, seeming to be made by crushing or stamping the cuttings or scrap platinum under heavy mill power. It is alloyed with copper and a small amount of silver. The coating when gold is not at once removed by aqua regia, requiring to be boiled for an hour or more. The analysis by Dr. John Torrey, gives 60 to 65 per cent platinum. A banker in Kansas City, was recently victimized to the amount of \$6,000 (gold) for a lot of 300 ounces, which as platinum was not worth over eight or nine hundred dollars (gold). It is surmised that this counterfeit finds its way into this country from France, via Mexican ports. Its appearance being so perfect as to deceive experts, the greatest care will be necessary to avoid imposition.

MINERAL WEALTH OF NEW HAMPSHIRE. Professor Hitchcock, of Amherst College, in a recent lecture expressed the opinion that the mineral wealth of New Hampshire was fully equal to any of the New England States. The results obtained by the use of Stevens' flux in working for gold were alluded to, and its use commended. He also alluded to the silver in Gardner's mountain, and to the soapstone, limestone, tin, lead and other minerals of the State. He stated that there was copper enough in Gardner's Mountain to supply the United States for 300 years, the vein being five miles long and 200 feet in depth.

A special train ran from Pittsburgh to Chicago, over the Pittsburgh, Fort Wayne & Chicago Railroad in twelve hours, on the 10th inst. The distance is 468 miles.

A factory 505 feet long, and estimated to need 3,000,000 bricks in its walls, is now being built at Saucok, N. H. The iron tubes employed to carry water to its wheels are one set five feet nine inches, and the other six feet and two inches in diameter.

PETROLEUM IN SWEDEN.—Shafts are sunk on the Osmund Mountain in Sweden for the working of certain petroleum springs which have been discovered. A depth has been reached of 225 feet. The materials dug out are impregnated with that species of petroleum known in America as surface oil, and which is of a deeper color than that generally used in Europe. It has been determined that the boring shall be carried to 600 feet, where the real petroleum is presumed to lie in great abundance.

An exchange suggests that the alkalies contained in the waters of the western states in the vicinity of Bridgers Pass, might be utilized in the manufacture of soap. These waters are so alkaline that in order to wash in them the skin has to be protected by a coating of grease which is converted into a species of soap during the operation.

Recent American and Foreign Patents.

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

TABLE FOR COMPRESSES.—Henry A. Burr, Brooklyn, N. Y.—The nature of this invention consists in so constructing and arranging the table or platen of a press, that with it cotton and other goods that have been previously pressed or put up in bales, can be again compressed without removing the hoops or bands of the bales.

ROAD SCRAPER.—E. B. Driskell, Paris, Ill.—This invention is an improved road scraper which can be operated more conveniently and is cheaper and more simple in construction than those in common use.

LOW WATER REPORTER.—Lorenzo Fulton, Edinburg, Ind.—The object of this invention is to furnish a simple, cheap, and accurately operating device which will indicate the fall of the water below its proper and safe level in the boiler, and which will also indicate the careening of the boat to such a degree as to improperly heat the sides of the boiler, and which, besides sounding an alarm at the time, will correctly record the fact that an alarm was given by means of a dial index and marking pencil.

SPARK ARRESTER.—James C. Rhodes, Stillwater, Minn.—This invention has for its object to furnish a neat, simple, and effective device for attachment to draft chimneys of stoves, furnaces, heaters, etc., to prevent the sparks from snapping out and setting fire to the carpet or house.

WAGON BRAKE.—William B. Morgan and J. H. Terrell, Antioch, Ind.—This invention has for its object to improve the construction of wagon brakes so as to adapt them for use with different kinds of loads.

DRAIN PLOW.—Phillip Ballard, Texas, Ohio.—This invention has for its object to furnish an improved plow for opening tile drains, which shall be simple in construction and effective in operation.

TOBACCO BOXES, ETC.—George M. Ball, New Baltimore, N. Y.—This invention has for its object to improve the construction of round or oval tobacco boxes, spectacle cases, etc., in such a way that they may have no sharp corners, edges, or projections to cut or wear the pocket of the person carrying them.

ATTACHING CARRIAGE TOPS TO THE RAILS OR BODIES.—Wm. Herrocks, Poughkeepsie, N. Y.—This invention relates to the manner of securing the carriage seat irons to the rails or bodies of carriages and consists in pivoting each seat separately to a disk or knob by a separate pin or pivot.

MOWING AND REAPING MACHINE.—Wm. O. Harrison, Chittenden, Vt.—This invention relates to the manner of operating the cutter bar of a mowing or reaping machine without the use of a pinion connection, and consists chiefly in hinging the finger bar to a revolving shaft which carries at its end a crank pin, that works in a slotted projection of the cutter bar and that imparts the desired reciprocating motion to the said cutter bar, in whatever position the finger bar may stand.

COMBINED SQUARE PLUMB AND LEVEL.—A. F. Ward, Marietta, Ohio.—This invention consists, first, in providing in the main portion of the body of the frame conical sockets, and providing the swinging frame with corresponding conical projections fitted to the said sockets, and a bolt and thumb nut, whereby a more durable and reliable axial joint is formed for the same; second, in forming the metal frame in two parts and providing them with the recesses for the glasses, one on each part; and third, in the manner of fastening the projector.

SAW SHARPENING MACHINE.—Hymen Clendenen, Beverly, Ohio.—This invention relates to a machine for filing or sharpening saws, and it consists in a novel construction and arrangement of parts, whereby the desired work may be done with the greatest facility and accuracy.

GAME TABLE.—Wm. Keil, Hastings, Minn.—This invention consists of a circular table having a conical center, and a raised rim around the edge between which and the base of the conical center is an annular groove divided into sections. In the center of the table a hollow stand is arranged having a concave recess in the top and a plunger running through it, which may be raised by a series of levers suspended from the underside of the table in radial positions, the outer ends projecting through the rim of the table sufficiently to be operated by the fingers of the players. The top of the table is provided with several circular rows of vertical pins at regularly recurring distances from the center, each row having the same number, the pins of every alternate row being in the same radial line. In the second row of pins, each alternate pin is enlarged and provided with conical recesses.

SUPPORTING STOVE PIPES.—G. W. Bradford, Brooklyn, N. Y.—This invention relates to a means for supporting stovepipes, and is designed to supersede the pieces of wire which are now used for such purpose, and are wrapped around the pipe one or more times previous to having their ends connected to the ceiling or other fixture. These exclusive wire supports do not have a very neat appearance and besides they are very liable to be snuffed in position.

STEAM VALVE.—R. A. Atkins, N. H. Adams, Mass.—This invention relates to a steam valve which is so arranged that it can easily be worked up and down with perfect ease, while it closes the ports perfectly steam and air tight. The invention consists of a plug or valve which is made of two sections fitted around a tapering stem that is smallest at its lower end, and of two fingers grooved between the sections. The fingers catch under a shoulder of the stem; but when the valve is on its seat, they release the stem and allow it to be forced down between the sections so as to spread them laterally apart. The port holes will thus be most effectually closed.

WATER WHEEL.—William S. Place, Charleston, Maine.—This invention relates to a water wheel of simple construction whereby the power of the water is obtained both by impact and gravity or by a simultaneous downward and lateral pressure.

PRESSURE.—C. R. Goigas, Brooklyn, N. Y.—This invention consists of an India rubber bag or cap provided with a rubber tube, which is to be distended by a flat spiral spring when inserted into the vagina; also of an implement provided for inserting the spring within the India rubber cap.

SELF-LOADING CART.—G. W. Whitson, Ashville, N. C.—This invention has for its object to furnish an improved cart, which shall be so constructed and arranged as to be self loading, and which can be easily operated.

NUTMEG GRATER.—H. H. Barstow, Chicago, Ill.—This invention consists of a grating plate placed within a case and sustained by springs which press the plate against the nutmeg held between it and the top of the case. The nutmeg is affixed in a rod which passes through the case terminating in a handle by which it is actuated to and fro in the operation of grinding.

APPARATUS FOR LOADING AND UNLOADING WAGONS.—Selah S. Brewster, Manchester, Mich.—This invention consists in providing within the building used for the purpose, near the top, an axle or windlass having ropes at each end and a pulley over which a rope works, which is connected at one end to a winding-up crank shaft conveniently arranged at the side of the building near the floor, whereby the said windlass is operated to raise the box or rack from the wagon, when it may be suspended till required for use again, by fastening the crank shaft so as to hold it.

CLOCK ESCAPEMENT.—J. V. D. Patch, Brownville, Nebraska.—The object of this invention is to obtain an equable and easy action of the pallets of a clock escapement or verge, so-called, and with the minimum power and friction.

PICK AX.—John C. Conklin, Yorktown, N. Y.—The object of this invention is to provide a socket for the insertion of the handle of pick axes.

WATER WHEEL.—D. W. Case, Garden City, Minn.—This invention relates to an improvement in water wheels, and it consists in a novel arrangement of chutes and gates, whereby the gates may be readily operated, opened and closed, and rendered self-regulating when desired, so as to obtain an improved speed of the wheel.

BOLT AND RIVET HEADING MACHINE.—Wm. Melville, Paterson, N. J.—This invention relates to a machine for cutting the blanks and for forming the heads of bolts and rivets, and consists in such an arrangement and combination of dies, holders, punch, and cutter, that the desired results can be attained with simple mechanism and in a short time. The whole machine operates perfectly automatically, as, after the various parts have been adjusted for the production of certain kinds of rivets or bolts, the end of the bar has only to be inserted in the machine when it will be cut and the separated blank will be held and headed in the desired manner.

SHEEP SHEARS.—Hermann Wendt, Elizabeth, N. J.—This invention relates to the construction of sheep shears, and is an improvement on a process of construction previously patented by Hermann Wendt and Henry Seymour. The object of the present invention is to obviate the wearing of what are commonly termed the "stops," which are employed to prevent the blades of the shears from passing each other. Hitherto these stops have been formed entirely of iron, but by this improvement they are formed of steel and iron combined and in such a manner that the process of construction of Wendt & Seymour, above alluded to, is not interfered with in the least. Henry Seymour & Co., 52 Beekman street, New York, assignees.

CLOTHES WASHING MACHINE.—John Phillips, Jr., Georgetown, Mo.—This invention relates to a clothes washing machine of that class in which a reciprocating rubber is employed for subjecting the clothes to the necessary pressure and rubbing action.

CLASP FOR JOINING BELTS.—Benjamin D. Randleman, Port Louis, Iowa.—The object of this invention is to provide a simple and effective clasp for joining the ends of belts. It consists of the combination of forked and straight links with a pair of hinged plates. The links serve to provide a flexible connection for the hinged plates, which latter serve to secure the ends of the belt.

MIXING CLEAVER.—Samuel J. Tongue, Philadelphia, Pa.—This invention consists in combining a mixing knife or cutter and a cleaver in such a manner that one and the same implement may be used either in the capacity of a cleaver or a mixing knife as may be desired.

CUTLERY.—A. L. Taylor, Springfield, Vt.—This invention relates to an improvement in cutlery and is more especially designed for table cutlery knives, forks, etc. The object of the invention is to avoid the difficulty attending the loosening of the handles on the tangs, which is caused chiefly by the washing of the cutlery in warm water and also to avoid the loss occasioned by the breaking and checking of the handles, a contingency of frequent occurrence when horn, bone, and ivory are used as the stock or material.

COMBINED CIDER MILL AND PRESS.—Eli Wagonman, Blairville, Pa.—The object of this invention is to combine grinding and pressing mechanism in the same general machine whereby apples, grapes, and other fruit may be ground, and the juice of the same expressed immediately by conveying the pomace from the grinding mechanism to the pressing rollers located at some point in the frame conveniently below.

POTATO DIGGER.—Arthur Van Norman, Detroit, Mich.—This invention relates to a potato digger, and it consists in the employment of a cylindrical revolving screen provided with an internal screen, the above parts being used in connection with a scoop and a reciprocating cutter.

COOKING STOVE.—Evan O. Thomas, Jersey City, N. J.—This invention relates to a cooking and baking stove, which is provided in the oven with a suspended shelf that can be rotated from the outside without requiring the oven to be opened. The above is of oval shape, with a cylindrical or nearly cylindrical baking oven, which is on one end of the stove so that the crescent shaped fire-place fits around half of the oven.

SPARK ARRESTER.—A. F. Smith, Ellsworth, Maine.—This invention relates to spark arresters, to be applied to the smoke stacks of locomotives, chimneys, etc., for the purpose of preventing escape of sparks therefrom. The invention consists in the peculiar construction of the device, whereby a good or efficient draught is obtained, to ensure the escape of smoke and cinders, at the same time prevented from passing out of the device.

MACHINE FOR SPLITTING WOOD.—Leonard Thion, Brooklyn, E. D., N. Y.—This invention relates to a machine for splitting wood, and it consists in the employment of fixed cutters, a reciprocating hopper and a vibrating bed all arranged to operate in such a manner as to effect the desired end, in an expeditious and perfect manner.

BEH HIVE.—Joseph Chase, Ripley, Ohio.—This invention relates to the manner of constructing a bee hive, whereby the contents of the hive may be readily seen, the best protected from the ravages of the moth, and the interior of the hive kept at a uniform temperature, or nearly so, being warm in winter and cool in summer.

SHEARS.—Hermann Wendt, Elizabeth, N. J.—This invention relates to an improvement in shears for general use, and it consists in forming the thumb piece of the eye or loop in the handle, through which the thumb passes in such a manner that the shears may be operated with far greater facility than hitherto; also, in a certain means, whereby the holes, through which the rivet or screw passes to hold the two parts of the shears together, may be formed by punching instead of drilling, which is now a necessity. At present rivet holes cannot be punched in consequence of the drop, which welds the steel to the malleable cast iron portions, coming in contact in its descent with the portion of the malleable cast iron through which the rivet or screw passes, and compressing or hardening said portion to such a degree as to preclude punching. This difficulty is fully obviated by this improvement.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

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

A. A. S., of Boston.—Why is spruce better than other woods for sound-boards? Because on account of peculiarities in its texture it is more sonorous at first and tends to become more so by use, its resinous matter probably being eliminated to some extent by continued vibration.

W. M., of Minneapolis.—What is the object of thumbing the vent while loading cannon? It is to prevent fragments of cartridge remaining in the gun, from being fanned into flame by currents of air.

E. H., of Mo.—All other things being equal the conductive power of lightning rods increase with the areas of their cross sections. Your conductors are not of the proper shape to insure the greatest efficiency, and they are not properly insulated.

L. H. S., of N. Y.—Your idea is not new and it is for many reasons impracticable.

A. F. A., of Albany, N. Y.—The water line of a vessel, in order to secure the greatest speed with the least expenditure of force, should form such a curve that the closing together of the water after displacement should tend to accelerate its motion, rather than to retard it. A water line of the shape you propose, would not admit of such acceleration.

W. A. E., of Va.—What is the object of making the hind-wheels of a wagon higher than the others? To bring the hind bolster to a level with the front one, and to raise the box so as to let the fore wheels under in turning. The question would be more to the point if you asked the reason why the fore wheels were smaller than the hind ones.

G. H. P., of N. Y.—To tin small castings, clean them and boil them with scraps of block tin in a solution of cream of tartar. To copper them, clean and dip in a solution of blue vitriol.

R. A., of Pa. says: "In your reply to J. B. F., of R. I., page 38, current volume, you say, in a suction pump the pressure of the atmosphere can raise the water about 30 feet without mechanical power; the conclusion is obvious. What do you mean by this? Will the lift pump require the necessary force to raise a column of water 30 feet high and the suction pump require no force to do the same work if the bucket is 30 feet above the water? Would it not require the same power to lift a column of water 30 feet high whether the pump is lifting or suction?" If our correspondent would read carefully the paper he would find that his inquiries are fully answered. On page 23 of the same volume to which he refers a complete answer is given to his query. Sometimes it is necessary to answer twice on the same subject to meet the demands of correspondents.

S. H. of Pa.—The increase of the pipe at the upper end would increase the flow, but to calculate the percentage of increase would take too much of our time. You should apply to a hydraulic engineer.

A. S. P., of Ohio.—After you have exhausted the air from an air-tight box, it would rise providing it was lighter than the atmosphere, —not otherwise.

C. H. H., of Mass.—We have not kept the address of the party who made the inquiry, therefore we cannot comply with your request.

J. S. M., of Me.—We are not responsible for the statement to which you refer. You will notice that it is credited to the Times' correspondent.

J. B., of Mass.—We are of the opinion that the device by which you propose to regulate the expansion and contraction of the balance wheel of a watch, possesses knowledge of a patentable character.

J. O. B., of Ohio, says that in railroad repairing much labor and money is uselessly expended in packing the gravel as closely midway between the rails as at the ends of the sleepers, where the weight and wear come. As the gravel is shaken out from under the rails the sleepers are supported mainly at the middle and the road becomes uneven.

J. B. S., of N. Y.—There is no foundation whatever for the statement that the notes of birds and insects, the rippling of brooks and waves, the sound of the wind, etc., follow the intervals of the minor scale. It is one of those assertions repeated by some by reason of some supposed authority. Every good musician, with a sharp well cultivated ear, knows that it is utterly untrue, and those familiar with the science of acoustics declare it absurd.

P. D., of Ohio, answers, in regard to the inquiry as to the cause of the variation in the watches of railroad men, that the reasons are, 1st, the want of perfect equilibrium in the balance wheel; 2d, deficient adjustment of lever fork, roller jewel, and plate; 3d, escape wheel and pallet lock too hard or too easy. He states that these defects are more common in the fine English escapements than in the American or Swiss watches. When these parts are well adjusted a watch will keep time almost under any circumstances. A thickening of the oil, which may also affect the motion, is also mentioned by this correspondent as being caused by the steam, gas, and heat to which the watchmen are exposed.

P. C., of Ill.—The sample of copper you sent us was found to contain no traces of silver. Of gold there were traces, but in so small a quantity that it would not pay to take it out. There is no premium offered for the finding of a large mass of copper. Eight pounds is a very small piece—much larger pieces are frequently sent to this market.

B. F. H., of Ind.—It is a fact known to all who have had experience in handling heavy glass tubes that they frequently break, when they have been rubbed on their interior surface. Glass tubes for steam gages should only be cleaned by washing, using hydrochloric or nitric acid, or any other substance that will clean them without the necessity of rubbing. The reason of such fracture is that the glass of these tubes is in state of great tension; the inside surface being stretched, and ready to crack when the least scratch or abrasion is made on its surface. Some standard experiments in natural philosophy illustrate and explain the same thing; for instance, the so-called Bolognese flask and Prince Rupert's glass drops, a description of which may be found in some good text book on physics.

Business and Personal.

The charge for insertion under this head is one dollar a line.

The patent sweet fern and chemical lacing, as made by J. H. & N. A. Williams, Utica, N. Y., is the best that is made, it will not mildew or become rotten.

Greatest invention of the age—a washing boiler by which clothes are washed in 4 to 6 minutes. A live partner wanted to obtain patent and exhibit at fairs this fall. Address Postoffice Box 309 Cedar Falls, Iowa.

Wanted—a situation by a competent manufacturing chemist of three years' experience in German factories. Address Box 3051, St. Louis.

Manufacturers of goods sold by hardware dealers will please address Daniel Clarke, Ipswich, Mass.

To machinists—see advertisement of rule for screw cutting.

Where can I get steel casting guards or fingers for harvesters? also, rivets of good quality for the knife sections? also rolled iron finger bars? What is the relative standing, with agricultural men, of the two kinds of harvester rakes, viz: those, like Wood's, called platform rakes which remove the grain at right angles to the cutter bar, or those which remove it parallel to the cutter bar, known as sweep rakes? I. Lancaster, No. 77 N. Paca st. Baltimore, Md.

Wanted—iron foundries to manufacture my patent window curtain fixture. No fitting required. State price per pound. C. F. Knauer, Pittsburgh, Pa.

For sale—the patent right of A. Eagle's machine for mixing compositions. Patented April 16, 1865. Address A. Eagle, 43 Court street, Brooklyn.

Manufacturers of rice cleaners will address M. W. C., care of Learycraft & Greenfield, New Orleans, with circulars and prices.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 8 Dey st., New York.

Parties wishing to contract for first class brass and composition castings, please address Rialon & Bond, Postoffice Box 733, Bladeford, Me.

Wanted—breech-loading shot guns made on contract, royalty, or shares. Address Box 786, Washington, D. C.

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

A partner wanted—a gentleman of integrity and Christian character—with a capital of \$50,000 to \$100,000, to invest in the perfecting of new machinery. Address L. H. Soule, Mt. Morris, N. Y.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glazier's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 64 Nassau st., N. Y.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' Boiler powder (11 Wall st., N. Y.) 12 years a standard article for preventing incrustations. Beware of imitations and pretended agents.

NEW PUBLICATIONS.

ENGINEER'S AND MECHANIC'S POCKET BOOK.

This valuable handbook, edited by Chas. H. Haswell, office No. 6, Bowling Green, New York, has reached its twenty-first edition. We do not hesitate to say that we have never before seen so much valuable information compressed into so small a compass. There is scarcely a subject in the entire range of mechanics, hydraulics, hydromechanics, steam engineering, and the collateral sciences, that is not practically treated of, in clear and perspicuous style, without those abstract formulas and demonstrations which render larger works of no avail to the ordinary mechanic. By the use of its tables a great saving of labor and time in any kind of work in which the principles of mensuration, strength of materials, or ordinary arithmetical computation are involved can be made. Mr. Haswell brings to bear upon his work a knowledge and judgment ripened by experience, and a stock of information gathered from the best sources both in this country and in Europe. The work is bound in flexible morocco covers, with a receptacle for loose memoranda, and a clasp. It should be carried in the pocket of every mechanic. We give it our unqualified commendation.

METALLURGY OF IRON. By H. Bauerman, F.G.S. A Treatise, with an Appendix on the Martin Process for Making Steel from the Report of Abram S. Hewitt, U. S. Commissioner to the Universal Exposition at Paris, 1867. First American Edition, revised and enlarged. New York: Virtue & Yorston, 12 Dey street, and D. Van Nostrand, 192 Broadway.

This is an important addition to the stock of technical works published in this country. It embodies the latest facts, discoveries, and processes connected with the manufacture of iron and steel, and should be in the hands of every person interested in the subject, as well as in all technical and scientific libraries.

THE CRACK SHOT, or the Young Rifleman's Complete Guide, being a treatise on the use of the rifle, with rudimentary and finishing lessons, including a full description of the latest improved breech-loading weapons, profusely illustrated, and containing rules and regulations for target practice, and directions for hunting game found in the United States and British Provinces, has just been issued by W. A. Townsend & Adams, New York. It will find a welcome place in the knapsacks of many sportsmen who at this season are exchanging the dust and noise of the city for sylvan shades and forest sports.

THE ECLECTIC MAGAZINE for August is at hand, with its usual amount of rich literary entertainment. The elegant portrait of Biram Powers, with which it is embellished, is by no means the least of its many attractions. E. R. Pelton, publisher, 108 Fulton street, New York.

ATLANTIC MONTHLY.—Ticknor & Fields, Boston. August number just out. For sale by all news dealers.

PATENT OFFICE ILLUSTRATIONS.—We are indebted to Messrs E. R. Jewett & Co., publishers, Buffalo, for advance sheets of the Patent Office illustrations from 62,847 to 64,386. This brings the work up to May, 1867.

The sixth number of the **WORKSHOP** is received. We should do violence to our sense of the sterling merit of this publication did we fail to heartily commend it to all lovers of art. The splendid engraving of the Palpit of the Church of Santa Croce, Florence, by Benedetto da Majano, and its accompanying description, are alone worth the price of the number. Published by E. Steiger, 17 North William street, New York.

EXTENSION NOTICES.

John Ross, of Brooklyn, N. Y., administrator of the estate of Charles Ross, deceased, having petitioned for the extension of a patent granted to the said Charles Ross the 17th day of October, 1854, for an improvement in grinding surface in mills, for seven years from the expiration of said patent, which takes place on the 17th day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 23rd day of September next.

Abigail L. Webster, of Binghamton, N. Y., administratrix of the estate of Benjamin B. Webster, deceased, having petitioned for the extension of a patent granted to the said Benjamin B. Webster the 3d day of October, 1854, for an improvement in musketo curtains, for seven years from the expiration of said patent, which takes place on the 3d day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 21st day of September next.

Samuel Van Syckel, of Titusville, Pa., having petitioned for the extension of a patent granted to him the 31st day of October, 1854, and renewed the 9th day of June, 1868, for an improvement in grain bars, for seven years from the expiration of said patent, which takes place on the 31st day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of October next.



PROPOSED SUSPENSION BRIDGE ACROSS THE EAST RIVER, NEW YORK. SEE PAGE 90.

Scientific American.

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NEW YORK, WEDNESDAY, AUGUST 5, 1868.

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INSTRUCTION AND AMUSEMENT COMBINED.

Within a few years the business of toy making has assumed considerable proportions in this country; and it is not strange, considering the utilitarian character of our people, that the style of toys made should be different from those made by poor Caleb in Dickens' "Cricket on the Hearth." Our toys are either artistic or mechanical—perhaps both. Certainly they are incomparably above our imported toys, especially when they simulate life. They are not repulsive exaggerations, nor caricatures, but life like. Even our dolls are pleasant to look at; almost instinct with life. All our toy representations of animal life are of a similar character. This taste, this striving after the actual, even in these little things, as some would call them, is very encouraging. Our young derive their knowledge of the world from things rather than from their representatives, words, and first impressions are lasting. Toys during the period of childhood are their constant companions, and from them, as models of the real, they derive their only actual knowledge. For this reason their toys should be reasonable.

But in mechanical toys particularly the Americans excel. Walking dolls, running steamboats, fire engines, carriages, etc., with many other similar contrivances, worked by simple clock work and driven by a coiled spring are both common and cheap. Some of them beautifully illustrate mechanical movements and may be made a means of instructing children in the principles of mechanics, while at the same time amusing them. The same may be said of chemical toys which illustrate some of the most important principles of chemical science.

But we think there is room for still further attempts, and successful, in this direction. It seems strange that the simplest of machines—the steam engine—has not been presented to the public as a toy. Miniature steam engines are common enough; but they are usually more than necessarily elaborate in finish and therefore costly in price. They are built either by amateurs as specimens of their mechanical skill and regarded as curiosities, or constructed by machinists or model makers to fill orders from educational institutions to be used to illustrate problems in natural philosophy. The amount of finish put upon these miniature specimens places them beyond the reach of the mass, or the vagaries of their builders in adopting unheard-of plans for their engines deprives them of practical use as means of instruction. Beside this, many otherwise sensible people believe that the steam engine with its necessary boiler is simply another form of a gunpowder magazine, ready at the touch of a match to blow their house into "flinders" and themselves into eternity. Perhaps the discussions in the SCIENTIFIC AMERICAN in regard to steam boiler explosions and the records of accidents in our daily papers conduce to this feeling of insecurity. But really a toy steam engine standing on the table or the mantel and running at lightning speed is much less dangerous than a common kerosene lamp.

Probably few machines are simpler in principle or easier in construction than the steam engine. Of course a large machine, with all its appurtenances and its exactions, appears to be complicated, and it is so in one way; the larger the engine the more accurate must be the fit and working of the parts to hedge in and control the subtle element of steam. But a small engine, such as would be appropriate as a toy, may be built by the most ordinary mechanic; and it may be made plain, light, and cheap. The mechanic who shall introduce this as one of our mechanical toys may be assured of a handsome return for his outlay, while the public will be gainers in a familiarity with what is now thought by many to be a mechanical mystery and a dreadful agent of evil.

ENCKE'S COMET.

This celebrated comet is now expected to make its appearance again, and it is not improbable that it will be observed before this article is printed. As it will probably be much talked about, a few words in regard to it may not be uninteresting to our readers. Encke's comet was discovered by the astronomer Pons, at Marseilles, in 1818. Encke, however, was the first to calculate its elliptical elements, and hence his name has been given to it. One of the results of Encke's calculations was to establish its identity with the comets observed in 1786, 1795, and 1805. After its observation by Pons, Nov. 26, 1818, it remained in view until 1819, since which time it has been regularly observed at each return. Its period is approximately three and one fourth years. It can rarely be seen by the naked eye, and it then appears as a star of the fifth or sixth magnitude, exhibiting, under favorable circumstances, a faint nebulosity.

This comet is remarkable not only on account of its periodicity—many comets having no periods—but also on account of the fact that its period is shorter than any other known periodical comet. It also exhibits a peculiarity in its motion which has given rise to much speculation. Observation has shown that its period is constantly diminishing, at the rate of about two hours and a half for each revolution. A similar retardation has been discovered in the motion of other comets having short periods. It is argued from this fact that the orbits of these bodies are constantly shortening, and that they are gradually approaching nearer to the sun, upon the surface of which they must ultimately fall. The cause for this retardation is attributed to a medium existing in the interplanetary spaces, of such tenuity that it does not perceptibly affect the motions of the denser heavenly bodies, but which opposes resistance to the attenuated masses of comets, the amount of resistance being assumed to increase with the square of the velocity of the moving body. Herschel and many others have dissented from this hypothesis, and have attributed the retardation of its motion to the gradual loss of its tail. However, it has only twice been observed to present the appearance of a tail. In 1805 it was observed by Prof. Huth, of Frankfurt, when it exhibited a tail three degrees in length. In 1848 Professor Bond, at Cambridge, also observed a tail extending toward the sun. It appeared like a faint brush of light. This discovery attracted great attention, as it is very unusual for comets to exhibit any appearance of a tail in the direction of the sun. Some weeks afterward another tail was discovered extending from the sun, also very faint and about two degrees in length, the one first discovered still remaining visible. The same peculiarity was also presented in the appearance of the comet discovered in December, 1823. The projection of the tails of comets toward the sun completely upset many ingenious hypotheses which were supposed to approximately account for both the material and the direction of these singular appendages, and after ages of observation and speculation we are still in the dark as to the real nature of cometary matter. It is probable, however, that the spectroscopic will hereafter be used to great purpose in the solution of this problem. Indeed some facts have been already added to the former stock by its use, although nothing has been attained that can be considered a sufficient basis for a complete and satisfactory theory.

The orbit of Encke's comet lies wholly within that of Jupiter, and it performs nearly four revolutions to one of that planet. Its frequent proximity to the planets of our system, and its small relative weight, give rise to marked perturbations in its motions, which have furnished valuable data for the determination of the masses of those bodies. By the use of these data important corrections have been made in previous computations of the respective masses of Jupiter and Mercury.

The observation of this comet has confirmed the truth of the assertions of Hevelius and Newton, that the volumes of comets contract as they approach the sun, and enlarge as they recede from it. This is accounted for by the supposition that the heat of the sun disperses the exterior portions until they become invisible from their extreme attenuation. As the comets pass into colder regions, the reverse takes place.

We have said that the period of Encke's comet is shorter than any other known. The comet of 1264 is supposed to have the longest period of any known, it being over three hundred years, making some allowances for imperfect data and calculations. The distance traveled by one of these bodies in such a period, flitting through the heavens at rates far exceeding any other of the heavenly bodies, is beyond all human conception. What wide and obscure regions are visited by them after they have disappeared from human observation, to what unknown systems and mysteries of space they penetrate, must forever remain a subject of doubt and speculation to the human mind. We may in a future article say something in regard to other remarkable comets, and the hypotheses to which we have alluded.

SHOULD THE PATENT LAWS BE EXTENDED TO HORTICULTURE.

Under the above caption the *The Horticulturist* discusses the value of the Patent Laws and suggests an extension of their benefits so that they may do for the farmer, the florist, and the horticulturist what they have already done for the mechanic. Our cotemporary says, let there be, in connection with the Agricultural Bureau, an office of record, where the name, character, quality, description, etc., of new varieties of fruit and grain, originating in this country, shall be entered and secured to the originator. Let specimens be sent to trustworthy correspondents of the bureau in various sections of the country, so that its value for general cultivation may be determined. Let the result thus arrived at be publicly

announced under authority of the bureau, and the right to vend the article be vested in the originator and his licensees for a term of years. Something of this kind would wonderfully stimulate to continued improvement in the production of choice varieties of plants and grains to the great advantage and profit of the country. While it would secure to the originator the just reward of his skill and labor, it would protect the public from the thousand impositions now put upon them by the vendors of new varieties of untried and doubtful value. As this business is now conducted, we have no hesitation in asserting that many thousands of dollars are annually thrown away in the purchase and planting of fruits, for example, which, however valuable they may have proved in their original locality, are totally unprofitable and useless for cultivation in other sections under an altered condition of soil and climate.

We know of many instances where other deserving horticulturists and agriculturists, who have devoted their best years to the public good, have had only their labor for their pains; other persons, to whom they have sent specimens of their plants, in various sections, to test their value, having stepped in to rob them of their reward. Every year the nurserymen of the country are mulcted in large sums of money for the purchase of new and professedly valuable plants, which too often prove of little or no value. These being sent out at extortionate prices, for general cultivation, and failing to answer the expectations excited by the glowing descriptions published of their merits, tend to discourage cultivators and bring the profession of Horticulture into disrepute. Were some such system adopted as we have suggested, however, the honest experimenter would be protected in the product of his labor, and the prices of new plants would be set at a more reasonable figure, so as to be within the reach of all, because the originator would, instead of, as now, being compelled to realize his profits out of his first season's sales, be secured in their enjoyment for a term of years.

We know it may be urged that such a provision as this has never yet been incorporated into the Patent Laws of any nation; but of its necessity, its justice, there can be no question. As the United States, by its greater liberality to inventors, has stimulated the arts and sciences, and added to the industrial wealth and resources of the people more than any other government in the world, let it go one step farther and by judicious legislation, stimulate the husbandman to take rank among the highest order of productive agents, and elevate and dignify that profession which, however much lauded by poets and extolled by politicians as an ennobling one, has heretofore been of the earth, quite too earthy.

THOUGHT AND EXPRESSION.

The eyes have been called "the windows of the soul." They are not only windows, but they and all the other organs of sense are doors by which impressions and ideas obtain ingress to the mind. The organs of speech, the hands, the muscles of expression, and the eyes, are the doors through which thought passes out of one mind to enter another. The perfection of these mind-valves has, probably, as much to do with what is commonly called mental vigor as quality of brain or its size. We think in language, and the more limited our language, the more limited must be our thinking power.

It is not essential to thought, however, that we should think in language of our own. We may think, in the language of another, thoughts which our limited means of expression are inadequate to utter. This is the case with mutes who possess the sense of hearing. They know and think in a language which they cannot speak. The same is true of animals to a very limited extent. If the mind of man were only accessible through such channels as that possessed by the dog, and if his means of expression were equally limited, it may well be doubted, whether the texture of his brain would enable him to exhibit higher mental manifestations than that animal.

It is possible that in the search for the causes of man's mental superiority to animals, too much stress has been laid upon the differences in the constitution of the brain, and too little attention has been paid to the effect upon mental development produced by his vastly superior physical organization.

We once heard an eminent professor, in a lecture upon the brain, make the statement, that the proportion of gray vesicular nerve matter which is found upon the surface of the white substance which forms the largest portion of the mass of the brain, was an index of the intelligence of animals, and that as the depth of the convolutions upon the brain increased its surface, such animals as possessed deeply convoluted brains would be found to possess a higher degree of sagacity than those having brains of more even surface. As an instance, he mentioned the horse, and declared that on account of his deeply convoluted brain, he possessed greater intelligence than any other animal.

We think the majority of our readers will hardly believe that the horse is more intelligent than the dog, or the elephant. We feel certain, however, that a dog will express such ideas as his limited powers permit with greater facility than the horse. As to how far physical organization influences mental manifestations, it is difficult to say, but that it has more effect than is usually attributed to it seems probable.

MEASUREMENT OF HIGH TEMPERATURES.

We have lately received several communications requesting information in regard to the best means of measuring high temperatures in kilns and furnaces. We reply to these queries, that Daniell's Pyrometer is undoubtedly the best instrument for the purpose. The well-known Wedgwood's Py-

rometer was the first used, and its operation depends upon the fact that clay, when highly heated, parts with some of the water which it always contains, and new chemical combinations take place which result in its permanent contraction. Wedgewood assumed this contraction to be in a ratio to the degree of heat employed, but this has been found by subsequent experiments to be erroneous. The amount of contraction corresponds to the time the clay is exposed, rather than to the degree of heat, and is found to vary also with the character of the clay used.

Daniell's Pyrometer consists of a bar of platinum inclosed in a sheath of black lead (graphite). The expansion of the platinum is indicated on a graduated arc. From the known rate of the expansion of platinum, the degree of heat may be computed. Platinum expands .000884 of its entire length from 32° Fah. to 212° Fah. It will be sufficiently accurate for ordinary purposes, to consider the rate of expansion as having the same ratio to the increase of heat for high temperatures, although not absolutely correct. There are other pyrometers in use, but for practical purposes we prefer Daniell's.

THE PROPOSED SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

The islands of Manhattan and Long Island are separated by an estuary connecting the waters of Long Island Sound with those of the harbor and bay of New York. It is generally but incorrectly designated a river—the East River. The connection between the two cities is by a series of ferries, which during the most of the year afford sufficient accommodation, but when the estuary is encumbered by ice, are entirely insufficient for the convenient accommodation of the people. The subject of a bridge between the two great and growing cities is not new, having been discussed for many years. Only lately, however, have any steps tending or looking to a decisive result been taken. A charter from the legislature, preliminary surveys, and estimates sum up the work done and exhibit the present condition of the project. The city of Brooklyn in its short-sightedness, has unwisely refused to make any appropriation for carrying forward the enterprise, and the work at present remains in abeyance. The engraving gives an excellent view of the proposed bridge, which will eventually be erected by private enterprise, even if municipal aid is not furnished. The following succinct description we copy from *Leslie's Illustrated*:

The engineer, Mr. John A. Roebling, a Prussian by birth, is a resident of Trenton, New Jersey. His reputation as a bridge builder has been established by the most successful practical illustration of his abilities in this country. Under his direction were built the suspension bridges at Niagara and that triumph of engineering skill, the bridge across the Ohio, at Cincinnati. The more stupendous enterprise in contemplation can be safely entrusted to a man whose credentials are the massive and beautiful structures already reared by his master hand.

The terminus of the bridge on the Brooklyn side, by the terms of the company's charter, must be at or near the junction of Main and Fulton streets.

The New York terminus: The Park line commences opposite the Registrar's office, on Chatham street, then crosses North William, Rose, Vandewater, Cliff, Franklin square, Cherry, Water, Front, and South; thence to the end of the old Pier, No. 29, now broken down, the line continues in a straight course across the river, and passes on to the Brooklyn shore, nearly through the centre of the spare slip of the Fulton Ferry Company; thence passing over Water, Dock, and Front; a part of James street, near Garrison will be occupied by the Brooklyn anchorage. Leaving the anchorage, the line continues to pass over James, and then crossing York and Main streets obliquely, deflects toward Fulton. After crossing Prospect, near its intersection with Fulton, it terminates finally in the block which is bounded by Fulton, Sands, and Washington streets.

The total length will be 5,862 feet. The central, river span, will be suspended on one swing of 1,600 feet from centre to centre of tower. Those parts between the anchorages and the respective termini are technically called "approaches." The streets will be crossed by iron girders at such elevation as will leave them unobstructed. The iron framing forming the floor of the bridge will be 80 feet wide. This will be divided into five spaces. The two outside spaces will be 15 feet wide between the chords, and will form a roadway for all kinds of common travel. The next spaces will be 13 feet wide. On it will be laid steel rails for running cars back and forth alternately. These cars are proposed to be operated by an endless wire rope, impelled by an engine under the flooring on the Brooklyn side. The degree of speed attainable by these cars is put at twenty miles an hour as the minimum rate. Twice that speed is declared to be perfectly practicable and safe.

The fifth division of the bridge is called in the plan proposed the "Elevated Promenade." It is intended exclusively for walkers. At each terminus, the bridge floor is widened out to 100 feet; this central promenade will be 17 feet wide. The carriage of the bridge is based upon the carriage of the Union Ferry Company. This corporation officially figures its passengers at 40,000,000 yearly. This averages 109,589 per day. It is plain at least this number can be passed over the bridge and many more.

The dimensions of the towers will be a base of 134 feet long, measuring on the water line, and a width of 56 feet in the extreme part. Below the upper cornice, at the top of the tower these dimensions will be reduced to 120 and 40 feet. One of these towers is shown well in the foreground of our picture, and the architectural details will be apparent. The elevation of the flooring of the tower will be 118 feet above

high water; the height of the roofing above the floor will be 150 feet; thus the total height of the towers will be 268 feet from high water to top of roof, not including balustrade and ornamental blocks. The towers will be built hollow. The impression of the whole will be that of massiveness and strength.

The cost of the bridge will be between \$6,000,000 and \$7,000,000. The engineer's estimate is \$6,675,357. Great as this amount, there can be no doubt that it would be advantageously and profitably applied in the construction of this grand hanging thoroughfare between the two great cities.

HYDROPHOBIA.

It is customary to regard the midsummer as tending to increase the prevalence of hydrophobia, and extra care is taken at this season to prevent danger from this cause by confining and muzzling dogs, if they are not otherwise finally and summarily disposed of. The practice of killing dogs upon the arrival of summer heat is of ancient date, and has the sanction of custom to recommend it. Some have, however, expressed the opinion, that dogs are no more liable to attacks of rabies at this season than at any other, and no doubt there have been enough cases which have occurred in colder portions of the year to justify in some measure such an opinion. If, as has been stated, this terrible disease originates in the first instance from excitement consequent upon the ungratified sexual instinct of the male dog, it is hard to see how the excessive heat of July and August, in this latitude, could fail to aggravate such excitement, and thus assist the development of the disease.

Whatever may be its cause at the outset, its propagation by the contact of the saliva of the diseased animal with the mucous membranes, or the abraded skins of man and animals, is certain. Some have, however, been so bold as to regard the sequences of bites from rabid animals, as the result of an imagination over excited from the terror which usually accompanies such occurrences, rather than as the results of infection. We were, however, personally cognizant of a case which could not thus be accounted for. A young man of our acquaintance, upon returning to his home one evening discovered a strange cat upon the steps of his house. He playfully ordered it away, accompanying his speech with a gesture as if about to strike, upon which the cat seized and bit his hand, not, however, very severely. The next day he went about his usual business, scarcely incommoded by the wound, and without the least suspicion of the real condition of the animal, or of the terrible consequences that were to follow. Weeks after, the wound having entirely healed, and the circumstance being nearly forgotten, he suddenly manifested symptoms of hydrophobia, and died after three days of terrible agony. We deem this case as conclusive, that rabies is the consequence of infection. There may be, and undoubtedly are, cases where terror induces an hysteria, which strongly resembles genuine hydrophobia, but this is not by any means the rule in a large majority of cases. The disease is so appalling in its nature, that such terror is not to be wondered at, especially among people who are unaware that the bite of a mad dog does not produce hydrophobia in more than about one in twenty-five instances. When the disease is developed, it may be regarded as fatal, good authorities inclining to the belief that in cases of supposed recovery, the disease is simulated by hysteria accompanied with tetanic symptoms.

The muzzling of dogs, by the use of a strap tightly buckled around the jaws, is a bad practice. It causes the dog a great deal of unnecessary suffering, and, by preventing him from cooling himself by thrusting out his tongue, adds greatly to any febrile condition of the body, which he may chance to be laboring under. If any muzzle at all be used, it should be one of reticulated wire, and sufficiently large to admit of his opening his mouth wide, and permit his drinking as freely as he could do without it. Such muzzles are not only safer, but more comfortable to the dog.

The only certain preventative of ill results from the bites of rabid dogs, is to cut out completely the wounded part, before the poison can be absorbed. It is recommended in order to do this quickly and thoroughly, that a stick be whittled to a shape resembling a dog's tooth, and inserted in the wound. This supports the part and renders the cutting more easy and certain. This should be followed by cauterization, either by the use of a hot iron, or some strong caustic substance.

Dogs, if they must be kept, should not be over-fed upon a stimulating diet of meat, and bones especially should not be given them, as the phosphate of lime they contain greatly stimulates the sexual instinct. Indian meal, made into a pudding, is eaten, when cold, with relish by most dogs, and used with thickened sour milk, it contains so much of what is required for the proper sustenance of the dog, that meat will be seldom required. A dog kept in this way will rarely become spontaneously rabid. A large majority of the dogs now kept are, however, a nuisance, and would be much better out of existence.

THE HORSE AND APPLIANCES FOR HIS USE.

So far as is known the earliest employment of the horse was for purposes of war. The ancient Egyptian chariot was drawn by two horses, attached to the chariot by a yoke suitably supported by straps, to which the pole of the vehicle was secured. To this harness were appended a breast strap and girth fastened to an ornamented saddle, a head stall with frontal, cheek-straps, a noseband, a bit with cheek pieces, and reins for the guidance of the animal. The whip consisted of a wooden handle and a double thong, with a loop whereby it might be suspended from the wrist while the warrior

was using his bow, the reins being often tied around the body.

It is impossible to determine when the horse was first used for riding. There is reason, however, to believe that it was at a very early period in the world's history. It is referred to in some of the most ancient books extant. Xenophon mentions a double bridle and bit in his work upon Horsemanship. One bit was smooth and flexible, the other was armed with sharp points. The original method of guiding horses was, however, by means of a cord passed through the mouth and around the lower jaw—a method still practiced to some extent, under circumstances where bits of iron cannot well be obtained. Horses were anciently ridden bare-backed, or supplied with a cloth thrown over the back.

The invention of the saddle for riding purposes has been ascribed to the Persians, but there is probably room for some doubt as to its true origin. It is not certain that it was used before the fourth century of the Christian era. The first accounts of stirrups date from the fifth century. Spurs were early used among the Romans, but their precise origin has not been ascertained. The ordinary stable equipments, including the currycomb, brush, scraper, rake, sieve, and shovel, are also of ancient origin, although they, like other things, have been much improved in their form and materials in modern times. It will be seen from these facts, that appliances for the management and use of the horse, are mostly of ancient origin. We believe there is still room for improvement in means for the more efficient use of this noble and often ill-treated animal.

DEATH OF MOSES Y. BEACH.

We record with regret the decease of Moses Y. Beach, Esq.—father of Mr. A. E. Beach, of the *SCIENTIFIC AMERICAN*—at Wallingford, Conn., July 19th, in the 69th year of his age. He was a man of generous impulses, quick perceptions, great industry, and superior ability. He was in every respect a self-made, self-educated man. At fourteen he was an orphan, and learned the trade of cabinet maker at which he worked for many years. He was one of the builders of the first stern-wheeled steamboats on the Connecticut river at Springfield, Mass.

Afterwards he became the proprietor of a paper making establishment up the North River, supplied paper to the newspapers here, which finally led to his purchase of the New York *Sun* establishment. When Mr. Beach carried on paper making one of the large items of cost was that of cutting the rags. This was done by hand, the rags being spread on benches along which ranks of women were employed, each with a large knife fastened horizontally in front across which the rags were one by one drawn. It was a slow and tedious operation. Mr. Beach very quickly overcame the difficulty by inventing a rag-cutting machine, somewhat on the principle of the straw cutter, for which he received a patent. One machine does the work of a thousand hands and this plan of cutting is now used in all paper mills.

Moses Y. Beach was extensively known throughout the country in connection with the New York *Sun* newspaper, of which he was the sole proprietor for nearly twenty-five years, and which under his administration became very popular, rising from a small edition to a circulation of over 50,000 copies, at that time the largest edition of any daily newspaper in the world. This was before the days of telegraphs, or many railroads, when the newspaper folks had to work hard to obtain news; and the rival publishers often resorted to strategy to get ahead of each other, employing horse expressmen, steamboats, and carrier pigeons. Mr. Beach was most energetic and successful in this respect, and the *Extra Sun*, containing important intelligence, hours in advance of other newspapers, used to be a familiar cry, in the streets of New York. Mr. Beach acquired a handsome fortune and retired from business several years ago.

During the Mexican war at the request of the President he went to the City of Mexico as Commissioner to negotiate for peace. This was an exceedingly delicate and hazardous mission.

Rigorous Apprenticeship.

Few persons have looked into the lives of so many remarkable men as I have, yet I cannot call to mind one of the acknowledged kings of business who did not in early life serve a long, rigorous apprenticeship to some occupation akin to that which he afterward exercised, and in which his great success was made. All my acquaintance with business men teaches me that the fundamental secret of success is KNOWLEDGE—real knowledge—such knowledge as is only practically acquired by becoming practically familiar with methods and processes—such knowledge, in fact, as a man gets by taking hold of work, and doing it until he can do it easily and perfectly. I should be sorry to say any thing to disparage our institutions of learning. Nevertheless, I feel confident that an intelligent youth, who remains at school until he is sixteen or seventeen, and then apprentices himself to a good trade, can get a better education out of his shop (with an hour's study of principles in the evening) than it is possible to get in any college in existence—that is to say, a better education for this new and forming country, where, for at least fifty years to come, no man can hope to play a leading part, except in wielding material forces.—*Parton, in Packard's Monthly.*

THE Commissioner of Patents has refused to grant to the heirs of the late James A. Catling an extended term of the so-called Bromine patent. Photographers will readily perceive the importance of the action of the Commissioner in this matter.

Editorial Summary.

BUTTER MAKING.—It is as easy to make sweet butter as that which is rank and offensive. Sweet cream and ordinary care in the processes of churning, working, and packing can produce but one result—good butter. One common fault is keeping the cream too long, for the sake of accumulating a sufficient quantity for a "big churning." Another is in raising the cream in a place where offensive exhalations or otherwise impure atmosphere can reach it, and another in churning in a room too warm. Sixty degrees Fahrenheit is the proper temperature for churning. Clean pans, pails, tubs, etc., are absolutely necessary to sweet butter, and one ounce of salt to one pound of butter is ample.

TRANSPARENT METAL.—From one of our German exchanges we copy a statement that a transparent metal has been discovered, the component parts of which are water-glass and copper: "It is of a deep orange hue, can be melted and cast, wrought under the hammer, and rolled. Files will not scratch it; it is translucent, and capable of being wrought into ornaments of rare beauty." Evidently a chemical canard, unworthy of serious notice.

AN exchange recommends as a preventive of the adulteration of drugs an increase of price, and claims that this would not prove burdensome to the poor, as the number of public dispensaries and the benevolence of practicing physicians, afford them ample relief. The profits on the retail drug trade are already sufficiently large, and we fail to see how its increase would affect the purity of the drugs sold. It is quite possible, also, that there are many poor people who prefer paying for what they need rather than to become the recipients of either public or private charity.

THE connection of Mobile Bay with the Mississippi River, via Bayou Manchac is being agitated by the citizens of Mobile. The expense of the work in order to make it practicable for large steamers is estimated at nearly \$4,000,000. Only one lock will be necessary. The feeling of the citizens of Mobile as indicated in resolutions adopted at a meeting held on the 11th inst. is highly favorable to the undertaking and it is probable that it will soon be commenced.

AN examination of the statistics of death from sunstroke in the city of New York, gives the following exhibit: In August, 1853, 224 persons died from sunstroke; in 1863, there were 135 deaths from the same cause; in 1866 there were 230 deaths from sunstroke, and during the present year up to Saturday, the 18th inst., there were no less than 833 deaths from heat alone, as reported by the papers.

PROF. TYNDALL concludes his memoir of Faraday with the following beautiful tribute to his memory: "You might not credit me were I to tell you how lightly I value the honor of being Faraday's successor compared with the honor of having been Faraday's friend. His friendship was energy and inspiration, his mantle is a burden almost too heavy to be borne."

PRUSSIA has shown her determination to become a first-rate maritime power, by making an extraordinary appropriation of \$7,152,374 for the year 1869, to be expended in the construction of fortifications at the sea ports she has just obtained, and in manufacturing heavy artillery and armored vessels. The amount to be expended at Kiel alone, is stated to amount to \$4,411,124, or \$2,514,842 more than in 1866.

THE *Courier Medico*, of Paris contains an able article upon infant mortality. It attributes it largely to the insufficiency of bone tissue, and says that the milk of a healthy nurse ought to contain more phosphate of lime—the basis of osseous tissue—than is often the case. Scarcely one in ten women come up to the proper standard in this respect, and as a consequence infants necessarily perish or grow up sickly or deformed.

SILK MANUFACTURE.—The silk mills of Paterson, N. J., are nearly, but not quite fully busy. The season for fringes is past. Some of the mills are engaged on trains. Paterson contains the largest silk manufactories in the country, capable of making anything from threads to trimmings. Some of them are now engaged on ribbons. We propose shortly to visit these mills, and to give our readers a more extended account of the silk manufacture as at present conducted in this country.

EXPENSIVE MATERIAL FOR MODELS.—One of our correspondents from Central City, Colorado sends us, as a model of his patent for deposition in the Patent Office, a horse shoe of solid silver, beautifully finished and elegantly engraved. It is made from native metal obtained in Colorado and is a solid specimen of the treasures now being revealed by the hardy miners in that region.

THE German philosophy is beginning to react upon the popular taste. According to recent statistics, novels and other works of light literature are much less called for than formerly, while the demand for works upon science is largely increased.

ACCORDING to the recently issued Register of the United States Navy it appears that we have now in the navy, two hundred and twenty vessels, of which fifty-two are iron-clad.

WE are in receipt of several interesting communications upon the subject of tides. We regret that owing to the pressure of other matter we cannot make room for them.

OFFICIAL REPORT OF
PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JULY 21, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On issuing each original Patent.....	\$15
On appeal to Commissioner of Patents.....	\$20
On application for Extension.....	\$30
On application for Renewal.....	\$30
On granting the Extension.....	\$50
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$20

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying use of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

80,046.—BRICK KILN.—Henry W. Adams, Philadelphia, Pa. I claim, 1st, The peculiar arrangement of the numerous and narrow heat distributing flues, y, at right angles to and in combination with the covered fireplaces, C, G, for receiving, dividing, and conveying their heat underneath the entire bottom of the bricks, when set in the kiln to be burned, substantially as described.

2d, The air flues, H H D D, in combination with the openings, G G F F, into the fire places, C, C, substantially in the manner and for the purposes set forth.

3d, The steam pipes, R S T T, in fig. 1, and passages, F F, and flues, E E, in fig. 2, in combination with the fire places, C, C, for the objects indicated, and substantially in the manner shown.

4th, The arrangement of the pipes, p, c2 c2, of oil, oil, and o, in combination with a covered brick kiln, for exhausting the smoke and gaseous products of combustion and superheated steam, in an equal and uniform method, from all parts of the kiln, for the objects described, and substantially as represented.

5th, The use of a jet of steam to create a draft at the top or end of the brick kiln, substantially as shown and for the ends proposed.

6th, The combination and arrangement of the exhaust pipe, o, when supplied with a jet of steam, the fireplaces, C, C, and with the air flues, H H D D, and with the openings, G G F F, and with the steam pipes, R S T T, in fig. 2, when they severally supply those vehicles of heat to the bottom of the kiln, which the steam jet, issuing from, o, pumps from its top, as herein substantially shown and described.

7th, The construction and operation of the brick kiln, substantially as shown and described, and for the purposes set forth.

80,047.—HAND-LOOM.—James Albertson, and Sample C. Byrnes, Cincinnati, Ohio, assignors to James L. Haven and James L. Branson, Cincinnati, Ohio.

We claim the combination of the driving shaft, having the sprocket-wheel, B, mounted thereon, and having the belt connected thereto by pitmen, E, with the cam shaft, having the sprocket-wheel, C, and the cams, n, secured thereto, when said parts are all constructed and arranged to operate substantially as described.

80,048.—ARTIFICIAL LEATHER BELTING.—Stephen M. Allen, Woburn, Mass.

I claim, 1st, The attaching, cementing, gluing, stitching, or uniting together of sheets of artificial leather belting or banding made from pulped animal fiber, tanned or untanned, used alone or in combination with other vegetable fiber or with other further combination with resinous or gelatinous substances.

2d, The attaching, cementing, gluing, stitching, or uniting together of artificial leather paper for belting, made from pulped animal fiber, tanned or untanned, alone or mixed in further combination with other pulped vegetable fiber, to sheets of common leather for belting, whether the sheets of leather are laid upon either one or both sides, or between sheets of artificial leather.

3d, The combination of sheets of artificial leather for belting, with sheets of leather, canvas, cloth, wood, yarn, iron, or wire, when properly attached together for the purpose, by gluing, cementing, riveting, or stitching the same.

4th, The overlapping and strengthening of joints in leather, artificial leather, or other belting, by the use of artificial leather sheets, set on and over the laps or joints in belting, by cementing, gluing, stitching, or stitching the same, substantially as within described.

5th, A belting made of pulped artificial leather, as described, by combining sheets made of the same to the other substances named, or any of them, as described, such as leather, canvas, cloth, wood, yarn, iron, or wire, properly attached together, in the manner and for the purposes substantially as described.

6th, The application of artificial leather, paper or veneer and increase the thickness and strength of leather belting by applying the same to the surface and thinner parts of leather belting, making them of uniform thickness, and nearly non-elastic, either when applied outside or between strips of leather, and confined substantially as herein described.

80,049.—KEY-BOARD FOR TELEGRAPH INSTRUMENT.—Wm. B. Allen, Boston, Mass.

I claim, 1st, The wheels, E, the uprights, D, D, one or two to each key, the roller, H, when constructed and operating as herein shown and described.

2d, The rod, M, in combination with the arms, N, or their equivalent, substantially as described for the purpose set forth.

80,050.—MACHINE FOR SHARPENING HOP POLES.—Truman S. Angel, Watertown, N. Y.

I claim a tool for sharpening sticks, stakes, and poles, consisting of the hollow frame of a cone of air, inserted longitudinally in its own conical rollers, and an adjustable oblique cutting knife, all constructed and arranged to operate substantially as described.

80,051.—CHRONOMETER.—Philip Bantel, New York City.

I claim, 1st, The combination of the shafts, B and O, one or both, and large gear wheel, D, said parts being constructed, as described, with the ordinary clock work of a chronometer, substantially as and for the purpose set forth.

2d, The combination of the shaft, B, with the screw pulley, G, and stationary screw, H, with cord, C, and shaft, I, substantially as herein shown and described, and for the purpose set forth.

3d, The swivel pulleys, I, and K, in combination with the cord, C, weight bar, J, and pulley, L, or its equivalent, substantially as herein shown and described, and for the purpose set forth.

80,052.—PORTABLE FENCE.—Benjamin F. Brattain, Noblesville, Ind.

I claim, in yoke herein described, when the same is constructed as aforesaid, in combination with a panel of fence, the rails of which are notched, as described a id for the purpose specified.

80,053.—MODE OF MULCHING STRAWBERRY BEDS.—Joseph Bratt, Geneva, Ohio.

I claim the mode of mulching strawberry beds by sowing thereon the seeds of plants, the stalks or blades of which are intended to serve as mulch therefor, substantially as set forth.

80,054.—FENCE.—R. W. Brockway and Henry Frederick, Akron, Ohio.

I claim, 1st, A crooked or angular rail fence, the joint of which rests upon a bed piece, A, with the uprights, C, C, fastened at or near one end of the bed piece, while the long end of the bed piece projects into the hollow of the angle of the fence, substantially as shown and described.

2d, The combination of the bed pieces, A, uprights, C, C, braces, G H, and angle legs, B, B, substantially as and for the purposes set forth.

80,055.—TOLE FOR VEHICLES.—Edmund D. Brown, Battle Creek, Mich.

I claim the arrangement and combination of the spring bow, G, and slotted arm braces, B, with each other and with an arm brace pole, A, substantially in the manner and for the purpose of adjustability, as set forth.

80,056.—MACHINE FOR SINKING SHAFTS.—John Dickinson Brunton, London, England. Patented in England, January 5, 1867.

I claim the construction and application of machinery of apparatus for sinking shafts and pits, and for driving or excavating tunnels, galleries, or shafts, wherein one or more cutting disks are caused to revolve on their own axis or axes, such axis or axes revolving round a center, which also revolves round another fixed center, substantially as hereinbefore described.

80,057.—APPARATUS FOR DRAWING MEDALS.—Louis Christoph, Paris, France, William Hawksworth, Garton, North Britain, and Gustavus Palmer Harding, Chislewick, England. Patented in England, April 19, 1867.

We claim the combination of the hydraulic or hydrostatic press, the collars or flanges, K, G, thereof, and drawing apparatus, substantially as hereinbefore described.

80,058.—CORN PLANTER.—Z. T. Clagett, Washington, D. C.

I claim, 1st, The diagonal shaft, F, and scraper, P, in connection with the cog wheel, E, constructed as described, the lever, O, spring, Q, slide, A2, axle, D, wheels, B, B, D, C, and H, and also the bar, H, constructed as specified. Also, in connection with the wheels, B, B, D, C, and H, the support, I, with lever, K, and catch, K', and spring, T, attached, working in the manner and for the purpose described. Operating together with slide, A2, slide, B, and lever, S, arranged as and for the purpose set forth.

2d, The arrangement of the arms, L, constructed with the wheels, L2, bars, L3, wheels, M, and cranks, M1, substantially as and for the purpose set forth.

80,061.—SHAFT COUPLING.—Wm. Crandall, Philadelphia, Pa. I claim, 1st, A coupling, composed of two halves, connected together on one side of the shaft by bars or links, B and B', or their equivalents, and on the opposite side of the shaft by set screws or bolts, all substantially as set forth.

2d, Arranging the said bars or links, or their equivalents, nearer to the shaft than the said screws or bolts, as and for the purpose set forth.

3d, The bars, B and B', embedded in the coupling during the process of casting the same, as specified.

4th, In combination with a grilling coupling, set screws, F, applied to prevent the end play of the shafts, as set forth.

80,062.—CUTLERY.—Edwin Day, Chicago, Ill.

I claim the handle, B, with the tang, a, inserted therein, and having the locking recess, c, or its equivalent, with the molten metal cast on them, so as to form the bolsters, m, straps, n, and the cross bar or tie, l, of greater diameter than the slit in which the tang is inserted, all at one operation, substantially as described.

80,063.—MANUFACTURE OF ICE.—R. S. Egbert, Colfax, Cal.

I claim forming artificial ice in houses or receptacles by spray, sprinkling or dropping water through a pipe or pipes, G, or vessels, pierced with holes, a, a, or their equivalents, substantially as described.

80,064.—STOCK-GUARD GATE.—W. C. Gault, Ruggles, Ohio.

I claim the weight or float, R, rose or chain, G, lever, F, and hook, I, as arranged in combination with the gate, A, substantially as and for the purpose set forth.

80,065.—FURNACE FOR ROASTING AND TREATING ORE.—R. George, Mineral Point, Wis.

I claim, 1st, An oxidizing, desulphurizing, chloridizing, and disintegrating furnace, as shown in the drawings, and detailed in the specification.

2d, A stirring machine, with all its parts, as illustrated and specified.

3d, A water and heating apparatus as illustrated, and for the purpose described.

4th, The substitution of fire-clay or porcelain tubes, or their equivalents, for the purpose of converting water into steam, and superheating the same.

5th, The cooling of the stirring machine, by air, steam, or water, used separately or combined, in the manner and for the purpose as described and set forth.

80,066.—VALVE COCK.—John B. Gibson, Cincinnati, Ohio.

I claim, 1st, The rubber rings, G and J, as arranged in combination with the valve, H, stem, E, and cap, D, as explained.

2d, The arrangement of stem, E, valve, H, recessed screw, N, and rubber disk, L, as and for the purpose set forth.

80,067.—HOISTING MACHINE.—Henry T. Goodling, York, Pa.

I claim the construction of a hoisting machine, arranged with a central post, B, turning on a head, K, provided with pulleys, L, windlass, and a pivoted screw lever, L, to base of post, B, combined substantially in the manner and for the purpose specified.

80,068.—MACHINE FOR CUTTING OFF NAILS.—M. Gormley, Wilna, N. Y. Antedated July 7, 1866.

I claim the shank, B, having arms, H, H, fingers, C, C, and opening, E, in combination with the sliding cutter, D, rods, G, G, and springs, all constructed, arranged and operating substantially as and for the purpose specified.

80,069.—MACHINE FOR BENDING PIPE.—Thomas J. Harrison (assignor himself and Geo. Allen New York City.

I claim the arrangement herein described of the formers, C, C, rollers, E, E, and bifurcated levers, D, D, on the platform, A, in the manner substantially as described, with the purpose specified and set forth.

80,070.—POTATO DIGGER.—Michael Henderson, Detroit, Mich.

I claim, 1st, The scow, A, connected with the bars, J and B, provided with transverse runners, O, and openings, I, when arranged and operating substantially as and for the purpose set forth.

2d, The cylinders, H, bars, K, and belts, L, when operated by belts, F, from pulleys, D, substantially as described, and for the purposes specified.

3d, The combination of the above named parts with frame, G, bars, K, brooms or brushes, A, secured to end shafts, N, and wheels, D, when constructed, arranged and operating substantially as and for the purpose set forth.

80,071.—INSOLE FOR BOOTS AND SHOES.—Robert Heneage, Buffalo, N. Y., assignor to himself and Ira K. Amisen.

I claim an insole for boots and shoes, attached or otherwise, consisting of an air-cushion or chamber with suitable attachments, as a new article of manufacture.

Also, constructing the sole with a perforated base plate or stiffener, a, an overlying air-cushion, b, and an outer covering, c, the cushion being united with the plate by cement or glue that passes through the perforations and holds on the opposite side, the whole arranged as described, and operating substantially in the manner and for the purpose specified.

80,072.—CLAW BAR.—Michael Hennessey (assignor to himself, and John Adams Crawford, N. J.

I claim the claw bar, B, and fulcrum, E, in combination with the claw bar, A, substantially as and for the purpose specified.

80,073.—PIANOFORTE.—Hiram Herrick, Boston, Mass.

I claim the improved arrangement of the sounding board, "the wrest-pin" block, and the bridges with respect to the rose frame and the strings, such sound-boards strings, wrest-pin block, and bridges, under such an arrangement, being placed underneath the iron frame and above the strings.

Also, the combination of the two separate cases, A, B, hinged together as described, with the action arranged on the lower one, and the sounding board and strings placed in the upper one as set forth.

Also, the combination of the auxiliary adjuster with the string, the tuning pin, and bridge.

Also, the improved arrangement of the tuning pins with the strings and wrest-pin block, or the same and the iron frame, the tuning pin, under such an arrangement, having its head to extend from one side of the said block, and having the string applied to the part which projects from the other side of the block, the whole being substantially as set forth.

80,074.—HOUSE SHOE.—John A. Heyl (assignor to himself, and John H. Wiggins, Boston, Mass.

I claim the connector, B, as described, that is as consisting of the jaws and toe and heel catches, arranged, constructed, and combined substantially in the manner and to operate with a hoof and with a shoe constructed essentially as set forth.

Also, the shoe as made or provided with toe and heel catch recesses to receive the catches of the jaws of the connector, B, constructed as described.

Also, the combination and arrangement of the standard, F, and its screw, g, with the shoe provided with toe and heel recesses to receive the connector, B, made in manner and so as to operate together substantially as specified.

80,075.—APPARATUS FOR TOWING VESSELS.—James Maze Kimer, Chester, England. Patented in England, April 4, 1867.

I claim, 1st, The combination and arrangement of the cleaver and its trunk with the hull of a vessel, so that the cleaver may be operated as described.

2d, The cleaver, constructed as represented in fig. 6, and as hereinbefore described.

3d, The arrangement of the tow chain, viz., so as to be fastened to a vessel near or below its keel as set forth.

4th, The combination and arrangement of the tow chain and the cleaver of a vessel to be towed, each chain being passed through and out of the cleaver as set forth.

80,076.—STOVEPIPE DRUM.—J. A. Lakin, Thompsonville, Ct.

I claim the arrangement of a number of radiating chambers, A, connected to the main pipe by means of the pipes, B and C, and operated by means of a damper, D, the parts being combined and arranged together in the manner herein shown and for the purpose set forth.

80,077.—MEASURING LUMBER.—Clement Littlefield, Kennebunk, Me.

80,161.—SHOEMAKERS' TOOL.—William T. Fisher, Roane county, Tenn.

I claim constructing the sides, A A, with jaws or projections, b b' and d d', for the purpose of combining with the pliers any suitable tool or device, substantially as described.

80,162.—LOW WATER INDICATOR FOR STEAM GENERATOR.—Lorenz Fulton, Edinburgh, Ind.

I claim 1st, The combination, with a low water indicator, or any equivalent thereof, of a mark, r, of an extra form, and recording plate, or its equivalent, when all combined and arranged together, substantially as and for the purpose described.

2d, The combination of the dial, J, index, K, pencil, p, pawl, n, and ratchet-wheel, m, whereby to register successively the occurrence of an inadequate amount of water in the steam generator, substantially as set forth.

3d, The combination of the pipes, A and B, with the valve, b, water space, C, pipe, D, v, and E, piston, F, rod, G, lever, H, pawl, n, ratchet wheel, m, index, K, and dial, J, substantially as described.

4th, The combination of the vessel, E, having the ledge, L, and the glass walls, e, e, with the piston, F, substantially as described.

80,163.—PESSEY.—C. R. Gorgis, Brooklyn, N. Y.

I claim 1st, The herein described improved pessary, consisting of the wrapper, A, provided with the circular portion, B, and the spring, C, substantially as and for the purpose described.

2d, The improved inserting instrument, consisting of the parts, b and c, provided with the pins, a and a', ratchet, d, spring pawl, e, and recess, g, and otherwise arranged substantially as and for the purpose described.

3d, The combination of the spring, d, with the inserting instrument, D, substantially as described for the purpose specified.

4th, The method herein described of inserting the spring, C, within the pessary, substantially as described for the purpose specified.

80,164.—HORSE POWER.—Michael G. Groff, Vogansville, Pa.

I claim the peculiar arrangement of the main wheel, A, and jack, O, with the horizontal or inclined shaft, T, B, having each two pinions, the gear connected by the shaft, M, which is provided with universal joints, substantially combined in the manner and for the purpose specified.

Also, attaching the spokes or arms, z, on the outer circumference of a wheel, O, which wheel has coars on both sides, which said spokes or arms are so curved as to admit the free action of a pinion, t, on each side of the face of said wheel, in the manner shown and for the purpose specified.

80,165.—STEAM GENERATOR.—Geo. Guy, Bay City, Mich.

I claim 1st, The aperture, f, in the crown sheet, a, and the valve, J, when arranged and operated substantially as and for the purpose described.

2d, In combination with the valve, J, arranged as described, the valve, K, substantially as and for the purpose set forth.

80,166.—CHAFE IRON.—Ephraim Hackett, (assignor to himself and R. West) Concord, N. H.

I claim a chilled iron chafe iron for vehicles, substantially as set forth.

80,167.—MELODEONS, &c.—Emmons Hamlin, Winchester, Mass.

I claim, in combination with a tremolo attachment and an exhaust bellows, a regulator valve or gate, operating substantially as and for the purpose set forth.

80,168.—MANUFACTURE OF WHITE LEAD.—Henry S. Hannen, Philadelphia, Pa.

I claim 1st, Subjecting metallic lead, after it has been treated in a chamber with acetic acid, to the action of carbonic acid gas, introduced near the bottom of the chamber, and at such a temperature that the proper degree of heat is maintained within the chamber without the use of heating apparatus.

2d, Subjecting metallic lead, during the process of its conversion into carbonate of lead, to the action of solutions of soda and carbonate of soda, substantially as and for the purpose described.

80,169.—WEIGHING SCALE.—Sandy Harris, Philadelphia, Pa.

I claim 1st, The beam, D, constructed substantially as described, in combination with the platform, E, provided with the connecting rod, J, in combination with the swinging frame or bail, J, operating substantially as and for the purpose set forth.

2d, The pedestal, A, constructed substantially as and for the purpose described.

3d, The platform, E, beam, D, pointer, F, weight, G, connecting rod, J, frame or bail, J, pedestal, A, neck, B, and plate, L, all combined for the purpose of forming a responding scale.

80,170.—HARVESTER.—Wm. O. Harrison, Chittenden, Vt.

I claim the arrangement of the gear wheel, G, constructed as described, hinged block, g, extension, i, bearing, h, pinion, f, and shaft, H, pivoting the finger bar to the machine, all constructed and operating as herein described.

80,171.—MILLSTONE DRESS.—Andrew C. Hartstock, Douglas, Ill.

I claim the millstone dress, composed of the distributing teeth, A, grinding teeth, B, circular furrows, a, and short angular furrows, b, constructed and arranged in relation to each other, in the manner and for the purpose, substantially as described.

80,172.—APPLE CORER.—Moses M. Hatch, Portland, Me.

I claim 1st, The corer, b, when attached to the knife, a, substantially as and for the purpose set forth.

80,173.—GOVERNOR.—John W. Hayes, Kittery, Me, assignor to himself and John G. Crockett, Portsmouth, N. H.

I claim 1st, In combination with a governor spindle, the sleeve, K, when constructed with the inclined planes, m, m, and wing, o, o, substantially as described.

2d, The interior cylinder, B, with its inclined bottom and the balls, p, p, arranged substantially as described, in combination with the sleeve, K.

3d, The transverse bar, i, on the spindle, C, in combination with the inclined planes, m, m, substantially as and for the purpose set forth.

80,174.—CHURN.—William H. Henderson, West Point, assignor to William H. Snider, Lena, Ill.

I claim the arrangement of the vertically reciprocating cross head, F, and end boards, r, with the oscillating perforated dasher leaves and stops, s', all these parts being constructed, arranged, and operating as described.

80,175.—SHAW CUTTER.—S. B. Hiles and J. B. Danner, Salisbury, Ind.

We claim the combination of the obliquely placed serrated knives, E E, in the sliding frame, D, with the horizontal stationary knife I, in the frame, A, and the rake, F, all constructed and operating as shown and described.

80,176.—BED BOTTOM.—Philip Hinkle, San Francisco, Cal.

I claim the combination of the rod, m, in the recess, bands, l and k, suspenders, j, bridge, h, wires, h, and slats, e, as herein set forth.

80,177.—METALLIC PAINT.—Franklin G. Holland, Washington, D. C. Antedated July 5, 1868.

I claim the combination of the within named ingredients, mixed in the several proportions as herein described, and for the purposes set forth.

80,178.—WATER WHEEL.—Franklin Hoyt and Aaron Denio, Montpelier, Vt.

We claim the adjustable inlet chute, B, and the extended outlet chute, C, provided with regulating vents, e, g, and arranged in relation to each other, and to the wheel, A, substantially as described, for the purposes specified.

80,179.—MACHINE FOR DRYING AND SCOURING SHEET METAL.—Charles E. L. Holmes, Waterbury, Conn.

I claim the arrangement of a machine for grinding, scouring, and drying sheet metal, of the rollers, f, h, revolving in a direction opposite to the direction of the passing sheet metal being operated upon, and rollers, g, i, having a vibratory motion, and all the rollers acting upon the surface of the metal while in a curved position, substantially in the manner described.

Also, operating the rollers, f, h, by means of the lever, m, cord, l, spring, h, and pivoted lever, i, substantially in the manner and for the purpose set forth.

80,180.—MODE OF ATTACHING CARRIAGE TOPS.—William Horrocks, Poughkeepsie, N. Y.

I claim securing the side iron of a carriage top to the supporting pin, A, by means of the separate pivots, a, as formed upon either of the disks, b, c, when it is over the pin, A, being clamped together upon the pin, A, by means of fast nuts, d, as herein described, for the purpose specified.

80,181.—MACHINE FOR PRESSING HATS.—Samuel Howard, Luton, United Kingdom of Great Britain and Ireland.

I claim the pump, h, acting directly upon the napkin, g, of the dome, e, and pump, i, which fills the cylinder, a, in combination with the clasp, a, b, and their connecting pipes, the whole being arranged in the manner and for the purpose described.

80,182.—FLY NET FOR HORSES.—Daniel W. Hurst, Petersburg, Va.

I claim connecting the ribs of a fly net by laces, each of which passes twice through one eye in each of the ribs, and forms two loops on the central rib, and one on each of the others, substantially as described.

80,183.—KNITTED FABRIC.—George Jolly, Roxbury, assignor to Charles W. Griffiths, Boston, Mass.

I claim the arrangement and combination of the series of ground yarns, a, b, c, and the series of stripe yarns, e, e, e, in the manner substantially as described, so as to produce a knit fabric, on which the stripe yarns will appear on one side of the fabric, and the parallel ranges as set forth.

80,184.—SLEEPING BERTH FOR RAILROAD CARS.—Agur Judson, Newark, N. J.

I claim 1st, The combination, with the lower plate, M, and its guide, of the upper plate, and its guides, substantially in the manner and for the purpose herein described.

2d, The combination, with the berths, of the fixed hanging pieces, F, having an opening, I, to receive the bolts which lock the berths to place.

3d, The arrangement, substantially as described, of windlass, cords, and pulleys in combination with the berths, whereby the latter may be raised and lowered.

4th, The arrangement, substantially as described, of springs within the berths, when supported and held in position by the plates, C C and M M.

5th, The arrangement, substantially as described, of a folding case or closet, substantially as and for the purpose set forth.

6th, The combination, with a car berth, of a hinged or pivoted curtain frame and self acting springs and catches, to hold it in position for use, substantially as set forth.

80,185.—GAME TABLE.—William Kell, Hastings, Minn.

I claim the improved game table herein described, when constructed and arranged substantially as and for the purpose set forth.

80,186.—WATER WHEEL.—William Kennedy, New London, Pa.

I claim the above described water wheel, having an upper and lower rim, and two sets of buckets, arranged in relation to each other substantially as described.

80,187.—SHAWL PIN.—William Knowles, Rockville, Ind.

I claim a shawl pin constructed of the bent arms, A B and C, attached to the band, D, substantially as described.

80,188.—HARVESTER RAKE.—Israel Lancaster, Baltimore, Md.

I claim 1st, The spring, O, rake head, m, pin, n, and stir, T, acting in combination, when used to regulate the movement of the rake head when passing over the cutter bar, and when constructed and operating substantially as described.

2d, The arm, g, provided with the pin, h, in combination with the pin, k, and block, l, which support the rake, m, constructed and operating substantially as described, and for the purpose mentioned.

3d, The arm, g, provided with the pin, h, the block, l, provided with the pin, k, and the guide bar, i, acting in combination when used to effect the purpose mentioned, d, and when constructed substantially as described.

80,189.—PLOW.—John Lane, Chicago, Ill. Antedated March 31, 1868.

I claim 1st, Forming a dove tail, tapering, open groove, matrix on the side of a removable slip plow point, substantially as described and for the purpose shown.

2d, The particular form and construction of the slip point, as arranged and described, and for the purpose shown.

3d, Forming an I constructed slip point, as shown and described, and claimed above, with a fin cutter, as arranged and shown.

4th, The particular arrangement of the share, G, lands, E, and landside, D, as shown, in combination with the above described, and above claimed slip point, either with or without the fin cutter, as described and for the purpose shown.

80,190.—CURRY COMB.—John W. Lacher, Albany, N. Y. Antedated July 18, 1868.

I claim forming a series of rows of teeth, b, from one block, substantially as shown and described, and for the purpose specified.

80,191.—CAR REPLACER OR GUIDE RAIL.—John P. Lipps, assignor to himself and Henry Gayer, Newark, N. J.

I claim a railway guide rail or car replacer, constructed with a portion which embraces and clings to the rail, a groove for the car wheel, and a pin or pins for securing the device to the cross-tie, substantially as shown and described.

80,192.—STILL.—Henry C. Lloyd Cincinnati, Ohio.

I claim 1st, The arrangement of chambered still, A B C and D, doubler, O and Q, condensers, U U', and vapor pipes, N P H and E, substantially as and for the purpose set forth.

2d, The condenser, U U', or its equivalent, having the discharge cock, X, in the double below the inlets of the escape pipes, V, as and for the purpose explained.

3d, The provision of exhaust and live steam injection pipes, I and J, in the lowest chamber of series, A B C and D, with their described or equivalent accessories, as set forth.

80,193.—WASHING MACHINE.—Lucius M. Lull and Philander C. Bowen, Altoona, Ill.

We claim the arrangement of the open frame, A, provided with the screw bolt, B, to which is connected the block, C, with the frame, E, concave bottom, F, rollers, H H, which are provided with pins, K K, and spiral springs, I I, the whole being used with the cylinder, D, as and for the purpose herein set forth.

80,194.—COOKING STOVE.—John Magee, Chelsea, Mass., assignor to Magee Furnace Co.

I claim a warming closet, B, placed under the hearth of a high-hearth stove, substantially as and for the purpose set forth.

Also, the warming closet, B, the top of which is provided with a movable floor, in the manner and for the purpose described.

80,195.—SKATE FASTENING.—Edward C. Mayloy, Rochester, N. Y.

I claim 1st, A clamp made with a flange on the upper edge, turned inward, an adjustable to any thickness of sole, or means of the screw or its equivalent so that the flange will press tightly upon the upper edge of the sole.

2d, The combination of the segmental arms with the T-headed bolt, t, and clamp slide, b, with the thumb nut, constituting the sliding bar, by which all the clamps are adjusted and tightened as before.

3d, Forming a sliding bar, connecting the segmental arms by means of a bolt and nuts, as shown in fig. 5.

80,196.—DRESS AND SATCHEL HOLDER COMBINED.—George McFadden, Thomson, assignor to himself and Richard Austin, Plymouth, Conn.

I claim an article of manufacture, a combined dress and satchel holder, consisting of the hook, G, eye, D, spring arms, a, rings, b, and sliding clasp, E, all arranged and operating as set forth, when all said parts, except the clasp, E, are made of one piece of metal.

80,197.—PAPER SACK KNIFE.—L. H. Mealey, Alpha, Ohio.

I claim the within-described device, consisting of a bobbin or spool formed handle, C, upon which the cord is wound, in combination with a cutting blade B, operating in the manner described.

80,198.—MACHINE FOR HEADING BOLTS.—Wm. Melville, Peterson, N. J.

I claim the improved bolt and rivet heading machine, consisting of the oscillating holder, L, carrying the cutter, N, of the stationary die, G, and reciprocating die, E, and of the reciprocating punch, I, all made and arranged substantially as herein shown and described, and combined with the two cam shafts, B and C, and springs, g and f, respectively, in the manner set forth.

80,199.—HORSESHOE.—G. B. Milligan (assignor to T. Poulney), Baltimore, Md.

I claim an expanded false shoe, provided with interlocking projections, adapted to suitable depressions in the permanent shoe, or the equivalents thereof, for the purpose of firmly securing the roughing or false shoe and the permanent shoe together, as and for the purposes set forth.

Also, the employment of an lat-rolocking lip or hook, x, in combination with the false shoe, and adapted to operate in the manner and for the purposes substantially as described.

80,200.—BUREAU TRUNK.—A. L. Mora, New York city.

I claim the bur-trunk, constructed as described, its top, A, being hinged at its back to the body of the trunk, and provided with interior compartments and a flange around its lower edge, when the doors, B, which cover the drawers, are hinged to the front sides of the ends of the trunk, and are held closed by the flange of the cover, which said cover is locked at two points by means of one lock, all arranged as described for the purpose specified.

80,201.—WAGON BRAKE.—William B. Morgan and J. H. Terrell, Antioch, Ind.

I claim the combination of the arm or lever, M, connecting box, N, and pivoted lever, O, with the rock bar, J, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the stationary bar, D, short levers, F, rock bar, J, arms or levers, K M L, connecting rod, N, and pivoted lever, O, with each other, substantially as herein shown and described and for the purposes set forth.

80,202.—STUMP JOINT FOR CARRIAGES.—F. B. Morse, New Haven, Conn.

I claim 1st, A stump joint, consisting of the two parts, A and B, joined by the plate, C, and pivoted, d, when the said plate, A is arranged and fitted into the parts, A and B, so as to operate in the manner specified.

2d, In combination with a stump joint, the outer or plates, D D, arranged upon opposite sides of the joints, substantially in the manner herein set forth.

80,203.—COAL SCUTTLE.—Orrin Morse (assignor to C. H. Morse & Co.), Rochester, N. Y.

I claim a coal scuttle having the bonnet cut away on both sides in such a manner and to such a degree as to enable the devices to pack and to discharge coal properly in a side opening, as specified.

80,204.—CIGAR MACHINE.—C. Muller, Albany, N. Y.

I claim 1st, The combination of trough, W, with the curved metallic plate, W, or its equivalent, substantially as described, and for the purpose set forth.

2d, The combination of drum, A, hoppers, D D' P' and R' H', scale pan, E, ratchet wheel, B, levers, H and I and M, and N, substantially as and for the purpose set forth.

3d, In combination with the subject matter of my third claim, the trough, W, the curved plate, W, and core, f, and weight, g, substantially as shown and described.

4th, The within-described process of manufacturing cigars, substantially as shown and in the manner set forth.

80,205.—LIGHTNING ROD.—G. W. Otis, Lynn, Mass.

I claim the lightning conductor described, consisting of several strands of angular metallic wire laid into a rope, all as and for the purpose described.

80,206.—SELF-PROPELLING VEHICLE.—O. D. Padrick, Shelbyville, Ind.

I claim the application of springs, S, spring cases, G, spur wheels, p', and spur wheels, h, to shafts, o, which are supported upon standards, P, upon the axle, C, in combination with the spur wheels applied to the hubs of wheels, B', and with means for sliding up said springs, S, substantially as described.

2d, The arrangement of propelling devices, which I have described, on both sides of the center of the rear axle, C, upon standards, P, which can be readily removed from said axle, in combination with the winding-up rod, E, applied to and supported by a removable plate, F, substantially as described.

3d, In combination with driving spurs, h, n, and the devices which operate these spurs, inakes, C, applied so that they can be caused to act upon said spurs at pleasure, for stopping and starting the vehicle, and regulating the speed thereof, substantially as described.

4th, The lever, at, applied to the rod, a, on the front axle, C, and arranged as described, in combination with a catch plate, H, and a vehicle which is adapted for being propelled, substantially as described.

80,207.—MANUFACTURE OF WATER-PROOF TEXTILE FABRICS.—A. J. Farar, New York city.

I claim the asphaltic cloth herebefore described, consisting of the combination of a textile fabric with albumenized asphaltum, substantially as before set forth.

80,208.—BUREAU BEDSTEAD.—Andrew Parker, New York.

I claim a bureau bedstead composed of a head piece, A, and foot piece, C, united by a hinged frame, D, and provided with a hinged flap, B, which, when folded up, is retained by lips, a, on the head piece, and which when folded down, catches over V-shaped projections, e, on the foot-piece, as shown and described.

80,209.—ESCAPEMENT.—J. V. D. Patch, Brownville, Neb.

I claim the laterally acting pallets, a and b, spring d, and pendulum rod, A, all substantially as shown and described, in combination with the verge wheels, H, and pendulum, C, or a clock, all as and for the purpose set forth.

80,210.—STOVEPIPE SHELF.—John Perham, Rockton, Ill.

I claim 1st, An improved metallic extension stovepipe shelf, A, constructed and arranged with the extension device, as shown, made in one or more parts, to operate substantially as described.

2d, An improved metallic stovepipe shelf, provided with and operating by means of grooved or sliding ways, to allow of an extension of the size of the shelf by elongation or lateral enlargement.

3d, The peculiar shaped adjustable grooved or slotted collar, B B C c, in two parts, when constructed and arranged to operate substantially as set forth, for the purpose described.

4th, In combination with the foregoing, the screws or bolts and nuts, D D', and radial arms and circular ribs, substantially as shown, with guard stops, of the shaft, A, when the whole is constructed and arranged substantially as herein set forth and described, to operate as specified.

80,211.—WASHING MACHINE.—John Phillips, Jr., Georgetown, Mo.

I claim the zigzag groove, a, in the wheel, B, and the pin, c, of the arm, C, to which the rubber is attached, fitting in said groove, in combination with the sliding table, E, all arranged to operate in the manner substantially as and for the purpose set forth.

80,212.—SHAFTING.—L. F. Pitcher, Salina, N. Y.

I claim the non-revolving bent shaft, S, when made and applied for the purpose aforesaid, substantially in the manner above described.

80,213.—HORSESHOE.—I. R. Potter, Dartmouth, Mass.

I claim 1st, The shoe, A, as described, with raised edge, C, and studs, E, E', the removable calks, B B', made in sections or continuous, with edge continuous or indented.

2d, Forming and applying the calks so that the bearing edge will be flush with the wall of the hoof.

3d, Carving the calks at the heel and toe, as shown.

80,214.—THILL COUPLING.—I. R. Potter, Dartmouth, Mass.

I claim making the clip, C, with projection, e, and slot x, on and in one jaw of same, and the thill iron, D, with projection, a, and arbor, d, made so as to operate substantially as and for the purpose specified.

80,215.—MOVABLE WINDOW BLIND.—Niels Poulsen, Washburn, D.

I claim 1st, The pivoted bars or links, A A', for elevating or lowering a pivot blind, and permitting the tilting of the slats, B, when lowered, substantially as and for the purposes set forth.

2d, The arrangement of two or more slats, B, on each of the bars, A, to avoid the blind to fold within a small vertical space, as explained.

3d, The combination of the hinged bars, A A', pivoted slats, B, connecting bars, I, and tilting cords, chains, or rods, K K', substantially as described.

4th, The combination of the inclined elevating cord or chain, L, hanger, N, guide pins, F', vertical grooves, G, and fastening, C P O, with the bars, A A', and slats, B, for the purpose of raising and lowering the blind, and locking it securely in its raised or closed position.

5th, The plate, E, in combination with the hinged bars, A A', and with the box or recess for inclosing the folded blind out of sight, as described.

80,216.—SPINNING MACHINE.—J. M. Pusey, L. Pusey, and E. Pusey, Wilmington, Del.

We claim 1st, The combination with the spindle of the spring bearing on the spindle, to hold and steady the same, substantially as described for the purpose specified.

2d, The combination of the spring, G, the connecting rod, F, the adjustable support, L, the division plate, I, and the brake, H, with a ring spinning frame substantially as described.

80,217.—EARTH-BORING MACHINE.—J. E. Race, Chicago, Ill.

I claim 1st, The bar, H, in combination with the rod or post, I, rope, z, and shaft, C, when constructed and operating substantially as and for the purpose specified.

2d, The combination and arrangement of the gear wheels, F and G, shaft E, and lever, L, with the rocking beam, K, substantially as specified.

80,218.—LOCK LABEL HOLDER.—J. S. Ramsey, Baltimore, assignor to himself and W. G. Hillman, Lonsconing, Md.

I claim 1st, The combination of the B,

3,113.—TRADE MARK.—Henry Albers (assignor to C. Albers & Co.), Warsaw, Ill.
3,114.—FRAME OF A GYROSCOPIC TOP.—C. P. Arnold (assignor to the Gyroscopic Top Company), New York city.
3,115.—SHIRT COLLAR.—Chas. K. Brown (assignor to himself, Chas. A. Brown, and Franklin Field), Troy, N. Y.
3,116 and 3,117.—COOK'S STOVE.—Wm. C. Davis (assignor to W. C. Davis & Co.), Cincinnati, Ohio. Two patents.
3,118.—TRADE MARK.—Henry M. Myers, Allegheny City, Pa.
3,119 to 3,123.—CARPET PATTERN.—Elemir J. Ney (assignor to Lowell Manufacturing Company), Lowell, Mass. Five patents.
3,124.—GASOLIER.—James F. Travis (assignor to Archer, Hancock & Co.), New York city.
3,125 to 3,127.—PICTURE FRAME.—Geo. L. Underwood, Boston, Mass. Three patents.
3,128 and 3,129.—INK TRAY.—G. L. Underwood, Boston, Mass.

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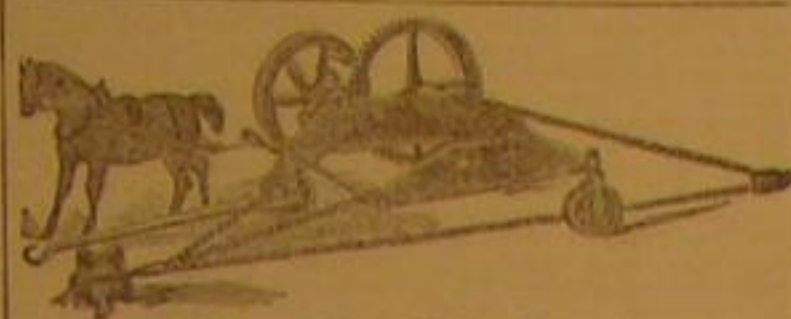
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Vol. XIX.—No. 7.
(NEW SERIES.)

NEW YORK, AUGUST 12, 1868.

\$3 per Annum.
(IN ADVANCE.)

Improvement in Cooling Mill Stones and Flour.

Every miller knows how desirable it is to deposit the flour or meal as it comes from the stones in a perfectly cool condition, and that one of his principal annoyances is the heating of the stones. The inventor of the device herewith illustrated intended to subserve these two purposes, says that practical tests show a saving over the ordinary mode of elevating of about one pound of flour on each bushel ground.

A represents a mill stone and hoop, beneath which is a scroll, B, containing a fan blower, the blades of which, instead of forming a gradual curve, turn at right angles, this form being considered preferable. From the stone a discharge pipe, C, leads to the eye or center of the fan, conveying the flour. The spout or pipe, D, is double, or divided longitudinally by a partition shown in the space broken away. The portion, E, leads from the periphery of the fan or blower to the chamber, F, the upper portion of the tube being shortened to permit the escape of surplus air. The flour or meal is forced upward through the pipe, E, from the fan, and is discharged at G, directly into the bolt, conveyer, or hopper boy. The chamber, F, is made of any suitable size and is covered, or partially so, on its sides with gauze or muslin. From this chamber a return spout, H, leads to the fan and through it the surplus air is returned, and also many particles of flour which would otherwise be lost.

The fan being revolved rapidly receives its supply of air through the spout, C, from between the stone and hoop, drawing all the heated air away, thus keeping the stone cool and dry, and preventing the formation and accumulation of dough around the hoop. The flour, soon as discharged from the stone, falls into a current of cool air which prevents evaporation. For simply elevating grain only the fan and spout, E, are used.

This apparatus was patented May 5, 1868, by James Raney, assignor to himself, L. Raney, and B. Raney, either of whom may be addressed for rights or further information at New Castle, Pa.

Learning to Telegraph.

According to the *Telegraph*, the institutions known as Telegraph Colleges are unmitigated humbugs. They purport to teach the art of telegraphing so that any young man or woman can become efficient in three months, obtain a good situation, large salary, &c. Fees payable in advance. Our contemporary remarks:

"We wish to impress upon the minds of those who desire to become telegraphers, that only upon telegraph lines, and in the practical daily practice of an office, can they become qualified for telegraphic positions.

Another fact is sedulously kept out of sight by the proprietors of these colleges, which is patent to every practical telegrapher, that is, that probably less than fifty per cent. of those who seek to learn telegraphy, even in the regular and proper manner, become good, reliable operators. The profession requires a quickness of perception and a certain amount of mechanical skill and facility of manipulation which is not generally possessed. Very few become good, practical telegraphers, unless they commence the study of the art before they reach their twentieth year. For those of over that age to endeavor to do so, is, in a majority of cases, pure waste of time. We do not mean to say that instances are unknown of persons more advanced becoming first-rate telegraph operators, but they are so few as not to offer encouragement to such to seek admission into the telegraphic ranks.

We have heretofore pointed out the deficiencies in scientific knowledge of a large proportion of the practical telegraphers. This we should be glad to see corrected, and we should regard any means of education in this particular afforded to telegraphers, and a disposition to avail themselves of such facilities by operators generally, with favor and gratification."

New Brunswick Hematite Iron.

We have received some specimens of white fibrous iron from hematite ore mined in New Brunswick. It is of extreme hardness, capable of scratching glass, and of remarkable purity. It is also exceedingly tough, Robert Mushet of Coleford, England, stating that he has twisted nail-rod cold, made from it, which exhibited a toughness equal to the best Llandross or Tevoitdale iron. Charles Sanderson says he is

using the iron as samples. He is the well known steel maker, and says "the steel made from it hardens perfectly at a moderate heat and is well suited for file making." The Pembroke Iron Works, Pembroke, Me., is using it with great success for ax iron and all edge tools. We understand the deposits of this ore in the vicinity of Woodstock, New Brunswick, are

table ware is unaffected by ordinary acids. Acting on these facts the inventor of the pitcher shown in the engraving has succeeded in coating the inner wall of metallic ice pitchers with a liquid enamel, fused and attached to the metal by heat, in one smooth, complete coating without seam. Prof. Hayes says "it is entirely free from anything poisonous or injurious. A quart of acidulated well water was boiled in one of these pitchers without perceptible action upon the enamel, and water to which caustic alkali had been added was afterward boiled in it with a similar result. When submitted to sudden changes of temperature the enamel did not crack or separate from the iron, and sharp strokes with pieces of ice failed to make any impression upon it."

It will be readily understood that the pitcher may be made of any form desired. Its freedom from unpleasant odor, as well as its perfect cleanliness and certain safety, seems to give this improved pitcher a deserved commendation.

It was patented through the Scientific American Patent Agency June 30, 1868, and assigned to the Meriden Britannia Company, West Meriden, Conn., by whom they are manufactured, to whom all orders should be addressed, D. C. Wilcox, Secretary. The commendatory letter of Prof. Hayes may be found in full on the last page of this paper.

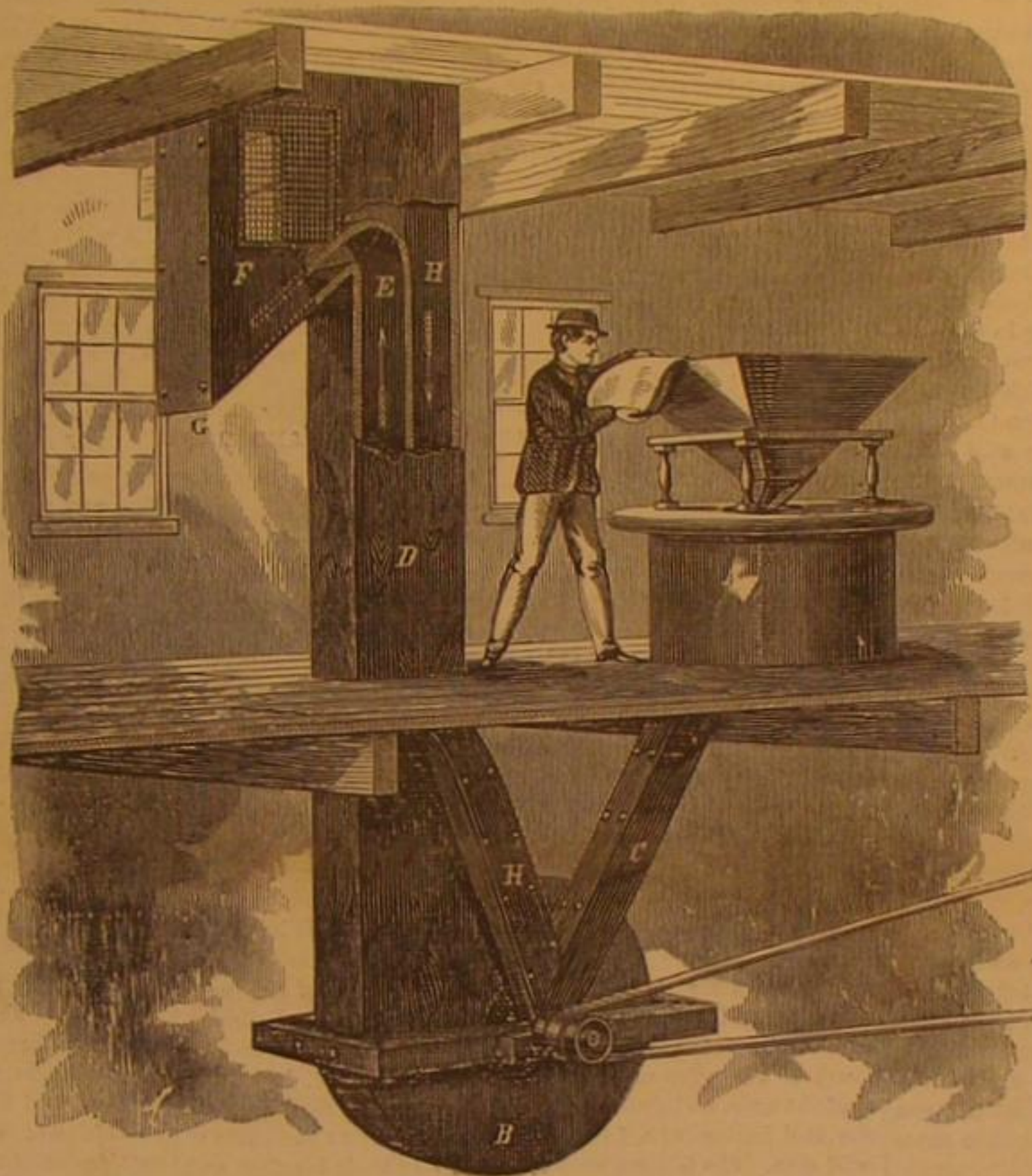
FUTURE PROSPECTS OF MACHINE MANUFACTURING IN RUSSIA.

If we take the map of Russia, and set one leg of a pair of compasses upon the spot occupied by the town of Kharkoff, setting the compasses to a radius of 370 miles, then this radius will reach to the extreme northern end of the rich agricultural government (or province) of Orel, inclosing at the same time the equally rich government of Koursk.

Sweeping around to the northeast we cut off part of the government of Tula, the Russian Sheffield, as also part of Tambov, inclosing the whole of the government of Voronej, with its rich stores of corn and oil. To the northeast we cut into the borders of the government of Kaluga, inclose the whole of the government of Poltava with a great part of that of Tchernigov, and join up to the borders of the government of Kiev. In a right line south from our starting point, we, with the same radius, cut into the sandbanks in the Sea of Asoph near the port of Berdiansk (for the removal of which said sandbanks, by the way, the future factory may have to provide dredgers, so they may as well be included in the circle), while at the same time we include the government of Tausidia, along with that of Ekaterinoslav with its coal bearing strata. Sweeping to the southeast, we inclose the whole of the territory of the Cossacks of the Don, with its vast beds of anthracite and iron ore. The same radius takes us in this direction across to the opposite shore of the sea of Asoph, fronting Taganrog and Rostov. To the southwest we come again upon the greater part of the government of Tausidia, with the greater part of that of Kherson, sweeping to within twenty miles of the ancient town of Kiev.

For enterprising men with capital this is an immense field for labor; and commercial energy might easily square this circle, even by means of a circumscribed square to enlarge the area. The principal railways (not merely projected, but actually being constructed) cutting into this circle are, first, the main line direct from St. Petersburg to the Sea of Asoph, passing through two coal fields in its course, namely, the northern or Kaluga-Tula and the southern or Donetz basin. (The Donetz is a river falling into the Don after a course of about 270 or 280 British miles, and forming a sort of border to the coal field; its repeated attempts to cut into the hard strata of the coal basin induced geologists to call the coal district by its name, the Donetski Kravj). This main line of railway after leaving Moscow passes through the towns of Tula, Orel, Koursk, Kharhoff, and many towns of smaller note, and will end, after passing through the whole of the southern future mining district, at Taganrog and Rostov.

From this main line there will be numerous branches to different places, the names of which are as yet unknown to fame, but which, in consequence of their stores of mineral wealth, are capable of becoming great industrial centers. Communication with Europe, through Poland, will be secured by the line from Kiev joining into the main line at Koursk. The main line will also communicate with the Black Sea, by means of the line from Kharhoff through Poltava and other important towns, to Kiev and Odessa. In like manner, by the extension of the Riga-Dinaburg-Vitebsk railway to Orel, the south of Russia will be put into communica-



RANEY'S PATENT PNEUMATIC ELEVATOR

practically inexhaustible. It has been largely and successfully tested in the casting of chilled car wheels, both in England and in this country, and in the former country by John Brown & Co., of Sheffield, for armor plates. We give an analysis of the ore.

Peroxide of iron	45.200	Soda	541
Protoxide of iron	3.628	Sulphuric acid	588
Alumina	5.448	Phosphoric acid	14.126
Oxide manganese	11.381	Silica	11.381
Peroxide manganese	1.063	Carbonic acid and water	11.381
Lime	1.756		
Magnesia	3.749		
Potash	588	Total	100.000

FOOTE'S PATENT PORCELAIN LINED ICE PITCHER.

Considerable has been said about the chemical action of different drinking waters on the metal of which the interior



wall of ice pitchers is composed, their being productive of oxides inimical to health, etc. It is well known, however, that the porcelain lining of iron kettles and the glaze on our

tion with the Baltic. There is also the inland line completed as far as Voronej from Moscow, afterwards to be extended to the anthracite mines at Grushevka, which last are already in communication with the river Volga by means of a short railway. Independently of the proposed branch lines, which from their situation may well be called mineral lines, it is proposed to lay another main line from a point about 100 miles south of Kharkoff to far-famed Sevastopol.

The imaginary circle thus drawn incloses the whole of the southern coal fields, and cuts into the border of the northern. As the northern coalfield is beyond the boundary line chosen little need be said about it, although it is far from being an unimportant one. The coal is inferior in quality to that of the southern field, while at the same time the iron found there makes very good castings. According to the report of the latest investigations published last year, the northern coalfield is 114 miles long by 80 miles wide, or about 9,120 square miles. Within this boundary there are no fewer than 113 known places favorable for mining; and four of the best known of them are estimated to contain a supply for 150 to 200 years, at the rate of 400,000 tons annually. The price at present at the pit mouth is about one dollar per ton.

The southern basin with which we have more immediately to do is more extensive, and the coal is of a better average quality. The coal seems to crop up to the surface in the government of Kharkoff so that in many places coal is turned up by the plow, and they extend to within less than 60 miles to the shores of the Sea of Asoph. The northern or Kharkoff end of this field contains coal similar to that of the Tula-Kaluga field; while in the center of the basin the best caking and steam coal is found, and at the southern extremity anthracite, containing, according to reported analysis, 98 per cent. of carbon. That part of the coalfield lying in the government of Ekaterinoslav is bounded by the rivers Dnieper, Don, and Donetz, and has a surface of over 10,000 square miles. Adjoining this in the territory of the Don Cossacks, and bordering on the Sea of Asoph, there are still 7,100 square miles under which lies the best coal and anthracite.

The now, in Russia at least, well known mines of Grushevka contain no fewer than 269 allotments, out of which, in 1866, 83, containing 93 pits or shafts, were being worked, and produced 150,152 tons of anthracite against 85,401 tons in 1865. The estimated quantity for the 42 square miles of this district alone is 24,000,000 of tons. In the 7,100 square miles of the territory of the Don Cossacks, reckoning only the upper seams and only those which are more than one assheer (2 ft. 4 in.) thick, the estimated quantity is 700,000,000 of tons. The seams vary from 2½ feet to 8 feet in thickness. In this black country there is much work yet to be done for both the mining and mechanical engineer. The 93 before mentioned pits are, with one or two exceptions, mere holes, and in the district generally, until within the last two years, the black diamond was left in the depths of the mine undisturbed; as soon as the water grew troublesome, another hole was struck, and the former one abandoned. At the present time, however, at Grushevka three shafts are being, or have been, sunk deeper in the water-bearing strata, and eight steam engines, from 6 to 75-horse power, are either at work or are in the course of erection. The price of the coal averages from one dollar and thirty cents to two dollars and seventy-five cents per ton at the pit mouth, according to quality.

This district is no less rich in iron ore than it is in coal. Geologists and mineralogists of different nations all agree in their statements as to the immense quantity of ore, and also to its high quality. The thickness of the layers varies in some places from 9 inches to 21 inches, and in others from 14 inches to 3 feet. The layers of ore extend in many places in an unbroken line for many miles, and are interspersed with layers of coal, limestones, and schists. The ore lies in many parts, especially in the ravines, at a depth of from only 14 feet to 28 feet from the surface, while almost the only mining as yet has been that of the aforesaid geologists. There is indeed one iron works in the district, belonging to Government; but from a mistake in the choice of a situation, caused by the wish to take advantage of water power, it is too far from the mines connected with it, and its rate of production has not as yet been very great.

The other subterranean products of this mine of wealth are in connection with iron smelting, limestone and good fire-clay, while for purposes connected with other manufactures are potter's clay, kaolin, gypsum, and the materials for good cement. There are also beds of the stone generally used here for millstones, also paving stones, and in some parts thick beds of roofing slate. Specimens of this slate were sent to the Paris Exhibition, along with specimens of the anthracite near which it was found. Limestones and sandstones for building purposes are also here, together with an inferior sort of marble. Clays of all sorts abound, suitable for brick-making, both fire and common red and yellow, and chalk enough to score up the reckonings of all the miners and puddlers in the world for centuries to come.

Lead ore, with a percentage of silver, is also to be found; while last, but not least, one of the great necessities of life, common salt, has formed a staple article of commerce for more than a century. The yearly quantity of this article supplied by this district within the past thirty years has varied from 5,000 to 16,700 tons. With the exception of this salt, this immense treasure vault has been little more than peeped into by scientific men; the full opening up has been as yet unattainable, not having had as in other countries, the assistance of the iron horse. The time of opening is however, now near at hand; the iron horse is on his way down south with the keys. The first sod of the Kharkoff-Taganrog railway was cut June 2d, 1868, although work had been commenced upon the line generally some time before.

The question now must be who will be the first to ravish this almost virgin treasure.

It must not be thought that the mineral wealth of Russia is confined within the boundaries of the imaginary circle drawn; on the contrary, the northern coalfield might, by deep mining, yield a better quality of coal, and it is supposed to dip a great depth under Moscow and some of the other northern governments, as it has been found to make its appearance again in the government of Archangel. There is then the eastern or Ural system, and the still richer western or Polish, where coal seams have been found from 35 feet to 43 feet, and in one instance even 49 feet in thickness, made up of layers of different qualities of coal, divided by very thin layers of clay. Then we have in Siberia, the Tomsk field, estimated at 170 miles long and 70 broad, and coal of an inferior quality, but still usable, at the foot of the Caucasus. Among other projected railways, first on the list stands one to connect the frontiers of Siberia with the interior of Russia. Railway communication has commenced in the Caucasus with the opening of the Poti and Tiflis railway, and Kharkoff is looked upon as the future central station for direct communication with the Caucasus.

All these places may, at a future time, become seats of manufactures, but in the part of the country above described everything is favorable to enterprise; even at present, the climate is wholesome, and peace and plenty reign around. Some difficulty would be experienced at first in getting together workmen, but when once found and settled, the real Russian likes to remain in one place if he finds himself at home, and generally likes to stick to a good master. There is one thing, however, although trades unions and general strikes are unknown there, still the workmen taken singly are very independent and firm in their demands; the being thrown out of work does not seem to frighten them much—they can be led easier than they can be driven.

THE AINOS, OR HAIRY MEN OF YESSO AND SAGHALIEN.

In Notes on the Expedition against the Settlements in Eastern Siberia, published in London in 1856, is an account of a peculiar race of people, of which some specimens were seen to the north of Cape Lamanon, on the western coast of the island of Saghalien, the most northerly of the Japanese group. The author, Mr. Whittingham, who accompanied the expedition, thus describes the people and their manner of living: "As we came near the shore, four dark men with very long black hair flying in the wind, and clothed in seal-skin jackets, kilts, and boots, waved their arms and hands, warning us to another landing-place, toward which they waddled with a peculiar clumsy gait. With many demonstrations of respect they led the way to their huts of rough logs, covered and the interstices filled with birch bark and dry leaves; they were low on the ground, and could only be entered by stooping on the hands and knees. The larger huts were used as store houses for their fishing apparatus. One of the men was a magnificent savage, tall, lithe, straight, and strong, with hair, beard, and mustaches never desecrated by the touch of the scissors; with a high broad brow, dark eyes, straight nose, and oval face, he was a far nobler creature than the Red Indian who, I had always fancied, was the pride of wild men. His fellows were less manly in their bearing, and smaller; and as far as dirt, mal-odor, and want of light permitted me to see, the women were ugly and little." R. Lin, in La Pérouse's voyage, gives the following valuable measurements of the head of one of these people:—circumference, 23.80 inches; its longest diameter, 10.30; and its shortest diameter, 6.83 inches.

In a recent communication to the Boston Society of Natural History, Mr. Albert S. Bickmore, A. M., gives the results of his late investigations in regard to the origin of this peculiar race, and adds important and interesting particulars of their manners, customs, and religion.

The first of these strange people seen by Mr. Bickmore were at Mori, on Volcano Bay, at the western side of the island of Yesso. Along the shore to the north of Mori they were met with, sometimes at work with the Japanese, but more frequently in companies by themselves.

At Urope, twenty miles north of Mori, is a village of about two dozen houses only, three or four of which are Japanese, the rest belonging to the Ainos. Mr. Bickmore describes this village as follows:

"The houses were scattered irregularly near the shore over a broad belt of sand, that has been drifted back by the easterly winds. They all have the same rectangular form, and are similarly situated in respect to the shore.

"The best are composed of a house part about thirty feet long and twenty broad. To this is attached a porch about twelve feet long and eight broad, and around the whole is a straw fence. The house and porch are built of a frame work of small poles, fastened together with strips of bark and covered with millet straw. The walls are about four feet high, and slightly sloping. The roofs project a few inches at the eaves, and rise from each side to a point in the center. In the walls under the eaves, there are two or three holes a foot in diameter, which serve as windows. In entering, you pass through the straw fence into the porch, and thence through the door into the house. The house part is generally one room, and also the porch; but in a few, a kind of partition is made in the larger room by hanging up mats. Most of the houses have no floors, but instead the sand is covered with mats of coarse straw, and on one side of the room there is a platform of boards on stones or blocks of wood, where the occupants lounge and sleep. They usually sit on the mats on the sand. In the center of the room the fire is made on the sand, and over this and about three feet above it, is a kind of frame work held up by strings from the rafters, where

they place the fish they wish to smoke. It also serves for a cupboard or dresser, where the smaller iron pans and kettles may be put away. There is no chimney, and I did not even see a hole in the roof for the smoke to escape. Everything overhead is, therefore, black with smoke, and generally has a shining, oily appearance. Each house is provided with a few iron pans and kettles of Japanese manufacture, and these with two or three wooden dippers, and some large valves of the pecten, comprise their cooking utensils. They make a fire by means of a flint, steel, and tinder, which are usually kept in a bag of undressed deer skin. In several houses I saw a considerable number of lacquered dishes, which they had evidently obtained from the Japanese. Near each house there is another small one about eight feet square, perched on a platform five or six feet high, in which they store their fish, in much the same manner as the natives of Sumatra preserve their rice. In the first house we entered, the man was sitting cross-legged in one corner making spears, with a fire of charcoal and a Japanese bellows. The woman was crouched near the fire, twisting up thin strips of the inner layer of the bark of a tree into a continuous line of the size of a mackerel line. It is from such material, and in this way, that all the lines for their fishing nets are made. They had four children, all boys, the youngest two and the eldest ten. The two younger ones were without clothing, and the others had only each a long jacket, though it was quite chilly.

"In the next house we entered—the dimensions of which I have given above as a model—we found an old man, his son, and three women. The old man said he was seventy five, and his white hair and white beard made it appear probable, yet a young woman, apparently of twenty, was presented to me as his wife. She was demurely at work in one corner, making a straw mat after the Japanese style. The other young woman was weaving a piece of cloth about ten inches wide, from strings made of bark as already described. These strings, which represented the warp, were fastened at one end to a post and at the other end to a board which she kept leaning against while she changed them and pushed through the filling and pressed it down with a sharp edged board. This kind of cloth seems to be the only one they have, and it is all made in this slow and laborious manner. In front of this house, that is, on the side toward the shore, there was a kind of rack filled with sticks, each having on its top the skull of a bear. In this single place I counted twenty-nine skulls of this animal, a number that must make our old friend and his son rank high in the estimation of his Aino companions. In another house we entered, we found a man and his wife seated by the fire. The woman was sewing, but the man was doing nothing, and yet the bay was swarming with fish. He showed us the bow he used in hunting the bear, but would only sell a model of it, declaring that in their estimation it was most disgraceful for an Aino to part with the bow he was accustomed to use. However I secured a real arrow. The after part of the shaft was of reed, the fore part of solid wood to make it fly point foremost, and the barbed part of bamboo. They carry short knives, but they appear to rely on their bows and arrows when they attack a bear or kill a deer. I saw no lances, nor any implements of stone or bronze. I also purchased of this man a pair of snow shoes, each made of two strips of wood bent like an ox bow, with the straight part fastened together with deer skin. The woman sold me a short knife, with a scabbard of wood and ivory rudely chased. It was the only piece of ornamental work I saw. As I was anxious to ascertain the height, the distance round the chest, and the length of the arm, hand, and foot of an Aino woman, my interpreter bribed the husband with a small piece of silver to make the desired measurements, but the paper was unfortunately lost, and now I can only state from memory, that the peculiarity which struck me most was that the regions of the waist and chest did not appear as separate as in most women, but it remains to be seen whether this is a permanent character. The mammae were very largely developed, and gourd shaped.

"When a woman marries they tattoo her upper lip and sometimes the under one also. A favorite pattern has the ends curved up, in just the way exquisite sometimes curl up the ends of their mustaches. Several times I inquired what was the cause or origin of this strange custom, but invariably received the unsatisfactory answer—'because it is the Aino fashion,' which is, perhaps, as good a reason as could be assigned for a thousand foolish customs in the most civilized lands. At all events it gives these Aino women the appearance of trying to add to their charms by artificially making up for what they seem to consider a defect in nature's handiwork. The women also tattoo the backs of their hands in narrow transverse bands, but no other parts of the body. They never blacken their teeth or compress the feet. In each Aino village, the oldest man, or a very old man, is the chief, and he in turn is responsible to a Japanese official styled the 'Aino Interpreter.' As the chief was away fishing, we called on the Interpreter, who was also absent, but a sub-official gave me some further items in regard to the strange people under his charge. They cultivate millet and potatoes, but no rice. In one hut I saw the thick midrib of some wild plant finely chopped. When they kill a bear, they are allowed the head, but the skin belongs to the Interpreter. They are permitted however to wear deer skin, and the woman I saw first at Mori had on an outer dress of that kind. It is said that when young cubs are found they are brought home and nursed by the Aino women like their own children, but this is quite incredible.

"On my return to Hakodaki I found that eight Ainos had just arrived in a couple of junks from a place on the south coast, a short distance east of Endermo Bay. With the prospect of a small present they readily came to the residence of Colonel Rice, whose kind hospitality I was then enjoying.

They all sat down cross-legged, in the Turkish style, not in a semicircle, like our American Indians, but in a straight line, the oldest man on the extreme left, the highest position of honor; the rest arranging themselves according to their ages, to the youngest on their right. They could not tell, however, how old they were, but said that the Japanese officials kept a record of their ages. As soon as they were seated they began their salutation, which consists in slightly inclining the body forward, at the same time raising both hands as high as the eyes, with the palms inward and the fingers extended and nearly touching each other. The hands then pass down along the beard to the chest. This is repeated three times, and when they wish to show still greater respect they accompany these motions with a low guttural muttering. Saki (Japanese rice whiskey) being their favorite drink, each was offered a glass and a chopstick. Taking the glass in the left hand and the stick in the right, they dip the end of the stick into the liquor they are about to drink, and slightly raising it, describe a circle with an upward and inward motion. While describing these motions with the stick, they uttered a long prayer, in a low monotonous tone. This prayer, they afterward informed us, was not in our behalf, in return for the saki, but addressed to the god of the sea, asking that they might be preserved in their boats, and find an abundance of fish. One of their number spoke Japanese fluently, and Mr. James J. Enslie, the Japanese interpreter at the British Consulate, and himself the author of two interesting papers on the Ainos, kindly volunteered to ask them a list of questions I had prepared. In this way the following information was obtained directly from the Ainos themselves. As some of the questions proved quite perplexing, they became tired before the list was completed, and I failed therefore to get replies to all my queries.

"They have many gods, but fire—not the sun, the moon, or the stars—is the principal one, and they are accustomed to pray to it in general terms for all they may need. They do not buy their wives, but are expected to make presents to the parents of saki, tobacco, and fish. At their marriages they make no great rejoicing or display. Their only feast is at the beginning of the new year, when they make offerings to all the gods. When a wife dies they burn the house in which she lived, but when a man dies they bury him without any funeral ceremony (perhaps the interpreter meant if he was a common man). To inter a body they dig a hole in the ground and lay in planks in the form of a box. The body is then clothed in white, and placed in at full length, with the head to the east, 'because that is where the sun rises.' A widower may marry again in two or three years, but a woman can only marry once. (This the interpreter probably intended to say was their law but not the universal custom.) A man can have only one acknowledged wife, but any number of concubines, each of whom always lives in a separate house. At present they have no king, but a great chief living in Saru. The interpreter had met other Ainos whom he could not understand (that is to say, there are at least two different dialects in the Aino language). They keep no cats, but catch rats in traps. They have 'only Japanese horses.' They keep fowls but no ducks. They eat their fowls and what wild birds they can take, but never eat eggs. They have no special burying grounds, and they desire only to forget their deceased relatives as soon as possible. They never speak of the dead, and if a man should call on a friend, and inquire for his deceased wife and say, 'Oh! is she dead?' such an act would be considered the grossest breach of good breeding. They say that they can make poison, but refused to tell how, and further declared that they kept it such a secret that even the Japanese officials knew nothing of the process. They have sorcerers whose advice they are accustomed to ask. They have no written characters, and only oral traditions.

"After this questioning I took measurements of two of them. These measurements were made from men of medium size. They show, that although the Ainos are stout and strong, they are hardly taller than the Japanese, and not near as tall as the average of the people in the north of China. The relative size of the hands and feet to the rest of the body seems to vary considerably.

"One of their chief peculiarities is the great development of their hair, not only the head and face, but over the whole body. Their eyebrows and eyelashes are very thick, and like their beards and hair, always of a jet black, till past middle life, when, as with us, they change to gray and in extreme old age to white. Their hair appears coarse compared with ours or with that of the Japanese. They wear it long—down to the shoulders. The men wear theirs as long, or longer than is the custom with their women. Their eyelids are horizontal and open widely, as in the Indo-European races, and are not oblique and open, but partially, as in the Mongols, Manchus, Chinese, Japanese, and also the Koreans. Their eyes are bright and sparkling, and always black. The fine development of their chests, with their full heavy beards, gives them the appearance of noble and hardy men as compared with their effeminate Japanese rulers. They seem to be endowed with great vitality, and the fact that they so successfully resisted the repeated attacks of a more enlightened race for eighteen hundred years, sufficiently proves their daring and perseverance.

"The dress of the men consists of a strip of cloth covering the loins in the same way as is customary among coolies in the East. In summer this is their only clothing, but in winter they wear long, loose coats, or dressing gowns woven from strings of bark. This is folded over from right to left, and bound at the waist with a sash. Their heads, feet, and legs are usually bare. The women have a shorter dressing-gown coming down to the hips, and beneath this a piece of cloth wrapped around the waist and hanging down nearly to the knee.

"As they have no written records, the earliest accounts of this people have come down to us through Japanese histories. According to a Japanese chronology, compiled from the best sources, and translated by Father Nicholas, for the Russian Legation, Jin-mu, the first Japanese emperor appeared on Kiusiu at Hunga (or Hewng-nga) in B. C. 667. In B. C. 663, he first came to Nippon, but was defeated and driven back by the aborigines. In B. C. 660, he returned and effected a permanent settlement on the southeast part of that island. In most of the Japanese histories, at least, no mention appears of the arrival of any new people, and the Japanese all believe that these aborigines were the ancestors of the present Ainos. Thus, these people, although so little known to this day, are mentioned half a century before the time of Nebuchadnezzar, and six hundred years before the northern and western parts of Europe were first described by Caesar in his Commentaries, and more than two thousand one hundred years before the discovery of this continent by Columbus. In A. D. 272 the Ainos, for the first time, brought presents to the Japanese authorities, and acknowledged them as their rulers. In A. D. 352 they rebelled, and in the year 366 they defeated the Japanese and killed their general. During the next two centuries, however, they appear to have been completely subjugated: for an educated Japanese states that as early as A. D. 655, the Japanese sovereign then reigning established a kind of government over the Ainos in Yesso, which was located near Siribets, a volcano on the north shore of Volcano Bay. In A. D. 1186, Yoritomo usurped the ruling power in Nippon, and becoming jealous of his brother Yosi Tsunay, had him put to death according to history, at a headland on the east coast, now called Shendai. But according to tradition, Yosi Tsunay escaped to Yesso, and treating the Ainos here with the greatest kindness, was deified by them and is now their chief hero.

"In their eyelids which are horizontal and open widely, in the abundance of their hair, and in the full development of their chests, these people differ totally from the Chinese, the Japanese, and the Koreans on the South, the Manchus on the west, and the Gilyaks and Kamtschadales on the north; but in these same characters they call to mind the bearded peasants in Russia of the Slavonian branch of the Aryan family.

"Are they, therefore, an extreme branch of the North Turanian family, or, as is more probable, in the same manner that the Indo-European races migrated from the high plateau of Central Asia through the plateau of Iran to the west, and the Persians and Indians to the south, did another part of that same family pass on to the east until they finally reached the islands now forming the empire of Japan; and do their living representatives now appear before us in the persons of this ancient and isolated people, the Ainos?"

Subsequently, Mr. Bickford was enabled to visit the Ainos of Saghalien, whose habits of living resemble those of their brethren in Yesso, in all important particulars. The following details of their customs in regard to marriage and the burial of the dead were learned of a Cossack who had been sent to live among them in order to acquire their language and learn their customs:

"The Aino name for Saghalien is Karapto. They have no written characters, but the old men can send intelligence to each other by means of sticks notched in different manners. They are superstitiously afraid of the Japanese, and believe that they have supernatural power to injure them, and can at pleasure cause them to sicken and even die. When a man dies they bury him clad, not necessarily in white, but in the best suit he may happen to have, and usually in furs when he possesses any. The bodies of persons of all ages are placed at full length in boxes, with the face upward. At such times they cry and mourn very bitterly, even to the children. The Cossack said that one time he wanted a little child that was visiting her parents, and when he came to their house he found her crying with the others over the loss of a friend. When a widow laments, they do not beat her with sticks as a Japanese doctor reported to me was the custom of the Ainos on Volcano Bay. Every friend who comes to mourn with a widow is very careful not to mention her husband's name; not from any superstitious fear of the dead, but for fear of reminding her of her loss, and thus adding to her sorrow. When a man dies, the next youngest brother takes the widow as his wife, either for life or until she has an opportunity to marry again. A widower may marry again in a month, but a widow is expected to remain single somewhat longer. They have no marriage ceremonies. A man does not buy his wife, but works for her father. A man may have two or three wives; the Cossack did not know any man who had more than three. (The Gilyaks, their immediate neighbors, usually have two.) If a woman is unfaithful, the husband merely reproves her, and if no one but he and the guilty parties knew of it, he would probably not mention it to any one. When a woman is in labor, she remains with the other members of the family, but is kept from her husband for one month afterward."

"They keep dogs to travel with in winter and also use them for food. They have no cattle, and do not cultivate the soil. They reckon time by twelve moons or months, and three seasons: when the snow melts, when the flowers appear, and when they fade.

"These people are undoubtedly passing away. Even during the last century and a half that the northern of the Kurile chain has been a part of the Russian empire, their numbers on those islands have been ascertained to have greatly diminished, though the Russians have unquestionably treated such obedient subjects with the greatest kindness. The causes of this decrease are supposed to have been the ravages of the small-pox, and the considerable numbers lost while crossing from island to island in their frail boats over those stormy seas."

Artificial Crystals and Minerals.—"The Crosse Mite."

Among the experimenters on Electricity in our time who have largely contributed to the "Curiosities of Science," Andrew Crosse is entitled to special notice. In his "school-days" he became greatly attached to the study of electricity; and on settling on his paternal estate, Fyne Court, on the Quantock Hills, in Somersetshire, he there devoted himself to chemistry, mineralogy, and electricity, pursuing his experiments wholly independently of theories, and searching only for facts. In Holwell Cavern near his residence, he observed the sides and the roof covered with Arragonite crystallizations, when his observations led him to conclude that the crystallizations were the effects, at least to some extent, of electricity. This induced him to make the attempt to form artificial crystals by the same means, which he began in 1807. He took some water from the cave, filled a tumbler, and exposed it to the action of a voltaic battery excited by water alone, letting the platinum wires of the battery fall on opposite sides of the tumbler from the opposite poles of the battery. After ten days constant action, he produced crystals of carbonate of lime; and on repeating the experiment in the dark, he produced them in six days. Thus Mr. Crosse simulated in his laboratory one of the hitherto most mysterious processes of nature.

He pursued this line of research for nearly thirty years at Fyne Court, where his electrical room and laboratory were on an enormous scale: the apparatus had cost some thousands of pounds, and the house was nearly full of furnaces. He carried an insulated wire above the tops of the trees around his house to the length of a mile and a quarter, afterwards shortened to 1800 feet. By this wire, which was brought into connection with the apparatus in a chamber, he was enabled to see continually the changes in the state of the atmosphere, and could use the fluid so collected for a variety of purposes. In 1816, at a meeting of country gentlemen, he prophesied that, "by means of electrical agency, we shall be able to communicate our thoughts simultaneously with the uttermost ends of the earth." Still, though he foresaw the powers of the medium, he did not make any experiments in that direction, but confined himself to the endeavor to produce crystals of various kinds. He ultimately obtained forty-one mineral crystals, or minerals uncrystallized, in the form in which they are produced by nature, including one sub-sulphate of copper—an entirely new mineral, neither found in nature nor formed by art previously. His belief was that even diamonds might be produced in this way.

Mr. Crosse worked alone in his retreat until 1836, when, attending the meeting of the British Association at Bristol, he was induced to explain his experiments, for which he was highly complimented by Dr. Buckland, Dr. Dalton, Professor Sedgwick, and others.

Shortly after Mr. Crosse's return to Fyne Court, while pursuing his experiments for forming crystals from a highly caustic solution out of contact with atmospheric air, he was greatly surprised by the appearance of an insect. Black flint, burnt to redness and reduced to powder, was mixed with carbonate of potash, and exposed to a strong heat for fifteen minutes; and the mixture was poured into a black-lead crucible in an air furnace. It was reduced to powder while warm, mixed with boiling water, kept boiling for some minutes, and then hydrochloric acid was added to supersaturation. After being exposed to voltaic action for twenty-six days, a perfect insect of the Acari tribe made its appearance, and in the course of a few weeks about a hundred more. The experiment was repeated in other chemical fluids with the like results; and Mr. Weeks of Sandwich, afterwards produced the Acari in ferrocyanuret of potassium. The Acarus of Mr. Crosse was found to contribute a new species of that genus, nearly approaching the Acari found in cheese and flour, or more nearly, Hermann's *Acarus dimidiatus*.

This discovery occasioned great excitement. The possibility was denied, though Mr. Faraday is said to have stated in the same year that he had seen similar appearances in his own electrical experiments. Mr. Crosse was now accused of impiety and aiming at creation, to which attacks he thus replied:

"As to the appearance of the Acari under long continued electrical action, I have never in thought, word, or deed, given any one a right to suppose that I considered them as a creation or even as a formation, from inorganic matter. To create is to form a something out of a nothing. To annihilate is to reduce that something to a nothing. Both of these, of course, can only be the attributes of the Almighty. In fact, I can assure you most sacredly that I have never dreamed of any theory sufficient to account for their appearance. I confess that I was not a little surprised, and am so still, and quite as much as I was when the Acari made their first appearance. Again, I have never claimed any merit as attached to these experiments. It was a matter of chance; I was looking for silicious formations, and animal matter appeared instead."

These Acari, if removed from their birthplace, lived and propagated; but uniformly died on the first recurrence of frost, and were entirely destroyed if they fell back into the fluid whence they arose.

One of Mr. Crosse's visitors thus describes the vast electrical room at Fyne Court:

"Here was an immense number of jars and gallipots, containing fluids on which electricity was operating for the production of crystals. But you are startled in the midst of your observations by the smart crackling sound that attends the passage of the electrical spark; you hear also the rumbling of distant thunder. The rain is already plashing in great drops against the glass, and the sound of the passing sparks continues to startle your ear; you see at the window a huge brass conductor, with a discharging rod near it passing to the

floor, and from the one knob to the other sparks are leaping with increasing rapidity and noise, every one of which would kill twenty men at one blow, if they were linked together hand in hand and the spark sent through the circle. From this conductor wires pass off without the window, and the electric fluid is conducted harmlessly away. Mr. Crosse approached the instrument as boldly as if the flowing stream of fire were a harmless spark. Armed with his insulated rod, he sent it into his batteries; having charged them, he showed how wire was melted, dissipated in a moment, by its passage; how metals—silver, gold, and tin—were inflamed and burnt like paper, only with most brilliant hues. He showed you a mimic aurora and a falling star, and so proved to you the cause of those beautiful phenomena."

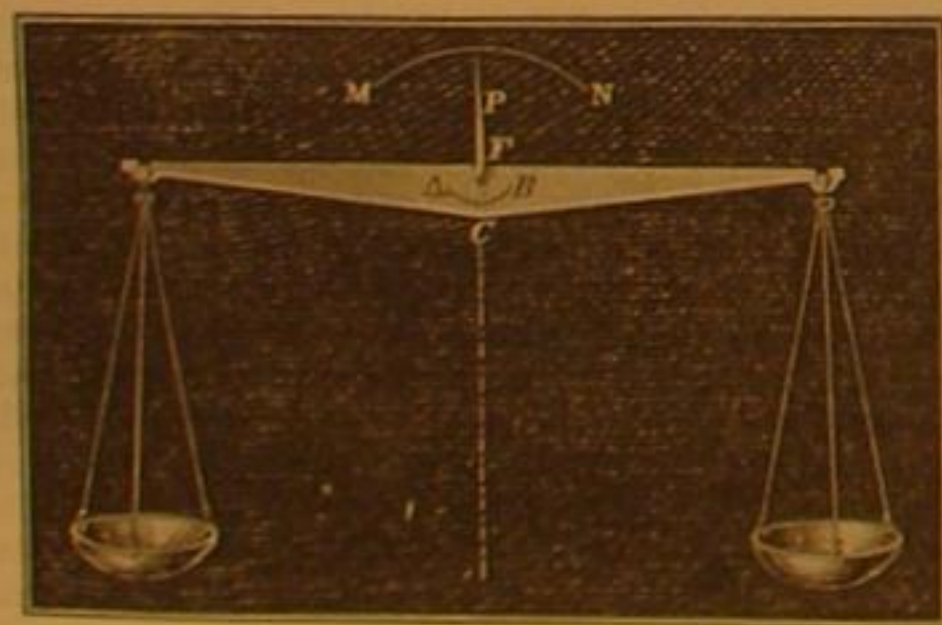
Mr. Crosse appears to have produced in all "about 200 varieties of minerals, exactly resembling in all respects similar ones found in nature." He tried also a new plan of extracting gold from its ores by an electrical process, which succeeded, but was too expensive for common use. He was in the habit of saying that he could, like Archimedes, move the world "if he were able to construct a battery at once cheap, powerful, and durable." His process of extracting metals from their ores has been patented. Among his other useful applications of electricity are the purifying by its means of brackish or sea water, and the improving bad wine and brandy. He agreed with Mr. Quekett in thinking that it is by electrical action that silica and other mineral substances are carried into and assimilated by plants except fungi; and positive electricity he ascertained to be injurious to fungi, but favorable to everything else.

Mr. Crosse died in 1855. His widow has published a very interesting volume of *Memorials of the ingenious experimenter*.—*Timbs' Curiosities of Science*.

THE BALANCE.

The balance is an instrument so universally used that it seems strange that the principles of its construction should not be generally understood, yet such is the case. To satisfy ourselves that we are correct in this statement, we have conversed with a large number of grocers, druggists, and others, and have only in a very few instances found them posted. Chemists, assayers, and others who have occasion to use very fine balances, are always acquainted with the subject; but we do not write with the view of giving such any information. Our intention is simply to be the means of popular instruction.

The center of gravity in a body is a point so situated that, if the body be suspended from it, the mass may be revolved about this point and will remain at rest wherever it is placed. The balance is a lever having its fulcrum above the center of gravity of the beam. When it is balanced the center of gravity lies on a line joining the point of support and the earth's center of attraction. If either end is depressed, the center of gravity describes an arc the radius of which is the distance between the point of support or fulcrum and the center of gravity in the beam. This center of gravity is thus raised or carried away from the earth's center of attraction, and consequently tends to return to it as soon as the weight or other depressing force is removed.

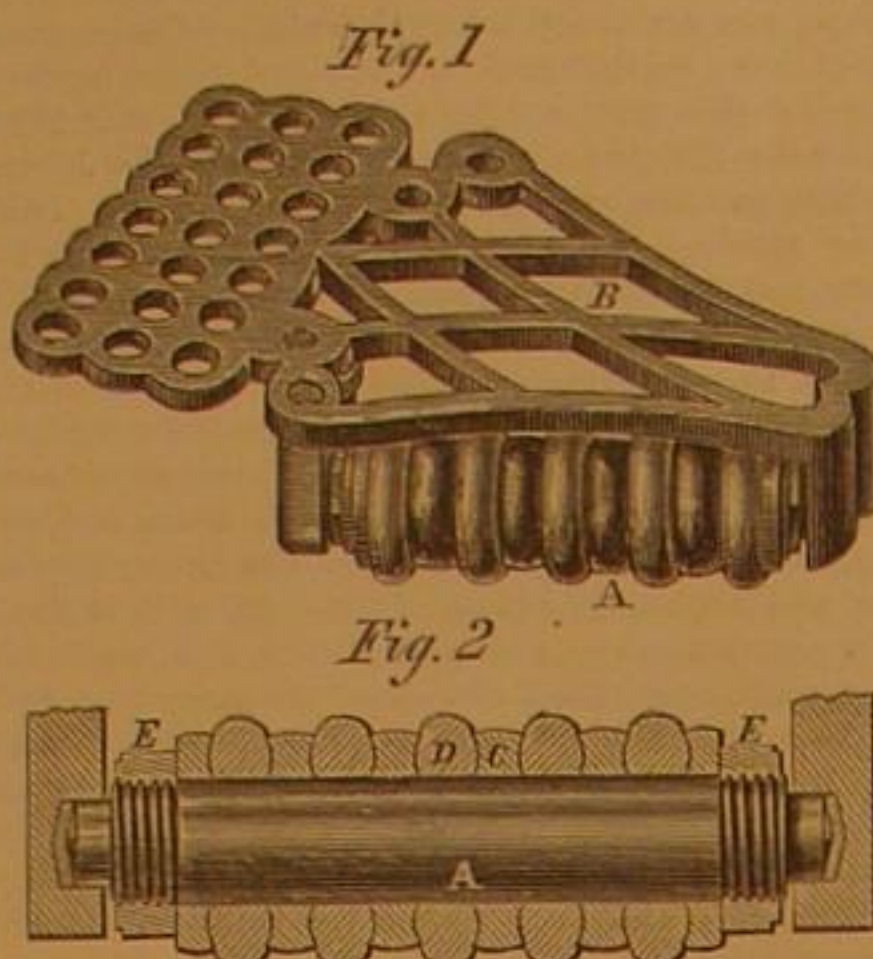


In the engraving, F represents the point of support or fulcrum, C, the center of gravity of the scale beam, and A B, the arc of oscillation. The dotted line represents a line drawn from the fulcrum to the earth's center of attraction, and M N, the arc described by the pointer, P. C, being the lowest point to which the center of gravity can attain, it will remain there unless some force acts upon it. The shorter the distance between F and C, the less will the center of gravity be raised in describing any number of degrees of arc, and the less force will be required to move it. Hence the nearer the center of gravity in the beam lies to the fulcrum, the more delicate will be the action of the balance, all other things being equal. If the beam were suspended from a point coincident with its center of gravity, the latter would not be raised, however much the beam might oscillate; the beam would not then return to its original level, but would remain wherever it was placed. Such a balance would show differences in the weights of bodies, but any difference in weights attached to the ends of the beam, sufficiently great to overcome friction, would continue to move it until it assumed a perpendicular position. The only basis for the estimation of the difference would be the rapidity of this motion, and not the angle which the pointer, P, makes with the perpendicular, as is the case with the properly constructed balance.

If the point of support should be placed below the center, the beam would be reversed by any difference in weight sufficient to overcome friction. Friction is as much as possible avoided by the use of knife edges for supports, and in very delicate balances these edges rest upon pieces of polished agate. A delicate balance with from one to 2,000 grains on each dish should be sensitive to a difference of from .001 to .0005 of a grain.

CAPEWELL'S REVOLVING CARRIAGE WHEEL FENDER AND STEP.

In turning an ordinary carriage short, the wheel is liable to cramp against the body of the wagon, endangering its overturn and wearing and defacing the vehicle. To prevent this is the design of the device exhibited in the engravings. It is a roller, A, turning in projections under one edge of an open work triangular frame, B, of metal which is secured to the under side of the carriage rail. The sides of the frame are of such an angle that the wheel, when backed toward the wagon for turning around, shall engage the face of its tire squarely with the roller, thus effectually preventing cramping or friction. The construction of the roller is seen in Fig. 2, which is a longitudinal vertical section. It consists of alter-



nate disks of iron, C, and rubber, D, the latter cushioned or compressed by nuts, E, at either end. As the rubber stands above the iron washer rims, it receives the pressure of the wheel and renders the action noiseless. The roller may be placed on either side of the frame, B, to suit either the right or left side of the carriage. Besides its use as a fender, it makes an elegant and handy step to the carriage.

Patented through the Scientific American Patent Agency, September 17, 1867, by Geo. J. Capewell, whom address, at West Cheshire, Conn.

Correspondence.

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

Provincial Protection to Inventors.

MESSRS. EDITORS:—A question which interests many persons in this Province, is the manner in which the Dominion will treat the Patent question. A Government measure was introduced at the recent session, passed the Commons, was amended in the Senate in an important feature, and was consequently withdrawn by the Government. The matter, therefore, stands open to the next session, some eight months hence; and meanwhile it is important that correct notions on the subject should be sent abroad.

Each Province has, at present, a different system. That of the late Province of Canada is, as you know, exclusive—giving no right to a Canadian, the assignee of a foreign inventor, to obtain a patent in Canada. In New Brunswick, on the contrary, our system is most liberal. Here, any assignee of a foreign inventor can obtain a patent for the invention, subject to precisely the same regulations and under the same conditions which are applied in the case of New Brunswickers patenting their own inventions. The fees, too, are moderate, and the mode of application simple. Now, what we desire in respect to a patent law for the whole Dominion is, that it should copy the liberality and simplicity of our local Act. The present law of the Dominion should give its protection to the creations of genius, skill, and application, whether the possessor of these qualities lived on one side of the line or the other. We have always found fault with the United States Congress for not passing a copyright law, by which the intellect and the labors of British writers would be protected in the Republic. Not that it would have been of much service to us, for New Brunswick literature is not very extensive; but because we consider it right, just, and politic. What applies to literary creations, applies equally to inventions and discoveries in the arts and sciences.

But beyond this, we think that the Dominion Patent Act should make patents already existing in each Province, patents for and throughout the whole Dominion. Objections to this there may be, but we conceive that the reasons in its favor are overwhelming. It would make what is property in one Province, property throughout the Confederacy; it would simplify the settlement of the patent law question; and it would prevent conflicts of jurisdiction, of local patent laws with the Dominion patent law, of local patents with Dominion patents—which must otherwise arise. We cannot see that it would work injustice to any person, because, of course, all existing rights would be protected in any legislation for the purpose.

Your experience in the matter of patents and patent laws, will enable you to give us advice and assistance in this matter. Although of very great importance, the subject of patent laws is little understood in New Brunswick. J. E. Woodstock, N. B.

Water Test for Boilers.

MESSRS. EDITORS:—I have a second-hand steam boiler and am desirous of knowing whether it will stand inspection or not, and I have no way of ascertaining except by sending to Chicago, a distance of one hundred miles, which would be an unnecessary expense in case of its not being strong enough to stand the test.

I propose to fill the boiler full of cold water, and then heat, it until it expands sufficient to produce the desired pressure which I think will take place before the water becomes very warm and before any steam has generated. I conversed with several machinists and engineers in regard to this way of testing, all of whom seemed to think it would not answer, but they could not give any reasons for thinking so. I cannot consistently place much reliance on such groundless opinions, and therefore would like to get your opinion and advice on the matter before trying the experiment.

De Pue, Ill.

J. H. HASSLER

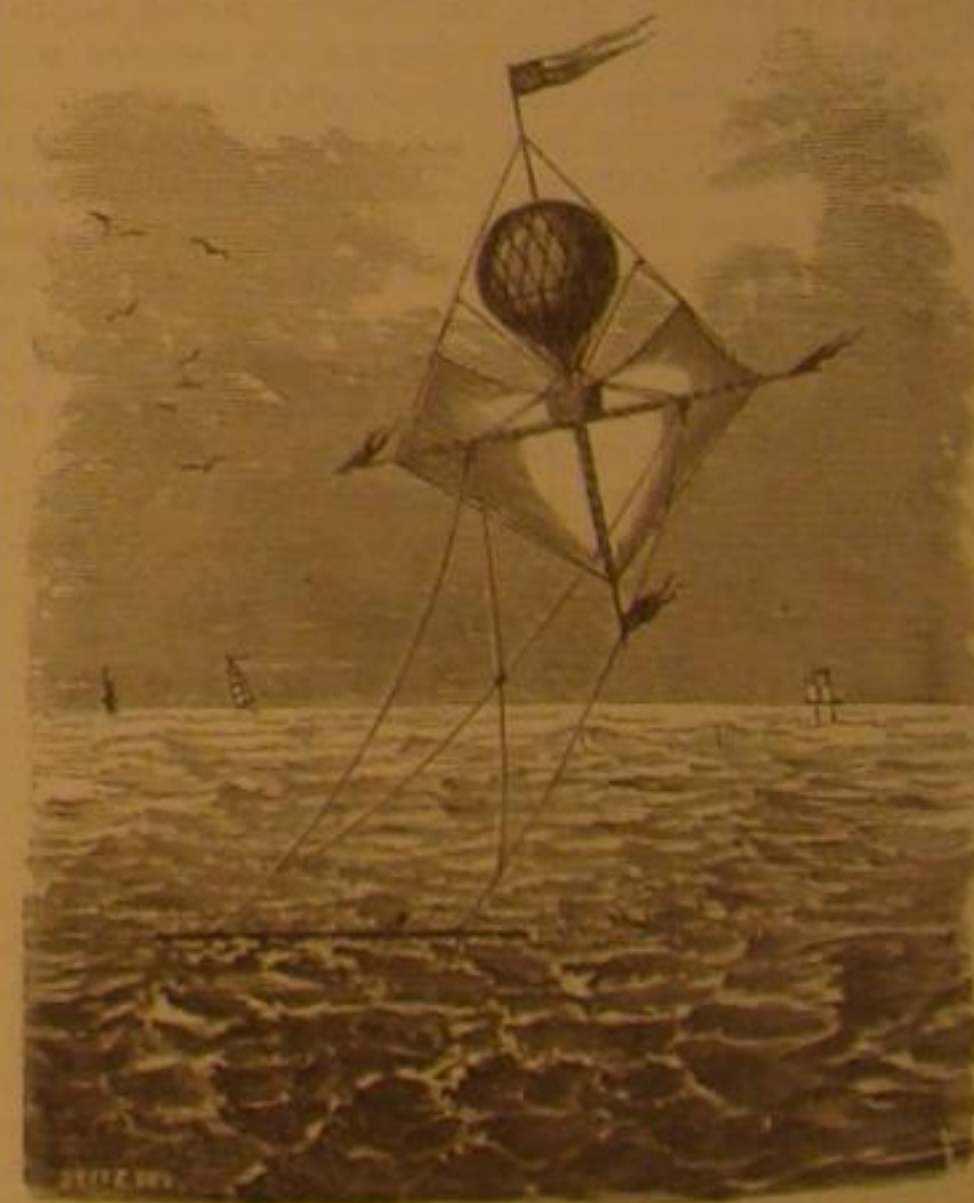
[We cannot advise the plan proposed; we do not think it would work. Dalton says that 1,000,000 parts of water at 32° Fah., becomes 1,046,600 at 212° Fah.; 1 in 23.3. Will not the shell of the boiler expand as much as the water and render nugatory the attempt to determine pressure? The boiler must be fitted with a force pump for feed, and it would be very easy to rig a contrivance to work it by hand so that you could apply the usual hydraulic test. If there is no steam gage to indicate pressure, the weight of the safety valve can be set to the point to which the boiler is to be tested and then the pump used until it rises.—EDS.]

Marine Aeronautics.

MESSRS. EDITORS:—In your last number I notice an article entitled "The Great Aeronautical Exhibition." One paragraph particularly attracted my attention, and I quote it:

"In this class we notice only the following, chiefly on account of its absurdity. The expectation that a body floating in a current of air, and propelled by no other force, could be guided by sails, is a folly which our readers will appreciate without further remark."

Probably the most of your readers concur in your opinion, that it is folly to suppose that a body floating along in a current of air or water, propelled only by the force of the current itself, would exert any resisting force upon the fluid by which its direction could be changed. It is a fundamental principle of mechanics, that a body, moved by a single force in a given direction, requires a second force, acting in another direction, to produce any change in its course. A ship propelled through the water by means of sails, can be guided by her sails alone, to some extent. The second force in this case is the resistance upon her keel. If the keel were movable upon a central pivot—proper strength and other difficulties not being considered—the ship might be guided by its keel so as to sail as close to the wind as it now does by the use of the rudder. Many of your readers are acquainted with the old method of utilizing the force of river currents to propel ferry-boats across streams; the ends of the boat being connected by ropes to grooved pulleys running upon a rope stretched from one bank to the other. The end



of the boat lying in the direction the boat is required to move, is hauled up stream by shortening the rope at that end, so that the boat makes an oblique angle with the direction of the current. The force of the current upon the side of the boat propels it across.

No far no means have been discovered of guiding vessels—not locomotive—except by the resistance of one medium to the force of propulsion afforded by another. The difficulties of effecting locomotion in air-navigation are very great, for reasons which I need not here mention.

It occurred to me, some years since, that an application of the principles to which I have alluded, might be made to the guidance of balloons over large bodies of water. Since I first conceived the idea, I have made some experiments which have confirmed my first opinion, and as the subject of aeronautics is now attracting much attention, I have ventured to send you a drawing and a description of the apparatus which I have been experimenting with, representing it, however, as I should suppose it would appear when made upon a suitable scale for actual use. The sails are, however, probably too

large for the balloon as represented in the drawing, but that will not affect the elucidation of the proposed plan.

The vertical axis of the balloon is occupied by a mast extending to some distance below it, to which is attached a yard crossing the mast at right angles, directly beneath the car. Rope stays or braces are attached to, and connect the upper and lower extremities of the mast with the ends of the spar. To these stays and also to the mast are attached suitable blocks and other appliances for furling and extending the sails. On the spar, at about one fourth its length from either end, are blocks through each of which pass two guy ropes. One of these guy ropes passes directly to the corresponding end of a floating keel, and the other passes through a ring placed at the point where it intersects the opposite guy rope to the opposite end of the keel. By shortening or letting out these guy ropes a proper inclination is given to both the sails and the keel. The guy ropes are so attached to the keel as to have no tendency to keep it otherwise than perpendicular. The keel is composed of a hollow metallic tube which floats upon the surface of the water, with a thin plate of metal attached to its under side of sufficient depth to prevent drifting by the force of winds. Its cross section would be so small as to oppose little resistance to motion, while by the use of the guy ropes it could be made to assume such a position as to guide the balloon in any required direction. It could not probably be held so close to the wind as a well rigged sailing vessel, still my experiments have demonstrated to me that it can be brought much closer to it than I at first anticipated. The keel not only acts as a means for steering the balloon, but it also takes the place of ballast. It might easily be made to carry the materials for the generation of gas to supply leakages which are liable to occur. These materials could be separated and confined in appropriate receptacles which, by means of a stop cock with a cord attached, could be made to communicate with each other, and the gas thus generated could be conveyed by a flexible tube to the balloon. Enough of these compartments could be provided to furnish the gas in quantities as it would be required.

So confident am I that this apparatus will answer the purpose, that I am willing to undertake the voyage from New York to Liverpool provided a proper person will volunteer to accompany me, and some one can be found to furnish the means for the construction of the "air-ship" under my direction, my own resources being inadequate to meet the necessary expenses.

AERONAUT.

Plan for Index Plates.

MESSENGERS EDITORS:—I send herewith a plan for an index or dial-plate for a gear-cutting machine. If you or your correspondents know of a better combination, please inform me through the SCIENTIFIC. I propose to make the index-plate twenty-eight inches in diameter, the first circle of holes (commencing at center of plate) four inches diameter, and the last circle twenty-seven inches diameter. There will be sixty-nine circles in all, containing the following number of holes, and in the following order:

77	87	99	109	118	127	135	143	280	420
89	101	111	119	128	136	144	152	290	430
91	103	113	121	130	138	146	154	300	440
93	105	115	123	132	140	148	156	310	450
95	107	117	125	134	142	150	158	320	460
97	109	119	127	136	144	152	160	330	470
99	111	121	129	138	146	154	162	340	480
101	113	123	131	140	148	156	164	350	490
103	115	125	133	142	150	158	166	360	500
105	117	127	135	144	152	160	168	370	510
107	119	129	137	146	154	162	170	380	520
109	121	131	139	148	156	164	172	390	530
111	123	133	141	150	158	166	174	400	540
113	125	135	143	152	160	168	176	410	550
115	127	137	145	154	162	170	178	420	560
117	129	139	147	156	164	172	180	430	570
119	131	141	149	158	166	174	182	440	580
121	133	143	151	160	168	176	184	450	590
123	135	145	153	162	170	178	186	460	600
125	137	147	155	164	172	180	188	470	610
127	139	149	157	166	174	182	190	480	620
129	141	151	159	168	176	184	192	490	630
131	143	153	161	170	178	186	194	500	640
133	145	155	163	172	180	188	196	510	650
135	147	157	165	174	182	190	198	520	660
137	149	159	167	176	184	192	200	530	670
139	151	161	169	178	186	194	202	540	680
141	153	163	171	180	188	196	204	550	690
143	155	165	173	182	190	198	206	560	700
145	157	167	175	184	192	200	208	570	710
147	159	169	177	186	194	202	210	580	720
149	161	171	179	188	196	204	212	590	730
151	163	173	181	190	198	206	214	600	740
153	165	175	183	192	200	208	216	610	750
155	167	177	185	194	202	210	218	620	760
157	169	179	187	196	204	212	220	630	770
159	171	181	189	198	206	214	222	640	780
161	173	183	191	200	208	216	224	650	790
163	175	185	193	202	210	218	226	660	800
165	177	187	195	204	212	220	228	670	810
167	179	189	197	206	214	222	230	680	820
169	181	191	199	208	216	224	232	690	830
171	183	193	201	210	218	226	234	700	840
173	185	195	203	212	220	228	236	710	850
175	187	197	205	214	222	230	238	720	860
177	189	199	207	216	224	232	240	730	870
179	191	201	209	218	226	234	242	740	880
181	193	203	211	220	228	236	244	750	890
183	195	205	213	222	230	238	246	760	900
185	197	207	215	224	232	240	248	770	910
187	199	209	217	226	234	242	250	780	920
189	201	211	219	228	236	244	252	790	930
191	203	213	221	230	238	246	254	800	940
193	205	215	223	232	240	248	256	810	950
195	207	217	225	234	242	250	258	820	960
197	209	219	227	236	244	252	260	830	970
199	211	221	229	238	246	254	262	840	980
201	213	223	231	240	248	256	264	850	990
203	215	225	233	242	250	258	266	860	1000

In the above I have left out the number 75, 150, and some between them, because they are factors of other numbers used, viz:

75 is a factor of	300, 350, 450, 600, 750, 900, 1050, 1200, 1350, 1500, 1650, 1800, 1950, 2100, 2250, 2400, 2550, 2700, 2850, 3000, 3150, 3300, 3450, 3600, 3750, 3900, 4050, 4200, 4350, 4500, 4650, 4800, 4950, 5100, 5250, 5400, 5550, 5700, 5850, 6000, 6150, 6300, 6450, 6600, 6750, 6900, 7050, 7200, 7350, 7500, 7650, 7800, 7950, 8100, 8250, 8400, 8550, 8700, 8850, 9000, 9150, 9300, 9450, 9600, 9750, 9900, 10000.
150 is a factor of	300, 450, 600, 750, 900, 1050, 1200, 1350, 1500, 1650, 1800, 1950, 2100, 2250, 2400, 2550, 2700, 2850, 3000, 3150, 3300, 3450, 3600, 3750, 3900, 4050, 4200, 4350, 4500, 4650, 4800, 4950, 5100, 5250, 5400, 5550, 5700, 5850, 6000, 6150, 6300, 6450, 6600, 6750, 6900, 7050, 7200, 7350, 7500, 7650, 7800, 7950, 8100, 8250, 8400, 8550, 8700, 8850, 9000, 9150, 9300, 9450, 9600, 9750, 9900, 10000.

All numbers below 75 are factors of the even numbers between 75 and 150. Consequently, I can cut a gear of any number of teeth below 150; above 150 I can cut as follows:

169 is a factor of	338, 507, 676, 845, 1014, 1183, 1352, 1521, 1690, 1859, 2028, 2197, 2366, 2535, 2704, 2873, 3042, 3211, 3380, 3549, 3718, 3887, 4056, 4225, 4394, 4563, 4732, 4901, 5070, 5239, 5408, 5577, 5746, 5915, 6084, 6253, 6422, 6591, 6760, 6929, 7098, 7267, 7436, 7605, 7774, 7943, 8112, 8281, 8450, 8619, 8788, 8957, 9126, 9295, 9464, 9633, 9802, 9971, 10000.
170 is a factor of	340, 510, 680, 850, 1020, 1190, 1360, 1530, 1700, 1870, 2040, 2210, 2380, 2550, 2720, 2890, 3060, 3230, 3400, 3570, 3740, 3910, 4080, 4250, 4420, 4590, 4760, 4930, 5100, 5270, 5440, 5610, 5780, 5950, 6120, 6290, 6460, 6630, 6800, 6970, 7140, 7310, 7480, 7650, 7820, 7990, 8160, 8330, 8500, 8670, 8840, 9010, 9180, 9350, 9520, 9690, 9860, 10000.

Total number of holes in index-plate would be 12,600; number of different gear that could be cut from six teeth upwards, 169; distance from center to center of holes in four-inch circle, 0.1632 inch; distance from center to center of holes in largest circle, 0.1666+ inch; distance from any circle to next adjoining, 0.172+ inch.

Kalamazoo, Mich.

E. H. H.

Breech-loading Cannon in Russia.

ST. PETERSBURG, RA., July 9, 1868.

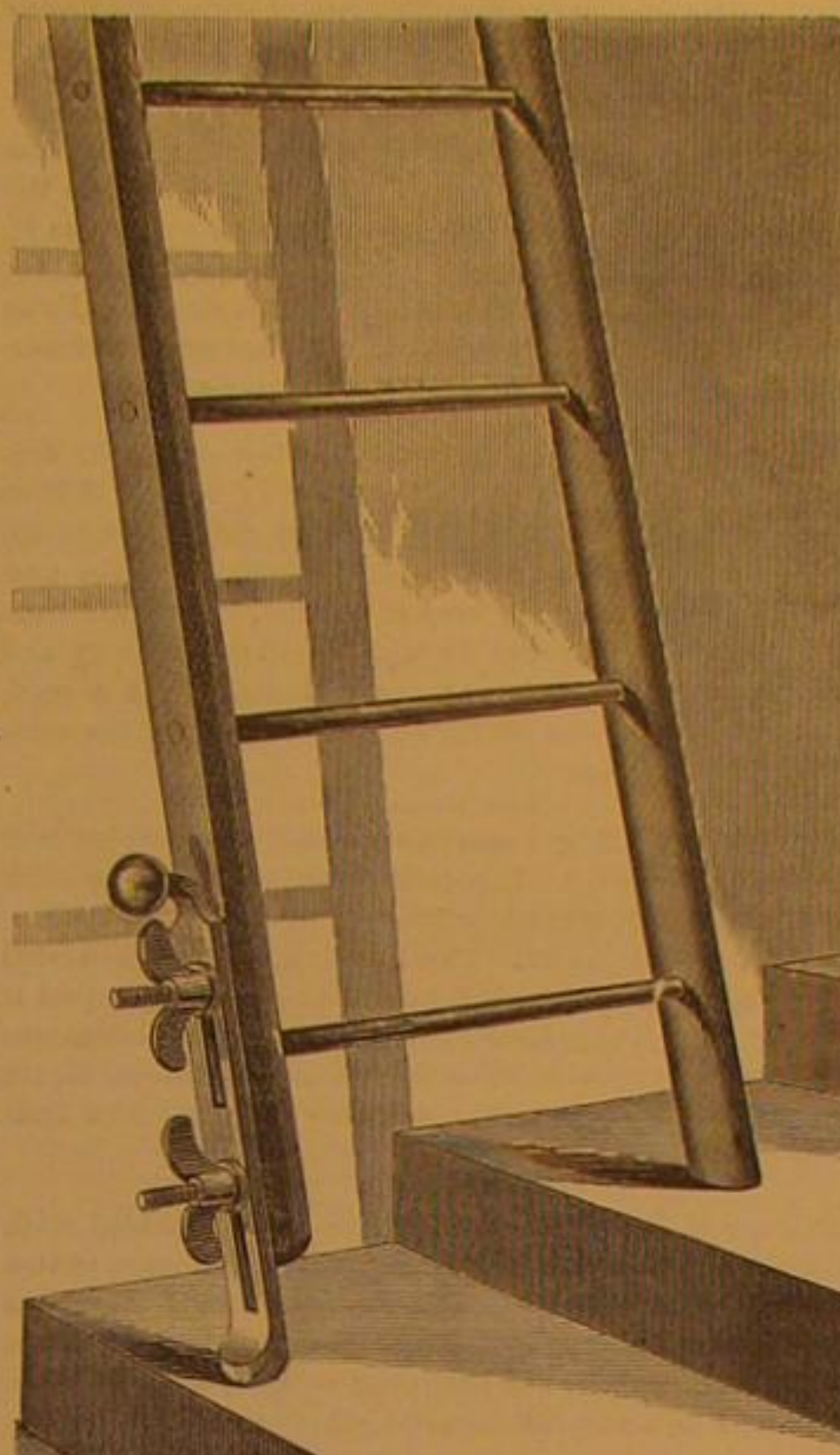
MESSENGERS EDITORS:—In your number of June 27th ult., you say that Russia had adopted the Prussian system of breech-loading cannon. This is a mistake. The Prussian system, together with the Armstrong and Broadwell systems of breech-loading cannon, was elaborately tried by a Russian Commission in the presence of the undersigned. The Armstrong gun, first, and the Prussian Krupp gun, second, broke down, and could not longer be loaded or fired without cleaning; while the American system of J. W. Broadwell proved a perfect success—his gun being as fresh and quick in loading, and accurate in fire, as at the commencement. As a consequence, Russia gave up the Krupp and Armstrong guns, and bought the Broadwell patent, giving him a decoration and a large sum of money, and now uses it both in the army and navy, in large and small bores.

AMERICANUS.

RICH or poor, it is every man's and every woman's duty to earn his or her own living. Everybody is a consumer; therefore, everybody should be a producer. The world's wealth is so much less by everything that is consumed or worn out. The idleness of individuals in all stations and places, makes salaries lower and bread higher; so it is the idle in any community who should be deplored, and not they who labor.

THOMAS & RAYMOND'S PATENT ADJUSTABLE LADDER.

Serious injury to body or limb, if not permanent crippling or loss of life, sometimes results from the slipping of the foot of a ladder, when, on account of the unevenness of the ground, it is necessary to "block up." This is usually done by means of brick, stone, pieces of wood, etc., liable to slip at any moment. The invention here illustrated is intended to obviate any such disaster. The engraving shows plainly a simple attachment effectual, cheap, and handy, which can be



applied to both feet of the ladder, which would seem to be preferable, as it would obviate the necessity of turning the ladder to suit its changed position to the surface of the ground.

In the engraving the attachment is very plainly seen. It is a strap of malleable, cast, or wrought iron, with two slots cut longitudinally, and is secured to the ladder by means of two bolts through the ladder leg, the attachment being held in position by nuts. For better security the foot of the attachment is corrugated, and the inside surface where it meets the ladder may be similarly corrugated if deemed necessary. When lifted up, the appendage is entirely out of the way, but it may be dropped to any extent desired to suit circumstances.

The patent for this device was issued June 30, 1868. The entire right or territorial rights are for sale by Thomas & Raymond, Beverly, Mass.

Dyspepsia—Its Symptoms and Causes.

We extract from a communication by Dr. E. P. Miller to the *Herald of Health*, the substance of an interesting article on Dyspepsia, a disease which prevails to an incredible extent in this country, and which is the fruitful source of many complaints often attributed to other causes.

"In persons whose digestion is perfectly healthy, there is, during the digestive process, more or less gas accumulated. This gas is generally all absorbed and used in the system, so that in the highest state of health no gas will accumulate in the body, it should all be taken up by absorbents and used.

"Flatulence, then, is due to an excess of gas. The cause of this excess may be either a failure of the absorbents to take up what naturally accumulates in the digestive process, or to its being produced in excess. The introduction of a certain amount of air into the stomach in the frothy saliva, by mastication, and in the act of swallowing food, may be considered a physiological process. This air undergoes a change by being interchanged or mixed with the digestive fluids and gases, and in this change it gives up a portion of its oxygen, which is finally absorbed. In the dyspeptic's stomach the absorbents are not active, and this gas accumulates, giving rise to flatulence.

"The chief origin of the gases which produce flatulence, however, is due to the decomposition or putrefaction of food in the alimentary canal, and those persons who are habitually troubled with flatulence, either eat at their meals a quantity of food which is absolutely much too large for their powers of digestion, or they are taking a quality of food that is not well adapted to the diseased condition of their digestive organs.

"Some authors think that the fluids which are thrown back into the intestinal canal from the blood to be excreted, generate gases which give rise to flatulence. This opinion has not, as yet, been so clearly established. The gas in the stomach differs from that in the intestines, and that in the small intestines differs from that in the large. There is a much larger proportion of oxygen in that found in the stomach, being much more like atmospheric air than those in the intestinal gases.

"Hydrogen is formed in much larger proportion, however, in the gases of the intestines than in those of the stomach. This hydrogen is not found in the blood to any great extent, and is not extracted from the blood into the intestines, so that it must arise from the chemical changes going on in the food after it leaves the stomach. This chemical change is doubtless due to obstructions in the function of the liver. MM. Bidder and Schmidt have tried repeated experiments upon dogs, by tying the duct which conveys the bile from the liver to the intestines, and they have invariably found that rapid chemical changes took place in all sorts of food when this was done. When animal food was fed to these dogs the feces smelled like carrion; there was a continual rumbling in the abdomen, and an evacuation of fetid air.

"From the experiments made, it is supposed that one of the functions of the bile is to act as an antiseptic, and prevent the putrid decomposition of albuminous food, and also to check the acid fermentation of vegetable foods. Dr. Chambers states 'the condition produced in dogs by mechanically stopping the functioning of the liver, answers exactly to the intestinal flatulence of dyspeptics in our species.'

"Flatulence of the small intestines generally occasions the greatest annoyance. There is usually considerable difficulty in this gas passing the ilio-colic valve into the large intestines, and for this reason it often rolls about in the abdomen, causing a very distressing rumbling noise, sometimes remaining several days without being able to escape or to be absorbed. In addition to this rumbling and motion, it often greatly distends the abdomen, causing severe pain in the side and other distressing symptoms. At times, when there is but slight pain or discomfort, it occasions much inconvenience by preventing sleep.

"When gas is expelled by the mouth, that has a strong odor of sulphureted hydrogen, it is intestinal gas that has passed up through the pyloric orifice into the stomach. When gas is belched up that has neither taste nor smell, it usually comes from indigestion of starchy food; when it is fetid with the odor and flavor of sulphureted hydrogen, or rotten eggs, it is from the indigestion of albuminous food. Flatulence arising from the indigestion of albuminous food is often attended with diarrhea, while that caused from starchy food is attended with constipation. Flatulence of the colon or large intestines is not near so troublesome as that of the small intestines. It is readily distinguished from that of the small intestines by percussion, by the absence of rumbling, and by its passing off more readily from the bowels.

"Constipation is one of the obstinate and very troublesome symptoms accompanying dyspepsia. It is often so formidable as to be almost the only symptom complained of. Patients often say: 'Doctor, if I could only get my bowels to move freely, I should be all right; but I can't get them to move at all without I first take something to start them.' This taking 'something to start them' is very often the sole cause of their extreme constipation. There are tens of thousands of dyspeptics in the country who have almost ruined the mucous coats of the alimentary canal by the constant habit of resorting to physics to cure them of every slight indisposition they may have.

"If people would only realize that in every dose of physic they swallow they are taking into their systems an irritant and dangerous poison, which the vital instincts hasten to expel from the body by this rapid purging, and that this poison must leave its damaging effects in the blood, on the nerves, bones, muscles, and particularly on the mucous membrane of the alimentary canal, it seems to me they would see a reason for not being in quite so much haste to defile the beautiful bodies God has given them.

"Constipation and costiveness are usually regarded as synonymous terms, yet some authors make the distinction, that in costiveness there is less fecal matter formed than in constipation. In both there is a default in the repulsive power of the bowels, allowing the fecal matter to accumulate, but in costiveness there is less accumulation than in constipation. In this difficulty there is evidently a great deficiency of expulsive power in the lower bowels. The causes of course are various. Purgative medicines, I think, should head the list. Imperfect digestion of the food before it reaches the colon; sedentary habits; acute diseases, which confine the patient to the bed for a long time; general debility; neglect to attend to the natural call to evacuate the bowels, thus keeping them too long dilated or distended; imperfect mastication; eating indigestible and insoluble articles of food, such as skin, gristle, stones and seeds of fruits, and half-cooked vegetables, highly seasoned food, new bread, starchy food that is imperfectly digested, alcoholic stimulants, tobacco, vinegar, and whatever interferes with the healthy action of the liver, will produce constipation.

"Too highly concentrated food is often a cause. A certain amount of innutritious material seems necessary to complete digestion, and thus, while we should not exclude the innutritious entirely, we should avoid the extreme of swallowing too much of the coarse and indigestible. The exclusive use of fine flour bread is a prolific cause of constipation. It prevails more among Americans than any other class of people; the reason for this being, they use more concentrated food, take more physic, and less exercise. Old people are most liable to constipation."

OUR Secretary of the Navy within a few days past, has sent in a communication to the Senate in reference to the acquisition of the Midway Islands, belonging to the West Indies group, and the opinion is expressed that the acquisition will prove a highly important one. The principal harbor is said to be equal to that of Honolulu, the soil is good and fish are abundant in the bays.

The Aniline Blue—An Instructive Lesson.

It is an old maxim that "Fortune favors the brave." It might be appropriately added that it also favors the persevering. Many important discoveries have been made in consequence of the dogged perseverance of men, who, when they have asked from nature a revelation of her mysteries, would not accept a negative answer, until it would seem that almost on account of their very persistence they were rewarded by success. An interesting treatise on Aniline and its Derivatives, from the pen of M. Remann, contains the following anecdote of the way in which the fugitive blue formerly considered as practically of no value, was rendered permanent. It presents a marked contrast to an instance of good abilities wasted on account of unfixedness of purpose, which we give in another column:

"A dyer, like all others of his craft at that time, was busily occupied experimenting with the aniline dyes. Amongst other things, he tried a reaction described by M. Lauth, viz., that of aldehyde on a sulphuric solution of aniline red. In this reaction, a substance is produced which gives to solutions an extremely evanescent blue color. M. Lauth had given up all idea of utilizing this blue color in practice; and M. Cherpin endeavored to fix the same color on silk or wool with similar want of success. His attempts, although fruitless, were incessantly renewed, exhausting his purse, but not his patience. One day, however, discouraged at the want of success attending some recent experiment on which he had founded great hopes, he was on the point of relinquishing the attempt at conquest over this fugitive blue, when the idea struck him to confide his troubles to an old friend, a photographer. 'A trouble shared is a trouble halved,' says the proverb. Cherpin proceeded to test this saying, and experienced the reward of his perseverance and his confidence in the consolation of friendship. He found his photographic friend, and confided to him the history of all his hopes, his experiments, and his fruitless results. 'Fix the blue?' said his friend. 'Is that the only difficulty? Why it's the easiest thing in the world! Have you tried hyposulphite of soda?' 'Hyposulphite of soda? *Mon Dieu*, no! Do you think it will fix my color?' 'Of course it will. Don't you know that hyposulphite of soda is the fixing agent *par excellence*, and that when we want to fix anything in photography, that is the substance we always employ.'

"Happy is he who possesses faith! Cherpin tried hyposulphite of soda, and his joy and admiration of the chemical knowledge of his friend may be imagined when he saw his blue color metamorphosed into a splendid green, this time perfectly stable. It is scarcely necessary for us to add, that the mode of action of action of hyposulphite of soda in this case is entirely different from its photographic action, and that it would be quite impossible to predict the one by knowing the other.

"This anecdote contains a moral. It shows, in our opinion, not the result of chance, for that is common to all the world,—for where is the discovery to which chance has not more or less contributed?—but it shows the power of will, the power of perseverance. Chance only favors two kinds of persons—those sufficiently instructed, or endowed with talents eminent enough to observe it, to seize it, and to profit by it; and those who, by patience, perseverance, and the power of their will, force it in time to become useful to them."

What a grand moral this ludicrous episode ought to convey to our students if they will only read it aright?

Editorial Summary.

CHICAGO was visited July, 21st, by countless numbers of the sand-fly, an insect about the size of the gallinippers which infest the Southern swamps. Their advent was sudden, and many of the saloons on the north and south sides were compelled to close up in order to prevent their ingress. Whenever a light was placed the flies gathered around it in millions, and covered the glass in the windows so as to render it almost an impossibility to see the gas jet. The street lamps were besieged, and in many instances the streets were as dark as if no gas were employed. The sidewalks were covered, and many were crushed to death beneath the feet of pedestrians. But still they increased, and about 10 30 o'clock they covered everything. They then commenced to disappear, and at two o'clock in the morning scarcely one was to be seen. This is about the usual time for their annual visit, but never before were so many seen at any one time at a particular point.

AN IRON MOUNTAIN IN WEST VIRGINIA.—The Pittsburgh Gazette says: "We are informed by Hon. D. D. T. Farrensworth, State senator from Upshur county, West Virginia, that an iron mountain exists in the upper portion of that county, of greater extent and purity than any other known body of iron in the world, not excepting the famous iron mountain of Missouri; and that under this vast body of iron there is a vein of bituminous coal, measuring on the face, where the Buchanan river cuts through, twenty-five feet in thickness. He declares this ore to be so pure that a blacksmith took a piece and forged a horse-shoe from it. This deposit is up the west branch of the Monongahela river, and can be reached from this city by a railway not exceeding one hundred and fifty miles in length."

In the southeast corner of the Territory of Wyoming is situated Cheyenne. This, the "Magi City," was laid out by General Dodge, on the 20th and 21st of July, 1867. In one short year it has gained a resident population of over five thousand, having had, perhaps, in the flourishing times of gamblers, roughs, and prostitutes, as many more. The citi-

zens now are mostly of a very respectable class, though, like all the western towns, it has a full quota of rum-shops and their patrons.

THE solvent power of glycerin upon several substances commonly used in medicine and the arts, is as follows: One part of sulphur requires 2,000 parts of glycerin; iodine, 100 parts; red iodide of mercury, 340 parts; corrosive sublimate, 14 parts; sulphate of quinine, 48 parts; tannin, 6 parts; veratrin, 96 parts; atropia, 50 parts; hydrochlorate of morphia, 19 parts; tartar emetic, 50 parts; iodide of sulphur, 60 parts; iodide of potassium, 3 parts; sulphide of potassium, 10 parts.

A COMMUNICATION to the Royal Society gives an account of some observations upon the small comet discovered on the 13th of June by Wincke. The spectrum of this comet is resolved into three broad bright bands, corresponding to the spectrum of carbon in the combustion of olefiant gas. From this it is not improbable that carbon will hereafter be determined to be a general constituent of cometary matter.

A WRITER in the London Quarterly Review urges the construction of the Euphrates Valley Railway by the British Government. It is probable that the demands of commerce will soon cause the construction of a railroad from the Caspian to the Indus valley by way of Muhad, Herat, and Candahar, that is to say a route through Russian territory and opening the way for Russian armies to India. Such a road, too, would compete with our Pacific Railroad for the commerce of Eastern Asia.

A METHOD of refining sugar has recently been submitted to the French Academy. It consists merely in adding milk of lime to the sirup, mixing intimately in quantities dependent on degree of impurity. The lime is afterward separated by a current of carbonic acid (passed as long as the liquid is alkaline), followed by boiling for a short time to decompose the resulting bicarbonate. The filtered and decanted liquid yields pure white sugar. The quantity of lime varies from four per cent. upward.

THE boxes in Boston post office have been provided with metallic doors and patent bank locks. The advantage of this innovation is that each box-holder can have access to his box at all times, and on any day. The lock is the property of the box-holder, and, on the box changing owners, the lock is removed, and a new and different one substituted.

ANILINE poisoning can be detected as follows: Macerate the contents of the stomach with water containing a little sulphuric acid, add an excess of solution of potassa, and distil; add a little sulphuric acid to the distillate and evaporate. If aniline is present, a purple or red margin will be formed at the top of solution where it touches the vessel.

M. LARTET, at the last session of the *Société Savante*, presented an account of some human bones discovered by him in Dordogne. The bones of the limbs were of remarkable size and prodigious strength. Three skulls were found also of great size. The age of these bones is judged to be equal to the mammoth, and they are considered to belong to the same geological period.

It is estimated that fire in the woods, this season, has destroyed in the Ottawa District, standing pine lumber, to the value of \$4,000,000, and the woods are still burning. The boats on the Montreal route, it is said, are seriously detained by the smoke on the river.

ON the Erie Canal, a boat has been placed, which is propelled on a new principle. The propelling power is a wheel in the centre, fixed upon a frame which allows it to rise and fall according to the depth of water, and permits the circumference always to come in contact with the bottom of the canal. Satisfactory results are said to be obtained.

A RESIDENT of Martigny, Switzerland, has lately organized a considerable trade in ice at Lausanne. The ice from the glaciers having been sawn into regular cubes of small volume and perfect transparency, is placed in boxes and sent off by fast trains to various centres of population in France, and arrives with very little waste.

THE boundaries of the new territory of Wyoming are as follows: On the north is situated Montana; on the south, Colorado; on the east, Dakota and Nebraska; and on the west, Montana, Idaho, and Utah. It lies between the 27th and 34th meridians of longitude west from Washington, and the 41st and 45th parallels of latitude.

No doubt the cheese factories of the country add much to the cheese product in the market; neither is there any doubt that the quality of the article decreases as the quantity increases. The rich productions which once made Goshen and Herkimer county famous, are now buried beneath the leathery and tasteless productions of the cheese factories.

THE parallel rod of the first locomotive run over the Boston and Providence road in 1834 is preserved in the Company's workshop at Boston. The parallel rods of their engines now in use weigh 249 pounds.

A NEW tunnel under the Thames is contemplated, at a point near the Tower of London, to be lined with blue brick and iron, and with hydraulic lifts at the ends to raise a carriage and ten passengers.

THE Reporter estimates the shoe business at Lynn, for the past year, at \$17,000,000.

NATURE was thoughtful in her arrangement of coal and iron. Generally, wherever she laid down a stratum of iron ore, she accompanied it with a layer of coal to smelt it.

THE largest sawmill in the world, but one, is at Clinton, Iowa, and when under full way employs 1,000 men. Its engine is of 900 horse power.

A MAN in East Thompson, Conn., is building two tenement houses, framed like ordinary buildings, but which are to be covered, sides and roof, with Manila paper instead of boards.

APPLES carried from this country to China, packed in ice, sell at Hong Kong for \$2 a dozen, gold.

BET sugar cultivation is a growing interest in the Western States. At Montgomery, Ill., a company has purchased this season 500 acres, on which they are raising beets for sugar.

NEW ELGIN, Ill., is a forest of pine and birch, the trees 20 feet high, and "raised from the seed," where ten years ago was only a shrubless prairie.

THE Foreign Associateship of the French Academy of Sciences, vacant by the death of Sir David Brewster, has been filled it is reported, by the election of the eminent mathematician, Professor Kummer, of Berlin.

A PHYSICIAN of Illinois reports a case of blindness of the right eye completely cured by the extraction of the first bicuspid of the upper jaw. The tooth was carious, and its interior was filled with pus.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

THE WORKING PEOPLE.—The Labor Exchange, at Castle Garden, N. Y., makes the following report of the first twelve working days of July: Applicants for employment, 1,304; consisting of males, 1,182; females, 622; orders, for employes, 2,012; males, 1,300; females, 622; persons employed, 1,834; males, 1,182; females, 622. Among these were 41 families comprising 134 persons. Average number of orders each day, 168; average number of applications for employment, 150; average rate of monthly wages paid to the males, \$25; average rate of monthly wages paid to females, \$9. Classification of the applicants: Males, mechanics, 129; agriculturists, 1,053; females, skilled labor, 24; unskilled labor, 598. Males able to read and write, 877; not able, 305; females able to read and write, 456; not able, 166.

A distinguished experimental chemist of Paris announces that he has taken advantage of the property possessed by fluoride of calcium (common fluor spar) of dissolving alumina at a high temperature to obtain magnificent crystals of corundum (sapphire, rubies, &c.) He promises shortly to give a full account of the experiment.

The roof of the Metropolitan station, now being erected for the Midland Railway at King's Cross, London, is to ordinary roofs what the Great Eastern was to ordinary vessels. Its span is 240 feet, and the height of the central portion of the arch from the level of the rails is 99 feet. It covers eleven lines of rails and four acres of cellars.

The statistics of cigar manufacture show that Great Britain and her colonies and the United States consume half the crop of the world, and that Cuba produces one-third of the whole supply of the world.

The descent of the Union Pacific railroad from the Black Hills to Laramie Plains, is every way sensational. The grade is 90 feet to the mile, so winding that 24 miles are traveled to reach a point 12 miles distant, and Medicine Bow Mountain, capped even in the summer time with snow, appears at the right of the traveler one minute, and at the left a minute later.

The Winsted Hoe Company which was employed wholly in the manufacture of hoes for southern plantations, has shut up shop for want of orders. The scythe factories of the same place have also a dull season, a circumstance with which the mowing machines may have much to do.

The Pacific slope intends to provide itself with iron. San Francisco has built a rolling mill, and Oregon has sent down 1,000 tons of pig iron to start with.

The patent on Hoe's rotary presses expired on Friday, 24th July. An application for its extension for seven years was not acted upon by Congress owing to the lateness of the time at which it was introduced.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notices of some of the more important recent American and foreign patents.

BUILDING MATERIAL.—Thomas J. Lowry, Conneautville, Pa.—The nature of my invention relates to improvements in the composition of matter for forming building material and in molds for forming the same.

LEVELS.—Wm. P. Carter, Chelsea, Mass.—This invention consists in an ordinary stock of wood which is provided with a circular metallic ring made in two parts and inserted within a central circular opening on the said stock within the said ring a weight-d pendulum is suspended upon a central axis and provided with arms which swing between cross arms of the ring, and always maintaining a vertical position no matter what position the stock may be in.

INDICATOR FOR BOILERS.—Robert Berryman, Philadelphia, Pa.—This invention relates to a new indicator, which is to be attached to steam boilers, and its object is to produce a perfect safety guard against all accidents that may arise from having too much or too little water or too high or too low a pressure of steam in the boiler.

DEVICE FOR HOLDING TOOLS AGAINST GRINDSTONES.—Edwin Fernald, Turner, Me.—This invention relates to a device by which tools having a long cutting edge, can be held against grindstones, and can be sharpened; the device being so arranged that the bevel formed in the tool will be entirely uniform, and that its edge will be ground perfectly straight.

CARRIAGE.—Job Whitehead, Ames Station, Iowa.—This invention consists in the arrangement upon the frame-work of the body or box of a carriage of one or more coiled springs which may be wound up with a crank and arranged to transmit motion to the axle of the hind wheels and belts.

OSTENTMENT FOR VETERINARY PRACTICE.—Richard Jones, New York City.—This invention and discovery relates to a composition design d for healing purposes in the treatment of horses, cattle, and other domestic animals, and which may also be used with good effect upon the human body for the cure of wounds, bruises, and for other purposes.

WATER WHEEL.—La Fayette Lyons, Burlington, Vt.—This invention consists of a horizontal wheel provided with vertical curved buckets against which the water flows in a right angled direction and is discharged through two or more openings in the cover into a circular chamber of the diameter of the wheel, from which lateral tubes convey it away out of the chamber through the curb which supplies the water to the wheel.

DUMPING CAR.—Pollander Danick, Jackson, Mich.—This invention consists in the arrangement on the platform of a car, of a dumping bed fixed on wheels and provided with racks and pinions, whereby the operator by turning a crank may move the said bed over the edge of the car and it will dump by the action of momentum and gravitation, the said bed being provided with staples which are caught by hooks suitably placed at the edges of the car and to hold it as on a pivot to be restored to a level position by the oper-

ator previous to being returned by the racks or pinions to its normal position on the car.

HOOP SKIRT.—Louis Felhelmer, New York city.—This invention relates to the manufacture of hoop skirts and particularly to the method of fastening the tape to the steel spring, and it consists in passing the steel spring transversely through one eyelet and then clucking or passing down the inner end of the eyelet on to the steel.

BOLT TRIMMER.—Henry Howe, Oneonta, N. Y.—This invention relates to a new device for trimming bolts, rivets and other suitable articles, and consists of a cutter sliding within the lower part of a slotted plate, so that its bottom is flush with the under side of the plate. Reciprocating motion is imparted by means of an oscillating cam, working on the said plate, and by means of a spring catch projecting from the rear end of the cutter. The cutter is supported in the plate by having beveled edges which rest upon the similar-shaped inner edges of the slot in the plate. The cutting edge of the tool and the corresponding abutting edge of the plate are set diagonal, so that a drawing cut is produced on a reciprocating cutter.

LOCK.—John G. Spathlef, Sandusky, Ohio.—This invention relates to certain improvements which are applicable to door locks, safe locks, trunk locks, spring locks, pad locks, and all other kinds of locks.

WOOD SAWING MACHINE.—Henry A. Daniels, Thomaston, Conn.—This invention consists in arranging the bearings of the crank shaft in the same slide to which the swinging saw frame is pivoted, so that the distance between the working and swinging centers cannot be varied. The invention also consists in the use of a reciprocating block, which turns loose on the wrist pin of the crank and which slides between two parallel bars that form part of the swinging frame.

COFFEE ROASTER.—Frederick Max Bode, Vienna, Austria.—This invention relates to a new coffee roaster, which consists of a spherical shell hung in a semi-spherical jacket, its one axis being hollow and serving as a filling and discharge opening. The shell can be revolved by means of a handle attached to the cover of the aforesaid hollow axis, which cover can be removed to allow the filling in and discharge of the coffee.

CARRIAGE CLIP.—Thomas McCreary, Matamoras, N. Y.—This invention relates to a new device for connecting the shaft of a carriage with the front axle of the same by means of a pivot which will not rattle, which cannot easily get out of order, and which can be readily removed to allow the shaft to be taken off. The invention consists in securing the pivot to the end of the shaft and not to the clip, as usual, and in then hanging it loose in the ears of the clip and in locking it to the same by means of a spring catch.

SEWING MACHINE.—Stephen French, Orange, Mass.—This invention relates to a new shuttle sewing machine, and consists in so combining with each other an oscillating shuttle driver, a double cam-feed motion, and a slotted plate for moving the needle up and down; that in one machine the main advantages of many different kinds of sewing machines are contained whereby a complete and satisfactory operation, as well as great simplicity of construction can be obtained.

HAND PUNCH.—J. D. Higgins, Greenville, Conn.—This invention consists in arranging a sliding tubular punch in an arm that is parallel with, and projects from the lower jaw, and in holding the punch by means of a spring constantly against the upper or pressing jaw. When the punch is to be used it is by the upper jaw forced toward the lower one, but is at the same time always guided in the aforesaid arm so as to remain perpendicular to the face of the lower jaw.

MACHINE FOR DRIVING FENCE POSTS.—Isaac J. Parker, Buffalo Grove, Iowa.—This invention relates to a machine for driving fence posts and is designed to be placed upon a wagon or any suitable frame mounted on wheels; the device being constructed in such a manner that it may be operated while on the wagon and, drawn from place to place where the posts are to be driven.

SWITCH LOCK.—John V. Chamberlain, Cincinnati, Ohio.—This invention relates to a lock for railroad switches, and it consists in a novel construction and arrangement of parts, whereby the lock is rendered self-locking and a very simple and durable lock obtained; all springs and small parts which are liable to get out of repair being avoided.

LIQUID MEASURE.—Ward Sprague, Sandy Creek, N. Y.—This invention is designed to obviate the difficulty attending the measuring in cold weather of thick viscous liquids, such for instance as molasses, sirups, etc.; and to this end the invention consists in constructing the measure with double walls with a space allowed between to receive water or other suitable fluid, while, by placing the measure on a stove it is kept warm and whenever the measure is used the heat radiated from the walls of the measure will render the contents of the same sufficiently fluid to flow readily.

FLATTENING AND BENDING RODS FOR CHAIN LINKS.—Peter Hendricks, Trenton, N. Y.—This invention relates to a machine for flattening and bending rods for the manufacture of links for chains such as are used more especially for mining purposes. The invention consists in a peculiar construction and arrangement of parts whereby the two different sized links required for the manufacture of each chain may have the rods of which they are formed, flattened and bent on one and the same machine.

CENTERING LATHE.—Benjamin F. Bee, Harwick, Mass.—This invention relates to a new centering lathe designed for centering articles, that is, adjusting their ends centrally in line with the bit of the lathe so that the article may be drilled centrally or have center holes made properly in their ends in order that they may be fitted centrally in a turning lathe.

AUGER TOP.—H. D. Penoyer, Athens, N. Y.—This invention relates to an improvement in augers, and it consists in providing a top plate to fit on the upper end of the auger shank and receive the handle, said top-piece being composed of two parts and provided respectively with pawls and a ratchet, whereby the auger may be turned and holes bored in close proximity to any vertical fixtures where an ordinary fixed handle cannot be turned, and at the same time admit of the handle being adjusted and turned as usual in places where there is room to allow it.

SULKY PLOW.—Benj. Slusser Sidney, Ohio.—The object of this invention is to simplify the construction of sulky plows so as greatly to reduce their cost, while yet enabling them to be capable of easy operation, of ready adjustment, and of yielding to immovable obstacles without breaking.

LOW-WATER INDICATOR.—T. G. Eiswald, Providence, R. I.—The object of this invention is to furnish a neat and convenient instrument, which, being attached to the head of a steam boiler, will enable the engineer at any time to try the condition of the water in the boiler, and will, of itself, sound an alarm whistle when the water gets too low for safety.

COMBINED LOW-WATER INDICATOR AND TRY COCK.—T. G. Eiswald, Providence, R. I.—This invention relates to that class of low-water indicators in which a fusible plug is employed, and consists in a simple and convenient device by which the interior of such indicators can be kept clear from the accumulation of dirt, sediment, or scale, and by which, when such foreign substances have accumulated in the indicator, they may be blown out at any time and the interior of the indicator left perfectly clean and free. The device by which these important objects are attained, can at other times be employed conveniently as a try cock.

CLOTHES WRINGER.—P. Crader, Providence, R. I.—This invention relates to a new clothes wringer, which consists of four rollers, one of which is an elastic roller, held loose between the three other rigid rollers. The elastic roller is not hung in bearings, and used therefore not be formed on a metallic or wooden or other axle, but will be soft and elastic throughout.

WINDOW WIPER.—R. F. Burgess, Boston, Mass.—This invention relates to a new and improved method of cleaning windows, and it consists in arranging on a handle, of any desired length, a revolving frame made of tin or other suitable material, and attaching rollers thereto on which wiping or washing cloths are wound and unwound.

PAUL KEE.—Geo. E. Eastman, New Hartford, N. Y.—This invention relates to an improvement in ball cars for pails or buckets, and for other vessels of a similar construction, whereby they are rendered much more durable than the ordinary ball car, and the invention consists in forming it a car with a branch exterior stay and an interior stay, which are connected with the main plate of the car, whereby the main plate is guarded and protected from injurious lateral strain and rendered strong and durable.

COMBINED WINDOW AND BLIND FASTENING.—Wm. L. Barnes, Irvington, N. Y.—This invention consists in a device by which the blind and sash of a window can securely be fastened on the inside by combining the two fastenings.

OIL CUP.—Sylvester Charney, Portage City, Wis.—This invention consists in so arranging a valve in an oil cup that it can be raised by the motion of the part to which the cup is attached and closed by its own gravity, so that the discharge of the oil will depend upon the rapidity of the motion up and down.

EXTENSION LADDER.—John A. Smith, Lacon, Ill.—This invention has for its object to furnish an improved extension ladder, designed especially for firemen, painters, and tinners' use, but which shall be equally applicable for other uses, which shall be simple in construction, easily adjusted, extended, and moved from place to place.

DOOR MAT.—Wm. Young, Franklin, Mass.—This invention has for its object to furnish a simple, cheap, and serviceable door mat, which may be made single or double, large or small, in one piece or in sections, and which, when worn, may be readily with little trouble and at trifling expense.

EVAPORATOR.—N. Evinger, Terre Haute, Ind.—This invention has for its object to furnish an improved apparatus for evaporating cane or other saccharine juices for the manufacture of molasses and sugar.

TRUCK CLEARER.—John Callaghan, St. Louis, Mo.—This invention has for its object to furnish an improved device for attachment to street railroad cars, by means of which the cars may be made to clear the track for themselves.

TABLE CUTLERY.—Wm. Clayton, Bristol, Conn.—This invention relates to a new manner of attaching the bolsters to the shanks and handles of knives and forks, and consists in attaching a wrought or cast metal bolster to the shank and handle by means of a Babbet or other metal, cast around the lower part of the bolster. The shank is perforated, and the upper edges of the scales or handle are recessed, as well as the lower edge of the bolster, so that a slot is formed through handle, bolster, and shank, through which the metal is cast; its two parts being thereby connected to lock the two parts of the bolster firmly together, and to the handle.

TANNERS' HOOK.—James Hoffman, Belvidere, N. J.—This invention has for its object to furnish an improved hook for tanners' use in handling hides in the vat, which shall be so constructed and arranged as to handle the hides without injuring their grain.

APPARATUS FOR CLARIFYING CANE JUICE.—Wm. Dill, Houma, La.—The object of this invention is to provide a simple and effective apparatus for straining and clarifying cane juice.

CRAYON HOLDER.—Rufus Wright, Brooklyn, N. Y.—This invention relates to improvements in the cases or holders for crayons which are used in drawing by artists, and in schools and institutions of learning for demonstrating problems on the blackboard.

GRAND SELF-OLIER.—Cyrus B. White, Port Richmond, N. Y.—This invention relates to an improvement in self-lubricating gibs for steam engines, and is an improvement on a device for that purpose patented by Wm. A. Devon, Nov. 19, 1867. The object of the invention is to avoid the waste of oil caused by the motion of the cross head, and while effecting this end to obtain a perfect or reliable bearing at all times of the friction roller against the guide.

BACK-BAND HOOK.—Charles Wack, Evansville, Ind.—This invention relates to harnesses used on horses for plowing and other purposes, and consists in forming the hook in such a manner that the chain which it supports is securely kept in place when in use.

CORN SHELLER.—A. C. Mills, Oaktown, Ind.—This invention has for its object to furnish a simple, convenient, and effective instrument for shelling corn, and which shall at the same time be durable and cheap.

BOOTS AND SHOES.—William Smith, Whitehall, Bridesburg, Pa.—This invention consists in inserting in the sole of a boot or shoe strips of wood, metal, or other suitable material, in such a manner as to preserve the sole from wear, and to admit of said material being readily withdrawn or detached from the sole when, from wear or other causes, it becomes necessary to have new ones attached. The object of the invention is to protect the sole of the boot or shoe from wear by a means which will not disfigure the same or be at all conspicuous even when applied to light or "dress" boots and shoes.

SMUT MACHINE.—E. McLane, Young America, Ill.—This invention relates to a machine for depriving grain of smut and other impurities, and it consists in a securing device of peculiar construction and a novel arrangement of a suction blast, whereby a very powerful and efficient blast is obtained without wasting or blowing away the grain, and the grain secured in the most thorough manner by a very compact device.

MACHINE FOR DRESSING SLATE FRAMES.—W. F. Mosser, Allentown, Pa.—This invention has for its object to so improve the construction of slate frame machines that each slate may be automatically fed from a pile, have their corners rounded off and their edges dressed, and may then be fed cornerwise to the revolving planers by which both sides of the frame are dressed, so that the slates may come from the machine completely dressed.

CYLINDRICAL FILTERING PRESS.—Pierre du Rieux and Edouard Roettger, Lille, France. Patented July 21, 1868.—This invention relates to an improved construction and arrangement of the parts of filtering presses, designed especially for use in sugar houses, whereby a more efficient working is obtained and all danger of the machine exploding under pressure is avoided, and the operations of filtering the liquid parts and casking the solid parts of semi-liquids may be conducted with more speed, regularity, and efficiency.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

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

J. A., of N. Y., asks: 1st, Whether a weak solution of carbolic acid applied with a watering pot to garden walks will be an effectual mode of preventing the growth of weeds. 2d, What should be the strength of the solution. 3d, In what form can the article be procured. 4th, Is there anything in the nature of the substance requiring precaution in using it. Answer, 1st, it will. 2d, The solution must be very weak, 1 part carbolic acid in 1,000 to 2,000 parts of water. 3d, It may be procured pure, in the form of white crystals, very fusible by a slight heat, and very volatile. It may also be had impure and much cheaper, as a solution contaminated with hydrocarbon oils and naphthalene, which however are no objection to the use proposed, for these last substances are not soluble in water, and therefore easily separated when dissolving the acid. 4th, Pure carbolic acid is a violent poison. When applied in too strong a solution larger plants may suffer; very weak solutions destroy only very small plants and animals, as parasites, miasma. Even Res and musketeers avoid its odor and may be driven away by it.

L. J. S., of Mass.,—There is at present no book published on the details of the subject you inquire about, it being quite new. Chemists apply the carbolic acid either as a gas, or dissolved in water, or combined with a volatile base as carbonate of ammonia. The pure liquid carbolic acid is a most intractable substance, as it requires some 40 atmospheres pressure to prevent its volatilization, and when this pressure is removed it volatilizes so rapidly that the remaining liquid solidifies.

W. G., and T. S. H., of Ill.—A reference to the ordinary treatises on physics will enable you to answer for yourselves the questions you ask. We do not wish to burden our columns with answers to questions which have no practical utility and answers to which may be found in any text book.

A. W. H., of Pa.—We cannot recommend any process for preventing the fermentation of milk.

E. P., of N. Y.—1st, Leather can be covered with a film of India rubber varnish, and still retain its strength and pliability. Such leather may be had in this market. It is perfectly waterproof at the side where the varnish is applied. 2d, Pens of hard rubber or vulcanite have been made. They are tolerably good, but they wear out too soon. Lately they have been improved with gold and iridium points. We use such pens, and they give great satisfaction. Those of gutta serena do not keep; they become brittle by oxidation.

S. W. W., of Mass., sends us some fine specimens of iron pyrites in cubic crystals and asks their value. Their marketable value is nothing; as mineralogical specimens some may esteem them.

G. M., of Ill., thinks there may be something in the electrical theory of steam boiler explosions because there have been a great number of boiler explosions and accidents by lightning this season occurring at about the same time. He believes there is yet some unknown cause or causes for boiler explosions, and prudently suggests investigation, etc. We believe a boiler constructed on correct principles, of good material, with good workmanship, and managed by a competent person is as safe from explosion by "mysterious" causes as a cooking stove. But let us have the facts of these mysterious explosions. The mystery generally disappears when the facts attending an explosion are discovered by investigation.

T. W. B., of Pa., sends a diagram and explanation of the relative positions of crank and piston of steam engines. His problem is solved by trigonometry, and we differ from him when he says his explanation is "free from the usual objectionable intricacy of algebraic mathematics." Our mechanics generally understand more of algebra than of trigonometry. We think our explanation on page 20, current volume, preferable to his more ambitious attempt.

J. S. R., of Pa., writes of a "perpetual motion" (more correctly designated a "self-mover") which is running in his neighborhood, it being a "combination of wheels, levers, and rolling balls," and is a puzzle to all mechanics who have seen it. He wants some competent expert to come and examine it. When "combinations of wheels, levers, and rolling balls" will generate and develop power we shall be glad to "make a note on't."

P. J., of N. Y.—We cannot give a recipe for a preventive and defence against mosquitoes. A remedy for the pain of the sting is aqua-ammonia. The preventives used are various. Hunters and fishers in the woods of Maine and the wilds of the Adirondacks make a "smudge," a smoke of birch and hemlock bark, etc., in which they sit and into which the winged pests dare not venture; or, they smear their faces and hands with lard or other grease, neither of which remedies are applicable to civilized society. Some persons have faith in bunches of pennyroyal hung in their windows and doors; others use spearmint, in the herb or as an extract—oil or essence. We have no sure preventive but "grin and bear it."

D. P. B., of Mass., says, "I am a machinist of a dozen years' experience, yet I must acknowledge that I find difficulty in turning tapers of the same dimensions even when the pieces are of exactly the same length. Can you help me?" If the height of the point of the turning tool is not changed when one piece is taken out of the lathe and replaced by one of exactly the same length, the taper on both will be the same. The best course is to keep the point of the tool exactly at the center. This can be done by testing the point by the points of the centers of the "live" and "dead" arbors at each change of pieces, or whenever the tool is removed for grinding and replacing. In ordinary turning the point of the cutter may be above the center, but not in turning a taper.

E. A. B., of Conn.—Will air be exhausted from an air chamber by water running under a heavy head? Ans., it will. Is there any automatic device for replacing it when thus exhausted? Ans., We think not.

S. H. E., of Ill.—"Will anything except the limestone now used prevent the slag from sticking to the sides of cupolas?" Fluor spar, marine shells and other substances will answer, but limestone is the cheapest material known.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Furniture factory for sale.—Is in perfect running order and can be purchased cheap. Shipping advantages excellent. Power, steam. For particulars address Wm. Winslow, Peru, Ill.

Troy.—Broughton's lubricators have been in use three years. They have proved superior to all others. Over 1000 are in use in this city. D. Southwick, Troy, has them.

Wanted—to negotiate for philosophical apparatus. Send priced catalogue to J. R. Ray, Sacramento, Cal.

For circular of best baling press for hay or cotton, or any other purpose, address L. & P. K. Dederick, Albany, N. Y.

Manufacturers of, and wholesale dealers in, notions, fancy goods, etc., may find a customer by addressing (with card, etc.) box 499, Oil City, Pa.

Wanted—a second-hand 30-horse power engine and boiler, portable preferred, by D. R. Edwards, Ceres, N. Y.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Send for description of Huntoon governor on entirely new principles. 103 State st., Boston, or 79 Liberty st., New York.

Bolt-heading machine just finished and ready for operation. May be seen at McLaxon & Stevens', New Haven, Conn.

Broughton's double-bottom oilers are the cheapest and best.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 8 Dey st., New York.

Wanted—breech-loading shot guns made on contract, royalty, or shares. Address Box 795, Washington, D. C.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glaser's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 64 Nassau st., N. Y.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' boiler powder (11 Wall st., N. Y.) 12 years a standard article for preventing incrustations. Beware of imitations and pretended agents.

Inventions Patented in England by Americans.

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

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,978.—MACHINE FOR DRAWING ROVINGS AND SPINNING YARNS.—Geo. W. Philip, Philmont, N. Y. June 18, 1868.
2,008.—MACHINE FOR POLISHING NEEDLES.—Chauncey O. Crosby, New Haven, Conn. June 22, 1868.
2,022.—CONSTRUCTION OF FOLDING CHAIRS.—C. O. Collignon and Nicholas Collignon, Clotier, N. J. June 23, 1868.
2,023.—CONSTRUCTION OF BRICK MACHINES.—Peter Hayden, Philadelphia, Pa. June 25, 1868.

Improved Self-Acting Gate.

The gate which the engravings illustrate has no springs or similar mechanical devices, but opens and closes simply by its own gravity. The main peculiarity is its method of hanging, not depending, from hinges placed in a vertical line, but from two points considerably removed from the vertical, in their relations one to the other. The foot is pivoted to a ring or staple fixed in the lower end of a post, and the top of the gate to the arm of an upright crank, as at A. This crank turns in staples secured to the post, the lower one a little out of the perpendicular. It will be seen that the lower gate hinge is at the back of the upright, and the upper at the front. The lower end of the upright crank has a horizontal foot, B, to which is pivoted two horizontal rods connected with two double right-angled cranks, C, one on each side of the gate. When one of these cranks is in a horizontal position the other is upright. The elevation or depression of one or the other partially rotates the upright crank at the gate post, elevates the forward or latch end of the gate, and throws the top of the hinge end of the gate at an angle toward the direction in which the gate will swing. This change of position changes the center of gravity, and the gate swings swiftly by its own weight to place, where it is held by a latch, shown enlarged in Fig. 2. This latch is without rivet, and closes by a simple flat spring, which having very little action and being concealed in the gate upright, is not liable to derangement. A diagonal brace extending from the lower front of the gate to the upper part of the rear upright serves, by means of nut and screw, to keep the gate in position if it should at any time tend to sag. In the engraving, for convenience of illustration, the lower hinge and the rods connecting it with the right-angled cranks are shown above the surface; but, in fact, they are below the ground, the rods being inclosed in gas pipe so that no water can reach them, and the lower pivot is guarded by a suitable casing of cast iron. The double cranks are operated by the wheels of a carriage or the pressure of the pedestrian's foot, and are placed at a sufficient distance from the gate to permit it to swing without interfering with the team.

An adaptation of the principle of the gate may be used, by which the gate is operated by means of handles or levers on posts connected to the operating crank by stout wires, the handles being touched by the rider in passing. Small hand gates, hung in the same manner, may be constructed to be opened by a latch in the ordinary way.

Patented July 9, 1867. All applications for rights, gates, etc., should be addressed to the American Gate Company, 225 Superior st., or box 2,156, Cleveland, Ohio.

Method of Locking the Nuts of Fish Plates.

Frequent jarring will rapidly loosen nuts however tightly they may be screwed up. Ordinary check or outside nuts are not proof against it under usual circumstances; but the jarring of the rails on a road over which frequent trains pass, is a harder trial than that of any ordinary machinery. Nuts holding the bolts of fish-plates on rails are continually requiring adjustment.

The improvement herewith illustrated provides blocks placed between the nuts which effectually prevent them from turning. The letters, A, represent the adjacent ends of two contiguous rails, held in place by the fish plates, B. These are secured on the sides of the rails, by bolts, C, which pass through them and the web of the rails, and are held by the nuts, D. Blocks, E, of wood or other suitable material, are made of suitable size and shape to fit into the space between the opposite sides of the two adjacent nuts to be locked. The block or locking piece is held in place by a rivet headed screw or nail, F, which may pass through the fish-plate its head being between the fish-plate and the rail, and should have a small nut screw on its outer end, which end should then be slightly riveted down on the nut. In case old fish-plates are used, a plate, G, of wrought or cast iron may be placed on the outside of the fish-plate, through which the bolts, C, and the screws, F, pass, the head of the screw being between the plate, G, and the outer side of the fish-plate. These explanations may be readily understood by reference to the sections, Figs. 2 and 3.

Patented through the Scientific American Patent Agency, July 7, 1868, by Samuel Garber, who may be addressed at Greenville, Mercer County, Pa. [See advertisement on back page.]

PERSEVERANCE ONE GREAT ELEMENT OF SUCCESS.

It may be doubted if the statement, too commonly accepted as truth, that "success is the real evidence of ability" is

just; yet it must be conceded that, generally, success attends well-directed and persistent endeavor, and that the qualities of discretion, prudence, and perseverance are proofs of ability in their possessor. That a "rolling stone gathers no moss" is correct in fact, and the sentiment, properly applied, is also true. Not only does human experience in these days teach the necessity of "sticking to one's business," the fact that vacillation and irresolution, and want of perseverance are ruinous to success, but the Scriptures teach the same truth. Jacob said of Reuben: "Unstable as water, thou shalt not excel." St. Paul said: "To them who by patient continuance in well-doing, seek for glory, and honor, and immortality—God will render—eternal life." If a young man has decided upon the business he intends to follow through life and serves

**NICHOLSON'S PATENT AUTOMATIC GATE.**

an apprenticeship to it, he should consider carefully before he allows a brilliant offer to embark in some other business to move him. His road to success lies through the routine of his chosen business. Life is too short, even in this fast age and this fast country, for a man to attain eminence or even success in two or more branches of business. Exceptions there are, of course, but they only prove, from the prominence given them in the public prints, that they are exceptional. The case is very well stated in the following, cut from an exchange. Many who have been close observers of life can recall instances similar in kind if not degree:

"I am writing a play," said an intimate friend to us one day years ago. "I'd like you to hear it, you have had some experience in literary matters." We found the play in an unfinished condition, but so far as it was in a form to be heard, it was very interesting and sufficiently witty. Its writer had undoubted talent.

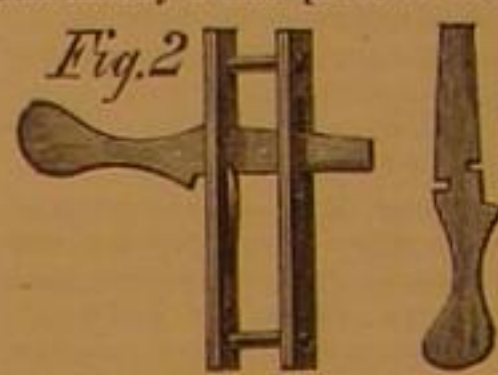
"How comes on the play?" we asked as we met our friend, four weeks from that time. "Pretty well; but, by the way, come around to my room this afternoon; I have a plan to talk over." The play was not brought out that afternoon. Its writer talked medicine to us an hour or two. He had learned of a remarkable root, grown in the East Indies and very scarce, but a certain cure for rheumatism and consumption, scarlet fever and sore throat. One man in England, an M. D., had introduced it there. He knew its secret, and would probably sell it to him at a low figure. He intended to start for England directly.

"When do you go away?" we asked, not many weeks after this. "Away? Where?" "To England." "Oh—yes—I'm not going just now—by the way—I've got a plan. When I was in Cuba I saw how this sugar business was conducted—do you know there are immense profits in it? I have a friend who sails between here and the Island. I'm going to get him to buy some

spite of the many obstacles to be overcome. The nature of these may be estimated from the fact that the cutting is not only very deep, but also so narrow that the space between the sides and the cars, when passing, does not exceed twenty inches. This stone has been widened so as to erect masonry. The widening is done by small blasts, in order that no great mass of rock may be thrown on the track, and thus delay the constantly passing trains. A portion of the space excavated is used for building the walls, while the arch is constructed of five layers of brick placed side by side. Shafts will be placed at intervals for ventilation and the escape of smoke. These will rise ten feet above the grade of Fourth avenue, and have a light iron cover to prevent anything falling through. On account of the want of space below, all the stone blasted out has to be hoisted up by derricks to the level of the street, cut into shape, and then lowered when needed in the erection of the wall. About 830 linear feet of mason work has already been completed, leaving 270 feet more to be built. The total length will be 1,600 feet, including the solid rock section between Ninety-second and Ninety-fourth streets. This last will be the most difficult portion of the whole, as the work will all have to be done from below with scarcely any means for removing the debris.—Sun.

The Chemistry of Sunstroke.

The effects and the treatment of sunstroke are well understood in this country, where the malady is one of frequent occurrence—more frequent, probably, in the hottest months, than in any other parts of the world. But the cause of the



sunstroke is as yet a mystery. The intense heat (merely as heat) of the solar rays, is not the agent of mischief. The human body may be exposed to the Turkish bath of 140°, and remain in it for an hour without injury. This is a much higher range of heat than that of the atmos-

phere at which sunstroke often occurs, viz.: from 100° to 110° (in the sun). Men working in zinc furnaces or iron foundries are subjected to a heat above 120°, but they are not prostrated to the ground with the phenomena of the sunstroke. The human organization is fitted to endure a much higher pitch of heat than any we have named. Experiments are recorded of men sitting quite comfortable in ovens while chickens were slowly browning by their side. How does it happen, then, that at a temperature of the open air, comparatively so low, men melt away (as the popular saying is) with heat?

A writer in the *Journal of Commerce* says, the reason must be looked for in the character of the sun's rays. The heat of the sun differs from every other heat, as the light of the sun differs from every other kind of light. This is a fact so well known as to need no demonstration. The effect of the sun's heat upon plants—as contrasted with artificial heat—is the most familiar, and, perhaps, the most striking illustration at hand. All animate and inanimate things are subject to precisely the same great laws of nature; and the solar heat which makes the flowers droop and close their petals, as if to shut out the dazzling rays, is not without its marvelous chemical effect upon the sensitive brain of man. The effect, we say, is chemical—just like the effect of poison. Strychnine, cyanide of potassium, arsenic, morphine, and the other deadly drugs do not work more marked organic changes in the system than a sunstroke. The countenance of the vic-

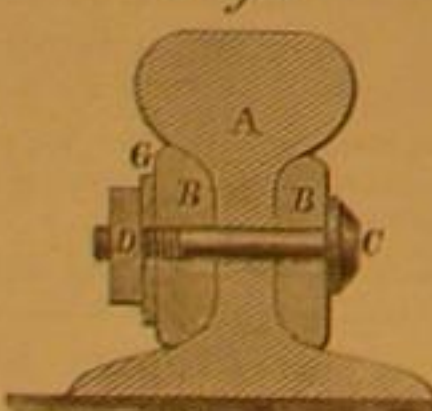
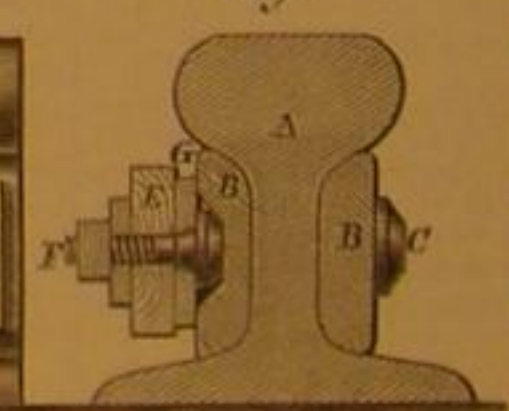
tim is dark-clouded and injected with blood, and a post mortem examination discloses congestion of the brain, lungs, and heart. These are the effects, varying in degree, of the administration of poisons. The chances of recovery from poisoning are far better, if remedies are seasonably applied, than from sunstroke. The latter is almost always fatal with persons of delicate health or full habit.

As to remedies, there is no improvement on the old ones. The application of ice to the head and under the armpits, brandy and water, or other stimulants, administered internally, a mustard plaster on the stomach, vigorous chaffing of the body and especially the hands and feet, fanning, and plenty of air—these are restoratives efficacious where anything is of avail.

Bleaching and Granulating Sugars.

In No. 4, current volume, we illustrated on the first page a device for purifying and bleaching cane juice. Since then we have received some specimens of the sugar purified by that process which seem to be of very excellent quality, even inferior cane delivering superior juice which granulates easily and makes a good quality of sugar. The process is well worthy attention by those interested in the manufacture of sugar. The address of the inventor was incorrectly given in our description of the illustrations; it should have been Evan Skelly, Plaquemine, Iberville Parish, La.

Toronto has produced a traction engine for drawing wagons over common roads, and it is said to work well. Brazil also puts in an appearance with a traction engine which runs easily on Macadamized roads, dragging a loaded omnibus up a steep hill with ease and speed, and the Emperor uses it for his country excursions from his summer palace at Petropolis.

Fig. 2**Fig. 1****Fig. 3****GARBER'S PATENT LOCK-NUTS FOR RAILWAYS.**

sugar for me, and I'll get a little corner store—live cheaply, you know—and in less than two years—"

We wished him success with his new plan and have not met him since. We received a letter from him, however, not many weeks ago. He was living in a little country town, where he had gone for his health, and was studying for the ministry. This reminded us of the fact that ten years ago he prepared himself for the ministry of another denomination. He actually went to Europe to finish his education, gave up the idea, returned to this country, and went into the navy. He afterward engaged in business pursuits for a few years, then took up literature; then came the various plans which we have noticed, and now a friend informs us that he had given up the ministry again, and is about to go on a farm and raise honey.

This reads like a fiction or a burlesque; every word of it is literally true, and the man to whom it refers will read this article. He has talents which are admitted by every friend he has ever had. He might find a name in literature. He would succeed in business; he would make an excellent minister. He is an exceedingly agreeable companion. His life, however, will be an absolute and total failure. It will be failure simply because he has no continuity of purpose. He cannot control his judgment and his taste. He tires of everything as soon as the novelty is lost.

An Engineering Feat.

Quite a remarkable piece of engineering is being accomplished on the Harlem Railroad at Yorkville. A substantial archway is being constructed, extending from Eighty-eighth to Ninety-second street, and covering an open space which has been the scene of several accidents, and is in itself exceedingly dangerous. The work was prescribed at the time of granting the charter to the road, and is now being completed in

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ATHLETIC SPORTS AND COLLEGIATE INSTITUTIONS.

Since Milo of Crotona astonished the ancients by his six victories at the Olympic games, the world has been spasmodically given to getting on its muscle. We are now in the midst of one of these spasms. Base ball, rowing matches, and feats of pedestrianism seem to rival in the public prints the attention which is claimed by political conventions, elections, and—scandal. We have a suspicion that many of those who engage in these matches, and who plead in their favor the old cant about the general promotion of health, and all the rest of it, will find in the end that in their particular cases they have been otherwise than beneficial. Exercise is useful and necessary, but like every thing else it becomes injurious when carried to excess.

No one supposes that a horse driven until he drops, has his strength or powers of endurance increased by such usage, and a man who should, except in emergency, thus use his horse, would justly merit the indignation which, in this humane age, he would receive. Is the constitution of man so vastly superior to that of the horse, or do the laws of physical development, exhibit such variations in his favor that he can violate them with impunity? All the exhibitions of muscular power and skill at the present, seem to have for their chief end the display of the utmost endurance which is possible, and the training which is undergone preparatory to such displays is of a severe and excessive character. By such training men are able to attain to superior power over their fellows, but it is a power which leaves them in middle age with stiffened sinews and rheumatic joints, hobbling about, like broken-down canal horses. The fact is simply that these public matches are exercising no more good influence upon the public health or morals than the races at Saratoga or Fordham. Violent exercise exhausts, it does not permanently strengthen, although perhaps it may give a temporary accession of strength. To use the language of a contemporary: "We always like to seize the opportunity, or even to make opportunity, to say a word for physical sports, and for all manly rivalry in athletic games. Whether it be shooting, or yachting, or rowing, or riding, or whatever else that gives strength, nerve, grace, address, to our American youth, we support it, believing that this is what they sorely need. For the physical training of the people, we must rely on the popular national sports."

It is the vicious system of matching that we complain of, from its very nature leading to excess. Most of these matches are made at the hottest season of the year, when excesses in anything are most dangerous, and we regret to add that they are too often accompanied by adjuncts of betting and gambling. Their tendency is to lead young men into expensive habits, and to absorb the time which they ought to give to business or study. No false coloring that can be thrown upon this subject can disguise these facts, and the verification of their demoralizing influences is at hand in the reports of the rowdism, lawlessness, and utter disregard of other people's rights and privileges shown at the recent regatta at Worcester.

The formation of beat clubs in the colleges and seminaries of the United States has, in our opinion, indirectly done more to injure them in public estimation, by their effect upon the morals and habits of the young men who congregate within them, than any other cause. The effect is not confined to the clubs themselves, but extends to those who are outside of their immediate organizations, and leads not only to the pernicious practice of betting, but the other concomitant evils—neglect of study and dissipation. The fact is becoming every day more apparent, that a man who sends a son to one of these institutions is exposing him, to the worst temptations,

while he is, at the same time, removing him from the safeguards which parental supervision and the sacred influences of home throw around the critical period of transition from youth to manhood. The chances are vastly against his returning with any acquirements that will be an equivalent for the four years of time and the money expended upon his collegiate career. There is no hope for these institutions except in immediate and thorough reform. If the ends which they were originally intended to subserve are kept constantly and persistently in view in their discipline, and all things calculated to obstruct or defeat their accomplishment rigidly proscribed, they may regain the confidence which (we speak advisedly) they have been of late rapidly losing. But unless the public can see something else in them than mere training schools for physical contests and other results than the riotous conduct which is the pest of almost every town in which one of them chances to be located, they will soon meet with the condemnation of all right-minded citizens.

WATER ON THE PLANETS.

In an article in our last number we stated that hereafter the use of the spectroscopic was destined to throw light upon the nature of cometary matter. Prof. Hinrichs, of the Iowa State University, thus describes its application to the determination of water upon the surfaces of the planets.

When the sunlight passes through a glass prism it is transferred into a beautifully colored band of light, the so-called *solar spectrum*. When observing this by means of a spectroscopic, a multitude of dark lines are observed. These lines are called *Fraunhofer's Lines*.

A considerable portion of these dark lines are produced by the light passing through the atmosphere. They are accordingly most prominent when the sun is low, and they are almost invisible when the observations are made on the top of a high mountain. But the greater number of dark lines are always equally prominent. They have, by Bunsen and Kirchhoff, been proved to be produced by the various substances constituting the atmosphere of the sun.

We may at some other time refer to the latter kind of dark lines and the unity of matter in the universe which they prove. Here we only intend to give some of the results obtained by a close study of the former or the atmospheric lines in the spectrum.

Among the lines produced by the earth's atmosphere, some have long ago been ascribed to the presence of watery vapor in the atmosphere.

To identify these lines, Janssen took a large iron tube of somewhat more than one hundred feet in length, and closed at both ends by means of strong glass plates. The whole tube was packed in sawdust and filled with steam under a pressure of seven atmospheres. At the one extremity sixteen gas jets sent their light into the tube. At the other extremity of this tube a proper apparatus for the accurate observation of the spectrum of these gas flames was placed. Janssen found that the spectrum of these gas flames contained all the lines peculiar to the solar spectrum at sunset.

By observations in localities distinguished for a very transparent atmosphere (such as Marseilles, Palermo, Athens), and by observations on the summit of Mount Etna, Janssen has proved the absence of water from the atmosphere of the sun, but its presence in the atmospheres of Mars and Saturn.

This latter result is particularly interesting. It may be remembered, that the planet Mars shows bright areas at its poles, alternately increasing and decreasing, appearing precisely in the same manner as our own earth would look at a great distance; having, during the winter season, its northern polar region covered with snow and ice much farther toward the equator than during our summer season. Hence it has long been concluded that the planet Mars is covered with water, just like our earth. From other observations it has long been known that Mars, Jupiter, and Saturn are surrounded by gaseous atmospheres. By the above observations of Janssen, the presence of water on Mars is now finally proved; as the seasons change on the planet, its polar regions are more or less enveloped in ice, just as here on the earth, and at all times the watery vapor in the atmosphere of Mars is seen in the spectrum of the planet as we notice the vapor of our atmosphere in the spectrum of the setting sun.

Janssen concludes his report with the following remarks: "To the close analogies which already unite the planets of our system, a new and important character has just been added. All these planets form accordingly but one family; they revolve around the same central body giving them heat and light. They have each a year, seasons, an atmosphere, and on many of the planets clouds have been observed in these atmospheres. Finally, water, which plays so important a part in all organized beings, is also an element common to the planets. These are powerful reasons to think that life is no exclusive privilege of our little earth, the younger sister in the great planetary family."

THE NEW COMMISSIONER OF PATENTS.

Hon. Elisha Foote, of New York, who, for some time past, has filled the important position of Examiner-in-Chief, has been appointed and confirmed Commissioner of Patents. The appointment is an excellent one in every respect. Judge Foote is not only a high-toned gentleman, well qualified to discharge the duties of the Commission, but he is in full sympathy with inventors, and will see to it that their interests are well cared for. We speak in this matter from a personal acquaintance with the new Commissioner of many years' standing, and we anticipate an energetic and popular administration of the duties of the office, which need a most prompt and careful revision.

PRESERVATION OF BRICK STRUCTURES.

We are in receipt of several communications desiring information upon the subject of the preservation of brick walls, chimneys, etc.; also, in regard to the use of soluble glass as a protective coating, and its effect upon the strength and durability of different kinds of mortars. It has been supposed that the use of the latter material would confer hydraulic energy upon lime, or upon mortars containing lime deficient in silica. Experiments have, however, proved that it is of little value. Gilmore, in his *Practical Treatise on Limes, Cements, and Mortars*, says, "It may and probably can be advantageously applied to the reclamation of the intermediate limes (those in which the hydraulic energy is exerted powerfully and rapidly when first mixed, but which soon yield and fall down under the action of the sluggish free lime present), but for fat limes it is unsuitable. When added to the intermediate limes, it appears to exert its influence by giving up its silica to the free lime present, thus neutralizing or perhaps only retarding its action, until the hydraulic principle has time to exert its indurating power." From extensive experiments, the following conclusions have been arrived at:

The addition of soluble glass to common mortar, while it renders it hydraulic, injures its strength and adhesive properties. It is at the same time greatly inferior to cement as an hydraulic agent, in both efficiency and economy. It may, however, be applied to hardening soft and porous stones, and concrete walls or stucco work, after these are well dried, but its utility depends so much upon the peculiar nature of the material to which it is applied, that the utmost care and judgment are needed in its application, not to say some chemical knowledge of the nature of the alkaline silicates, and their reactions upon clays, limes, etc. Most cases in which its use has been attempted for such purposes have secured unsatisfactory results, and it is therefore not to be generally recommended. For walls of concrete brick, a paint made by mixing hydraulic cement with oil is highly recommended, and it is also a good water proof paint for roofs and walls of cisterns. The action of the acids produced by combustion of wood, coal, and other fuels upon the mortar of chimneys, often act as disintegrating agents, and for this we know of no efficient remedy.

Large chimneys may have their interior surfaces painted white which, being a non-radiant surface, tends to promote a draft, while at the same time the mortar or cement is protected from the action of the gases of combustion.

CARE OF GRINDSTONES.

A correspondent, who writes himself a farmer, complains that his grindstone, which for several years has proved of uniform grit, has deteriorated in this necessary quality. He has kept it heretofore under a shed, but lately removed it to an open space in his back yard, and asks whether this exposure has changed the character of the stone. One side is soft, as the whole stone was formerly, but the other side is hard and rigid.

We think the removal of the stone is the cause of its change of character. Exposure to sunlight is always injurious to a grindstone. The substance of the stone is porous, and it contains a considerable amount of water; this being evaporated, the stone becomes granulated, harsh, and hard. It is not altogether for personal comfort that the farmer places his grindstone under the friendly protection of a wide-spreading apple tree or elm. He knows, almost intuitively, that the summer's sun's rays are inimical to the qualities of the stone, and he shelters it from this too fervid light and heat. The stone that in the shop of the mechanic runs in water through all the hours of daylight, will preserve its homogeneity better than one that is used only occasionally, and is exposed to the sunlight.

The red or brown freestone, so much used in New York city, New Jersey, and Connecticut, is a sandstone similar in structure to the ordinary grindstone, differing, mainly, in being of coarser texture and colored with an oxide of iron. It is an aggregation of particles of sand, agglutinated by clay, and compressed. Yet this stone, which is such a resistant to the action of the elements on exposure, may be easily cut with a knife when first removed from the quarry. In fact it is so saturated with water, that, when quarried in the fall, it must be preserved from the action of frost during the winter, by being sunk under water or otherwise protected, else it will burst by the freezing of the water contained in it. Exposure to heat, or to the sun's rays, evaporates the water and leaves it quite hard.

So with the grindstone, and, in a lesser degree, with the oilstone. Notwithstanding the close grain of the best oilstones, they deteriorate by long exposure to the sunlight.

SUB-MARINE EXPLORATION—THE WRECK OF THE FRIGATE "HUSSAR."

Nov. 25th, 1780, was a day of rejoicing to American patriots. The French fleet had approached the harbor of New York, and were preparing to enter. The British forces were obliged to evacuate the city. In their haste, the whole of the treasure for their army was placed on board the frigate *Hussar*, which, with its rich freight, a number of British officers, and eighty American prisoners of war, started up the East River, her only avenue of escape. In passing Hell Gate she struck what is commonly known as "Pot Rock," and stove her bottom. The injury was not, at first, considered very serious, and the vessel pursued her course. After proceeding about a mile, however, she was found to be filling, and her head was turned toward Stony Point, upon which, at that time, stood the mansion of Gouverneur Morris, that being the nearest land, and, as they supposed, a sloping, sandy shore. Upon nearing the point, however, they realized their mistake,

the water being at low tide, about twelve fathoms at not more than a ship's length from the shore. When about seventy-five yards from the point the stern commenced to settle rapidly. A hawser was thrown out and attached to a tree upon the point, but so great was the tension created by the rapidly sinking vessel, that the tree was snapped asunder, and the attempt to warp the vessel failed. A general stampede ensued, and it was only by the most urgent efforts that the crew and the officers reached the shore. The prisoners of war, manacled and helpless, all perished. The officers were received at the house of Gouverneur Morris, where they remained during the night, the disaster having taken place at about 5 o'clock, P. M. So great had been their haste that their swords were left in the cabin, and no attempts were made to save the treasure, supposed to have been placed in her run and walled in with brick, as was the custom at that time in the shipment of treasure.

For eighty-eight years the waves have rolled over the wreck, and shrouded the remains of the unfortunate men so suddenly engulfed. The treasure amounted to 900,000 guineas, worth about 5,000,000 dollars in American gold. The English government fitted out two brigs, and sent them to the spot, in 1794, to attempt its recovery; it having been previously proved, by the united testimony of the officers, before the Court of Admiralty, that it went down with the vessel; and so far from being able to make any efforts to save it, they could not, from the rapidity with which the vessel sunk, even rescue the prisoners or save their most ordinary personal effects. This evidence is corroborated by the fact that the swords of the officers, guineas, and other articles, have been rescued since, from her cabin. Many of these articles are now preserved in historical collections and museums. Porter bottles, corked, and probably containing the original fluid more or less changed, have been obtained from time to time. Some of these bottles were exhibited in Barrow's collection previous to its destruction by fire. In 1848 a company was formed, under charter from the State of New York, to attempt the recovery of the bullion. This company was called the "Frigate Hussar Company," and, under their direction, divers have visited the wreck, daily, from June first to September first of each year since 1848 to the present time. They have succeeded in removing her decks, and have hoisted up twenty-six cannons, 4,000 balls, and buckets bearing the name "Hussar." The bones of the arms of the drowned prisoners, with the manacles attached, have in some instances been recovered. The perseverance of this company, and the positive knowledge that the treasure was sunk in the vessel derived from the circumstances of the case, the testimony of the officers as recorded in the British archives, added to a second attempt on the part of that Government to recover the treasure in 1819, at which time they were ordered off by the American Government, have kept the stock of this company from ever selling at less than twenty-five per cent. The company have this season made a contract with Wm. R. Taylor and Dr. J. A. Weiss, owners of the improved Submarine Explorer, to raise the treasure at a salvage of thirty per cent. They are now at work, and, by invitation, we were permitted to witness the operation, of the "Explorer," on Thursday, July 30th.

Before describing this machine, however, it may not be amiss to refer briefly to some features of marine exploration as hitherto conducted. The first attempts at penetrating below the surface of water were confined to diving; and many marvelous stories of the feats of divers, the depths reached by them, and the time they could remain beneath the surface, have been handed down, bearing the impress of romance rather than sober fact. The truth is, that two minutes is probably the utmost limit of time at which any unaided diver has remained under water. Admiral Hood tested the powers of the famed Indian divers with watch in hand, but found that none of them could remain under water more than one minute at a time. It is probable that ten or twelve feet is the greatest depth to which divers unaided by apparatus can reach, and remain so as to perform any useful service. We have not room to notice the different kinds of submarine armor which have been devised to enable divers to remain at greater depths, and for longer periods under water. They all have for their object the supplying of air for respiration, and the protection of the body from external pressure; and are more or less cumbersome to the wearer, and inimical to freedom of motion. In many of them the air contained within the walls of the armor prevents the stooping of the diver, as when he attempts to stoop it rises suddenly to those parts of the apparatus which are higher than his head, thus destroying his equilibrium, and making him unwillingly perform a somersault. The only remedy is to get down upon his knees, and, in this awkward position, his working efficiency is necessarily much impaired.

The substitution of the diving-bell for such apparatus leaves the operator unencumbered to make observations at length, to drill rocks, to make excavations, and to perform any of the engineering operations, or other work for which submergence is necessary. The diving-bells hitherto used have, however, been attended by some objections; the principal of which was the fact that the divers were entirely dependent upon their assistants above for the supply of air as it was required, and also in case of emergency the ascent of the bell was a slow and tedious process. The pressure also varying with the depth reached, was beyond their control, and they were unable to graduate it to suit the circumstances of the case. The accumulation of carbonic acid gas from respiration was also imperfectly removed, and caused much inconvenience to the divers. The absorption of the gas by water forced into the cavity of the bell by pumping removed the gas, but the water was itself a great inconvenience. In case communication with the surface should become interrupted, they

could neither rise, sink, nor change the position of the bell.

The Submarine Explorer, invented by William Mont Storm, and improved by Wm. R. Taylor, was built at Secor's Iron Works. Its exterior consists of a cylinder, also of boiler iron, surmounted by a truncated cone of the same material. Within this cylinder is another concentric cylinder, of boiler iron, surmounted by another truncated cone which meets the external cone at the top, the inclination of its sides being less than the sides of the external cone. The distance from the bottom of the cylinders to their junction with the cones, is about seven feet. The top of the double cone has a man-hole provided with a tight cover. The space between the concentric cylinders is separated by an iron diaphragm into two compartments. The lower of these compartments forms a hollow ring entirely around the bell, and is called the "ballast ring." It communicates freely with the external water, and of course when the air it contains is allowed to escape, it becomes filled with the water which replaces the air. The upper of these two chambers, which is called the "air-chamber," communicates with the "ballast ring" by means of a stop-cock, worked from the interior of the inner cylinder, and it also is connected by a stout, one and a quarter-inch hose to two powerful air-pumps placed upon the deck of the attendant vessel or dock, or otherwise situated according to circumstances. The pumps are worked by steam power, which constantly force air into the air chamber while the bell is descending or rising, as well as when it remains at the bottom. That portion of the bell within the interior cylinder is separated by a circular iron floor into two compartments, an upper chamber in which the workmen place themselves in ascending or descending, and a lower or "working chamber," into which they descend through a man-hole, after they have arrived at the bottom. These chambers have a lining of felt, four inches thick, upon the inside of which is placed a lining of perforated zinc. Water is admitted through a pipe leading from the ballast-ring to the upper portions of the felt, and filtering through it, oozes through the perforations in the zinc, and trickles down along its surface, absorbing in its progress the carbonic acid without subjecting the occupants to a continual shower bath. The air, as it is rendered unfit for breathing, is discharged through a cock provided for that purpose, and rises to the surface with great violence; its place being supplied from the air-chamber, which is kept constantly filled with condensed air by the action of the air-pumps above the surface.

The capacities of these chambers are as follows: "Ballast-ring," 109 cubic feet; "air-chamber," 135 cubic feet; "working-chamber," 304 cubic feet. The entire height of the bell is 10½ feet, its diameter at the bottom 9 feet, and the height of the working-chamber about 7 feet. The bell operates on the same principle by which a fish raises or lowers himself in water, by altering the specific gravity. The air-chamber takes the place of the bladder in the fish. It will now be readily seen how the divers in this bell can rise or descend at their option. The air-chamber contains 135 cubic feet of air compressed to four atmospheres; this pressure is more than equal to a pressure of a column of water 90 feet in depth, and the additional pressure of the atmosphere upon its surface. Communication between it and the ballast-ring being established by the opening of the stop-cock above described, the expansion of the compressed air will force out the water from the ballast-ring, so that the specific gravity of the entire mass of iron, occupants, and contained air, becomes less than water, and it will consequently rise. A suitable stop-cock being opened to allow the air to escape from the ballast-ring, at the same time closing the stop-cock between the air-chamber and the ballast-ring, the water replaces the air in the latter, and the specific gravity of the mass is thus increased until it will descend at the required rate. When at the bottom, they can so nicely poise the bell as to be able to easily shift it from place to place, notwithstanding its entire weight in air is 32,000 lbs.

The operation of this bell, as we witnessed it, was interesting in the extreme. The sloop *Confidence*, anchored over the wreck, was thronged by eager spectators. The time fixed upon for its descent having arrived, Mr. Owen Kenny and two workmen, provided with picks, sperm candles in glass lanterns, bags, and the other paraphernalia for prosecuting their labors, descended into the bell. To those on deck it seemed almost like descending into a tomb. The iron cap was adjusted to its place, and, for a few moments, silence reigned. Soon, however, the water at the side of the bell became violently agitated by a jet of ascending air. Mr. Taylor explained that they were now taking in ballast. Slowly and steadily the bell disappeared from sight, and continued its descent until, at seventy-five feet, the signal rope announced that the bottom had been reached. The descent was made in fifteen minutes. A more rapid descent is painful to the divers, who do not in that case have time to become accustomed to the pressure. An hour elapsed, during which period nothing was heard from the divers, except the occasional agitation of the water as it was disturbed by the escape of the foul air. Then the signal announced that the bell was about to rise. At the suggestion of Dr. Weiss, it was signaled to the divers that, when they were about thirty feet from the surface, they should allow the bell to rise rapidly. When this distance was reached, the motion began to increase so rapidly that it was with difficulty the men upon the deck could take in the tackle. Suddenly the monster reared its head, and shot up out of the water half its length, or more, preserving its equilibrium admirably, and finally came to rest where, an hour and a half previous, it had disappeared. The cap was raised, and the divers came forth—not dripping with perspiration like those who awaited them, but fresh and cool and without the slightest symptom of exhaustion.

The contents of their bags were some undoubted English shore ballast, copper and iron nails, and some gun flints bearing marks of use in the guns of the revolutionary period. They also reported having struck some of the timbers of the vessel.

This experiment satisfied all present of the value of the Submarine Explorer, and of its entire applicability to submarine blasting, sponge and pearl fisheries, etc. We were informed by Mr. Taylor that the Rothschilds, having heard of this machine some two years since, sent an agent to negotiate for its use in the Mediterranean sea, in the gathering of sponges, they being largely interested in that industry; but the Sultan would not permit its use, as it was thought its introduction would produce discontent among the divers, and the transaction remains still in abeyance.

At the place where these experiments are progressing, the tide runs seven knots per hour, and rises to the height of nine feet. The divers say the force of the tidal wave is distinctly felt at the bottom, but perhaps they regard as the tidal wave, currents arising from other causes. The bell has a lifting power of 6,000 lbs; it could therefore be used to great advantage in lifting blocks of stone after blasting, and dropping them where they would not interfere with navigation. Its application to removing the obstructions at Hell Gate seems feasible, and it is to be hoped that it may be tested with a view to its employment for that purpose.

WHAT CONSTITUTES A GREAT INVENTOR.

The faculty of invention is possessed by very few in an eminent degree, and originators of great mechanical ideas are only rarely found recorded in the history of the world's progress. There are many who can seize upon and develop the ideas of others, who never were able to conceive an original idea for themselves, and such men are usually unable to distinguish the difference between an original conception and the appropriation of the conceptions of others.

It is said that Columbus, to illustrate how easy it was for men to follow in a path once marked out, or to do apparently simple operations when once some man of genius has shown the right way to do them, puzzled his hearers by a demand that they should attempt to stand an egg on end. After all tried and failed he, by a slight blow, cracked the shell, and in this simple manner solved the problem. The class of men to which we have alluded, taught to balance an egg, would conceive themselves equal to the discovery of new worlds. In their arrogance and insufferable self-conceit they assume equality with the mental giants to whose stature they can no more approach than could the frog in the fable, that burst itself in vain emulation of the ox. Lacking the modesty which usually accompanies real genius, they are always foremost in giving expression to their opinions, and inattentive to the claims of genuine merit.

These may be called the parasites of genius. Another class of men are those who, while recognizing and admiring inventive genius, are willing to admit that they do not themselves possess it, and to confine themselves within the sphere for which their peculiar gifts fit them. In Reade and Boncalt's celebrated story, "Foul Play," when Hazel is credited with great inventive genius, at the time he was puzzling his brains over the problem, "How to diffuse intelligence from a fixed island over a hundred leagues of water," notwithstanding he had done some very skillful planning and adroit execution, he disclaimed all pretension to the character of a great inventor. He said, "I do things that look like acts of invention, but they are acts of memory. I could show you plates and engravings of all the things I have seemed to invent. A man who studies books instead of skimming them, can cut a dash in a desert island until the fatal word goes forth—invent; and then you find him out. * * * Ah, if James Watt were only here, instead of John Hazel—James Watt from the Abbey, with a head as big as a pumpkin—he would not have gone groping about the island, writing on rocks and erecting signals. No; he would have had some grand and bold idea, worthy of the proposition."

A great inventor combines in one mind the imagination of the poet and the painter, and the logic of the mathematician, with perceptive faculties which enable him to trace from a cause its effect, with a rapidity and certainty that seems almost like intuition. He is ready for unforeseen emergencies, and undaunted by unexpected obstacles. He never abandons an idea once conceived, until he has proved either its impossibility, or that it is of no practical value. He cannot abandon ideas; they will not leave him; they haunt him by night, and press upon his mind for solution by day; his only relief is "to work them out." This is one reason why so many inventors die poor. They are men of ideas, and ideas are expensive things. They demand apparatus and time and energy, and they are persistent in their demands. Such men are, after all, to be envied. They have resources which are not shared by the many. We know of one such—an old man, stooped and bowed with infirmity, but with a mind as placid as a summer sea. We verily believe that a pecuniary loss, which to most men would be a catastrophe, would be forgotten by him in an hour, or dismissed from his mind as unworthy of further thought. Such men are glorious examples of the triumph of mind over physical infirmity. What a noble spectacle is a Humboldt, at upwards of threescore, working sixteen hours a day, his feeble age upheld by the sheer force of mental power; forgetful of physical discomforts, his mind soaring far above the petty cares of life, and reveling in the contemplation of Nature's mighty works.

JOSEPH BEAUMONT, of Canton, Mass., who built the first cotton mill in that State 68 years ago, is still alive, 90 years old, and of remarkably sound mind for fourscore years and ten.

THE ATLANTIC CABLE.

A correspondence has just been published by F. N. Gisborne, in relation to the origin of the Atlantic Cable, the conception of which, he states, was his, as well as a great part of the labor required before capitalists would even take the matter into consideration. We think the statement of Mr. Gisborne is very likely correct, but the credit due to Mr. Field is, that mainly through his perseverance the enterprise became a success.

It is announced that a submarine cable is to be laid next year, connecting the coast of France with this country. It is in the hands of Mr. Erlanger, the celebrated banker, and Mr. Reuter, who enjoys considerable notoriety for his sensation telegrams.

PLANCHETTE.

We have received a large number of readable communications, claiming to explain the mysteries of Planchette—fair examples of which have already appeared in our columns. The whole discussion, thus far, is chiefly speculative, always tending to religious and spiritualistic notions.

We fail to discover any substantial benefit to be gained from a continued discussion of this subject. We therefore drop it until some more reasonable explanation is put forth. We never did believe very much in the operations of ghosts and spirits, therefore it is hard for us to conclude that the little three-legged stool, provided with a pencil, and called "Planchette," has anything whatever to do with spirits. It is simply an amusing plaything.

OFFICIAL REPORT OF
PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JULY 28, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a patent, except for a design.....	\$15
On issuing each original patent.....	\$30
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On application for Extension of Patent.....	\$20
On granting the Extension.....	\$20
On filing a Disclaimer.....	\$10
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$20

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

80,264.—NEEDLE FOR KNITTING MACHINES.—Ransom Allen, Salem, Mich.

I claim the movable shank, b, attached to the body of a knitting machine needle, and operated substantially as and for the purpose herein described.

80,265.—STEAM GENERATOR.—Jonathan Amory, West Roxbury, Mass.

I claim, 1st, The combination of the heating curve and its pipe or pipes for receiving air, with the fire box of the boiler, arranged and operating substantially as described.

2d, The combination of the heating curve and its pipe or pipes for receiving air, with an air chamber, K, arranged and operating substantially as described.

80,266.—SHUTTER AND WINDOW FASTENING.—Wm. L. Barnes, Irvington, N. Y., Antedated July 11, 1868.

I claim the bolt, F, constructed as described, and secured to the inner side of the sash, A, arranged in relation with the blind, a, and staple, the blind being held closed when the sash is raised, and locked by the bolt, F, passing through the staple above the blind, a, when the sash is lowered, which movement also locks the sash, as herein shown and described.

80,267.—MANUFACTURE OF CARRIAGE SHAFT COUPLINGS.—Henry M. Beecher (assignor to H. D. Smith & Co.), Plantville, Conn.

I claim the above described process or method of making the shaft connection blank, the same consisting in forming it with the head part, A, and the shank, B, and subsequently cutting it through on the lines, e, e, and finally bending the portions, f, f, around into right or nearly right angles with the shank part, B.

Also, the machine, substantially as described, for creasing or cutting the blank, and bending the portions, f, f, of it around into or nearly into right angles with the shank, such machine being composed of the bed plate and standard, the two levers, the follower, and the two pairs of crescent cutters, the whole being arranged for use in manner as specified.

80,268.—APPARATUS FOR CARBURIZING GAS AND AIR.—Alonso T. Brown and Albert D. Perry, Galesburg, Ill.

We claim the emery receptacle, F, when combined and arranged with float, b, screw rod, H, valve, m, pipe, N, and dip, a, substantially in the manner and for the purpose as herein shown and described.

80,269.—TUCK CREASER FOR SEWING MACHINES.—Edward Bostock, Albany, N. Y.

I claim, 1st, A tuck creasing device constructed substantially as described, in combination with a plate, A, and a guide plate, D, both constructed and arranged substantially as described, and the plate, D, serving to confine A to the bed plate, as set forth.

2d, A gage plate or guide for a sewing machine, when provided with an adjustable piece, I, having a slot, as and for the purpose set forth.

3d, The gage plate, H, slide, I, and creasing device combined, to admit of adjusting the apparatus in any desired position relatively to the needle and feeding device of different machines by means of a single screw.

4th, The tuck creaser and gage plate, for use with or without a sewing machine, when the whole is constructed as described.

80,270.—TUCK CREASER FOR SEWING MACHINES.—Edward Bostock, Albany, N. Y.

I claim, 1st, The combination with the tuck creasing device, of a sliding wedge, eccentric, or a slide and fixed inclined plane, on the base plate, substantially as and for the purpose shown and described.

2d, In combination, the spring arm, and its creasing and pressure adjusting device, and the fixed stand or yoke, E, substantially as and for the purpose set forth.

3d, The tuck creaser and its gage plate, constructed with their coinciding slots at an angle to the creasing arm and line of stitching, as described, so that, when affixed to a machine by means of the thumb screw and screw hole, and moved in a slanting direction for adjustment, the parallelism of the line of creasing with the line of feed may always be preserved.

4th, The device herein described, the same constituting the tuck creaser, constructed as specified.

80,271.—CAR COUPLING.—C. T. Burchardt, New York city.

I claim, 1st, The car coupling composed of the hook, E, bearing piece, H, links, G, and the spring frame, B, when connected with the main spring, C, all substantially as herein described and for the purpose specified.

2d, The beveled or double inclined bearing, at H, arranged relatively to the main spring, C, and spring frame, B, and its connections, as and for the purpose herein specified.

80,272.—HAYSTICKER.—H. K. Burnett, Poughkeepsie, N. Y.

I claim, 1st, The cams, D, D, rotated by the gears, B, G, in combination with the arm, U, roller, E, and jointed pitman, G, connecting the arm, U, to the center bar, h, substantially as set forth.

2d, The bar, K, at the end of the hook bar, H, and jointed at Q, to the shoe, I, and arm, X, as and for the purpose set forth.

3d, The shoe, I, jointed to the arm, X, in combination with the slotted brace, I, finger bar, H, and cutters, i, arranged and operating as and for the purposes set forth.

80,273.—BOOT SOLING MACHINE.—Thomas Cabourg, Paris, France.

I claim, 1st, The construction and use of the pulley, A, on which is wound the wire to be tapped, substantially as herein described.

2d, The construction of the tapping plate, substantially as described.

3d, The construction, disposition, and simultaneous action of the knives, substantially as described, and more fully shown in the drawings.

80,274.—FISHING SEINE.—John Collins, Ecorse, Mich. Antedated July 19, 1868.

I claim the application of the braces marked A, A, as above, to a seine or net, substantially as and for the purposes herein described.

80,275.—COAL STOVE.—John Cooper, Dublin, assignor to himself and Bennett F. De Witt, Indianapolis, Ind.

I claim the addition, D, separated from the fire chamber by the partition, Q, and subdivided into compartments, H, J, by the partition, I, as set forth, and, in combination therewith, the induction pipe, E, induction pipe, F, and chamber, L, arranged substantially as set forth.

80,276.—MACHINE FOR UNLOADING RAILROAD CARS.—John D'Alle, Chicago, Ill.

I claim, 1st, A swing frame of a car unloading machine, provided with head plates, B, B, having convex surfaces presented to the sides of pulleys, C, C, which are perforated and otherwise constructed substantially as described.

2d, The arrangement and combination of the pulleys, C, C, and the head plates, B, B, adapted to serve as guides or fenders for pulleys applied to the swinging frame of an unloading machine, substantially as described.

3d, Perforated guards, h, perforated pulleys, C, C, and convex surface head plates, B, B, applied to the swing frame of an unloading machine, substantially as described.

80,277.—HORSE HOOF.—Elon Denio, Baldwinsville, and Elon C. Denio, New Hartford, N. Y.

We claim, 1st, The horse hoof formed of the hoe or hook, combined with the sole, substantially as and for the purposes specified.

2d, The ferrule, with the raised projections or ears, and slot, or their equivalents, for securing the knife in place, in combination with the hoe or hook, of one or more times, substantially as and for the purpose set forth.

80,278.—STOPS FOR FORE-AND-AFT SAILS.—Jacob Edson Boston, Mass.

I claim the arrangement and combination of the saddle, D, with the springs, H, H, their rods, A, and the sliders, F, connected with the rinz, E, Also, the arrangement and combination of the arched and annular flaps, G, G, b, and the arms, a, a', with the rinz, E, and the sliders, F, and springs, H, applied to the rod or bar, A, extending between them and from abutments, B, B, as set forth.

80,279.—FURNACE FOR TREATING ORES.—Samuel H. Folsom, Winchester, Mass.

I claim a series of two or more revolving tables placed within a furnace, A, and operating as substantially as described, for the purposes herein set forth.

Also, the revolving cylinders, m, m, with their inclined guides, in combination with the flue, G, operating substantially as described, for the purpose set forth.

Also, a central deflector, O, applied to a table, C or D, for the purpose of more thoroughly distributing the flame over its surface, substantially as set forth.

Also, the inclined stationary stirrers, a, b', in combination with a revolving table, C or D, substantially as described.

Also, the scrapers, F, on the under surface of a table, C or D, in combination with a projecting edge or shelf, e, beneath the table, substantially as and for the purpose set forth.

80,280.—STOVE AND FURNACE GRATE.—Bartholomew Gommaringer and Chas. W. Trotter, Rochester, N. Y.

We claim, 1st, The grate, as herein constructed and operated in the manner and for the purpose specified.

2d, In combination with the grate, a, the sliding ring, e, when constructed and operated in the manner and for the purpose specified.

80,281.—LAMP BURNER.—Richard Gorshine, Rochester, N. Y.

I claim the combination of the open frame, D, and transparent bottom plate, G, when arranged in connection with the removable cone, H, and fixed rim, C, the whole as herein set forth.

80,282.—LAMP CHIMNEY.—John Gracie, Pittsburg, and Robert H. Boyd, Hulton Station, Pa.

We claim, 1st, Providing a lamp chimney with an elliptic flange, substantially as herein described.

2d, In combination with the above, a lamp top provided with a flange, portions of which project inward for the purpose of catching, grasping, and holding the chimney in position, the contour of said flange corresponding to the form of the flange of the lamp chimney, substantially as herein described and for the purpose set forth.

80,283.—MACHINE FOR PRODUCING A RECIPROCATING MOTION IN KNITTING MACHINES, ETC.—Seotimus Haalam, Jr., New Britain, Conn., assignor to himself and John B. Talcott.

I claim, 1st, The combination with the shaft, b, of the sleeve, d, carrying the clutch and wheels, f, f, and the collar, k, and collar, i, on the shaft, and clutch, m, or its equivalent, substantially as described.

2d, The gears, f, f, arranged upon the sleeve, d, in combination with the clutch, k, upon the shaft, p, and spring, s, or their mechanical equivalents, with the gears, 3, 4, 5, i, and chain, v, for the purpose substantially as described.

80,284.—CIGAR.—Frederick L. Hilbright, Newark, N. J., assignor to himself and Chas. E. Woodman, Boston, Mass.

I claim the combination and arrangement of the foraminous ferrule or cap with a cigar, the same being substantially as explained and represented.

80,285.—ADDRESS PRINTING MACHINE.—Henri Julien, Ottawa, Canada.

I claim, 1st, The combination with the vertically sliding press, A, of the rack, B, pinion, C, shaft, D, spring, p, and the mechanism for operating the shaft, D, substantially as and for the purpose specified.

2d, The combination with the pawl, P, and connecting rod, E, of the mechanism for connecting them and disconnecting them with the parts to which they communicate motion, substantially as and for the purpose specified.

80,286.—MACHINES FOR DRESSING STONES.—Francis L. King, Worcester, Mass.

I claim, 1st, The peculiar construction of the self-adjusting frame, with its shaft, gears, and set screw, B, when constructed and operating substantially as and for the purpose specified.

2d, The carriage, A, spindle, B, or its equivalent, apron, H, constructed and operating substantially as and for the purpose specified.

3d, The tucks, C, C, disk, E, and curb, i, constructed and operating substantially as and for the purpose specified.

4th, Gears, F, and L, shaft, K, constructed and operating substantially as and for the purpose specified.

5th, The peculiar relative position or adjustment of the carriage, A, and grinders, M, upon different rollers, which by the irregular or eccentric motion is produced, arranged and operating substantially as and for the purpose specified.

6th, The combination of the hopper, R, hollow shaft, N, the grinder box, M, with the carriage, A, with its various bearings, constructed and operating substantially as and for the purpose specified.

80,287.—MANUFACTURE OF CIGARS.—William C. Kneeland, Brooklyn, N. Y.

I claim a process of manufacture of a cigar made with a cut-tobacco filler, substantially as described.

80,288.—FRUIT PICKER.—John A. Knight, Durham, Me.

I claim the fruit picker as described, combining the removable head, a, edge or teeth, c, handle or pole, a', jointed conductor, i, attached as described to the pole, and having the peculiarly formed chucks, p, as and for the purposes described.

80,289.—TABLES, BENCHES, ETC.—David S. Leavitt, Grand Rapids, Mich.

I claim the combination of the dovetail fastening, B, hinged levers, C, wedges or pins, and rods, when applied and used in the manner and for the purposes shown and described.

80,290.—CAR BRAKE.—Samuel M. Lee, New London, Iowa.

I claim, in combination with an independent piston, d, the arrangement of a forked bar, b, with the tender, and a single bar, c, with the car, for operating said bar, c, at either end, substantially as and for the purpose specified.

80,291.—TEETH FOR GEAR WHEELS.—John Letskus, Allegheny City, Pa., assignor to himself and Richard Brown, Youngstown, Ohio.

I claim curved gear teeth for wheels and pinions, the upper and lower edges of which are arcs of circles of equal radius, having their centers in the same right line, constructed substantially as and for the purpose hereinbefore described.

80,292.—ROSE ENGINE LATHE.—Thomas Lippiatt, New York city. Antedated July 11, 1868.

I claim, 1st, The arrangement of the swinging frame, H, carrying a tracing pin, e, or an equivalent device, the vertically sliding die or pattern, J, maul, K, and engraving tool, d, operating substantially as herein specified.

2d, The arrangement of the revolving die or pattern, N, the swinging frame, O, and tool box, F, operating substantially as herein specified.

3d, The combination of the screw rod, S, and shaft, L, with the sleeve, M, and die, N, substantially as herein specified, for giving a lateral progressive movement to the said die, N.

4th, The arrangement of the revolving die or pattern, N, on the mandrel shaft, I, the swinging frame, H, and tool box, F, operating substantially as herein specified.

80,293.—TELEGRAPH INSTRUMENT.—George Little, Hudson City, N. J.

I claim, 1st, The combination of a pen with a reservoir.

2d, The combination of a pen, reservoir, and coil.

3d, The combination of a pen, reservoir, and coil, with paper properly secured.

4th, The combination of a pen, reservoir, and properly moved paper.

5th, The combination of a pen, float, and reservoir, and all of these in combination with coil, and all of these also in combination with properly actuated paper.

6th, The combination of a pen and a reservoir, having an opening therein for the protrusion of the pen, with a regulating tube, and all of these in combination, first, with a float, second, with a coil, and third, with properly actuated paper.

7th, The combination of a pen with a reservoir of fluid and a permanent magnet properly located, and all of these in combination, first, with a float, second, with a coil, and third, with both a coil and float.

8th, The combination of a pen, a reservoir, and a coil, when the reservoir is vertical and provided with an opening at the bottom thereof, and the pen passes through the opening and the coil surrounds the vertical reservoir, and these parts thus relatively arranged in combination with a regulating tube.

9th, The combination of a pen, a vertical reservoir, open at bottom, a coil surrounding the reservoir, and a permanent magnet, located above the reservoir, and all these parts thus relatively arranged, in combination with a permanent magnet, located below the reservoir and pen.

10th, The combination of the following parts: viz, A pen, a float, a reservoir of fluid, a regulating tube, a coil, a piece properly actuated, and these in combination with a permanent magnet, so located as to influence the pen, all these combinations, and the parts or elements making up the combinations, being substantially as herein specified and set forth.

80,294.—STILL FOR HYDROCARBONS.—Charles Lockhart and John Gracie, Pittsburg, Pa.

I claim, 1st, The still, D, combined with a series of fire chambers, z, and smoke chamber, m, constructed, arranged and operating substantially as herein described, and for the purpose set forth.

2d, Making the chimney, D, the axis of the wheel, 7, used for rotating the screw, in the manner substantially as herein described, and for the purpose set forth.

3d, The arrangement of the column, e, pipes, g, and h, openings, 10, and valve, z, constructed, arranged, and operating substantially as herein described, and for the purpose set forth.

4th, Providing a still for hydrocarbons with a valve, which will act from an internal or external pressure, substantially as herein described and for the purpose set forth.

80,295.—BOLT.—Benjamin F. Lotridge, New York city.

I claim, in combination with the slotted case, B, the bolt, C, tongue piece, G, set screw, H, and spring, D, when the same shall be constructed and operated substantially as described for the purposes specified.

80,296.—FRUIT JAR.—W. W. Lyman, West Meriden, Conn.

I claim, 1st, The combination of flange cap, f, having incline or wedge elevations upon its outer edge, g, with a gasket seat, d, gasket, e, yoke, h, and 2d, The combination of the flange cap, f, elevations, g, yoke and pin, h, i, with the gasket and seat, e, d, substantially as and for the purpose described.

80,297.—BUTTER DISH.—William W. Lyman (assignor to Meriden Britannia Company), West Meriden, Conn.

I claim the right and left hand screw actuating fulcrum, in combination with the cover, a', and body, a, constructed and operating substantially as and for the purpose described.

80,298.—MACHINERY FOR MAKING PAPER BAGS.—George H. Mallory, New York city.

I claim, 1st, The clamp, formed of the bar, L, the shaft, K, with its lugs, i, when combined with the supporting frame, v, substantially as set forth.

2d, The clamp, formed of the slides, W and Y, and the jaw, 31, when combined with the folders, 6, 6', and the cams, 5, 5', substantially as described.

3d, The cross head, Z, the folding blade, 15, and the passing roller, 13, when combined and arranged substantially as described.

4th, The levers, D and E, the crank, e, e, the clamp formed of the bar, L, and the shaft, K, with its lugs, i, and the clamp formed of the slides, W and Y, and the jaw, 31, all combined and operating substantially as described.

80,299.—MANUFACTURE OF ARTICLES OF SOFT RUBBER.—George W. Martin, (assignor to himself and J. W. Haskins) Boston, Mass.

I claim an elastic screw thread, substantially as described.

80,300.—CANE SEAT.—George W. Martin (assignor to himself and J. W. Haskins), Boston, Mass.

I claim a movable cane seat, having sunken bearings, g, as specified, and so constructed as to be reversible, and present each side to the front, substantially as and for the purpose described.

80,301.—PORTABLE ROOFS FOR HAY STACKS, ETC.—Thaddeus Munson, Canandaigua, N. Y.

I claim the combination with the sections, A, A', connected by hooks, a, at 2d, of the bracing cleats, c, c, at the top, and the cords, z, at the bottom, passing loosely through the rings, d, d, and attached to the bars, f, f, and stakes, h, the whole arranged as described, and operating in the manner and for the purpose set forth.

80,302.—LAMP.—Person Noyes, Lowell, Mass. Antedated July 11, 1868.

I claim the use or application of a cap or stopple, a, to the top end of the wick tube of a lamp which has an outer jacket, sleeve, or other similar or analogous device, when said cap or stopple is constructed and arranged to operate substantially as and for the purpose set forth.

80,303.—CULINARY APPARATUS.—William W. S. Orbeton, Bradford, Mass.

I claim the improved brazier as connected with the main air supply openings, a, a', the auxiliary inlets, B, B', and the conical openings, e, e, arranged and combined together substantially in the manner and so as to operate as set forth.

Also, in combination therewith, the annular register supporting plate, C, as and for the purposes described.

Also, the combination of the main and auxiliary air inlets, a, B, the discharge opening, c, the fire pot cover, D, the annular register supporting plate, C, the latter having a dome or cover applied to it in the manner and for the purpose as explained.

Also, the combination of the hoop or band, F, with a brazier or cooking apparatus constructed in other respects substantially as set forth, the same being for the purposes explained.

80,304.—MACHINE FOR MAKING KNITTING MACHINE NEEDLE SHANKS.—Jesse S. Perkins, Lake Village, N. H.

I claim the combination of the friction jaws, d, e, or the equivalent thereof, and the dies and cutters, f, g, n, o, p, arranged and provided with mechanism substantially as described, for operating them in the manner and for the purpose as specified.

80,305.—HANGING FOR GATES.—Peter Rasar and D. J. Mayes, Illinois, Ill.

We claim the rollers, d, d', plate, c, and yoke, k, of a self-closing gate, when arranged in relation to each other and the rest of the gate, substantially as and for the purpose specified.

80,306.—SMUT MILL.—Richard Redfield and James H. Redfield, Salem, Ind.

We claim, 1st, The arrangement of the horizontal fan, J', blast spout, B, B', branch spout, B1, partition, S', vibrating trough, C, g, and horizontal spirally slotted case, E, y, and horizontal beater, F, J, substantially as and for the purpose specified.

2d, The relative arrangement of the blast spout, B, B1, B6, S', hopper, A, box, d, d', vibrating rounded surfaced trough, C, openings, f, f', spout, D, hopper, P, horizontal case, E, y, horizontal beater, F, J, passage, T, inclined spout, T1, vertical spout, T2, cap, H, and inclined receiver, H', substantially as described.

80,307.—MEASURING FAUCET.—Thaddeus S. Reeve, Chicago, Ill.

I claim a measuring faucet, consisting of screw, A, stop, B, gate, D, cylinder, E, and gate, F, and gate, H, arranged substantially as described.

80,308.—HORSE POWER.—M. A. Richardson, Sherman, N. Y.

I claim, 1st, The friction brake, D, and nut, d, applied to the operating parts of a horse power, substantially as and for the purpose set forth.

2d, The combination and arrangement of the driving wheel, I, with the friction device, D, d, in such a manner as to be removable from the bed, either separately or together, by the removal of the nut, d, as explained.

80,309.—PEAT MACHINE.—Marvin S. Roberts, Racine, Wis. Antedated July 14, 1868.

I claim, 1st, The digging apparatus, D, consisting of box, E, plunger, F, and endless chain, G, with buckets, H, H, combined and operating as described, and the whole secured to the boat, A, and provided with continuous automatic movement along the semi-circular curve, A', by means substantially as described, or other equivalent means.

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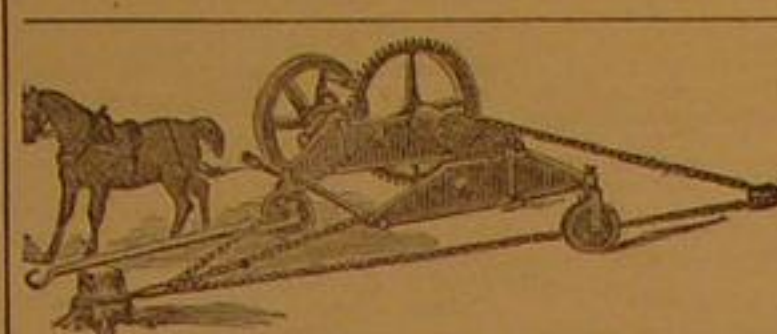
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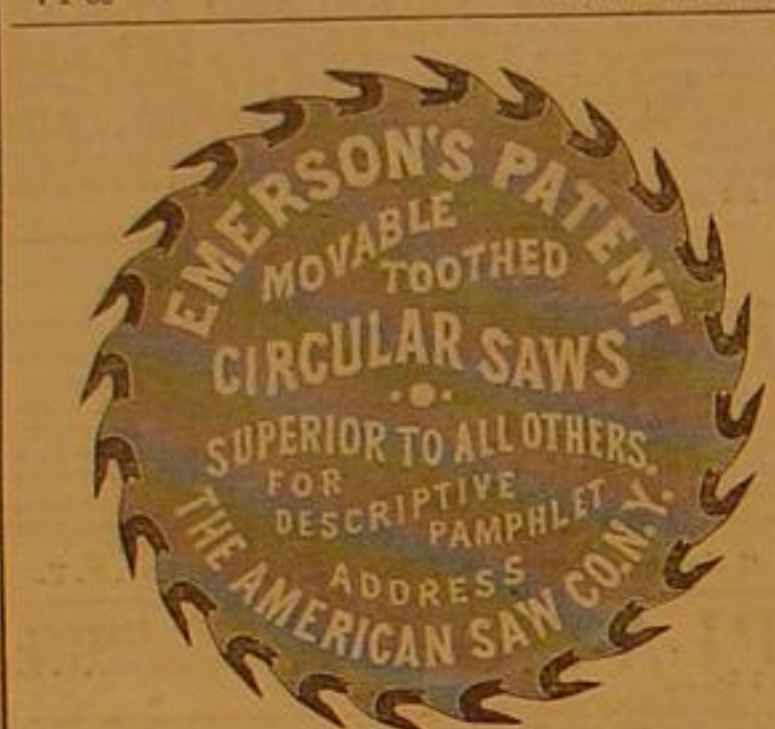
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1868.

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Vol. XIX.—No. 8.
(NEW SERIES.)

NEW YORK, AUGUST 19, 1868.

\$3 per Annum.
(IN ADVANCE.)

Improvement in Safety Hoisting Apparatus.

The use of cams and levers and of springs and levers for preventing the fall of the cage of a hoist, on the breaking of the hoisting rope, is not new; but, unfortunately, neither cams nor springs are wholly reliable, the latter, especially, are unreliable transmitters of power, losing elasticity when kept long compressed, and breaking when subjected to sudden strain. The object of the improvement, of which the accompanying engraving is an illustration, is to provide a certain means for preventing the fall of the cage in consequence of accident to the hoisting rope or chain. In this device the operation of the arresting levers is assured, as they are engaged with the rack instantly, in case of the breakage of the hoisting rope, by means of a counterbalance or weight, which, when the cage or platform is ascending, is moving in a contrary direction, thus giving the additional advantage of reducing the weight of the cage. Whenever the hoisting rope or chain ceases to act, the counterbalance rope comes into action and prevents disaster.

In the engraving, A, is the hoisting cage or platform, B, the lifting chain, attached by means of links, C, to the bell crank levers, D, having their fulcrums at E, and provided at their outer ends with teeth cut to fit the racks in the uprights of the framing. The ropes suspending the counterbalance weights are attached to the levers, D, at points outside their fulcrums, and pass over grooved pulleys, F.

The operation of the machine and its arrangements is apparent from an examination of the illustration. So long as the hoisting rope is held "taut," the levers, to which it is attached, are drawn away from the racks, and the machine operates freely; but the instant the hoisting rope breaks, or is slackened suddenly from any cause, the weight of the cage and its load comes upon the counterbalance ropes, the levers instantly engage with the racks, and the descent of the cage is prevented. There is no possibility of the device getting out of order, and ceasing to operate, except by the breaking of both the levers or one of the ropes; and the former may be made of the toughest wrought iron, and the latter may be wire ropes. A large machine is in operation at the works of Merrick & Sons, Philadelphia, Pa., and a working model may be seen at their office, 62 Broadway, New York city. Further information may be obtained by addressing the patentees at either place.

THE PARKHEAD FORGE.

The Parkhead Forge, Glasgow, is an extensive establishment, giving employment to seven hundred men and boys, but in consequence of the heavy nature of the work, the proportion of boys to men is smaller than in other branches of iron manufacture. The buildings cover several acres of ground, and are built in a most substantial style. On approaching the entrance to the Forge, the visitor is startled by the vibration of the ground under his feet, caused by the incessant blows of the steam hammers; and a peep inside reveals a scene of extraordinary activity. We shall briefly describe what came under our observation as we were shown through the work by one of the proprietors, and thus endeavor to convey some idea of what goes on in the place. The first department we entered was the rolling-mill, which is three hundred feet in length, and one hundred and fifty feet in breadth. At one end of the mill are arranged twenty-two puddling furnaces, and half a dozen reheating furnaces. The rolling and other machines are driven by a pair of horizontal engines of three hundred horse-power. The fly-wheel of the engines is eighteen tons in weight, and it makes one hundred revolutions in a minute. The steam is supplied by fourteen vertical boilers, heated from the puddling furnaces. The iron is first rolled into bars, then cut up, re-heated, and either rolled into ship and boiler plates or wrought into pieces suitable for the forge. At one time the firm devoted attention to the making of armor plates, and their specimens stood the test of competition with those of English makers most creditably; and but for the want of convenience for carrying the plates—the nearest railway being a mile distant—Messrs. Rigby and Beardmore would have obtained a fair share of patronage from our own and other governments. The machines are capable of producing plates eight inches thick, and some of the plates made of that thickness have

weighed twelve tons each. At some of the puddling furnaces a new invention was being tested, and we were told that the most satisfactory results were being produced by it. Its object is to hasten and render more perfect the puddling process, by injecting a current of air at high pressure into the furnace. This is done by making the puddling bar hollow, and affixing to the outer end of it an India-rubber tube communicating with a powerful air pump. The patentee is Mr. Richardson, of Glasgow; and the advantages gained by the contrivance are that a charge of the furnace can be puddled in fifteen minutes less than the time required by the

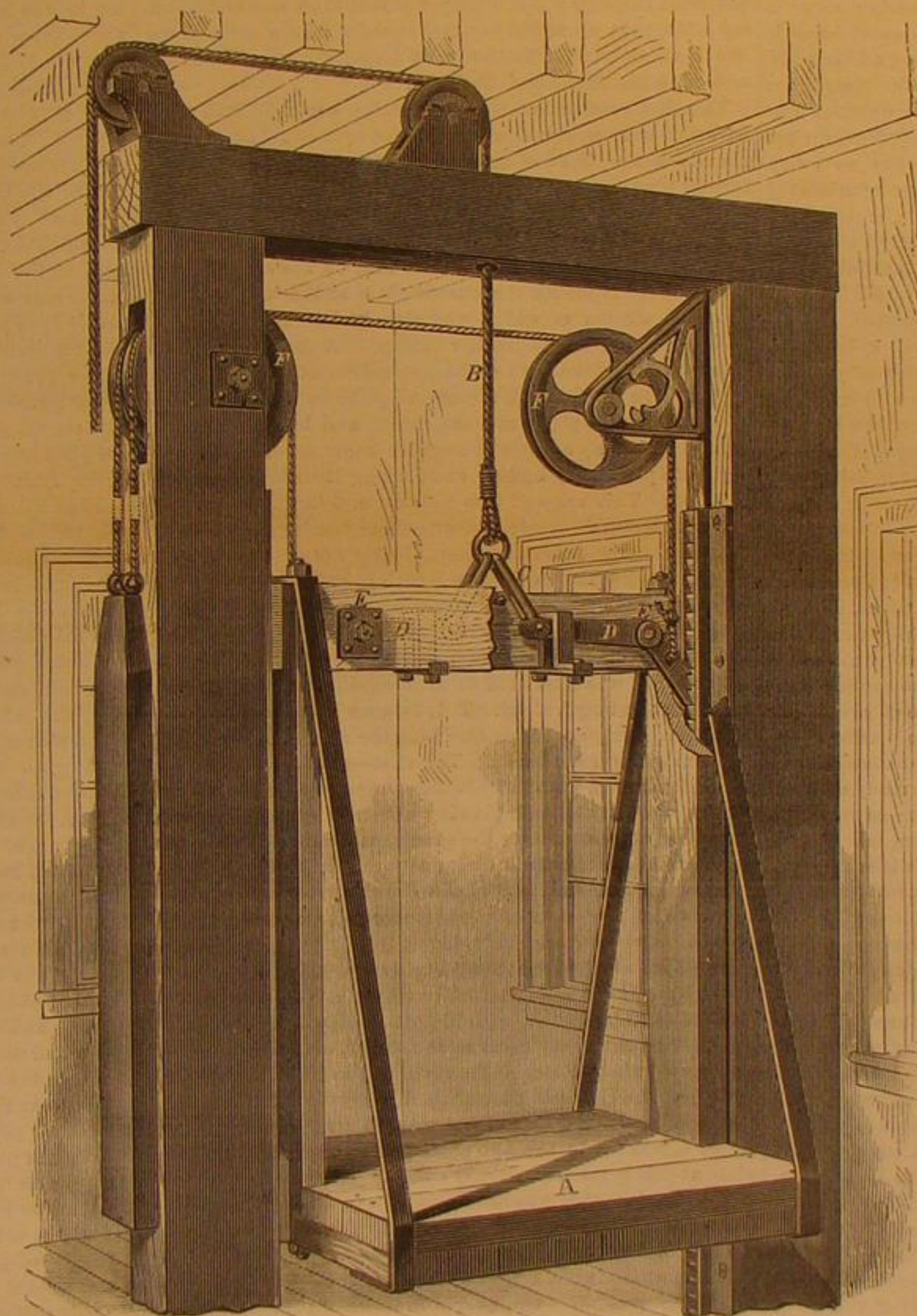
iron is moved about is fitted with a chain collar or sling, in the loop of which the iron rests. The collar works in a pulley attached to the chain of the crane, and moves easily, so that the shaft may be readily turned on the anvil. When the proper degree of heat is attained, the stopping of the furnace is removed, the steam crane put in motion, and the gigantic bolt is swung on to the anvil of the steam hammer. Several large slabs of iron, similarly heated in another furnace, are then brought out and laid on the "face" of the "haft." A signal from the head forgerman, and the hammer drops upon the glowing mass, and a dazzling shower of sparks fly off in all directions. Again and again the hammer descends, the iron meantime being carefully moved about, so as to have the whole wrought into a homogeneous mass. Gradually the iron assumes a dull color, but not before the desired end is obtained. It then goes back to the furnace, comes forth glowing, has another addition made to its bulk; and so on. The most difficult part of the work is the formation of the crank-piece, which is forged solid, and forms a huge square projection on one side of the shaft. When the shaft has acquired the proper dimensions it is allowed to cool, and the haft-piece is cut off to be used again. As the shafts are turned down until a good surface is obtained, an extra inch or so is allowed in the forging. The heaviest work on hand, at the time of our visit, were the shafts for two iron-clad rams which are being built by Messrs. R. Napier & Sons for the British Government. These shafts were upwards of fourteen inches in diameter. All shafts are made in lengths of about twenty feet, and these are made with flanged ends so that they may be firmly united.

For dressing and finishing such huge pieces of iron as we have described, special and costly appliances are necessary. These are located in the machine shop, an apartment one hundred and fifty feet in length and fifty feet in breadth, both sides of which are lined with turning lathes, slotting and boring machines, and such like, of extraordinary size. One of the turning lathes is said to be the largest in the world; and some idea of its dimensions and form may be obtained from the fact that the crank shaft of the *Monarch*, though weighing thirty-two tons, was turned in it without taxing its capabilities to the utmost. Some of the iron shavings lying about the vast machine were fully one inch broad and one eighth inch thick; yet these were turned off with apparently as little effort as if the material had been wood instead of iron. One of the boring machines is sufficiently powerful to drill a hole ten inches in diameter through a solid block of iron; and the largest slotting machine can send off chips a pound or two in weight. When the work leaves

this department, it is generally quite ready for being fitted into its place. This firm pay nearly £40,000 a year in wages; and in all departments of the establishment, 15,000 tons of iron, and 60,000 tons of coal are annually used.—*The Ironmonger.*

THE LIFE OF IRON BRIDGES.

The Engineer says: "It may be assumed that a wrought iron girder bridge, subjected at intervals to a dynamical load not exceeding the fourth part of its powers of ultimate resistance, will be safe for traffic for a period of 328 years. This assumption is based upon the proviso, that the successive alternations of strain and repose should not be repeated more than 100 times during the same day. With the exception of some country lines and rural branch railways, the number of trains of every description passing over bridges in twenty four hours, considerably surpasses the limited number one hundred. Taking the traffic during the night to be only one third of that during the day, we may conclude that, as a low average, 200 trains pass daily over the majority of our metropolitan and suburban railway bridges, and as a maximum, the hardest worked member of the bridge tribe possibly undergoes as many as 300 alternate changes of active and passive conditions from sunrise to sunset. Adapting this calculation to our theory, we may estimate the life of the hardest worked railway girder to extend over a period, in round numbers, of 100 years, under ordinary circumstances.



MERRICK & SONS' PATENT SAFETY HOISTING APPARATUS.

"Similarly to all theories, conditions are here supposed to exist, which, in numerous instances, are probably wanting. In the experiments upon a wrought iron beam, from which these results have been deduced, the dynamical load was accurately proportioned to the ultimate power of resistance; but there is no question, that in some of the earlier built iron girders no such proportion obtains. Certainly the majority of wrought iron girders are in excess, so far as their strength is concerned, of the quarter ratio between their working and breaking load; but, if we may judge from failures that have taken place, some are comparatively weaker than they ought to be. Unfortunately, in these experiments, with the exception of those confined cast iron bars, in which the load applied was of a static and not dynamical character, the element time does not enter into the calculation, and the inevitable deterioration it produces upon everything exposed to its influence, is altogether disregarded. It is one thing to rivet up a beam, and then subject it immediately in the plenitude of its strength to so many alterations of state, before the corroding action of wind and weather has the least chance of exerting its destructive power; but it is a very different affair to allow a beam, which is yearly becoming weaker, to be submitted to the passage of heavy rolling weight. In the one case the strength of the girder, so far as extraneous causes are concerned, is constant; in the other it is variable.

"A difference will obviously present itself respecting the ultimate durability of cast and wrought iron girders individually. When the former fail they fail completely; there is no repairing a fractured cast iron beam, whatever shape it may possess; it is only fit for the cupola or the puddling furnace. The same circumstances do not attend the dissolution of wrought iron girders provided they are well watched and the 'first symptoms' attended to. The Menai Bridge, for example, might be replaced piecemeal, accordingly as every plate, angle iron, or other portion of it becomes deteriorated to an extent sufficient to imperil the safety of the structure. In this sense a wrought iron bridge is practically indestructible, since it admits of any and every degree of partial repair, and after the lapse of its first hundred years of life, may be completely rejuvenated and commence a fresh career. Lattice bridges—those constructed upon the open web system—in general afford special facilities for this process of gradual reconstruction, since a bar can be taken out and replaced without in any manner jeopardizing the safety of the remainder. The external effects, or visible appearance of the influence of time, must not be confounded with that invisible and inexplicable action that is incessantly in progress in connection with the molecular composition of the material. For similar reasons that the wrought iron girder, as a structure, can be preserved by successive reparation from the results of visible corrosion and decay, so is it also independent, in some degree, of any atomic alteration, unless we imagine the whole girder to be equally affected, and to fracture precipitately like one of cast iron. It has always been a puzzle to engineers to satisfactorily account for the sudden fracture of cast iron, whether in the form of girders, axles, or engine beams, under a much smaller strain, than what they had previously borne with impunity for a long period of time. A ready and apparent, though by no means necessarily a true, explanation of the fact is that it is owing to a change having taken place in the internal structure of the material. This is equivalent to the specious and clever manner in which members of the faculty exonerate themselves from their professional dilemmas by ascribing the fatal termination of any unknown complaint to 'disease of the heart.' The experiments made by Mr. Fairbairn upon cast iron bars, although interesting and valuable so far as a mere static load is regarded, present no analogy to the case of a cast iron bridge undergoing the transit of some couple of hundred trains per diem. Whatever the exact nature of the change may be, or the rate at which it progresses, until the cohesive power of the material is injured, it is impossible to assert; but we are nevertheless certain that the continual repetition of severe strains on a girder, must ultimately impair its powers of resistance. In a word, then, upon this hypothesis, every cast iron girder is doomed to break at some time or another, and what is worst, break suddenly, the precipitation of the passing load into the gulf beneath being the first sign of danger. This is not a very consoling reflection to a people who travel so much by rail as ourselves; but immunity from accident begets indifference, and although the contingency is possible, yet it is of an occurrence so rare that it is out of the sphere of probabilities.

"One is apt to regard the breaking down of a railway bridge in the light of a possible, but very remote contingency; to believe in such an occurrence in a vague, uncertain manner as an event that might or perhaps would take place 'some day,' but which, at present, is not worth thinking about. There is a little of the Mahometan doctrine of fatalism in all this, and although we do not exactly sit down, fold our hands, and cry 'Bismillah,' as the sole preparation and defence against a coming danger, yet we require it to be brought pretty well home to us before we are thoroughly aroused to action. From the experiments we have quoted, it was ascertained that the strength of cast iron to resist repeated alterations of strain was much greater than what has usually been accorded to it. At the same time we have no data upon which to base the life of a cast iron girder, unless we assume it to be equal to that of a wrought iron one. It has already been shown that the facilities offered by structures of the latter description, for gradual repair and actual reconstruction, leave no cause for anxiety on their behalf. We are in possession of the true elixir vitae as regards them, and all that is required is to watch the time for making use of it. On the other hand, the 'first symptoms' of approaching rupture in the case of a cast iron girder cannot be perceived, and it is questionable whether the most careful and minute 'surveillance' which

can be exercised over every cast iron bridge upon a line, would be able to detect the 'internal change of structure,'—that invisible dissolution which precedes the visible downfall. Taking for granted, therefore, that the natural life of a cast iron railway bridge is, for a minimum, one hundred years, some of our oldest examples have about sixty years to run, supposing that they die literally of old age, and their demise is not accelerated by accidental injury."

THE SHOEBURNESS EXPERIMENTS.

During the months of June and July, a series of experiments in artillery practice have been made at Shoeburness, England, to test the modern improved artillery, and its effect upon iron plating. The tests were of the most severe character, the plates being of a great thickness and of a superior quality of iron. One of the targets had a port-hole in its center, and its condition at the end of the experiments, as illustrated in the English journals, gives evidence of the enormous efficiency of the guns used in the experiments. The most formidable shot at this target was from a 10-inch gun, at a range of 1000 yards. The effect of this shot was to carry away, for a considerable area, the whole of the plating above and to the left of the port-hole, driving with it masses of iron, converted by the projectile into missiles more deadly than the shot they were designed to resist. We have waited for the conclusion of these important experiments, which have extended through a much longer period than was at first anticipated, that we might lay their results before our readers. We shall only refer to the most important of them, as described in the *Mechanics' Magazine*.

The first experiment we shall notice was a 12-inch shell, with full charge, aimed at the upper part of an extra plate, placed on the front of the shield, and which it broke into several pieces. It penetrated 16 inches, and exploded backward, doing no damage at the rear of the shield, beyond fracturing another horizontal plank. The Rodman gun, with a full charge, was then brought to bear on the upper part of the shield. It struck the curved plate at the left hand top corner, a portion of which was already knocked off, and it broke in two, doing no further damage. A shell from the 12-inch gun was fired with a charge equivalent to 1,000 yards range. The shell struck the second plate from the left hand, carrying away a piece from the corner, and bursting; the explosion lifting up a large triangular fragment of the adjoining plate previously broken, and hurling it on the roof of the building. This mass of iron was about 6 feet base by 5 feet sides, and remained pivoted on one of the large roof bolts, which held it without breaking. Inside the casemate at the rear, the ironwork in connection with the roof was much distorted, and a great cavity, admitting daylight, was formed through the plates, the head and point of the shot remaining jammed among the debris of the cavity.

The firing was afterward directed against the granite base on which the target stood. This forms a plinth about 4 feet high, projecting about as much from the surface of the shield, the step being rounded off. The shot—a 450-pounder, from the Rodman gun, with full powder charge—struck the granite toward the right hand, plowing a furrow some 5 feet wide and 3 feet deep, smashing the granite to powder, and scattering a cloud of fragments and dust around. After this shot, two rounds were fired at Sir John Brown's solid rolled 15-inch plate, which merely stood against some iron standards and a few balks of timber. This target had already had three rounds fired at it, with a result highly creditable to the plate, considering the conditions under which it was tested. The first was a 12-inch shell, with 76 pounds of powder, and which struck the shell about 2 feet from the end, which it broke off and buried about 6 feet to the rear. The second shot, which was from the Rodman gun, with full powder charge, struck the plate near the center of the original length, and close to where it was hit by the two shots of the previous day. The plate at this point was already severely cracked, and the result of the last shot was to complete its destruction, the plate separating into four pieces. The fracture showed a splendid quality of iron, although here and there symptoms of bad welding were visible, and this was all the most adverse criticism could pronounce against it. In its favor there was everything to be said. Considering its unsupported position, and the widely different conditions under which it was fired at to those of a fort where it would be fixed as a defence, it stands out at once as a great success. Although the Plymouth fort stood a good amount of battering, it is to be remembered that it has been improved upon by replacing some of the bars by plates. These were just the points that withstood the firing the best, and this strengthens the conclusion that a mighty strength of resistance would result from the use of a single solid plate, instead of a compound laminated plating.

This was the conclusion of the third day's experiments, and at this point we may pause to notice the recorded details of the practice, as regards the force and velocities of the shots fired, and which are as follows: The Woolwich 12-inch rifled 600-pounder, with 76 pounds of pellet powder, 5,588 foot-tons, 1,159 feet per second velocity. The 10-inch rifled 400-pounder, with 60 pounds 1 gr. powder, 4,431 foot-tons, 1,264 feet velocity. The 15-inch smooth-bore Rodman, with 50 pounds English powder, equal to 60 pounds American, 4,215 foot-tons, 1,101 feet striking velocity. In the same gun, with 83½ pounds charge—equal to 100 pounds American powder—the velocity was above 1,400 feet, and the total energy about 4,000 foot-tons.

The "War Office Casemate," was next made the object of attack. This casemate was manufactured at the Millwall Iron Company's works, and was designed with the view of testing the resistance offered by a given weight of iron plate, disposed in various thicknesses and positions. It is divided

into six sections, each one of which represents a different system. The first section consists of an 8-inch solid plate, placed direct upon the 2-inch skin, which is common to all the series. The second is of 4½-inch plate upon a backing 7 inches deep, formed of channel-iron placed back to back. The third is a 6-inch plate, with backing 7 inches deep of Hughes' hollow stringers. The fourth is a 4-inch plate, with 7-inch backing of channel-iron; the fifth is a 4½-inch plate resting partly upon 7-inch backing of channel-iron, and partly, with only the interstices between itself and the inner 2-inch skin, filled up with 7 inches of concrete, forming the sixth section. The structure was roofed in with brick arches and concrete, as in ordinary casemates. The firing was from the 7-inch, 9-inch, and 10-inch rifled guns, and the Rodman 15-inch smooth-bore gun, with battering charges, and at the same range as the Plymouth shield, viz., 300 yards. Only Palliser shells were used, these having established their superior penetrative power over the Palliser shot.

Twenty rounds were fired in all at this target, the first being a 7-inch shell, which struck the 8-inch plate, penetrating about 8½ inches, but doing no damage to the rear. The second round, a 7-inch shell, struck the 4½-inch plate supported by 7-inch channel-iron backing. It penetrated 14 inches into the target, but caused no damage to the rear. The third shell struck on the vertical junction of the last plate fired at, with the 6-inch plate backed by hollow stringers. The result was a penetration of 8½ inches, the head of the shell remaining in the hole, and the rear remaining undamaged. The above three portions are marked A, B, and C, respectively, and they are backed with a massive tapering concrete pier. The fourth shell struck the last named section (C) where it has behind it 2 feet 6 inches of concrete, strengthened by iron girders. The penetration was 10½ inches, with half a dozen nuts stripped off in the rear. The fifth shell struck that portion of the target covered by 4-inch plates upon 7-inch channel iron. The plate buckled ½ inch for about two feet around the shot-hole, and the total penetration was 13½ inches, the head of the shell remaining in the hole. Seven more nuts in the rear were stripped off the bolts. The sixth shell struck the 4½-inch plate on concrete backing, penetrating 14 inches into the structure.

The practice now commenced with 9-inch shells, the first round striking section A of the target, penetrating 13 inches. The second shell struck the B section, penetrating 21½ inches, the plate buckling considerably, and seven nuts twisted askew in the rear. The third shell struck on a bolt in section C, causing a buckle of ½ inch at the top edge of the plate, the penetration being 18½ inches. The fourth shell struck the same section, penetrating 14½ inches, and clearing off five small nuts in the rear. The fifth shell hit on section D, the penetration being 9 feet 8 inches. At the rear the ½-inch iron skin mantlet was driven back 3 inches, and twenty small nut heads were stripped off. This portion was driven back by a bolt, and the mantlet skin was turned up also beside the port, the whole forming a considerable smash. The sixth round struck upon the E section, penetrating 22½ inches, and causing no damage in the rear. The 10-inch gun was then brought into play, the first shell from which struck the A section, buckling the plate, and penetrating 32 inches. The second round struck the B section, causing a buckle, and penetrating 4 feet 9½ inches. The shell was supposed to have burst in the concrete backing. One of the vertical channel irons lifted up a few inches through the concrete roof. The ½-inch skin at the back of the pier opened slightly at the joints. The third shell struck the section C, penetrating 6 feet, and passing into the concrete pier. At rear, the covering slip at the angle of the pier, ripped open over a length of 5 feet 8 inches, with ten rivets sheared, and a bulge of 5 inches in the ½-inch skin on the back of the pier.

The next shell struck the C section in another place, and completely penetrated the structure, clearing everything before it, the point of the shell being carried 200 feet to the rear. Some pieces of the ½-inch skin were thrown 20 feet away. The point struck was a weak one, being near a joint which was not covered by the backing. This points out the necessity of placing the stringers so that the joints of the plates should be supported by them, instead of having them at right angles to the line of the plates, as at present. The fifth round, with the 10-inch shell practice, struck the D section, making a clean penetration. One of the ½-inch mantlet plates in the rear was blown 20 feet away, and the timber screen was smashed up. There was an opening in the back of the target 4 feet in height and of considerable width. The angle iron of a vertical girder on the left of the shot-hole was curved 3 inches out of the straight, a 2-inch bolt was broken off, and the concrete was blown out. The sixth and last 10-inch shell also struck upon the D section, and drove the whole side of the target back from its brick-work setting about half an inch. It penetrated 4 feet 11 inches, lodging in the concrete backing, and bulged the cover plate in the rear, stripping some more small nuts, and cracking the roof slightly all round. After this shot the Rodman gun was fired, a round shot striking the junction of the 6-inch plates above the port-hole. It caused an indent 7 inches deep, and sheared off a bolt head 6 inches from the face of the target. At the rear the angle iron supporting the ½-inch skin over the port bent three inches, thirty small screw nuts were knocked off, and the whole skin ½-inch plate, was knocked out a distance of 9 inches. One rivet was knocked out from the top of each port jamb. The second round from the Rodman gun struck the A section of the target, making an indent of 4½ inches, but doing no further injury.

From the above the nature of the subsequent experiments may be sufficiently inferred, as well as their general results. *Engineering* says that the protective points of the Plymouth Breakwater Fort have been well tested in this trial, and found

wanting, and nothing more conclusive is required to prove the fallacy of opposing to heavy ordnance a rigidly unyielding iron wall.

THE PACIFIC MILLS MANUFACTURING ESTABLISHMENT AT LAWRENCE, MASS.

IN connection with the French Exhibition of 1867, the Emperor Napoleon proposed ten awards of 10,000 francs each (nearly \$2,000 in gold) to ten different individuals or associations, who, in a series of years, had succeeded in securing a state of harmony between employers and their workpeople, and most successfully advanced the material, intellectual, and moral welfare of the employes. In response to this appeal, the "Pacific Mills," at Lawrence, Mass., devoted to the manufacture of ladies' cotton and wool dress goods, prepared and forwarded to the jury a statement concerning the operations of their establishment. The jury awarded the third place on the list to the Pacific Mills, together with a prize and a gold medal.

We have before us the printed statement, which embodies many very interesting facts about the organization and management of this model establishment, some extracts from which will interest our readers.

THE ORGANIZATION.

The management is confided by about one hundred and fifty stockholders, to nine directors, chosen annually.

The original number of shares of the company was one thousand, costing \$1,000 each, making a total capital of \$1,000,000. The cost of the buildings and machinery having exceeded this sum, fifteen hundred shares more, at same cost, were issued, making the total number of shares to be twenty-five hundred, and the cost of the capital stock \$2,500,000.

They commenced operations near the close of the year 1853, but no goods were ready for market until the spring of 1854. The amount of machinery then consisted of one thousand looms, with carding, spinning, and dressing machinery sufficient to supply them, together with combing machines and spinning for worsted yarn, used in the manufacture of mixed fabrics, and was equal to the production of about two hundred thousand yards weekly, of calicoes and mousseline de laines, with ten printing machines for preparing these goods for the market.

The buildings and machinery have since been increased, so that there are now in operation about one hundred thousand spindles for spinning cotton, with cleaning, picking, and carding machines to supply them, and about sixteen thousand spindles for worsted, with all the necessary preparing machines to occupy thirty-five hundred looms for weaving the two classes of goods above-named, and others, together with twenty-two printing machines, producing a weekly average of about seven hundred thousand yards. The machinery is propelled by eight turbine wheels, six of them being seventy-two inches in diameter, with a fall of water equal to twenty-six feet, yielding fifteen hundred horsepower.

The average sale of the manufactured goods of the company, for a few years past, has exceeded \$7,500,000.

About thirty-six hundred work-people are now employed by the company; of these there are sixteen hundred and eighty men, fifteen hundred and ten women, eighty boys between ten and twelve years, one hundred and forty boys from twelve to eighteen years, forty girls from ten to twelve years, and one hundred and fifty girls from twelve to eighteen years.

In the origin of the establishment the principle was adopted by the managers that there was to be a mutual dependence between employers and employed, each having rights which the other should respect, and that inasmuch as the success of the proprietors must depend much upon the cheerful and intelligent co-operation of the work-people, certain plans were adopted to secure "the material, moral, and intellectual welfare of the workmen," both as a duty to them, and one of self-interest to the proprietor.

MATERIAL.

For the material well-being of the laborers, special care was used in the original construction of the work-rooms, to make them cheerful, comfortable, and well-ventilated, so as to avoid as far as possible, the unpleasant drudgery of work, and to secure order and neatness throughout.

Houses were constructed for dwellings, which should give to families residences at moderate cost of rent, that would secure the health and comfort of the work-people, while they were cheerful and attractive. Men pay for these houses a weekly rent about equal to one-eighth of their wages. Large buildings were erected for the use of single females whose residences were at a distance, and divided into seventeen large apartments, capable of accommodating eight hundred and twenty-five persons in the aggregate. The rooms are arranged for two persons each; well ventilated and lighted, and comfortably furnished. Unmarried men are never allowed to lodge in these houses, nor in any case a married man, excepting he is accompanied by his wife, and even then but rarely. Females pay about one-third of their average wages for rooms in these boarding-houses, including food, lights and washing. Fuel for fires in the rooms is an extra expense.

It is common to provide coal, and sometimes flour, for the work-people, at the cost price of large quantities.

Another effort for the material welfare of the operatives was adopted in the earliest history of the enterprise, and has been continued for nearly thirteen years, with marked success, doing much to promote "harmony among all those co-operating," and to establish a bond of sympathy and union.

An association was formed, called "Pacific Mills Relief Society," of which each person employed by the company must be a member, the entire management thereof being in the

hands of the work people, each officer being chosen by themselves from their own number, excepting the president, which office has always been filled by the resident agent or manager, who seldom acts, however, excepting as counsellor or umpire.

Each person, on commencing service, elects whether he will pay two, four, or six cents per week to the relief fund—the lower sum being a little more than one-hundredth part of the weekly averages of those who are the youngest, and consequently least paid, and the highest sum, six cents weekly, bearing the same proportion to the average weekly wages of the entire body of work-people. When the sum in the hands of the treasurer of the society, who is always the confidential clerk of the company, and keeps the deposit with the company for protection, has reached the sum of \$1,000, the weekly subscription of all persons who have been employed by the company three months ceases, while it continues with the new comers.

This condition of funds occurs so often that for nearly one-half the time the older employes are not assessed, and the real sum withdrawn from their wages annually is a very small proportion of their wages, and is far from being a burden to the poorest.

When a person has been in the employment of the company three months, and consequently for that time paid his elected sum to the funds of the relief society, he becomes a full member of that society, and entitled to certain privileges. If sickness occurs, preventing him from labor, and he sends notice to the overseer or head workman of his room, one of the appointed stewards is sent to learn the nature of the illness, and the sick one becomes the special charge of this steward, who for a man is one of his own sex, or if a female, a woman; and it is this steward's duty to see that a nurse and physician are secured, if necessary, and to draw from the wardrobe of the society such changes of personal and bed linen as the circumstances demand.

Each sick person, if the illness continues one week, is thenceforward granted an allowance from the funds of the society. He who has paid two cents per week for at least three months, receives \$1 25 weekly for the period of twenty-six weeks, if sick so long. Double this sum is allowed if four cents have been paid; and \$3 75 when the amount paid has been six cents weekly. In cases of special need the officers of the society are authorized to make an extra allowance, though great care is used in such a dispensation. Those who die poor have their funeral expenses paid, and are respectfully buried in the beautiful lot in the city cemetery belonging to the society. In some cases the deceased has been sent to his native town, by the desire of his friends without cost to them if they were poor.

Sick members are often accompanied to their friends by a steward, or the overseer of their workroom, when too feeble to go alone, or the friends too poor to come for them. The blessings of this society are thus made known to parties at a distance, and it often induces persons of excellent character to seek employment of this company, while those who have secured the benefits of the relief society retain it in warm remembrance. More than one poor mother, whose only child, while a member of this society, has been disabled by sickness, has found the weekly allowance an invaluable aid to her slight income, and called loudly for blessings upon its officers and the institution engaged in such a work of merciful kindness. Many a father or mother, or other relative, whose child or friend has been sent to this company, have besought the blessings of heaven upon the members of this society who have cared for their absent ones in time of sickness, and soothed them as they have faded away from life.

Though there is not space for details of great interest, it must be seen that this plan has a direct tendency to promote sympathy for each other among the work-people, and to secure a bond of union. Most surely those who daily observe its workings see it.

It will also be noticed that a very important feature of this plan is that it is an association of the work-people themselves, wholly controlled by them, and consequently sure of permanency, while favored to its present extent by the employers. This is likely to continue, because they witness its important influences and usefulness.

The total amount of money expended for the benefit of sick members in twelve years of its existence, ending in April 1866, has been \$25,530 68 to eighteen hundred and sixty-eight persons, and the amount paid to the fund has exceeded this sum about \$1,200. The corporation contributes weekly to this fund, and also to meet individual cases which are especially aggravated.

MORAL.

To meet the protection of the large number of single females employed by the company, who, as is often the fact in the manufacturing establishments of the United States, and perhaps elsewhere, are away from the guardianship of their friends, the boarding-houses referred to above are controlled by persons carefully selected for their ability to influence this class of work-people, of established good character, who will take an interest to secure the comfort of their boarders, and save them from bad moral influences, acting really, as far as possible, in the place of guardians. If a young female is known to visit places of evening amusement of doubtful character, or gives any reason for suspicion that she is guilty of immorality, or even of careless unguarded conduct, she is admonished, and if reform is not immediate she is discharged from the house and from employment.

The doors of the house are locked at ten o'clock at night, and no one allowed to be out after that hour without a satisfactory excuse. Doubtless persons of immoral character secure employment by the company, and by superior secrecy retain their connection. Among so large a number some will be

impure, but it is believed that very few of these females are led astray while connected with the mill, if virtuous when commencing work. It is impossible for an openly vile person to retain connection with the company.

Men of intemperate habits, or of general bad character, are excluded from the company's service, though patience with them is encouraged, with the hope of securing reform, and this forbearance and attendant labor has often been rewarded. It is an established principle that all profanity or other bad language, any bad example, or even abuse of authority among the head workmen, must be strictly avoided, especially when these overseers have in their charge females or young persons. More than one such responsible workman has been removed for using improper words, or ill-treating subordinates. It is absolutely demanded of these persons that they treat those under them as they would desire to be treated themselves if in their position.

The directors have placed their associate, the manager at the works, to represent their feelings to the work-people; to show them sympathy in their trials; to counsel them in their need of advice, and to be their friend.

Careful efforts have been made by him to secure their confidence, and he has cultivated the conviction that they could ever find in him a father, a brother, or friend. Many hearts have been moved to earnest gratitude for the aid which they have thus secured in their time of need. It requires a vast amount of patient listening to complaints; to tales of sorrow and want; but it has had its reward in seeing so many relieved and made glad and hopeful. The real moral effect and the real satisfaction in such a relation between employer and employed cannot be written. The spirit of the employer is imparted to the more responsible and influential workmen, and to those under them, while a healthy moral condition is secured.

INTELLECTUAL.

When the company was first established, the directors appropriated \$1,000 for the purchase of suitable books for a circulating library, and provided a suitable room for it on their premises. The work-people have always been required to pay one cent each week during their services, and they thus become members of the Pacific Mills Library Association, which is managed entirely by themselves, they choosing their own officers for the control of its affairs, and for the selection of books, but selecting one resident manager for the president and chairman of the library committee. This weekly payment secures the privilege of the use of the library and reading-rooms of the society. One room is appropriated to males and is supplied with the local newspapers of the city, and of Boston and New York, together with numerous serials of a scientific and literary character, and is open from six o'clock A. M. till nine P. M., warmed and lighted. It is in close proximity to the other room containing the library, now exceeding four thousand volumes, and also a cheerful, airy, comfortable apartment for the females, which is carpeted, and made attractive by daily and weekly publications, specially adapted to their wants, and stereoscopes with numerous slides, all in charge of an intelligent and cultivated young lady. It is open from nine o'clock A. M. till nine o'clock P. M., and is much frequented and valued.

A large number of volumes of the library are in constant circulation, as the number of the work-people who cannot read or write does not exceed fifty in one thousand, and these are principally of foreign birth. All new publications adapted to this class of readers are bought as soon as published. The privilege of taking books from the library is extended to members of families whose head is a member of this association.

The funds of the society are also used to purchase tickets of admission to lectures, and suitable popular amusements, which are distributed among the members. This association, as well as the relief society, it will be seen, is supported and managed by the work-people themselves, who secure a valuable return for their small outlay, and also the permanency of its operations, avoiding the dependence for existence and usefulness upon the life or even connection of any one person of special prominence.

The law of the State forbids the employment of children under ten years of age, and requires that children employed between ten and twelve years of age shall be in school sixteen weeks of each year, and those between twelve and sixteen years, eleven weeks. The company contribute annually to the support of an evening-school for both sexes.

SUCCESS.

It has often been stated that care of employers for the education and welfare of their operatives, especially to the extent herein shown, is incompatible with pecuniary success. Facts prove that this is not true with the Pacific Mills, but others must determine how much of this is due to the principles of action established and maintained. It is also believed that the work-people have received great benefit. Some of the evidences of this are the following:

1. There have been no strikes among the work-people, which are their curse and the dread of employers. They have been encouraged to feel that any grievances will be patiently listened to, and frankly discussed, and the result has always been favorable to good order. By no means has every uneasy spirit been quieted, but the mass has been satisfied.

2. A higher class of workmen has been secured. Those best able to appreciate the privileges enjoyed in connection with this company have been drawn thither for employment. Specially is this true among the overseers who engage the laborers in their different departments, and give character to the mass. Their intelligence and hearty co-operation in the plans for the material, moral, and intellectual advancement of the operatives, mold the whole and secure a higher stand-

ard. The general influence of the principles adopted by the company leads these prominent workmen to feel that they are intrusted with a degree of guardianship of those under them, and this feeling is very manifest. Respect for the manhood of a workman molds him.

3. Many of the work-people have invested their funds in *savings banks*, and this is specially encouraged. Formerly the company received deposits from the work-people, allowing an annual interest of six per cent., but for some prudential reasons this plan was abandoned, and the depositors were encouraged to invest in chartered banks. The company held in their hands, at one time, more than \$100,000 of the savings of their work-people, which has been changed into other channels. There is no doubt that their deposits now exceed this sum largely.

4. Quite a number of the work-people own *houses* free of debt, while others have been partially assisted by the company, it receiving a portion of their wages each month in reduction of the debt. More than \$50,000 are thus invested.

5. Others invest their funds in the bonds of the United States Government in preference to savings banks.

6. Several of the workmen are owners of the *stock* of the company, and have the same rights in regard to the control of the officers and general management as other stockholders.

7. Investments of earnings in premiums on *life insurance* have been made by many of the workmen.

8. More than one of the workmen have been members of the City Government in its board of aldermen and common council, and not an annual election passes without the choice of one or more to some of these important offices.

The pecuniary success of the company has warranted a liberal spirit in the payment of wages to the work-people. The least sum now paid in weekly wages to the youngest employed is \$1.82 in gold, and the number belonging to this class is very small. Boys of sixteen years do not receive less than \$2.85 in gold weekly. The least amount paid weekly to men is \$6.75 in gold, while a very large majority receive much more. Females receive from \$2.48 in gold weekly to \$6.72, while a few earn more. This excepts young girls, whose wages are the least sum named above.

Spinners, weavers, and a few others, are paid in accordance with their products, some of them earning very large wages.

The stockholders, as previously stated, have invested \$2,500,000 in the company. During the past twelve years they have received in dividends more than \$3,000,000, and the fixed property has cost a much larger sum than the amount of the capital stock. The treasurer, furthermore, holds in his possession a very large amount of undivided earnings, with which to purchase cotton, wool, and other materials, for cash.

PROGRESS OF THE WORKING CLASSES.

We have received from Messrs. Geo. Routledge & Son, No. 416 Broome street, a volume of 300 pages, bearing the above suggestive title. The work embraces a great variety of topics, bearing upon the social condition of the overworked working classes of Great Britain, and the moral and legal agencies employed toward their reformation during the past thirty-five years. The information and the statistics contained in this volume, are worthy to be studied by every manufacturer in our country who employs a considerable number of hands.

The cotton manufacturers of Manchester were a shrewd, sturdy, square-set, selfish body of men more conspicuous for their business management than for humanity in dealing with those whose labors were necessary to the success of their undertaking. It is not to be wondered, therefore, that the evils growing out of this state of things were of a dreadful character. The absence of education stunted the mind while increasing labor dwarfed and deformed the body, and the short hours of relaxation from toil allowed to the factory worker, were commonly spent in the most sensual and degrading pursuits until the evils were almost unbearable.

The testimony of an English philanthropist, given in 1832, says:

"The population employed in the cotton factories rises at five o'clock in the morning, works in the mills from six until eight, and returns home for half an hour or forty minutes to breakfast. This meal generally consists of tea or coffee, with a little bread. The tea is almost always of a bad, and sometimes of a deleterious quality. The operatives return to the mills and workshops until twelve o'clock, when an hour is allowed for dinner. Among those who obtain the lower rate of wages this meal generally consists of boiled potatoes. The mass of potatoes is put into one large dish, melted lard and butter are poured upon them, and a few pieces of fried fat bacon are sometimes mingled with them, and but seldom a little meat. Those who obtain better wages add a greater proportion of animal food to this meal, at least three times in the week; but the quantity consumed by the laboring population is not great. The family sits around the table, and each rapidly appropriates his portion on a plate, or they will plunge their spoons into the dish, and with an animal eagerness satisfy the cravings of their appetites."

After thus describing the half-savage domestic habits of the people, he goes on to describe their general surroundings: "The population nourished on this aliment is crowded into one dense mass in cottages separated by narrow, unpaved, and almost pestilential streets, in an atmosphere loaded with smoke, and the exhalations of a large manufacturing city. The operatives are congregated into mills and workshops during twelve hours in the day, in an enervating heated atmosphere, which is frequently loaded with dust or the filaments of cotton, or impure from constant respiration, or from other causes. They are drudges, who watch the movements

and assist the operations of a mighty material force, which toils with an energy ever unconscious of fatigue. The state of the streets powerfully affects the health of their inhabitants; sporadic cases of typhus chiefly appear in those which are narrow, ill-ventilated, unpaved, or which contain heaps of refuse or stagnant pools."

"What were the amusements of the masses, thus overworked, ill-fed, ill-housed,—left for the most part uneducated? Large numbers of working people attended fairs and wakes, at the latter of which jumping in sacks, climbing greased poles, grinning through horse collars for tobacco, hunting pigs with soaped tails, were the choicest diversions. An almost general unchastity—the proofs of which are as abundant as they would be painful to adduce—prevailed among the women employed in factories, and generally throughout the lowest ranks of the working population. But drink was the mainspring of enjoyment. When Saturday evening came, indulgences began which continued until Sunday evening. Fiddles were to be heard on all sides, and limp-looking men and pale-faced women thronged the public houses, and reeled and jiggered till they were turned, drunk and riotous, into the streets, at most unseasonable hours. On the Sunday morning the public houses were again thronged that the thirst following the indulgence of the night might be quenched. When church hour approached, however, the churchwardens, with long staves tipped with silver, sallied forth, and, when possible, seized all the drunken and unkempt upon whom they could lay their hands, and these, being carefully lodged in a pew provided for them, were left there to enjoy the sermon, while their captors usually adjourned to some tavern near at hand, for the purpose of rewarding themselves with a glass or two for the important services they had rendered to morality and religion. In fact, sullen, silent work alternated with noisy, drunken riot; and Easter and Whitsuntide debauches, with an occasional outbreak during some favorite 'wakes,' rounded the whole life of the factory worker."

It appears from the volume before us that the first efforts towards the reformation of factory abuse began among the more thoughtful of the operatives who proposed the "Short Time Bill," the agitation of which brought about the organization of trade societies, in nearly all of which there was a tendency to violence. Riots were not uncommon, and the union men habitually refused to work with non-union men or "Knobsticks," as they were nick-named, and often maltreated and even murdered them.

The mercenary practices of employers had become so oppressive that human nature broke down under the severe burdens heaped upon the working classes and under the infliction of wrongs to which those in power seemed indifferent, it cannot be wondered at, though always to be regretted, that violent demonstrations were put forth. The volume briefly sketches the various agencies brought into existence to reform the abuses of the factory system, and now it appears that progress has been general and continuous, and that chiefly through influences which have proceeded from the class itself.

At the present moment in Europe, as well as our own country, the factory system is vastly improved and improving. The operatives are not degraded by ignorance and vice, and children are not allowed to enter factories and to be excluded from the privilege of schools and such outdoor exercises as tend to develop the mental and physical powers. We are happy to record the progress of the working classes.

Improved Spring and Bolt for Shears.

The object of this invention is to arrange a spring for opening the blades and jaws of scissors, shears, hand nippers,



BERGNER'S SPRING AND BOLT FOR SHEARS.

punches, etc., which shall be always effective and out of the way of the hand in using the implement. The engraving shows a pair of pruning shears with this improved spring. The details are shown plainly in the small figure.

The bolt which holds the two blades in connection, has a broad cap or head that conceals and retains in place a coiled spring, one end of which passes through a hole in the shank of the bolt under the head, and the other, formed into a hook, engages with a projection made on the handle of one of the blades. Soon as the pressure of the fingers is relaxed, the tension of the spring acts on the handle of the jaw and throws the blades apart. The rivet or bolt is secured by a nut on its end in the usual way, one blade fitting a squared place on the shank of the bolt and the other turning freely on the cylindrical portion.

The patent bears date of June 23, 1868, and all applications

for rights, etc., may be made to the patentee, Georg Bergner, or to L. Wattenberg, Washington, Mo.

Poisonous Champagne.

It is much to be doubted whether alcohol or any of the sparkling and seducing liquors which contain it are to be considered, even when pure, as anything but poisons. The following extract from the *Grocer* will show the character of the factitious substances which are vended in modern times, and may prove both interesting and instructive:

"There is nothing but roguery to be found in villainous man!" exclaimed Sir John Falstaff on detecting lime in his sack. Could the fat knight now revisit the earth, he would have to admit that the art of doctoring wines had been carried far beyond the stage reached when 'a cup of sack with lime in it' set him moralizing on human depravity. He would have an opportunity of trying 'something sparkling,' compared with which limed sack was a harmless mixture. We cannot blink the fact that much of the so-called 'champagne' which is ostentatiously set before heated guests at public and private assemblies is simply the product of fraudulent ingenuity—a detestable counterfeit which resembles the natural wine just as the Champagne Charley of the music halls resembles a finished gentleman. Its color and flavor are adventitious, its bouquet is artificial, and its

"Beaded bubbles, winking at the brim."

may be traced to the condenser of a modified soda water machine. Happily a disputed contract has led to an exposure which will probably check the further growth of the British champagne trade. From the recent case of Cox against Barnett we gather many interesting particulars respecting the fabrication of this aerated stuff. Our present object is to call special attention to the chemical facts elicited at the trial of this case, and to explain our reasons for believing that 'champagne' of British manufacture is generally contaminated with lead. The case was an action to recover damages from a machine maker for a breach of contract. With the laudable intention of carrying on business as a manufacturer of aerated wines, the plaintiff purchased from the defendant, at the cost of £135, a champagne machine, on the understanding that it was capable of producing a hundred quarts of champagne or aerated wine daily. The 'champagne,' in its 'still' condition, consisted of light white wine, fortified and flavored with a sirup technically termed 'trente-six,' and to convert it into sparkling wine it had to be impregnated with carbonic acid gas in the condenser of the machine. According to the plaintiff, the wine left the condenser turbid, and those who tasted it suffered severely from sore lips. Dr. Matthiessen, F. R. S., the eminent chemist of St. Mary's Hospital, submitted the product to analysis, and actually extracted from a single gallon no less than four grains of metallic lead, in quantity corresponding to about two thirds of a grain per bottle! With characteristic acuteness, he then performed a number of experiments to determine the action of lead and solder on samples of wine originally free from lead, and in every case he found the wine contaminated with the poisonous metal. We have had an opportunity of checking Dr. Matthiessen's results, and can vouch to their accuracy. The free acid of the wine attacks lead and solder with great rapidity, and, by suitable processes, the dissolved lead can be separated from the wine and weighed. An examination of the condenser in court brought to light the source of the lead, for almost the whole of the interior was found to be covered with solder. The principal witness for the defendant was a champagne manufacturer of twenty-five years' experience, not from the department of the Marne, but from an unrecognized wine district in the city of London. This gentleman swore that neither tin, lead, nor solder would affect the wine; that the

condenser exhibited was a first rate article; that he himself had for a long time manufactured 'champagne' with the aid of similar machines, and that one of his condensers contained a lump of solder as big as a hen's egg! He did not inform the court whether the unhappy consumers of his wine had escaped lead colic. The examination of this witness elicited the curious fact that he imported grapes from France to make champagne in London.

French champagne made in England!

ALASKA.—Late advices from Alaska are very encouraging. Coal mines have been discovered near Sitka, on the mainland. The quality is considered unequalled, and the seam is over twenty feet wide and traceable for some distance. The coal was tried on the United States steamer *Sigline* and pronounced excellent. It has the appearance of pure anthracite, and is superior to any Lehigh coal. In addition to this discovery, Alaska is likely to become a place of fashionable resort in hot weather.

WINE is becoming an important article of manufacture in Kansas. The Lawrence papers state that the wine producers are now actively employed in gathering an abundant crop of summer grapes.

COPERNICUS BY EARTH LIGHT.

On page 82 of the current volume, we gave a condensed report of a lecture by Professor Morton, of Philadelphia, and of the magnificent experiments by which the lecture was illustrated. We also described some splendid photographic views of the moon, and of the planet Mars, among which was the view of the lunar volcano Copernicus. We herewith reproduce this view from the Journal of the Franklin Institute, and we feel that in so doing we are presenting an engraving that will prove of the greatest interest to our readers. Who does not long, while gazing upon the serene face of the queen of night, as she glides in majesty over a cloudless sky, to know and see the hidden wonders of her structure? Her mean distance from the earth is two hundred and forty thousand miles, yet it is hard to realize on one of those glorious autumn evenings which occur in our latitude, that she is so far away. It is even harder to realize that her fair face is seamed, and scarred, and blotched, and torn—a scene of the wildest confusion, a dreary, barren, and lifeless desert, only variegated by rude precipices of enormous height and extinct volcanoes, which, in their former active state, must have presented a spectacle of the aroused forces of nature beyond conception, awful, and sublime.

We ordinarily see the moon by means of the light of the sun reflected from her surface. During one half of her revolution, however, the sun shines upon the portion of her surface which is entirely or partially turned away from us, leaving the side which is toward us, dark, with exception of the light which falls upon it from the stars and planets, and the light of the sun reflected from the earth. Surfaces are good reflectors of light, in proportion to their smoothness. A body like the earth can, therefore, be only an imperfect reflector. Even the water, which, if at rest, would form a more perfect reflecting surface than the land, is rarely perfectly still; and the regions near the poles, where the water is congealed into snow and ice, present also great irregularities of surface. Color has also much to do with the amount of light which bodies reflect, and all reflecting bodies which have not pure white surfaces, modify more or less the character of the light which they reflect. Snow is, therefore, a better reflector than the bare earth, both because it is white, and its surface is smoother than the land which it covers. All bodies seen by reflected light are less illuminated than the reflecting surface. The moon, viewed only by the reflected light of the earth, stars, and planets, is, therefore, very dimly seen. The eye, unassisted, can scarcely see more than the mere outline of her form. When the moon is entering upon her first quarter, she may be seen as a thin crescent upon that side of her disc which lies nearest the sun. The remaining portions being only just perceptible. The dark portions of the moon which, seen at the full, are fancied to resemble the human face, are shadows cast by the summits and craters of extinct volcanoes. The principal mountains which form these shadows are called Tycho, Copernicus, and Kepler. The largest of these is Copernicus, which has a crater fifty-five miles in breadth. Its height above the surrounding plains is eleven thousand two hundred and fifty feet.

The engraving represents this immense crater as seen by earth-light. It is a vast plain surrounded by a circular wall, with central cones and huge boulders scattered over its surface. Mars, proportionately magnified, is seen above the horizon, with masses of clouds floating in his atmosphere, and showing the marks of continents and seas. In the immediate vicinity are seen lesser craters, their edges illumined, and inclosing gulfs of vast depths and proportions. The rugged and mountainous appearance of the moon is admirably shown, and the appearance of desolation most truthfully delineated. What features are presented by the side of the moon which human eyes have never seen we cannot certainly say; but it is probably just to infer that it possesses the same general characteristics as the side presented to us. The craters of some of the lunar volcanoes are of immense depth, their sides rising almost vertically, often to a height of many thousand feet.

In 1787, it was announced by Sir Wm. Herschel that he had observed three volcanoes in a state of eruption upon different parts of the moon. Astronomers have, however, generally supposed that the phenomena seen by Herschel were due to peculiar reflections of earth-light from portions of the peaks having great reflecting power. There have been, without doubt, some recent changes in the craters, which are found everywhere upon the moon's surface. In 1866, Schmidt, Director of the Observatory of Athens, observed the total disappearance of the deep crater Linné. In its place remained only what appeared to be "a little white cloud." This observation, which was observed by other astronomers, occurred in October and continued till the latter part of December, when the crater was again distinctly visible. The cause of this phenomenon has never been explained; but it indicates that the forces which have so convulsed the surface of the moon in ages past, have not yet fully expended their energies.

A SINGLE coffee plant, taken from Arabia to Paris, in 1614, was the parent stock of all the coffee plantations in the West Indies.

Correspondence.

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

Experiments—The Condensation of Alcohol by Frost.

MESSRS. EDITORS:—Being induced to believe that the severe frosts of winter may be utilized in the condensation of alcoholic liquids, by the freezing of the water combined with the alcohol, and subsequent separation of the water by draining off the unfrozen liquor, leaving the water in the bottle as ice, I instituted the below-described experiments to satisfy myself as to the correctness of this idea:

A bottle of pure new grape wine, having been exposed at a low temperature, appeared to have become frozen. Upon examination I found that its contents were only partially frozen, a feathery crystallization filling the bottle, the interstices between which were occupied by the unfrozen liquid. Suspecting that this latter was prevented from freezing by the greater amount of alcohol which it contained, I decanted the unfrozen liquid into another bottle, leaving the ice (or

liquid being distilled, gave one hundred and fifty minims clear distillate; thirty minims remaining in tube-retort, and consisting of fined carbon and yellow volatilizable matter, which latter was almost inappreciable. It was probably derived from the decomposition of the sugar present. About five minims out of one hundred and eighty minims was a precipitate containing tartaric acid.

No. 4. One hundred and twenty of the clear red liquid being distilled, yielded one hundred and ten minims, clear distillate; about three minims of yellow liquid of empyreumatic odor was rendered by severe heat (fusing of tube-retort), and seven minims of fixed carbon, etc., remained. About four minims in one hundred and eighty minims was a brown sediment containing much tartaric acid, together with some organic or microscopic vegetable matter. Alcohol and sugar, undetermined; though the former was present in some quantity in the clear distillate, and the latter (sugar) existed in quantity in the remainder, being afterward metamorphosed by heat into the yellow liquid and fixed carbon.

No. 5. In this instance the record of amounts and results distilled was unfortunately lost; however, the general tenor of the experiments suffices. This was the rich, blood-red liquid, heavy and sirupy; greater in specific gravity than any of the preceding. From its characteristics I was led to suppose that I had succeeded in condensing nothing but the sugar. Here, however, I was mistaken; the clear distillate which first passed over was a proof spirit, inflammable. A piece of paper dipped in it was lighted upon being brought near flame. Much of the yellow liquid before described passed over with severe heat, and considerable "fixed" carbon remained in tube, covering the sides of tube with a black scale, that shrunk with a "crackling" sound upon the cooling of the tube.

From the result of these experiments I was led to infer that the process of freezing and decantation, etc., had been one of condensation.

That from the regular increase of specific gravity in the liquids, something besides alcohol was being condensed.

From the results of distillation, caramel and yellow liquid, having the odor of burnt, or, rather, decomposed sugar, sugar was supposed, also, to have been condensed. Tartaric acid, or tartrates, were also condensed.

My conclusions are, that, by the method described, alcoholic liquids, wines, etc., may be condensed; the sugar, alcohol, and tartaric acid, being the condensed substances. I have thought that the condensation of the sugar was more complete than that of the alcohol and tartaric acid.

A hundred casks of wine, of an inferior grade, may, by freezing and decantation in the winter season, be condensed into a less in amount, but stronger, more sirupy, and valuable "port" wine.

It is a fact, that, from a barrel of fermenting cider, well frozen, may be drawn gallons of strong drink, unfit for temperance folk.

It is a fact of the "Sugar Bush," that maple sugar-makers, when, on a sharp morning, they find a bucket of sap standing half frozen under the tap, throw out the clear, tasteless ice, and find a thick syrup beneath.

Hoping that these hasty notes may not be without interest, and, perhaps, of assistance to those desirous of pursuing the subject further, or may save others from wasting time upon an already explored field, I remain, respectfully,

Albany, N. Y.

VERPLANCK CALVIN.

Change of Pitch in the Tone of Moving Bodies.

MESSRS. EDITORS:—In regard to this subject—first mentioned by a correspondent, page 247, Vol. XVIII, and correctly explained by Mr. Welling, page 323, same volume—it may be remarked that I was present at the first experiments, made in Holland about the year 1845, on the railroad from Amsterdam to Rotterdam, of which the purpose was to ascertain if practice would fully verify the teachings of theory, as to the amount a musical tone would become sharp or flat, when the distance between the ear and the instrument producing the tone was rapidly diminishing or increasing. It was done simply by sounding a trumpet or other loud musical instrument on one train, and observing carefully the pitch on the other train passing in an opposite direction, or similarly sounding the instrument on board the passing train and observing it upon the road, or *vice versa*. The results were always perfectly in accordance with the theory.

The theory is very simple. For instance, the middle C of the musical scale makes 256 vibrations in one second, which are transmitted with a velocity of nearly 1,100 in the same time. Suppose now we could move toward the sounding body with a velocity of 1,100 feet in a second, twice the number of vibrations, or 512, would reach our ear, which corresponds with the octave above and the tone would appear an octave higher. Such velocity is, however, at present beyond the power of actual experiment, but the illustration serves to make the theory clear. As the octave is divided into twelve so-called semitones, we can easily find how fast we have to move to raise the pitch a semitone; namely, the twelfth part of the velocity of sound or about ninety feet in



water) in bottle No. 1. Though the liquid thus decanted remained a liquid, the ice in No. 1 remained unfrozen. No. 2 was finally frozen, however, by the increasing severity of the weather (winter of 1867-68), which, as the technical nature of the experiment demanded, was my only reagent for reduction of temperature. A crystallization similar to that in the first instance also existed throughout the contents of the second bottle, No. 2; but as before, a portion of the liquid did not congeal. This also was decanted, the operation being repeated until the original wine had been separated into five portions, the last decanted of which—the fifth—which was of a ruby red color—refusing to congeal even at a temperature of from 28° to 30° Fah.

The liquids thus separated had the following peculiarities: The liquid in bottle No. 1, which was obtained by thawing the ice, formed in the first instance by the partial congelation of the wine, was greater in amount than any of the separated liquids, having a slight amberish tint, though almost clear.

No. 2. This liquid was one quarter less in amount than that in No. 1, but had much the same color and quality, containing, however, a little organic, saccharine, and volatile matter, with tartaric acid, depositing one half to one quarter of a minim of sediment from seventy-five minims of liquid.

No. 3. The liquid in receptacle No. 3 was still less in amount, one quarter less than the contents of No. 2. Color, red amberish, light tint of red prevailing. Organic, volatile (alcoholic), and acid matter, etc., were present in increased quantity.

No. 4. Amount of liquid one quarter less than No. 3. Color, clear red; about five minims in one hundred and eighty minims of liquid, being a faint reddish sediment of organic matter, containing much tartaric acid.

No. 5. The amount of liquid was similar in its proportion to the rest, being about equal to three quarters of the contents of No. 3; its specific gravity being perceptibly greater than any of the preceding. Color, deep, rich red; liquid, sirupy and rich.

The comparative amount of liquid, color of, and specific gravity of, was, in a sort of proportion, much as below:

Liquid No.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Amount of liquid in dr. and fractions of.	94	705	47	3.525	21+
Color of liquid.	Clear.	Amberish.	Faint Red.	Red.	"Deep, rich Red."
Specific gravity in proportion of.	0.6	0.7	0.8	0.9	1.0

The next step taken in the examination of the separated liquids was a fractional distillation; or the separation by heat (in the form of vapor) of the different substances existing in the liquids.

No. 1. The liquid denominated "No. 1" was not distilled, being little but water.

No. 2. Also undistilled (only differing from No. 1 in leaving a sediment).

No. 3. One hundred and eighty minims of this reddish

a second, about sixty miles an hour or one mile in a minute. When we move from the sounding body with this velocity, the opposite will take place; one twelfth of the vibrations will reach our ear and the tone will appear flattened a semi-tone. When the sounding body moves and we are at rest the effect will be the same, as is self-evident.

When two railroad trains are passing one another and one locomotive sounds the whistle, the passengers in the other train will hear a higher note, when the trains are approaching, due to the combined effect of the two motions. When each train is moving at a velocity of sixty miles an hour, the rise of pitch will be a whole tone above the real note. When the trains have passed and the distance intervening is increasing at the same velocity, they will then hear the sound a whole tone below the true one. Hence, at the moment of passing a change of pitch will be observed of two whole tones or a major third. Both trains, however, seldom reach this velocity, and the change of pitch usually observed will seldom be more than a minor third, or one tone and a half, which corresponds to a mean velocity of each train of one fifth less than sixty, or forty-eight miles an hour. The same fact is observed in the sound of the locomotive bell when it is rung in passing.

When traveling at night I have often amused myself in noticing the correct interval of this change in pitch; deducing from it the sum of the velocities of the two passing trains. Then, by knowing the size of the drive wheels of the locomotive of my train, and taking into consideration that four puffs of steam correspond always with one revolution, and timing the velocities of these steam puffs, I had the key to the velocity of my train; and subtracting this from the total velocity obtained the velocity of the train which had passed, and of which nothing but the changing pitch of the whistle had been observed.

P. H. VANDER WEYDE, M. D.
New York City.

Explosive Gases in Steam-Boilers.

MESSENGERS EDITORS:—The explanation of the highly interesting case, mentioned by a "Practical Engineer," page 35 is evident. When the supply proper refused to give water, there was, of course, a lack of water in the boiler; and, notwithstanding that the engineer withdrew his fires, some part of the boiler became hot enough to decompose the steam, not into its elements (this is a pure speculation, having no fact to support it), but the iron became oxidized by the oxygen of the water and the hydrogen was set free, which is always the case when steam is in contact with red hot iron. It is, in fact, one of the ways to manufacture hydrogen. The boiler being closed, and the hydrogen not soluble in water, it remained there; and when, after cooling, the man-hole was opened, air enough entered to form with the hydrogen an explosive mixture, to which the engineer set fire with his lamp. Any practical chemist, acquainted with the enormous explosive power of oxygen and hydrogen, mechanically mixed in such proportion as they are chemically combined in water, will agree that, if such a mixture had been in the boiler something much worse would have happened to the engineer and to the boiler also. In this case it was simply hydrogen and common air, which may be considered almost harmless, when compared with the tremendous power of hydrogen and oxygen.

P. H. VANDER WEYDE, M. D.
New York City.

The Use of Ozone in Sugar Refining.

MESSENGERS EDITORS:—In your journal of June 23d and August 5th, I notice two articles on the use of ozone as a decolorizing agent in a sugar refinery. Having visited that refinery about six weeks since while in London, I thought that the following facts might be of interest to you.

The first experiments in bleaching sugar by ozone were made in the country, about sixty miles from London, and were a perfect success, changing a dark brown solution of sugar to a straw color in a few minutes, and at the same time depositing all the foreign substances. The result of these experiments being so satisfactory, the owner of a sugar refinery in White Chapel was induced to put up a steam engine to drive an electric machine and bleach sugar by these means; but it has proved a total failure on account of his inability to produce ozone in any quantity. The owner of the refinery attributes this to the air of London being, to a great extent, deprived of that gas by its immense population. Be that as it may, until somebody discovers a means of obtaining that gas in large quantities at a moderate price, sugar refining by ozone will remain in its present condition.

H. W. B.
Philadelphia, Pa.

Useful Hints for the Season by Septimus Plessee.

REMEDY FOR INSECT BITES.—When a musketo, flea, goat, or other noxious insect punctures the human skin, it deposits or injects an atom of an acidulous fluid of a poisonous nature. This causes an irritation, a sensation of tickling, itching, or of pain. The tickling of flies we are comparatively indifferent about; but the itch produced by a flea or goat, or other noxious insect, disturbs our serenity, and, like the pain of a wasp or bee sting, excites us to a "remedy." The best remedies for the sting of insects are those which will instantly neutralize this acidulous poison deposited in the skin. These are either ammonia or borax. The alkaline reaction of borax is scarcely yet sufficiently appreciated. However, a time will come when its good qualities will be known and more universally valued than ammonia, or as it is commonly termed, "barbourn." Borax is a salt of that innocent nature that it may be kept in every household; it can be recommended as a domestic and harmless chemical. The solution of borax for insect bites is made thus:—Dissolve one ounce of borax in one

pint of water that has been boiled and allowed to cool. Instead of plain water, distilled rose water, elder, or orange flower water is more pleasant. The bites are to be dabbed with the solution so long as there is any irritation. For bees' or wasps' stings the borax solution may be made of twice the above strength.

WATER COOLERS.—We all know that cold water during the summer is one of the greatest luxuries. When it is generally understood that evaporation produces cold, it will be evident that any vessel or material that favors evaporation will induce this result. Now, all porous and absorbent vessels are of this character. Pottery not glazed is porous. A linen cloth dipped into water is porous, absorbs water, and when exposed to the air the water evaporates, producing cold; hence, if any vessel be covered with a damp cloth, the interior will be colder than the exterior. A water cooler is a porous vessel, which allows evaporation to take place on its outer surface, thus cooling the contents. The water coolers, as sent to us from Staffordshire, have, however, one fault; they are not sufficiently porous; hence there is only a very slow infiltration from the inner to the outer surface, and any minute organic substance that may be in the water is arrested by the crock. After a time, this organic matter, it is often observed, undergoes decomposition, giving a musty, earthy odor to the water that may be in the vessel. When this is the case, it should be cleaned both inside and out, with an ounce or two of strong muriatic acid, rubbing the exterior with a flannel wet with the acid, followed with clean hot water. After this treatment the vessel will be, as before, a good water cooler.

LEMON KALI.—A teaspoonful of this compound in a tumblerful of fresh cold water, forms a very agreeable effervescent summer drink. When made, it must be preserved in a dry place, and in well-corked bottles, otherwise it will soon be spoiled. To make it, take one pound of powdered white sugar, half a pound of bicarbonate of soda, half a pound of citric acid, powdered, and half a drachm of essence of lemon. Sift the whole well together, then put it into dry, wide-mouthed bottles. Tartaric acid may be used instead of the citric acid at less expense, but it is not so good for general use. Citric acid is the true acid of the lemon; tartaric acid is derived from grape lees, tamarinds and other fruit. The pleasing flavor of lemon kali depends much upon the quality of the essence of lemon, which rapidly spoils in druggists' shops, and smells like turpentine. See that you have good and fresh essence of lemon.

FLEAS IN DOGS.—Fleas trouble dogs, and one of the best remedies is the following: Rub colza or common olive oil into the coat, saturate the hair with the oil to the surface of the skin, let it remain on for half an hour, then well-wash out the oil with the best yellow soap and lukewarm water. A small portion of any sweet oil brushed into the coat of a woolly dog, will prevent its being infected with vermin. Matrons of large schools may advisably take this hint. Insects of every kind have a "life and death" dislike to grease in any form.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

An iron steamer, the first ever built there, was launched at Cleveland, Ohio, on Saturday, 25th ult.

It has been suggested in England to unite Scotland and Ireland by a tunnel. The distance of the proposed tunnel is about fourteen and a half miles, and the cost is set down at £3,150,000.

Sun-dried oysters, cured like beef by hanging in the sun, are becoming an important article of traffic in California.

Ninety locomotives are now in use on the Union Pacific Railroad, and a hundred and seven others have been ordered.

An Imperial French decree suspends the tonnage on vessels entering the ports of the Empire with breadstuffs for three months from the 1st of October next. This would seem to imply a short harvest in France.

DISCOVERY OF CHLORIDE OF POTASSIUM.—A vast deposit of pure chloride of potassium has been discovered in a salt mine in Hungary. This must prove of great commercial value to Austria.

APPROPRIATIONS FOR IMPROVEMENTS.—Congress appropriated a million and a half dollars for river and harbor improvements at the late session. Three hundred and fifty thousand dollars go for the improvement of the Mississippi.

NEW OCEAN STEAM ROUTE.—A contract was concluded, a short time back, by the Chilean Government with the Pacific Steam Navigation for direct mail communication with England. The voyage out and back must be completed in forty-two days. The first ship sailed on the 15th of July.

SUGAR IN BREWING.—The use of sugar in British breweries has largely increased. During the year 1867, 41,143,000 pounds were consumed. Narcotic adulterations of an exceedingly deleterious nature are often added to the liquor.

A NEW PHASE IN ECONOMY.—A species of co-operation system has been adopted by the Pennsylvania Railroad Company. It is agreed to divide among the engineers and firemen all that they save from last year's expenditure of fuel, oil, and other articles in running their locomotives.

PEAT AS FUEL FOR LOCOMOTIVES.—Mr. F. Trevelthick, has been making experiments in Canada on the engines of the Grand Trunk Railroad. He seems to have arrived at the conclusion that a ton of peat (2,240 pounds) is equivalent to a ton of the best wood.

LARGE SALT MINE.—Near Berlin, Prussia, an enormous salt mine has been discovered. The thickness of the bed is five hundred feet, and its extent has not yet been determined.

HOW A STRIKE WAS CONQUERED.—A shoe manufacturer in North Adams, Massachusetts, has conquered a strike in his factory and is now running it with a full force of workmen. He secured forty-three men in Montreal, and now employs none who belong to a "Union."

NEW PUBLICATIONS.

HAPPY HOURS: A Collection of Songs for Schools, Academies, and the Home Circle. By Edward Kingsbury and Alfred A. Grady. New York: Taintor Bros., No. 698 Broadway.

A collection of music suitable for children, interspersed with pieces requiring some skill and culture in their execution. The words and the music seem equally chaste and carefully arranged. Both are of a high order. The collection is a good one, and will meet with great favor with teachers, pupils, and families.

Recent American and Foreign Patents.

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

MILL FOR GRINDING CLAY.—Levi Moore, Baraboo, Wis.—The object of this invention is to provide a mill for reducing clay to a pulverulent and plastic state, suitable for building brick or pottery. It consists of the form and arrangement of the grinding devices, the whole being contained within a frame adapted to their operation.

FENCE.—Henry J. Culp, Goshen, Ind.—This invention relates to an improvement in fences, and consists in so constructing the panels of which the fence is composed that they can be readily connected and disconnected.

SICKLE BAR FOR MOWING MACHINES.—G. W. Chapman, Jr., Iowa Falls, Iowa.—This invention relates to an improvement in the construction of sickle bars for mowers and reapers, and consists in forming the bars in two pieces, in such manner as to secure separate cutters or teeth between them, so that the teeth may be easily removed when necessary to sharpen and repair them, or replace any when broken.

LOG SLED.—Chas. W. Mosher, East Leon, N. Y.—The object of this invention is to provide a log sled or boat with means to enable the logs to be taken on to the sled through the draft forces exerted by the cattle hitched thereto. It consists of an angular or arched frame vibrating over runners, which latter have bearings on the sides or runners of the sled, or in suitable pieces of timber affixed thereto, together with a chain and log hooks so arranged that the draft force of the team will act to raise the log and draw it forward upon the sled.

PORTABLE CLOTHES RACK.—Geo. H. Hammond, Davenport, N. Y.—The object of this invention is to provide a simple, durable, and portable rack for drying clothes. It consists of a central staff having two hubs affixed thereon, the said hubs being formed with jaws in which are provided folding arms and a jointed brace for holding the arms rigidly extended; the drying ropes are arranged at proper intervals on the arms, and the whole is set upon a post and revolve freely thereon.

BELT TOOL.—Eben Hester, Suffield, Conn.—The object of this invention is to furnish a convenient tool for fitting belts for machinery. It consists of a square shank set in a handle and bearing two punches for cutting holes in the belt, and two punches having hollow or concave points for heading rivets. It is also provided with a flat lacing awl having an eye for carrying the leather lacing strip.

COUPLING FOR SICKLE PITMANS.—O. P. Drury, Niles, Mich.—The object of this invention is to provide a strong, durable, and easily working coupling device for connecting the pitmans of a reaping or mowing machine with the sickle back of the same.

LAMP.—S. C. Brockington, Groton, Conn.—The object of this invention is to construct a lamp for kerosene and other hydrocarbon liquids, in which the wick will always be equally far inserted in the liquid, so that thereby a steady and equal flame will always be obtained. The object of the invention is also to provide an oil reservoir and connections by means of which any number of lamps can be supplied with the necessary fuel.

WRITING AND DRAWING DESK.—Wm. W. Levering, New York City.—This invention relates to a new desk, which is provided with slates, blackboards, and transparent ground glass plates, in such manner that they will be convenient for teachers, artists, and business men.

FLY FRAME FLYER.—James S. Stryker, Providence, R. I.—This invention relates to a new and improved method of constructing flyers for the twisting of yarn, whereby the same are more economically made and whereby the roving is more effectually prevented from flying out when running.

RICE CULTIVATOR.—Geo. W. Cooper, Ogechee, Ga.—This invention relates to a new rice cultivator, by which the ground between the drills is broken up, without throwing clods upon the plants, and without forming furrows and hills between the drills.

SASHES AND WINDOW FRAMES.—Johann Schnell, New York City.—This invention relates to a new manner of constructing window frames, with a view of facilitating the cleaning of the glass panes, the replacing of broken panes, and the repairing of broken sash cords. The invention consists in hinging the frame in which the sashes move up and down to the casing of the windows, so that it can be folded or turned like a folding window, and still be provided with sliding sashes.

EXTENSION WARDROBE FRAME.—Elias Gill, New York City.—The object of this invention is to construct a frame for a portable wardrobe, in such manner that the same may be freely and readily extended and contracted as to length and width, according to the room which it is intended it should occupy. The invention consists in connecting the four posts of the frame, which fit with their lower ends into slotted bars or beds, longitudinally as well as transversely, with toggle levers or slotted extension levers, or both, so that they can, longitudinally as well as transversely, be moved any desired distance apart.

ELASTIC SUPPORTS FOR CAR SEAT BACKS.—Geo. Higginson, Newark, N. J.—This invention relates to a new device for supporting the arms of car seat backs and for receiving the shock when the same are reversed. The invention consists in the use of bolts or blocks which are resting upon springs or other cushions, and which are secured to the sides of the seat, so that the arms, to which the back is secured, may rest upon the upper ends of these elastic supports, and may, if the back is reversed and suddenly let fall, find a yielding support.

GRATE FOR STOVES AND FURNACES.—A. J. Magoon, Providence, R. I.—This invention relates to a new grate for stoves, ranges, and furnaces, which is so arranged that it can at the same time serve as a grate and ash sifter. The grate is of circular form, and is at its center, by a vertical pin, pivoted in a horizontal shaft. On one side the grate is supported by a fixed lug, so that it cannot be dumped to that side. If by suitable gearing connection the grate is revolved around its vertical axis in one direction, it will simply obtain the said motion and will cause the coal held on it to be thoroughly shoveled and sifted, but if revolved in the opposite direction, it will not be held by the lug and will swing around the horizontal axis and be dumped.

ICE PITCHER.—Thomas Leach, Taunton, Mass.—In this invention a detachable and removable lining, of glass, china, or earthen ware, is employed, and in connection with it a combined valve and filter of peculiar construction, together with a novel and convenient device for holding the lining firmly in the pitcher and at the same time preventing it from fracture by the sliding of the ice.

MACHINE FOR DISINTEGRATING CEMENTED GRAVEL.—J. B. Cox, San Francisco, Cal.—This invention relates to an improved machine by means of which the compact gravel that abounds in and about the gold mines of California and elsewhere can be readily disintegrated, so that the gold which it contains may be separated from it.

POCKET COUNTER.—Jacob S. Detricke, San Francisco, Cal.—The object of this invention is to provide a neat and convenient pocket instrument by which the velocity of shafting, etc., can be accurately determined.

MANUFACTURE OF BROOMS.—Robert F. Dobson, Goderich, Canada.—This invention relates to an improvement in the mode of securing the broom proper, or the corn to its handle, and it consists, first, in so fastening the broom corn that the tree portion shall extend toward the upper end of the handle and then bending or turning the said corn back upon itself and there securing it.

PORTABLE FENCE.—Joseph W. Norman, Eugene, Ind.—In this invention the pickets are connected together by links, and each panel is so attached to its supporting posts that it can readily be detached and folded or rolled up, forming a compact and easily portable roll. The form of the posts is also new.

SCREWDRIVER.—W. S. Goss, Baltimore, Md.—In this invention the handle is made of three pieces connected by clutches and stops in such a manner that its lower part can be turned continuously in either direction without releasing the hand from the upper part. In addition to this improvement, the blade is provided with an adjustable tool holder, which can be employed for holding gimlets, augers, awls, etc., while inserting them into or removing them from the wood.

POLISHING SCHOOL SLATES.—William Kester, Cherryville, Pa.—This invention relates to the slates are supported upon a car which runs under the grinding stones or wheels, and alternately raises the slates against or depresses them from the stones. The cars are caused to rise and fall gradually and yet preserve a perfect level, by means of a series of inclines.

EXCAVATOR.—Chas. F. Woodruff, Newbern, Tenn.—This invention relates to that class of excavators in which a revolving scraper is employed, and consists in so adjusting such scraper, and the means for operating it, that it can be worked more conveniently than heretofore.

BENCH VISE.—O. H. Gardner, Fulton, N. Y.—This invention has for its object to improve the construction of bench vises so as to enable them to adjust themselves to the form of the object to be held, and to enable them to be adjusted so that the jaws may stand at any desired horizontal angle with the bench, and which shall at the same time be simple in construction, and easily adjusted.

METHOD OF PRODUCING SILK FROM MULBERRY TREES.—Wilhelm Holdmann, New York city.—This invention relates to a new method of preparing a good quality of silk directly from mulberry trees, without requiring the aid of the silk-worm. Silk can, by this method, be made as good as from the worm, and at least at half the expense. The preparation can be carried on profitably on a small scale by manufacturers. The production is increased from year to year with the growth of the trees.

MACHINERY FOR MAKING LOOM HARNESSES.—Joseph Sladdin, Lawrence, Mass.—This invention relates to certain improvements in machinery for weaving loom harnesses, whereby, by an automatically operating machine, one is enabled to form the heddle eye, and at the same time secure the yarn to the rig bands in a firm and substantial manner.

MEDICAL COMPOUND.—N. H. Cass, Henryville, Ind.—This invention relates to a remedy for the disease known as "hog cholera."

STEAM EXHAUST DEVICE.—Robert Brown, Norwich, Conn.—The object of this invention is to so construct a steam valve movement for the exhaust of the steam that it shall be self-acting and moved exclusively by the pressure of the steam, and it consists in operating two disk valves upon a rod in a partitioned steam chest, connected with the cylinder whereby the engine cylinder is relieved of undue pressure at its exhaust end, and also of the water of condensation.

SCREW DRIVER.—Isaac Allard, Belfast, Me.—This invention consists in making the shank of the screw-driver in a spiral form by twisting or otherwise, and operating it in a tube by a spiral spring, whereby the screw driver is made self-revolving.

TATTLING SHUTTLE.—Ira H. Stockwell, and Lizzie C. Goodwin, Worcester, Mass.—This invention relates to the construction of an article called a shuttle, which is extensively used by females in fabricating what is known as "tatting," a kind of trimming or edging for female undergarments.

DEVICE FOR MARKING BAGGAGE.—G. S. True, Leavenworth, Kansas.—This invention relates to an improvement in the method of marking trunks, chests, boxes, and other similar articles used by travelers for transportation from place to place as baggage, or for other purposes.

FIRE BACK.—D. Hattan, Zanesville, Ohio.—This invention relates to an improvement in the backs of fireplaces, and it consists in arranging a horizontal sliding plate thereon, and providing for the admission of cold air, whereby a more perfect combustion of the gases which are evolved from the fuel is obtained.

GLASS FURNACES.—Miles Granger, Saratoga, N. Y.—This invention consists in providing a peculiarly constructed melting pot, whereby one is enabled to melt and blow glass without intermission, and by which improved melting pot, produce a perpetual glass melting and blowing process.

LET-OFF MECHANISM FOR LOOMS AND OTHER MACHINES.—William Hall, North Adams, Mass.—This invention relates to a new and improved let off mechanism for looms and other machines, in which a warp or web is required to be increased or let off from a shaft, with as uniform a tension as possible. The object of this invention is to obtain a simple means to effect the above result, and one which will keep the warp or web at a uniform tension throughout, or from the commencement of the let off to the end of the same.

FOLDING CHAIR.—J. Nicolai, Boston, Mass.—The present improvement consists in connecting the legs and seat of the chair in such a manner that said parts will move simultaneously in folding and unfolding the chair, thereby rendering the chair capable of being adjusted (folded and unfolded) with far greater facility than hitherto.

MACHINE FOR CLEANING THE FIBER FROM THE HULL OF COTTON SEEDS.—Thos. W. Brown, Cudworth, Barnsley, Yorkshire county, Eng.—This invention consists essentially in accomplishing the same by the application of heat under such arrangements of apparatus, and by such applications as shall be found most advantageous for the same.

HOMINY AND PEARLING MILL.—E. A. Duer, Decatur, Ill.—This invention consists of a rotating shaft provided with beaters arranged to rotate in a horizontal cylindrical case, to which the grain is fed by suitable mechanism, and from which it is passed away through a fan and a separating screen.

ELEVATOR BUCKET.—O. W. Clark, Appleton, Wis.—The nature of my invention relates to improvements in elevator buckets, the object of which is to make them more durable, less liable to catch in the cases, and to make them of greater capacity.

ALARM LOCK.—Nash Cheek, Chapel Hill, N. C.—This invention relates to a lock of simple construction, which is designed to be unpeckable, and capable of being applied in all cases where an ordinary lock may be used, and in combining with said lock an alarm.

PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J.—This invention relates to a new and useful improvement in pruning shears whereby the latter, when required, are rendered available as fruit pickers; the construction of the implement being such that the picking attachment will not interfere in the least with the pruning or cutting mechanism.

SEED PLANTER.—Moses Atwood, New Sharon, Iowa.—This invention relates to a new and improved machine for planting corn, and other seed designed to be dropped in check rows, and it consists in a novel construction and arrangement of parts, whereby the seed may be dropped or planted perfectly even or in hills at a uniform distance from each other and the working parts readily operated by the driver.

PATTERNS FOR TRIMMING HAT BRIMS.—C. M. Hawes, New York city.—This invention relates to a new and useful improvement in patterns for trimming hat brims, and it consists in attaching the pattern to a revolving frame constructed and arranged in such a manner as to admit of one pattern being readily detached from the frame, and another of a different size readily applied to it, so that hat brims of different sizes may be trimmed, the revolving frame admitting of the work being done very expeditiously and in a perfect manner.

WATER WHEEL.—John Y. Lanfair, Queensbury, N. Y.—This invention relates to a new and improved water wheel of the class which are placed on a vertical shaft and work within a scroll or curb. The wheel is designed to be submerged, and is constructed in such a manner that power is obtained from the water both by impact and reaction.

DEVICE FOR FEEDING SAW DUST AND SHAVINGS TO FURNACES.—J. A. McClelland, Vernon, Ind.—This invention relates to a new and improved device for feeding saw dust, shavings, etc., to furnaces, and is designed more especially to be applied to wood-working machines, such as planers, circular saw machines, etc., etc., in order to take the shavings and dust from the same and convey or force them direct into the furnace.

CURTAIN FIXTURES.—Davis E. Long, Pawtucket, R. I.—This invention relates to a new and useful improvement in curtain fixtures, and consists in a novel means employed for attaching the tassel to the lower end of the curtain. At present the tassel is attached by boring a hole through the stick which is inserted in a bend at the lower end of the curtain, and passing the tassel cord through the hole in the stick and curtain, and securing the ends of the cord in the heads of the tassel. This plan is objectionable for two reasons; first, the hole in the stick weakens the same, rendering it liable to break; second, the detaching of the tassel to admit of the stick being withdrawn when the curtain requires to be washed, and the attaching of the cord of the tassel to the curtain are attended with considerable trouble.

FILE CUTTING MACHINERY.—Sedgwick A. Sutton, Dixon, Ill.—This invention relates to certain new and useful improvements in file cutting machinery, and is more especially designed to be applied to a file-cutting machine, for which Letters Patent were granted to Edward Bucklin, bearing date Feb. 27th, 1866. The present invention relates, first, to an improvement in the hammer shaft, whereby the teeth are cut more perfectly than hitherto, and the chisel, in its descent, prevented from cutting off a tooth made by a previous cut, a contingency of not unfrequent occurrence in the operation of other machines. The invention relates, second, to an improved pressure roller, the manner of applying it to the machine, etc., whereby it may always be adjusted at a proper distance from the chisel. The invention relates, third, to an improvement in the screw feed, the half nut pertaining to the same, whereby all play or back lash is avoided.

NURSERY CUP.—J. E. Leslie and Edwin A. Tibbels, Woburn, Mass.—The object of this invention is to furnish an article or vessel for heating liquids by the use of alcohol (or some equivalent combustible liquid), which shall be simple, cheap, and convenient, the same being intended more particularly for treating milk for children, water for shaving, as well as for all other purposes for which it is adapted; and it consists in a funnel-shaped cup with a handle and spout thereto, and combined with a disk-shaped base with a projecting center and a wire support for the cup, which base serves as a cover for the cup when the cup is not in use. Patented July 28, 1868.

MACHINERY FOR SEPARATING ORE AND OTHER GRANULAR SUBSTANCES.—Stephen T. Pearce, New York city.—This invention consists according to one example of my invention in the employment of a vertical hollow rotating cylinder to which the pulverized ore is fed by any suitable means and which is formed with lateral discharging tubes near the bottom through which the ore or other substance is impelled by the centrifugal force due to the rotation of the cylinder in combination with graduated annular receptacles under the said cylinder into which the substance will be discharged according to its specific gravity.

YOKES FOR ANIMALS.—F. M. Shields, Macon, Miss.—This invention consists in metallic hooks arranged to be suspended from the heads of the animals in a manner to hook into the fence to prevent jumping or throwing it down.

MACHINE FOR SEPARATING ORES.—S. T. Pearce, New York city.—This invention consists of an arrangement of means whereby the granulated and sized substance to be acted upon, being discharged upon the surface of a cone of polished metal under rotary motion upon its vertical axis, will be set into motion by the contact of the same with the cone, and discharged therefrom in various lines, governed by the specific gravity of the particles and the frictional quality of the same, in a manner to fall into various receptacles arranged with reference to the various positions in which the particles all fall, to separate them in the order of their falling.

STAND FOR MUSKETO NETS.—A. Strasser, and B. M. Lewy, Montgomery, Ala.—This invention consists of a frame in the form of a parachute suspended from the top of an adjustable support rising up from a stand or table, and susceptible of adjustment, either to a vertical or inclined position, on which the musketo net is suspended.

TANNING.—W. Wiedoes, Fond-du-lac, Wis.—This is a new and economical invention by means of which a very soft and beautiful leather may be expeditiously produced with great success. We have examined some excellent specimens of the leather, in fact we are using gloves made of it which are admirable in quality. We regard the improvement as one of value. The process is quite simple, and reflects credit upon the inventor.

GAGE FOR MEASURING HOLES FOR KEYS.—Benj. F. Merrill, West Lebanon, N. H.—This invention consists in a gage made of two pieces of wood or metal, united together by any adjustable connection, the general form of which, when so united, resembles to some extent a key as ordinarily constructed for securing a wheel to a shaft or the parts of a connecting rod and cut together; which may be inserted in a key hole and adjusted to the proper angle to fit the two inclined sides of the same, when the parts may be secured in that position and removed from the key hole after which the measurement may be readily taken to form the key to fit the said hole.

STEAM VALVES AND VALVE MOTION.—L. H. Allen and John B. Wilford, Tamaqua, Pa.—This invention relates to an improvement in sliding steam valves, and to the method in which they are operated, and it consists in forming the valve with bars for covering the exhaust ports and in moving the valve by steam from the main cylinder operating in an auxiliary cylinder.

DOUBLE ACTING SUCTION PUMP.—Patrick Foley, Nineveh, N. Y.—This invention relates to a new pump, of that class in which two vertical cylinders with reciprocating pistons are used, and which are generally employed for raising water from deep and other wells. It consists chiefly in a novel arrangement of valves, whereby the connections of the suction and discharge pipes with the cylinders are closed; said valves being so arranged that, when the pump is not to be used, they can be opened to discharge all the water from the cylinders, so that the freezing of the water within the pump or its pipes is completely avoided.

CHURN DASHERS.—T. W. Tyler, Corry, Penn.—This invention has for its object to furnish an improved churn dasher which shall be so constructed as to bring the butter quicker, with less labor, and in larger quantities than the dashers now in use, and which shall, at the same time, be easily washed and cleaned.

DUMPING CARTS AND WAGONS.—William W. Rogers, Hampden Corner, Me.—This invention has for its object to furnish an improved device by means of which the tail boards of dumping carts and wagons may be made self-operating—that is to say, so that the tail board will be raised automatically, as the cart or wagon body is tipped up to dump the load, and will drop back into place and fasten itself as the said body is again raised into a horizontal position.

TIRE COOLER.—John Wampach, Shakopee, Minn.—This invention has for its object to so improve the construction of tire frames that the tire when set may be instantly cooled before it can injure the felloes, and without wasting the water, which is an important consideration where water is scarce and has to be brought from a distance.

SHEAR RUDDER BOOM.—Levi W. Pond, Eau Claire, Wis.—This invention has for its object to furnish an improved boom which shall be so constructed and arranged that it may be held in any place to stop the floating lumber, and opened and closed when required by the action of the current of the stream.

CHURN.—D. A. Flake, Delavan, Wis.—This invention has for its object to improve the construction of the dasher so as to make it more easily worked and more efficient in churning the butter; and to improve the construction of the cover so as to prevent the escape of the cream while the churn is being operated.

WEATHER-BOARD GAGE AND MEASURE.—Isaac Williams, Westfield, Ind.—This invention has for its object to furnish an improved instrument simple in construction and easily and quickly adjusted, by means of which the exact length of the space between the window frames and other places may be conveniently and quickly measured, in such a way that the board when marked and sawed off may exactly fit into the desired space without its being necessary to use the plane upon the ends of said board to make it fit, and which shall be equally applicable for other similar uses.

WEATHER-BOARD, GAGE AND REST.—Isaac Williams, Westfield, Ind.—This invention has for its object to furnish an instrument to gage the distance apart of the edges of the weather boards and at the same time to support the board while being nailed on, so as to avoid the necessity of driving in nails to support each board, as is now the practice, economizing time and labor.

BUNDLING MACHINE.—Edward J. Reddy, Bayville, N. Y.—This invention has for its object to furnish an improved machine designed expressly for bunching or bundling asparagus and other vegetables, to be put up in bundles or bunches, and which shall at the same time be simple in construction and easily operated.

CARRIAGE TOP.—J. F. Sargent, North Amherst, Vt.—This invention has for its object to furnish an improved carriage top, which shall be so arranged that it may easily and quickly be attached to and detached from the seat and when detached may be so closed as to occupy a very small space.

CAR COUPLING.—Clinton R. Hardy, Lexington, Ind.—This invention has for its object, to furnish a simple convenient strong, safe and reliable car coupling, which shall at the same time be so constructed and arranged as to uncouple itself should one or more cars of the train be overturned or thrown from the track.

COMPOSITION FOR DESTROYING INSECTS UPON HOP VINES AND OTHER PLANTS.—W. A. Phillips, Perry Center, N. Y.—This invention has for its object to furnish an improved composition for destroying lice and other insects upon hop vines and other plants, which shall be composed of ingredients easily obtained, prepared and applied, and which shall at the same time be effectual in accomplishing its object, and harmless to the vines or plants.

CHEESE VAT.—Paschal Coivin, Peccatonica, Ill.—The object of this invention is to provide an apparatus which will accomplish the formation and manipulation of cheese curds in an effective and economical manner. Patented July 28, 1868.

FIRE AND WATER-PROOF CEMENT.—Snow and Hunkins, Macon, Missouri.—This invention relates to a new and useful cement which is adapted to various uses when the action of fire or water is to be resisted. Patented July 28, 1868.

CEMENT BRANCH PIPE.—Enoch Lockhart and Frank Roberts, Louisville, Ky., and Henry Knight, Brooklyn, N. Y.—This invention relates to an improvement in the manufacture of branch pipes for water conductors in drains or sewers, and for other purposes, and it consists in the peculiar formation of the mold and the cores, and the manner in which the cores are nailed and secured in place, and the method of using the same. Patented July 28, 1868.

SHORES FOR RAISING HOUSE FRAMES.—J. W. Glover, Wm. B. Orner and B. E. Orner, Martinsville, Ind.—The object of this invention is to accomplish the raising of house frames with a small number of persons. It consists of two or more toothed shores in combination with saddles, to be set on to the upper tie-beams of the "bents," so-called, and which accomplish the raising of the bents by the reciprocating action of the shores. Patented July 28, 1868.

GRAIN REGISTERING MACHINE.—Barnett Taylor, Forestville, Miss.—The object of this invention is to accomplish the registering of grain automatically. It consists of a box provided with a yielding top which is actuated downward by the weight of a measure of grain, the top being connected with suitable mechanism to register the number of times the top is so depressed. Patented July 28, 1868.

HAT HOLDER.—Z. Waters, Bloomington, Ill.—The object of this invention is to provide a means for holding hats, and locking the same in such a manner that none but the person having the key to the lock, can take it from the rack. It is particularly designed for hotels, steamboats, and public halls, to prevent those mistakes in taking hats from racks, which mistakes are generally annoying and disadvantageous to one of the parties concerned, and will save hotel keepers and other parties who are responsible for the loss of hats, a great deal of expense in replacing stolen hats. Patented July 28, 1868.

VEGETABLE GRATER.—E. A. Goodes, Philadelphia, Pa.—The object of this invention is to provide a machine for grating vegetables in an expeditious and easy manner. It consists of a case containing a grating cylinder of punched sheet metal, or other suitable substitution therefor, and arranged in such a manner that the vegetables will be brought in contact with the grating cylinder, and the grated particles permitted to fall below into any suitable receptacle. Patented July 28, 1868.

PAPER CAP.—G. Imbach and J. Weidenman, Hartford, Conn.—The object of this invention is to furnish a cap or hat of paper, or other equally light cheap material, having the crown and band in two distinct parts, whereby the former can be removed when soiled, and another substituted. Patented July 28, 1868.

SUBSOIL ATTACHMENT FOR PLOW.—J. C. Leonard, and J. J. Gobar, Clinton, Mo.—This invention consists of an auxiliary plow so constructed as to be attached in rear of a common sod or other plow. Patented July 28, 1868.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Manufacturers of skate materials please address E. D. Tracy, Sterling, Ill.

Makers of potato diggers and agricultural machines send circulars to G. E. Carleton, Caledon, N. H.

Anderson Bro's will contract to do lathe work at their machine works, Peekskill, N. Y.

Manufacturers of cider mills will please send circulars and address to F. R. Burnham, Rushville, Yates county, N. Y.

E. J. Hatch, Eaton, N. Y., wishes to know the construction, capacity, and peculiarities of the Jonval turbine.

For sale—A part of a patent right now in successful operation, manufactured by Haas & Co., patentees, Nos. 25 and 27, Haydock st., Philadelphia, Pa., whom address for further particulars.

Wanted—clear white birch wood, Higley & Hirst, 1126 Chollita st., Philadelphia.

J. H. & N. A. Williams, Utica, N. Y., make the best patent sweet fern and chemical lacing that has been put in market. It has great strength, and is of very superior quality.

If D. H. Carpenter, patentee of a gas machine, etc., will address Daniel H. Carpenter, 39 Bethune st., New York, he will hear of something to his advantage.

Foundry and machine shop for sale, with engine, boiler, shafting, etc., all complete, located on the N. Y. & E. R. R.; coal, iron, lumber, and labor very low. Suitable for any class of manufacturing. Enquire of, or address J. A. P. Porter, 15 Cortlandt st., New York.

Information is wanted concerning steam plows—address of inventors and makers, statements of the work they will do, where they have been successfully employed, sizes, prices, number of men required to operate, and all particulars in full. Address Louis Haas, Stockton, Cal.

For sale—the patent right, in Great Britain, for perforated saws. The manufacture of these saws is now firmly established in the United States, and they are rapidly taking the place of all solid saws. Apply to J. E. Emerson, Trenton, N. J.

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

Send for description of Huntoon governor on entirely new principles. 103 State st., Boston, or 73 Liberty st., New York.

Bolt-heading machine just finished and ready for operation. May be seen at McLagan & Stevens', New Haven, Conn.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 8 Dey st., New York.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glazier's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 84 Nassau st., N. Y.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' boiler powder (11 Wall st., N. Y.) 12 years a standard article for preventing incrustations. Beware of imitations and pretended agents.

Improvement in the Velocipede.

Within a few months the vehicle known as the velocipede has received an unusual degree of attention, especially in Paris, it having become in that city a very fashionable and favorite means of locomotion. To be sure the rider "works his passage," but the labor is less than that of walking, the time required to traverse a certain distance is not so much, while the exercise of the muscles is as healthful and invigorating. A few years ago, these vehicles were used merely as playthings for children, and it is only lately that their capabilities have been understood and acknowledged. Practice with these machines has been carried so far that offers of competitive trials of speed between them and horses on the race course have been made.

The engraving represents one used by the well known Hanlon Brothers in their public exhibitions, and has only two wheels, the vehicle being kept in an upright position while in motion by the skill of the rider. The power for propulsion is applied by the feet and the vehicle is steered by a lever worked by the hands, which is attached to the forked support of the forward wheel. The subjects of the Hanlons' patents are extension or adjustable cranks to suit the driver's peculiarities, an extensible seat, and its adaptation to the use of ladies by making it similar to a side saddle. The vehicle may have three wheels—a steering wheel in front and two supporting wheels in the rear of the occupant—in this form being better adapted to the use of women and children and to new beginners. The seat in this improved velocipede is a spring, being supported on flexible steel or wooden strips and insuring ease of motion. We are told that the capabilities of this machine are admirably exhibited by the Hanlon Brothers, some of their evolutions rivaling in grace and rapidity those of the best skaters. The machines are built on this improved plan by Calvin Witty, carriage builder, 638 Broadway, New York. Patented July 7, 1868. For further particulars address Hanlon Brothers, 53 and 55 West 13th street, New York city.

action there is introduced into the passage-way, F, a cock by which the movement of the liquid from one end to the other may be governed. If the passage is nearly closed by the cock, the obstructed liquid forms a cushion which receives the shock of the steam piston. The time employed in changing the liquid from one side to the other may be exactly regulated by means of the cock, F, which may be adjusted by hand, or automatically by mechanism connected to the governor of the engine. By this means complete control



HANLONS' PATENT IMPROVED VELOCIPEDE.

over the action of the steam piston is obtained, in accordance with the amount of work to be done and the speed of the pump. The movement of the auxiliary valve and pistons commences at a point far enough removed from the end of the stroke to allow of a gradual shutting off and admission of steam, producing an easy and uniform motion, without jar or shock at each end of the stroke.

The pump itself does not differ materially from the ordinary steam pump; it is a double-acting plunger pump familiar to engineers and machinists.

These pumps were introduced in the mining region about eighteen months ago, and have proved themselves the best yet tried for heavy lifts. There have been built and put in

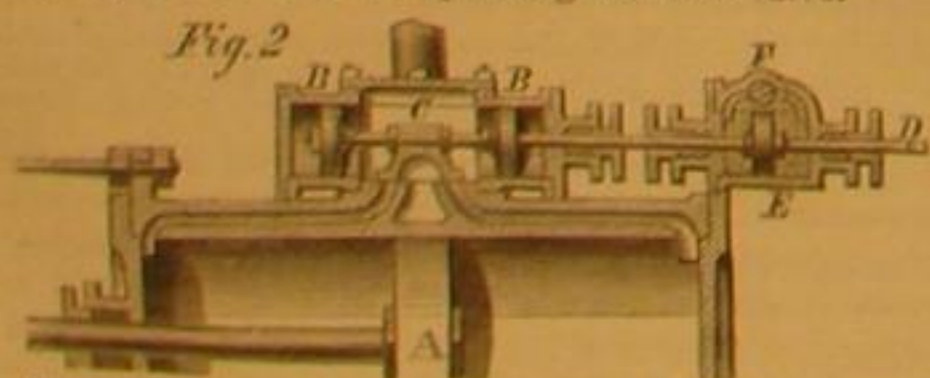
Rocky Mountains as a series of impassable crags, frightful precipices, and unattainable cañons. The builders of this road have reached and crossed the summit at an elevation of 8,262 feet above sea level, without any grade greater than 90 feet to the mile, and that only for a short distance. What has been called the "Great American Desert" has been found to have such rich agricultural resources that Nebraska, which lies almost wholly within the confines of that suppositious "Desert," produces more wheat to the acre than any other State of the Union. That popular faith in this enterprise is strong is attested by the fact that the public has, within a little more than a year, invested more than \$17,000,000 in its securities, and continue to look upon the bonds of this company as equaled only by Government's in all the elements of security and profit.—*Electric.*

Improvement in Double-acting Steam Pumps.

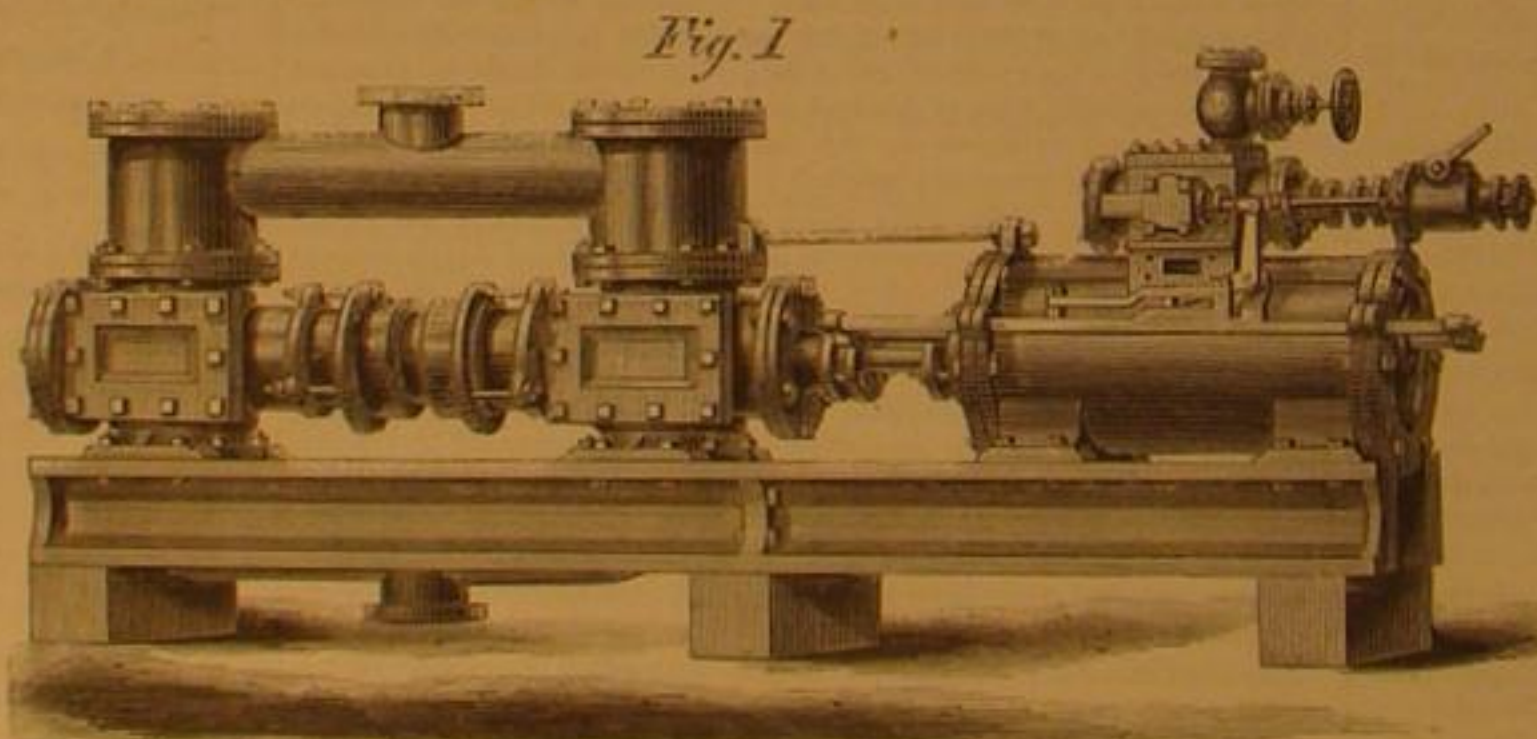
The object of this invention is to overcome difficulties, heretofore experienced, in the working of reciprocating steam pumps for raising water from deep mines, and in other situations where it is necessary to elevate water to a considerable height. This object is sought to be accomplished by means of an auxiliary valve which, with its connections, operates and governs the main valve and the stroke of the piston, preventing all shock and jar at the end of the stroke.

Fig. 1 is a perspective view of the machine, in general appearance resembling the common steam pump, but having peculiar appurtenances for the purpose above stated. Fig. 2 is a sectional view of the most important of these appurtenances. They consist first, of an auxiliary steam chest on the side of the main steam chest, containing an auxiliary sliding valve covering the ports of passages leading from each end of the main steam chest, and an exhaust port connecting with the main exhaust. This valve is operated by the motion of the main steam piston, A, through the medium of a sliding bar on the outside of the steam cylinder, having its bearings in the flanges of the cylinder, and being provided with arms at each end, to which are connected parallel rods passing through stuffing boxes in the cylinder heads, and projecting far enough into the cylinder to be actuated by the piston as alternately it approaches either end of the stroke. This outside sliding bar has a cam slot which is connected to the rod of the auxiliary valve by means of a bell crank; one end of the crank engaging with the valve rod and the other, by means of a wrist, with the cam slot in the bar.

At each end of the main steam chest is a short cylinder, B, fitted with a piston, the two pistons as well as the main valve, C, being secured to a valve rod, D. As the main steam piston approaches the end of its stroke, the auxiliary valve is opened, admitting steam to one of the pistons in the auxiliary cylinders, B, and operating the main valve.



The valve rod to which the pistons in B are attached extends through an oil or water cylinder, E, in which is a solid piston secured to the rod and having, of course, the same stroke as those in B. This cylinder is filled with water, oil, or any other suitable liquid, and the ends are connected by a channel, F, providing a free passage from one side of the piston to the other. It will be seen that, as the piston in E moves, the liquid will be driven before it, if the passage is free, to the other end of the cylinder. But to govern this



ALLISON'S STEAM PUMP AND GOVERNOR VALVE.

use some sixteen, varying in size from 6-inch plunger with 9-inch steam cylinder, 3 feet stroke, up to 16½-inch plunger with 38-inch steam cylinder 6 feet stroke, and working on lifts up to 400 feet vertical height. In some cases the steam is carried over 1,500 feet. Their action is so smooth that they require no fastenings of any kind, their own weight being sufficient to keep them perfectly steady. For these improvements one patent dated September 24th, 1867, was granted through the Scientific American Patent Agency, and another is now pending through the same agency.

For any further information or for pumps of any size, apply to Allison & Bannan, Franklin Iron Works, Port Carbon, Schuylkill County, Pa. Shop, County, or State rights for sale.

LETTERS are daily received at this office without the writers' signatures. We pay no attention to such communications—they are committed to the waste basket at once. Persons who write to us should always sign their names as a guarantee of good faith, and if their letters are intended for publication the writer's name need not be printed unless he so desires.

THE refusal of the Commissioner of Patents to extend the patent of the Union Paper Collar Company, has virtually terminated the protracted litigation between S. W. H. Ward and other paper-collar manufacturers, and that company.

The Railroad to the Pacific.

That the railroad now being built from Omaha, Nebraska, to San Francisco is one of the marvels of this age of great events, is a trite saying, but one whose truth is confirmed by every day's reports from "the front," where twenty thousand laborers are digging and laying the iron continental highway. We speak of "the front" and not of the "end," for the Union Pacific Railroad may be said to have but one end, and that one rests upon the banks of the Missouri. The other end is an indefinite point, a shifting spot in the surveyed route: here to-day and away beyond to-morrow. Where the last rail was laid a week ago is now a score of miles in the rear, and what is the further end of the track as we write will be miles behind the track-layers when these lines reach the eye of our readers. Let the figures of the past tell the story of what is being done in the present. Two years ago the Union Pacific Road had just started upon its way; last December 540 miles were completed and in running order. One hundred and twenty miles have been built since the frost was out of the ground this year, and 250 more miles will be finished before 1869, if we may believe the promises of the contractors, whose performances hitherto have not only equaled but exceeded their predictions. Then, with the completion of the promised 300 miles of the Central Pacific Road, now being vigorously pushed from the Pacific coast toward Salt Lake, there will remain a gap of not more than 600 miles to be built next year. With the record of past and present achievements before us, we may confidently believe the assurance of the managers of the Union Pacific, that this gap will be entirely closed in time for brothers and sons upon the Pacific coast to return to us by rail to eat their Christmas dinner in a year from the coming holiday time.

No text-books ever taught us so much concerning the western half of the American continent as the surveyors and builders of the Union Pacific have done and are doing. We have been accustomed to think of the

Central Underground Railway.

It is announced that the subscription books of the Central Underground Railway Company, New York City, are now open at the office of Brown Brothers & Co. The Board of Directors comprises some of the best men in New York. The road is to be begun within a year and completed within five years according to the conditions of the Charter, and a pledge of \$300,000 for the fulfillment of these terms, is to be deposited with the Comptroller. It is said that \$1,200,000 are already guaranteed. The company intends to purchase and improve much of the property along the line of this road, and thus some portions of our city will doubtless receive a much-to-be-desired renovation. The route is to begin on the easterly line of Broadway, in City Hall Park, running underground in front of the City Hall, to Center street, to City Hall Place, under City Hall Place to Pearl street, across Pearl in a curved line to Mulberry, thence northerly under Mulberry to Bleeker street, across Bleeker to Astor Place, thence passing under Eighth and Ninth streets to Fourth avenue; continuing on under Union square and passing in a direct line to Madison square, under which it will pass to Madison avenue as now opened to Eighty-sixth street; continuing its course in a north-easterly direction to the Harlem river; thence easterly and westerly along the river until it reaches its terminus at the Harlem bridge.

Patents Not Wanted.

W. H. Higbee, of Trenton, N. J., whose letter appeared on page 83, wherein he stated that he would be glad of an opportunity to purchase an interest in a really good thing, writes to us to say that he has no desire at present to invest in a patent, and requests that letters to him on the subject may cease. Mr. Higbee informs us that his letter was not intended for publication; he supposed, at the time, that we had a list of patents for sale, which we had not.

Two of the cables for the new suspension bridge at Niagara Falls have already been stretched and attached to the anchorages. The others will shortly be thrown across.

Scientific American.

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ROTARY AND RECIPROCATING ENGINES.

We are in receipt of several communications upon the relative value of rotary and reciprocating engines, and the supposed waste of power by the use of the crank while passing the center. In one instance we are asked to compute the precise "diameter of a rotary engine, that will equal in efficiency a reciprocating engine having an equal piston area, and a crank of given length." This question of loss of power by the crank is constantly recurring in one form or another, and we have so often discussed it in our columns that we think our views upon it should be well understood by those who have been for any considerable time readers of our paper. The attempt to substitute any other method than the crank, for changing a reciprocating motion into a rotary one, where any heavy work is to be done, has always resulted in a demonstration of the superiority of the crank. The latter is at the same time one of the most simple as well as one of the most beautiful of all mechanical movements. The notion that it wastes power is not founded upon fact, and we think we can make this perfectly plain to our correspondents.

Steam under a given pressure possesses a fixed amount of mechanical power for every unit of volume. The application of the pressure and expansive force of a given amount of steam through the entire revolution of a crank, provided it might be so applied, would not increase its working efficiency. The same amount applied to a portion of the revolution so that its entire efficiency should be used would produce the same result. Suppose a windlass to have a fly-wheel attached of sufficient weight to store up and to impart considerable more power than is required to raise the weight attached to it. Suppose further, that a power of 4 lbs. applied to the winch through its entire circuit is sufficient to raise the required weight. Then will a force of 16 lbs. applied successively through $\frac{1}{4}$ its revolution continuously raise the weight. In this case 12 lbs. of force are taken up by the fly-wheel and gradually expended in raising the weight through the three fourths of the revolution to which the power is not directly applied. In reciprocating engines the steam is applied only through a partial revolution, but enough is applied so that the surplus force absorbed by the fly-wheel, expended during the remainder of the semi-revolution through which the crank must pass, is sufficient to keep up the speed at the required rate. Therefore there is no loss of power, provided the parts of the engine are properly adjusted, and the steam is cut off at such a portion of the stroke that the full force of its expansion is realized. The steam in a reciprocating engine is applied while the connecting rod is nearly at a right angle with the crank; the fly-wheel transmits its store of force in a direction always at right angles with the crank; hence it is absurd to suppose that other devices having for their object the application of the steam in a direction uniformly at right angles with it, can possibly possess any great superiority over the crank and fly-wheel which does so very nearly the same thing.

Now a word in regard to rotary engines. If steam is applied to them only through the same fraction of a revolution that it is applied to reciprocating engines, we think there is no one who would suppose them superior to reciprocating engines. But if steam were applied only through one fourth of a revolution, twice during each revolution, it will take twice as much steam to supply it during the entire revolution. In the latter case more power would be obtained, but it would be at the expense of more steam. Hence we assert that a rotary steam engine having the same piston area as a reciprocating engine, properly constructed and manipulated, and its semi-diameter equal to the length of the crank, can never do more work in proportion to the steam used (leaving out of the question the slight disadvantage in the application of the

power above alluded to), while on account of the imperfect use of the expansive force of the steam, it is less efficient. The account summed up would leave a balance in the favor of the latter.

IS MANUAL OR MECHANICAL LABOR EITHER DISHONORABLE OR UNPROFITABLE?

We shall take the negative of this question most decidedly; yet from the practice of most persons one would think that the facts were against that view. Even the most successful practical mechanics do not generally commend to their sons their own business, but, seeming to entertain some sort of an antipathy to mechanical labor and to have exalted notions of mental work, or employment involving but little outlay of physical force, strive to devote their sons by placing them in a store, office, or some other place or position to which the idea of useful, hard work does not attach.

It may be that there is less hard work in employing the brain, almost exclusively, than in using the muscles, but the writer in an experience of forty and more years as common laborer, machinist, mechanical engineer, store and office clerk, school teacher, and writer has failed to discover the fact. Perhaps, also, anything or everything pays better than manual or mechanical labor, but that fact has not yet reached the apprehension of the writer. Clerks and even salesmen in stores, copying clerks in offices, the scribbling drudges of corporations, contributors to periodicals, etc., are among the poorest paid and hardest worked classes of the community. Beside this, they are frequently the "servants of servants," envying the independence of the "wood sawyer's clerk."

If wealth brings honor and position, surely the creator of the wealth need not be dishonored by his employment. It is absurd in this country, where there are no family estates held by laws of primogeniture or entailment to nurse a brood of loafers, where whoever has must first get, to talk of the ignobility of labor. Our wealthiest—our best men—feel proud to have been the builders of their own prosperity, the arbiters of their own fate, the commanders of circumstances. Wealth acquired or competence obtained by hard, persistent, physical labor is valued and really enjoyed, because the very labor expended has given a zest for its enjoyment, and the knowledge that it is a deserved reward for persistent endeavor gives a conscious right to its possession.

As to the social disabilities often attributed to mechanics and laborers, much misapprehension exists. "Society," *par excellence*, is not confined either to the wealthy or the butterflies of fashion. As much intellect, as much education, as much general knowledge is to be found among our mechanics as among an equal number of our wealthy men. They form institutions for benevolence, for mutual education, for enjoyment, and carry them on successfully. They are among our most forcible debaters on religious, political, or social questions. Their contributions to the daily and weekly press are as potent in their influence as the carefully studied and elaborately constructed leaders of the professional editor. If their social world is theirs only, it will compare favorably with that of the "upper ten." No; the laboring classes are not low in the social scale. Indeed, not unfrequently they give a healthy tone to that so-called higher society which is continually recruited and sustained by members from their ranks. Physical labor, so far from being inimical to intellectual development, is one of the necessities of that development. Then, the workman (muscleman) is not to be pitied or commiserated, but rather to be envied. He is to be envied, because, first, he has an agreeable and healthy employment; second, because, whether reasonable or not, he has the stimulus of hope to achieve what he may consider a higher position—that of competence or affluence. His mind is engaged, his physical powers exercised, his health insured by congenial, constant, and useful employment.

Now as to the relative profit of manual labor and apparent work. While the salesman, clerk, or scribbler must be content with his two, three, or possibly four dollars per day, the mechanic can earn as much or more, even five dollars, with a feeling and knowledge of independence which the clerk can never experience. Still more, as this is a country where labor rather than rich patronage governs, the possessor of a good trade—the master of a useful business—can almost always not only find employment, but even dictate his terms. Such a man is truly independent. He knows that his two hands, guided by his educated brains, are sufficient to provide for him and his, and may possibly place him far above those who consider the "greasy mechanic" a fair subject for insane jests.

MINERAL AND ANIMAL AROMAS AS CONDUCTIVE TO HEALTH.

A paper published in the heart of the Pennsylvania oil regions, the *Titusville Herald*, states that "sickness is comparatively unknown in our oil towns, the statistics showing a degree of health unequalled by that of any other portion of the country." Apropos to this it may be stated that petroleum vapor contains much of what is known as carbolic acid, a notable destroyer of the lower organisms and their germs. So we are told that the stench arising from partially putrified hides in a tannery is an antidote to diseases which are supposed to be conveyed, if not propagated, by the atmosphere and destructive to the infinitesimal germ of noxious matter contained in it. We have little faith in either of these statements. They may appear plausible from the fact that nobody who has any sensitive olfactory nerves can live in comfort under the influence of either of these noxious effluvia. It has been suggested that Venango county, Pennsylvania,

would be an excellent retreat for invalids on account of its presumed peculiar healthiness. It may be so, but if our experience of some two months in the oil region is a criterion we do not envy the invalid his sojourn in that delectable atmosphere.

THE PHYSICAL RESEARCHES OF THE AGE.

The physical researches of the present age seem to be devoted in a great degree to the two subjects of optics and acoustics, and some very novel and ingenious practical applications of the principles of these sciences have been made to mechanical engineering, the value of which remains to be demonstrated. The workers in these fields, at the head of whom must be ranked Dr. John Tyndall, have brought to bear an amount of labor and experiment that would scarcely be credited by our readers should we state it. Prof. Tyndall, in speaking of the amount of experiment made to determine the velocity of sound, says: "Those who are unacquainted with the details of scientific investigation have no idea of the amount of labor expended in the determination of those numbers upon which important calculations or inferences depend. They have no idea of the patience shown by a Berzelius in determining atomic weights; by a Regnault in determining the coefficients of expansion; or by a Joule in determining the mechanical equivalent of heat. There is a morality brought to bear upon such matters which, in point of severity is probably without a parallel in any other domain of intellectual action. The desire for anything but the truth must be absolutely annihilated; and to obtain perfect accuracy no labor must be shirked, no difficulty ignored. Thus, as regards the determination of the velocity of sound in air, hours might be filled with the simple statement of the efforts to establish it with precision." The relation of tension to pitch of sound was early established, but its application to the solution of engineering problems has, so far as we are aware, only been made within the present year. This application is due to Mr. W. Airy, who used it to determine the strains upon every one of the intermediate bars connecting the top and bottom members of what is known as the "bowstring bridge." These strains are due to the various arrangements of weights upon the bridge. It is obvious that this is a problem of great complexity, as a weight upon any given point is more or less distributed to other parts of the bridge, on account of its peculiarities of construction; a reaction of strains taking place throughout the entire structure. The problem is by no means indeterminate, although its solution would tax all the resources of mathematics.

It would almost seem at first thought that the sense of hearing would be the least liable to be applied successfully to the solution of such a problem; but the ingenuity of modern experimenters seems almost inexhaustible. Mr. Airy constructed a model of a bowstring girder having its intermediate ties of steel wire of uniform size. By loading a wire of the same size and length of any particular tie, with weights, until its tone was in unison with the tie, the weight would of course be equal to the strain which produced the same tension in the tie. This experiment, which seems to have given very satisfactory results, will no doubt lead to similar tests upon more complicated structures, which present such severe problems of construction that anything more than an approximate determination of the strains to which their different parts are subjected, is by mathematical means not to be expected.

In the science of optics we notice the announcement of the invention of a new photometer, which gives most accurate measurements of the intensities of luminous rays. The delicacy of the instrument is so great that Mr. Crookes, who perfected it, announces that it will indicate a difference of intensity caused by moving a lamp one tenth of an inch. The description of this instrument may perhaps be given in a future article.

In chemistry much is being accomplished. The complex substance called neurine, which is a large constituent of the brain and nerves, has been synthetically produced. Inorganic chemistry is attracting increased attention, and theoretical chemistry is receiving a new impulse from the labors of Sir Benjamin Brodie and the discussions arising from the publication of his late work, the "Chemical Calculus."

In physiology, Pectenkofer and Voit, with the celebrated respiration apparatus, at Munich, are throwing light upon the mystery of sleep, by showing that animals during sleep store up oxygen.

To the sciences of geology, paleontology, and microscopy many important additions have been recently made, which we cannot now allude to in detail, while in the other sciences which we have forborne to mention, the march of intellect keeps step with the general progress of the age. Would that we might also add that the moral progress of the world was also in keeping with its advances in knowledge.

OBITUARY.—GEN. CHARLES G. HALPINE.

General Halpine, known under his *nom de plume* as "Miles O'Reilly," died suddenly at the Astor House, New York city, Aug. 3d, from an overdose of chloroform administered by himself while suffering from illness. He occupied the positions of city register and chief editor of the *Citizen*. As an official he was capable, honest, efficient; as a writer, energetic, terse, vigorous, and talented. Socially he was generous, genial, and honorable. General Halpine was born and educated in Ireland. He came to this country in 1851. When our civil war broke out he went to the field as second lieutenant and rose successively through the different grades to the rank of Brevet Major General. His death at the early age of 39 is regretted by a large circle of friends and acquaintances and by the public at large.

TASTE AND SMELL UTILIZED.

The two senses of tasting and smelling are usually considered mainly as servants, capable of contributing to our luxurious pleasures, rather than as aids to business success; yet some departments of business could hardly be conducted without their employment. The sale and purchase of liquors and wines are consummated almost entirely by the help of taste and smell. Although the strength may be judged by the size and appearance of bubbles formed when shaken, by the sinking or floating of olive oil in them, and their appearance when turned, yet the expert judges more readily and correctly of their strength, as well as purity, flavor, etc., by tasting and smelling. In the great wine marts of Europe the business of wine taster is a distinct profession. Tobacco and hops are judged by the purchaser fully as much by smell as by sight and touch; and it is wonderful what expertness is attained by professional judges by the cultivation of this sense; their judgment being practically infallible.

But the testing of tea exhibits, in a more marked manner, the use of taste and smell in mercantile transactions. In every wholesale tea house will be found a row of tea cups with a little furnace or lamp for heating water. There is no sugar or milk. In the side of every chest of tea, ranged in tiers along the walls, is a small hole stopped by a cork. The taster draws the cork, takes a few grains of tea in his hand, smells it, then puts it in a cup, pours a little hot water on it, tastes, and his judgment is formed, the character of the tea is fixed. Frequently the smelling is sufficient, and it is remarkable how absolutely and decidedly the professional taster declares the character of the article he has tasted. Not less remarkable is the fact that there is seldom any marked disagreement between the estimates made by different individuals. The profession of tea taster in our large cities is frequently quite lucrative. Merchants purchase largely, relying implicitly on the representations of the expert; and it is seldom their confidence is misplaced, whatever "tricks of the trade" there may be attempted to deceive the taster.

The gift, if so it may be called, of being a successful tea taster, is not general, although it might be supposed that experience would be all that is necessary to insure perfection, or at least an approximation to it. The profession is severely taxing to the nervous system, affecting the subject similarly to alcohol or tobacco when used to excess.

Submarine Perambulation.

The *Novelliste* of Marseilles gives a very minute account of the system employed there for working under water. Fulton, it informs us, was the first to solve the problem of a submarine vessel, which he built of copper for purposes of naval warfare, but was obliged to give up the plan because of the difficulty of supplying the men with air, especially when they were to operate at a distance from the apparatus; and, moreover, his method of propulsion was defective, consisting of jointed oars that could not afford a greater speed than 400 yard per hour. At present many ways have been devised for removing those obstacles. The air is supplied by a mechanical and chemical process combined. Before the vessel is let down a provision of compressed air is secured by means of pumps, and distributed among the various compartments; it is calculated to balance the pressure of the column of water she is to encounter at the depth required. The immersion of the submarine boat is obtained by increasing her specific weight through the introduction of water into its reservoirs; the immersion is effected by the expulsion of this water, which latter therefore acts as a moveable ballast. The boat's center of gravity is so arranged as to make her touch the bottom with her base flat, and almost without a shock. When the ground has not been explored before, the vessel is kept in suspension until, by a skillful manoeuvre, a proper place is found for her. By ingenious contrivances an exact equilibrium is obtained between the compressed air and the column of water, and the trap doors communicating with the bed of the sea are then opened. The men, standing with their feet on the latter, but having their heads still in the chamber containing their supply of air carry the boat to the spot they want to explore; but if they find it necessary to leave the craft, each puts on his scaphander, or water tight helmet, provided with a hose, through which he receives air from the vessel, and which is screwed to one of the reservoirs of compressed air, and can thus work at a tolerable distance from the boat.

Editorial Summary.

A SPLENDID BEQUEST.—It is understood in private circles, that Henry Keep, Esq., of this city, whose name is very prominent in the railroad interests, has purchased the block of ground on the Fifth avenue, opposite the Roman Catholic Orphan Asylum, consisting of twelve city lots, whereon he proposes to erect, at his own expense, and for the benefit of the city, an elegant art gallery. The price paid for the ground is \$250,000, and it is understood that Mr. Keep will expend nearly a million of dollars upon the building. Mr. Keep began life a poor boy, and as a reward for his energy and integrity he has amassed a large fortune, and now proposes to spend some portion of it for the good of the people. The particulars of this noble bequest have not yet been made public.

THE atmosphere in the tunnels of the Metropolitan Railway in London is reported to be absolutely poisonous, and without any sufficient cause, as their proper ventilation is perfectly practicable. Several deaths are reported as having occurred in these neglected passages, and the compulsory purchase of the road by the Government is loudly demanded by some of the English journals.

SMOKY CHIMNEYS.—A correspondent of the *Builder* submits a simple and cheap remedy for smoky flues, which is stated to be successful in eight out of ten bad chimneys. The principle upon which it depends is sound, and its use would obviate, in many instances, the employment of the unsightly chimney-tops which so often mar the architectural effect of otherwise fine buildings, without answering the desired end. He says: "I find from experience that, by the use of fine wire gauze of from thirty-six to forty wires to the inch, as a screen, blower, or guard, judiciously applied to register stones, ranges, or stove doors, little if any smoke will come into the room. The atmospheric pressure prevents the smoke entering the room through the gauze, and if applied immediately to the front of the fire more smoke will be consumed than by any other means. In that case the wire should be kept two inches from immediate contact with the hot fire."

HOW NOT TO STRAIGHTEN CURLY HAIR.—Two different applications for patents were lately made for compounds, claimed to take the natural curl out of the hair of negroes and make it straight. In one of the compounds, the chief ingredient was extract of Iceland moss, and in the other nitric acid $N O_3$. It was proved by actual experiment, to the satisfaction of the examiner that neither of these compounds would accomplish the result, and the claims were refused. Evidently the applicants only wanted patents as a recommendation to induce as many colored people as possible to try a bottle of the worthless stuff. Indeed if every colored woman in the United States would only spend fifty cents to buy the remedy, being persuaded to do so by the recommendation of a United States patent, the patentees would make a nice little fortune. The result of these applications shows the value of a preliminary investigation into the merits of alleged new discoveries.

THE enterprising city of Chicago is to have a grand park, to be located on the Riverside Farm, about seven miles out of the city, and known as the Gage property—owned by D. A. Gage, of the Sherman House, embracing about eleven hundred acres, and to be connected to the city by a broad boulevard. The park is to be laid out in winding avenues for drives, and the grounds will be offered by the proprietors as sites for the erection of suburban residences. This strikes us as a very sensible project, and the natural advantages of Chicago will place the proposed park within easy access of those who seek for rural beauty and homestead enjoyment.

WOODEN PARASOLS.—The wooden parasols which were introduced extensively in the French capital and will likely find patrons in other fashionable centers, may thus be described: They are painted to represent peacocks' feathers, each feather being a separate rib, like those of a fan. By ingenious mechanism they can be fastened into the form of a parasol, and can also be folded up into as small a compass as a fan, which purpose they answer admirably. They also can be turned into a variety of things, and have joints by which they shade the wearer on any side where the sun is too powerful.

THE Abyssinian King.—Theodore wished his captains to attack the British by night, but preferring to meet death by daylight they declined the proposition. Had they accepted, it is doubtful whether they would not have been put to rout without a single shot, by the magnesium light Sir Robert Napier carried with him on the expedition. Had they stood their ground in face of the blaze of light thrown directly in their faces from a distance of 600 yards, the English shielded by the night could have picked them off at their leisure.

THE first Northwestern Woolen Exposition and Convention of Wool Growers and Manufacturers at Chicago, opened August 4th. It promises to be interesting. Mr. W. G. Coulter, in his speech during the second day's proceedings, stated that the superior facilities possessed by Western woolen manufacturers were nearly 25 per cent. in their favor over those possessed by the New England States. Fifteen hundred different lots of goods are on view, and many distinguished agriculturalists, wool growers, and manufacturers are present.

A CORRESPONDENT from Franklin, N.Y., sent, some days ago, a communication in regard to some reports heard by many individuals in that locality. By some mischance the communication was mislaid. The explosions occurred at a time when the sky was cloudless, and we learn from a second communication that they have been ascribed to the falling of a meteor. The reports were so loud in some cases as to severely jar houses and cause dishes to rattle, etc.

THE Revue Populaire, of Paris, gives an account of some very curious experiments made by Dr. Claude Bernard. If oxygenized blood be injected into the arteries of the neck immediately after decapitation, warmth and sensibility return, the eye gets animated and displays such perception that an object shaken before it will cause winking of the eyelids and movements of eyeballs as though to avoid injury.

THE dwellings found at the bottom of the fresh water lochs in Scotland continue to be discovered in various parts of the country and are attracting great attention, as throwing light upon the habits and history of the Celtic race which for many centuries inhabited that country. The first one was brought to light by the draining of a loch on the property of the late Mr. F. D. P. Asley, in Arisaig.

RUSSIA will soon have the Black Sea and the Baltic in direct railway connection. This was a long contemplated project, and will not only develop her commerce but enormously increase her defensive power.

WE are in receipt of several communications requesting information in regard to the spectroscopic and spectral analysis. A full description of the instrument and its use, with engravings is to be found upon pages 17 and 18, Vol. XV. of the *SCIENTIFIC AMERICAN*.

THE Commissioner of Patents has extended the patent of M. A. C. Mollier, of Paris, for making straw paper. It is a chemical process for reducing straw and other vegetable matter to pulp by the application of a solution of hydrate of soda, also in the employment of hypochlorites in the process of bleaching. It is said to be a valuable invention.

MONEY PACKAGES.—Persons who send money to this office by Express, should always enclose a letter in the envelope along with the money. We frequently receive packages without the accompanying letter and are sometimes bothered to know who sent it. A letter would save time and trouble.

ANOTHER victim to science has fallen on African soil. Le Saint, the geographer, who had left France about nineteen months ago, has died at Abn Khaka. Malte-Bran has received letters from Alexandria which leave no doubt as to the young traveler's fate.

CYRUS W. FIELD telegraphed from London, August 3d, that the Atlantic cable of 1866 ceased to work about thirty-five minutes past twelve o'clock on that day. The damage is at the Newfoundland side, according to the tests, and is supposed to have been caused by an iceberg.

A PETITION signed by four hundred ladies has been presented to the Russian Minister of Public Instruction, praying that the Professors at the University might give special lectures for ladies, so as to satisfy their legitimate desire for higher instruction.

A SPINNING wheel made in the year 1768, and in good preservation, was recently sold in Lancaster, Pa., for ten cents, we should think that a poor compliment to the old family friend.

OFFICIAL REPORT OF
PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUGUST 5, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a Patent, except for a design.....	\$15
On issuing each Original Patent.....	\$50
On appeal to Commissioner of Patents.....	\$20
On application for Reissue.....	\$30
On application for Extension of Patent.....	\$50
On granting the Extension.....	\$50
On filing application for Design (three years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

80,529.—YARN-BEAM FOR LOOM.—Benjamin A. Bailey (assignor to himself and William H. Kilmer), Lewiston, Me.

1 claim, 1st, The serrated keys and key-seats, for holding the beam in position, substantially as set forth.

2d, A yarn beam, having main heads, made movable and adjustable, in combination with serrated key seats and adjustable keys, substantially as described.

80,530.—ELEVATED RAILWAY.—Eli M. Barnum, N. Y. city.

1 claim, 1st, The construction and arrangement of the supporting columns of three plates, two outside corrugated plates joined upon a third central plate, arranged substantially as described.

2d, The construction and arrangement of the base block of the columns, substantially in the manner described, with a bearing in the top and bottom thereof, the bottom of the bearing being fitted with keys, by which the column can be adjusted to a vertical position after the base or foundation block has been set, and without disturbing the same, the upper bearing acting as a fulcrum, by which the keys in the bottom bearing bring the tops of the columns to their proper position, in the manner substantially as described.

3d, In combination with the top of the columns, a separate cross-head, T, constructed, applied, and secured, substantially as described.

4th, Combining, between the wooden cross-head, Q, and the iron cross-head, T, when constructed, the latter with a Y-shaped top, and the former with a Y-shaped bottom, the iron-rubber bearing pieces, I, inserted in the recesses cut in the bottom of the cross-head, so as to shed the water, and avoid the accumulation of ice and dirt around the rubber.

5th, The method and arrangement of securing the cross-tie and rail chair to the cross-head, substantially as described.

6th, Combining with the columns and rails of an elevated railway, a pipe or tube, for the purpose of supporting, sustaining, and bracing the same, substantially as described.

7th, In combination with the supporting columns, the adjustable brackets, u, figs. 6 and 8, for supporting the swing-rod t, and by which they can be moved up or down, or attached to the inside or outside of the columns, substantially as described.

8th, In combination with an elevated railway, and as part of the system herein described, the construction and arrangement of the described signals to govern the movements of the cars, substantially as described.

80,531.—MACHINE FOR CUTTING RAGS.—Allan T. Bennett, and William O. Anderson, Cincinnati, Ohio.

We claim the combination of the gang of hooked knives, C, I, C, C, arranged spirally along the shaft, so as to reach the material to be acted upon in rapid and regular succession, the notched bench, D, and yielding intermediate, E, E, E, E, all constructed as described, the knives working immediately between the feed wheels and projections of bench, D, for the purpose set forth.

80,532.—COAL-STOVE.—David B. Cox, Troy, N. Y.

1 claim the annular horizontally-rotating flue, b, around the base of the fire pot, and separated from the chamber above by a perforated partition, g, substantially as and for the purpose herein specified.

80,533.—GOVERNOR FOR STEAM-ENGINE.—Christopher G. Cross, Chicago, Ill.

1 claim the arrangement of the lever or crank, T, beam, P, and pumps, N, with the cylinder, D, regulating stop, x, y, shaft, E, rod, H, and case, A, B, substantially as and for the purpose specified.

80,534.—LET OFF FOR LOOM.—George Draper, Hopedale, Mass.

1 claim the combination of the connection rod, P, or the mechanical equivalent thereof, with the lay, B, and the mechanism applied to the warp roller, D, and the yarn beam, C, such mechanism consisting of the friction-strap, I, its wheel, G, and spring, d, and the operative lever and train of gears, as explained.

80,535.—APPARATUS FOR SWAGING THE SWIVEL-EYES OF

WATER CRANES.—Virgil Draper (assignor to Edmund J. Richards), North Attleboro, Mass.

1 claim the combination of the grooved supporter, A, the carrier B, the bed die, D, the swaging die-plate, E, and the punch, F, each being constructed for use in machine and for the purpose substantially as described.

80,536.—AUTOMATIC BOILER FEEDER.—Samuel Driver (as-

signor to Robert H. Driver), Philadelphia, Pa.

1 claim the combination and arrangement of the chambers, B and B', and valves, G and G', provided with pistons, F, and operated by means of the wheel, F, on the driving shaft, D, substantially in the manner above described.

80,537.—CUPOLA FURNACE.—John H. Eddy, Taunton, Mass.
I claim, 1st, The air chamber, I, when used in connection with cupola furnaces, as above described, and
2d, The introduction of the blast into cupola furnaces, at the center thereof, whether the same is accomplished in the precise method herein described or by any other means substantially the same.

80,538.—WEATHER STRIP.—Thomas S. Fellows, Walnut Lake, Minn.
I claim a weather-strip, composed of the plates, C, D, when the former is provided with a lip, c', and the latter with an acute-angular groove or recess, d', and the same are so combined and arranged that they are operated by the natural elasticity of the metal, substantially as described and for the purpose specified.

80,539.—REVERSIBLE LATCH.—Charles R. Fisher, Chelsea, Mass.
I claim, 1st, The slider or saddle, F, with the reversible bolt, C, and its spring, e, when combined and arranged as described, and so as to operate together as set forth.

2d, The combination of the carriage, D, the tumbler, E', and the retractile spring, E, with the saddle, F, the reversible bolt, C, and its spring, e, the whole being arranged and applied to the case, A, in manner as described, and so as to operate together as set forth.

80,540.—WASHING AND WRINGING MACHINE.—George P. Fuller, Philadelphia, Pa.
I claim, 1st, The rotating rings, D, D, in combination with the heads, E, E, and pressing-bars, C, substantially as described.

2d, The combination of the rollers, d, with the pressing bars, C, and guiding-rings, D, substantially as described, and for the purpose specified.

3d, The combination of the rollers, d, with the pressing bars, C, and guiding-rings, D, substantially as described, and for the purpose specified.

4th, A revolving drum, which has around its periphery a series of squeezing bars, supported by springs, and having metallic plates on their ends, which are caused to vibrate in radial grooves in metallic rings, that are confined to the inside of the drum heads, when the several parts are constructed and arranged in relation to each other substantially as described, and the drum is combined and arranged with a series of squeezing rollers, substantially in the manner and for the purpose set forth.

5th, The combination of the segmental strips, k, with the dovetail grooves or recesses, l, and rollers, G, substantially as and for the purpose specified.

6th, The combination of the wringing apparatus, consisting of the squeezing rollers, l, l, carrying rollers, m, and end supports, j, and chains, k, with the washing-machine, substantially in the manner described.

7th, The combination and arrangement of the shifter, consisting of the clutch wheel, O, lever, P, and horizontal rod, Q, with the driving-shaft, F, and wheel, L, substantially as and for the purpose set forth.

80,541.—MACHINE FOR THRESHING AND CLEANING GRAIN.—Henry Gill, Mansfield, Ohio.
I claim, 1st, The picker roll, C, in combination with the parts, a and b, when constructed and arranged to operate substantially as and for the purpose set forth.

2d, The beater or shaker arms, F, in combination with the roller, D, provided with the cams or tappets, e, for more thoroughly shaking up the straw and separating the grain therefrom, substantially as described.

3d, The straw-carrier, consisting of the belts, E, provided with spikes or teeth, and the notched bars, K, when arranged to operate substantially as shown and described.

4th, The adjustable tail-piece, G, in combination with the belts, E, substantially as described.

5th, The shoe, I, when located in a threshing machine, and pivoted at its front end, in front of the axle of the threshing cylinder, substantially as set forth.

6th, Providing the shoe, I, with the adjustable slide, h, for regulating the delivery of the grain and chaff to the blast in a thin and even sheet, as set forth.

7th, The combination of the float, p, and the registers, V, when applied to a fan, and arranged to operate substantially as described.

8th, Operating the screw, u, by means of the springs, a', and the arms, f, and cam, n, as set forth.

9th, The combination of the shoe, I, inclined chute or grain board, H, and operating cam, n, when arranged for joint operation, substantially as described.

80,542.—CHEMICAL FIRE-ENGINE.—Edwin Gordon, Boston, Mass.
I claim, 1st, The combination in a chemical fire-engine, of chamber, A, rod, D, supplied with rings or conical shaped disks, E, or other equivalent measuring or graduating device, suction pump, C, and connecting pipe, F, valve, a, and c, and pump, e, operating together substantially as and for the purposes explained.

2d, The combination in a chemical fire-engine, of chamber, A, rod, D, supplied with rings, conical disks, or other measuring or graduating device, suction pump, C, connecting pipe, F, and valve, a, and c, operating together substantially as and for the purposes explained.

3d, The combination in a chemical fire-engine, of the upper part of the chamber, A, or any equivalent, for holding chemical substances for generating carbonic acid gas, with the pump-rod, D, supplied with rings or disks, or any equivalent measuring or graduating device, and the suction pump, C, or any equivalent, for supplying a graduated quantity of pure water, operating together substantially as above described, and for the purposes therein stated.

4th, The rod of a force-pump, or other expelling pump of a chemical fire-engine so constructed that it shall extend above the piston chamber of said pump, and have upon it a series of rings or conical disks or other equivalent measuring or graduating device, for carrying down from a chamber above, through which the rod travels, a definite and regular quantity of some chemical substance, or substances, for generating or assisting in generating carbonic acid gas, substantially in the manner as above specified.

5th, A suction pump so arranged that it shall furnish a regular measured supply of pure water proportionate to the amount of chemical substances used, and varying with the speed with which the engine is worked, for the purpose of dissolving and mixing with the chemical substances used for generating carbonic acid gas in a chemical fire-engine, substantially in the manner and for the purpose specified above.

80,543.—STEAM-GENERATOR.—Joseph Harrison, Jr., Philadelphia, Pa.
I claim, 1st, Compensating units, e, combined substantially in the manner and for the purpose described, with a steam boiler constructed in accordance with that described in the patent granted to me, October 4, 1859.

2d, For combining the compensating units, e, with the plain cast-iron pipes, in the manner and for the purpose specified.

80,544.—COMPOSITION FOR PREVENTING INCORUSTATION IN STEAM BOILERS.—William Hewitt, Pomfret, England.
I claim the use of tannic acid, in combination with tannic animal matter, in a solid form, for the purpose of preventing incrustation in steam boilers.

80,545.—TASSEL-FASTENING.—S. B. Hill, assignor to himself, Levi B. Taylor, and Charles B. Lantz, Catoosau, Mass. Antedated July 18, 1868.
I claim a connector, the bobbin, b, and cord, c, by means of the spring, a, substantially as described, and for the purpose specified.

80,546.—HANGERS FOR SHAPING.—George W. Hubbard, and Scott A. Smith, Philadelphia, Pa.
I claim, 1st, The combination of the hanger, when made for the purpose specified.

2d, The combination of the hanger, when made for the purpose specified.

3d, The combination of the hanger, when made for the purpose specified.

80,547.—RAILROAD GATE.—T. Roney Huntington, and William W. Hunt, St. Louis, Minneapolis, Minn.
We claim, 1st, The revolving lever, A, having from end to end, a shoulder or groove, and a spring, B, and a roller, C, and so constructed that, when it is turned upon the track alongside the rail, such shoulder or groove will receive the flange of the wheel, causing the lever to revolve, all substantially in the manner described.

2d, The combination of the rod and crank, I, G, with the revolving lever, A, by means of short arm, J, so constructed and arranged that the train, passing over it, shall communicate a lifting force to rod, L, all substantially as described.

80,548.—TRUNK-CASTER FRAME.—George B. Jenkinson, Newark, N. J.
I claim, as a new article of manufacture, the within-described trunk-caster frame, formed with clamps, c, c, braces, b, b, and having the roller placed in the angle of the frame, for the purpose set forth.

80,549.—BOOT PROTECTOR.—J. U. Johnson, Springfield, Mass. Antedated July 24, 1868.
I claim, as an article of manufacture, the boot protector, constructed and arranged as described.

80,550.—STEAM HAMMER.—David Joy, Middleboro, Great Britain, assignor to Gustav Brinkman, assignor to J. Vaughan Merrick, W. H. Merrick, and John E. Cope.
I claim the employment of the piston or hammer bar of a steam hammer or hammers, driven by elastic fluid, as the valve for the hammer, the ports being formed in the piston, hammer-bar, or cylinder, or among them conjointly substantially as set forth.

80,551.—WHIFFLE TREE.—J. W. Kelley, Cleveland, Ohio.
I claim the dove-tailed fork plate, C, in combination with the dove-tailed ribbed plate, F, in the manner and for the purpose set forth.

80,552.—APPARATUS FOR WELDING TOGETHER THE LAY AND LAND SIDE OF A PLATE.—John Lane, Chicago, Ill.
I claim an improved implement for facilitating the welding together the lay and land side of a plate, namely, a vice, the jaws of which are so shaped as to fit the curved surface of the lay and the under edge and inner side of the land side, substantially as shown and described.

80,553.—KNIFE RING.—Charles B. Long, and William A. N. Long, Worcester, Mass.
We claim the combination of the peculiar-shaped knife or cutter, b, with the slotted nut, a, c, p, h, and part, C, of the ring, substantially as and for the purpose set forth.

80,554.—FRUIT JAR.—J. B. Lyon, East Cleveland, Ohio.
I claim the screw tube, G, provided with notches, a, as arranged, in combination with the valve seat, D, valve, E, elastic band, H, and cover, B, for the purpose substantially as set forth.

80,555.—BOOT AND SHOE AND CLOG FOR THE FEET.—George W. Martin, Boston, Mass.
I claim, 1st, The two parts, A and B, of a boot or shoe heel by means of tongue and groove, h and g, when provided with self-adjusting retaining springs, c, c, either with or without the spring, d, for the purpose specified.

2d, The tongue and groove, h and g, when formed with the receding slopes, i, i, and the heel, j, when constructed and attached, as described, either with or without the projection, k, and openings, p, p, as and for the purpose set forth.

3d, The elastic adjustable pieces, m and n, in use either upon heel or sole of boot or shoe, as specified and set forth.

4th, The tongue, b, and groove, g, in application to the heel of a boot or shoe, substantially in the manner illustrated, and for the purposes described and set forth.

80,556.—CULTIVATOR.—Robert McCorkell, Philadelphia, Pa. Antedated July 15, 1868.
I claim, 1st, The lever, H, rack, L, and connecting rod, N, in combination with the plates, K, for the purpose set forth.

2d, The lever, E, in combination with the drag bars, C, standard, n, and rubber spring, r.

3d, The mode of attaching and securing the head, b, of the drag bar, C, for the purpose of adjusting the angle of the plow.

4th, The mode of attaching and securing the standard, z, to the bar, y, as and for the purpose set forth.

80,557.—SPEAKING TRUMPET.—F. J. Miller, Brooklyn, N. Y.
I claim as a new article of manufacture, a speaking trumpet, made in substantially the manner described and shown, and for the purposes set forth.

80,558.—HAMMER FOR SEWING MACHINE.—John Morrison, Birmingham, England.
I claim, 1st, The hammer, a, in combination with the graduated jointed arm, b, and horizontally-awing base plate, c, substantially as and for the purposes herein shown and set forth.

2d, The combination, with the graduated arm, b, and base plate, c, of the spring shoe, f, f, f, constructed and used substantially as herein shown and described.

3d, The combination, with the hammer, a, a graduated jointed arm, b, and base plate, c, of the spring plate, b, b, b, joined to the arm, b, at h, substantially as and for the purposes set forth.

80,559.—OIL FOR WOOL.—William H. Moss, New Richmond, Ohio.
I claim the preparation of a compound oil, composed of the ingredients and in the proportions, and made in the way and manner, substantially as set forth above, for application to the use and manufacture of all kinds of woolen goods, and the greasing, carding, cleansing, and spinning of all kinds of wool.

80,560.—EXPANDING MANDREL.—Augustus F. Nagle, Providence, R. I.
I claim an expanding mandrel, as herein described, consisting of the slotted shell, B, having spring jaws, B, B, and tapering arbor, A, all constructed, arranged, and operating in the manner set forth.

80,561.—BIRD CAGE.—Charles L. Osborn, New York city. Antedated July 20, 1868.
I claim, 1st, The combination, in a cage, of the sills, posts, plates, girts, cross ties, etc., constructed as described, with the glass sides, substantially as herein specified.

2d, The rest or sleeping compartment, J, constructed below the surface of the floor of the cage, substantially as described, when used for the purpose set forth.

80,562.—SPRING-SEAT FOR WAGONS.—Henry H. Palmer, Rockford, Ill.
I claim a seat, A, bottom, B, braces, C, and straps, E, in combination with the spring, D, when arranged to operate substantially in the manner herein described.

80,563.—BUTTON.—Frederic J. Peabody, Medford, Mass.
I claim a stud or button, having its back or inner plate, B, divided on one side into two portions, b, c, which are bent or curved around in opposite directions, so as to overlap each other, substantially in the manner and for the purpose set forth.

80,564.—MACHINE FOR POLISHING WOODEN HANDLES.—E. Quinlan, Sheboygan Falls, Wis.
I claim a hollow mandrel, A, with the burnishers, D, D, attached thereto, substantially as and for the purpose set forth.

80,565.—ATTACHING HANDLES TO TOOLS.—George Raymond, Fitchburg, Mass., assignor to himself and Samuel E. Crocker.
I claim the combination, with the handle, its ferrule, and the tang or shank of the tool, of a special key, passing through both the ferrule and handle, and encircling and grasping the end of the shank or tang, under the arrangement and for operation as herein shown and set forth.

80,566.—WATER WHEEL.—Isaac S. Roland, Reading, Pa.
I claim the movable and self-relieving chute chamber, f, j, k, l, located within the series of water wheel buckets, c, c, and operating therewith, substantially as herein set forth.

Also, the arrangement of the movable chute chamber, f, j, k, l, and its annular support, g, with the disk and buckets of the water wheel, substantially as herein set forth and described.

Also, the combination of the tubular gate, h, with said movable chute chamber, arranged and operating substantially as herein set forth.

80,567.—MOLD FOR CASTING LETTERS, ETC.—George F. Sack, New York city.
I claim a mold for casting letters and ornaments, which will retain an accurate impression of the most delicate tracings of the pattern, made of a soap or other material, in the manner substantially as herein described, and for the purpose set forth.

80,568.—GAS-BURNER ATTACHMENT.—John Scholl, Soho, assignor to Samuel S. Watson, Myfair, England.
I claim, 1st, The combination with a gas burner or other equivalent gas light improver or perfecter, of a guard or protector, for the purpose hereinbefore set forth.

2d, The peculiar mode of combining a gas light improver or perfecter with a guard or protector, whereby the former is maintained, through the agency of the latter, in a proper adjusted position, substantially as hereinbefore described, and illustrated by the drawings.

80,569.—HOISTING APPARATUS.—Elijah U. Scoville and Washington L. Coville, Madison, N. Y.
We claim, 1st, The circular disc-shaped pulley, J, and roller, I, for operating the discharge of the transit pulley, A, B, substantially as shown and described.

2d, The circular catch, K', and latch, M, N, in connection with the transit pulley, A, B, constructed and operating substantially as herein shown and described.

3d, The combination of retaining projections, e, with discharging levers, E, and hooked cheeks, a, a', of transit pulley, A, as herein shown and described.

80,570.—LIGHTING UP PICTURE GALLERIES.—Edgar M. Smith, New York city.
I claim a lighter, so constructed with dimmed plate glass, and with the burners, as set forth, that portion of a room or gallery above the line of vision shall be brightly lighted, and all that portion below the ordinary line of vision be in dim or obscured light, substantially as and for the purpose set forth.

Also, in combination with the dimmed plate glass, the bent rods and knobs, or their equivalents, for changing the height of the bright light, and the dimmed light in the room or gallery, substantially as and for the purpose described.

80,571.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Benjamin B. Snow and Theo. J. Dickerson, Auburn, N. Y.
We claim, 1st, The combination with a rotating frame, for the purpose of holding the knife clamp, substantially as described.

2d, The rod, D, moving longitudinally in the rest, C, for the purpose of successively bringing the sections of the reaper knife to the stone.

3d, The combination of the clamp, E, and rod, D, with the rest, C, frame, A, and fixed stone, B, all arranged and operating substantially as described.

80,572.—HAND-SPINNING MACHINE.—W. H. Stevenson, Athens, Mo.
I claim, 1st, The rod, e, stud, m, levers, r, v, v', and t', jaws, h, b', step, s, and plate, w, of a spinning machine, all constructed, arranged, and operating in relation to one another and the parts of the machine, substantially as and for the purpose specified.

2d, The rod, e, stud, m, lever, r, and its arm, A, levers, s, and g, with its connection, ratchet, l, l, and a spinning machine, all constructed, arranged, and operating relatively to themselves and the other parts of the machine, as and for the purpose specified.

3d, The combination of the parts above mentioned with the frame, A, carriage, B, drum, C, belt, D, and roller, F, of a spinning machine, as and for the purpose specified.

80,573.—WATER BOSHES FOR PUDDLING FURNACE.—Joseph Stokes and John Hough, Trenton, N. J.
We claim making the boshes below, and the hollow to extend under the bottom for the passage of a current of water, substantially as and for the purpose set forth.

80,574.—GRATE BAR.—O. H. Taylor, Brooklyn, N. Y.
I claim, 1st, The grate bar, A, provided with serrations or indentations upon the upper slope of said bar, as herein shown and described, and for the purposes set forth.

2d, The key, D, in combination with the slots, F, F, for the purpose of locking the bars, substantially as shown and described.

3d, The combination of the grate bar, A, provided with serrations or indentations, and interlocked by an independent key, when constructed as shown and described, and for the purpose set forth.

80,575.—FRICTION NIPPLE.—D. Thomas, Hingham, Mass.
I claim, in friction nipper feeds, the employment of a shoe in connection with the notched lever, cheeks and flanged ring, so as to operate substantially as described.

80,576.—TEA-KETTLE, COFFEE-POT, ETC.—W. Wagstaff, Millbury, Ohio.
I claim the transverse arrangement of the pipes, C, in the chamber, B, and in combination with the tea kettle or coffee pot, A, in the manner as and for the purpose set forth.

80,577.—LAMP WICK TRIMMER.—Daniel Warner, Boston, Mass., assignor to himself, James T. Bowman, Richard C. Dougherty, and Daniel J. Buckles.
I claim the clamp gage, as constructed of the flat tube slitted at its opposite edges, as set forth.

Also, the combination and arrangement of either or both the flanges, e, e, to the flat tube slitted at its opposite edges as specified, the whole being for the purpose or purposes as explained.

80,578.—HORSE DRIER.—W. F. Waterhouse, Weyauwega, Wis.
I claim, 1st, A furnace, with hopper-shaped interior, in combination with movable belt, b, substantially as described.

2d, The roof, D, hung by hinges at the eaves, so as to perform the threefold purpose of roof, for protection against the weather, as shown in Fig. 1, of eaves, to reflect aerial and solar heat, and to cover the kiln, to retain the heat when the hops are off, substantially as described.

80,579.—ROCK DRILLING MACHINE.—William Weller, Washington, N. J.
I claim, 1st, The driving shaft, D, carrying at the opposite ends wheels F and F', and arranged on the frame of the machine, substantially as and for the purpose described.

2d, The yoke, G, secured to the top of the frame of the machine, for the purpose specified.

80,580.—APPLE PARER.—C. Albert Wiggins, North Sandwich, N. H.
I claim, 1st, The turn table, B, cogges as described, and furnished with projection, N, in combination with pinion, F, constructed and arranged to operate substantially as set forth.

2d, Shaft, b, spring, D, pinion, F, table, B, shank, g, knife, G, springs, et and 23, fork, J, shaft, F', pinions, i, and h', gear wheel, L, and shaft, F, all combined and arranged substantially as and for the purpose set forth.

80,581.—SCAFFOLDING.—Marvin T. Williams, Milwaukee, Wis., assignor to himself and John Lund.
I claim the two short ladders, A, pivoted to the bars, C, having the spring catches, D, arranged to engage, this catches in the ends of bar, A, all constructed and arranged for use substantially as herein shown and described.

80,582.—ADJUSTABLE BARREL HEAD.—Andrew C. Yawger, Newark, N. J.
I claim the pieces, A and B, when used in connection with piece, C, of a barrel head, as held in place by means of piece, F, and screw, G, all constructed and operating substantially as set forth.

80,583.—SCREW DRIVER.—Isaac Allard (assignor to himself and Frank A. Howard), Belfast, Me.
I claim, 1st, The tab, A, the spiral shank, B, and the spring, C, when the same are constructed, arranged, and operated substantially as and for the purpose shown and described.

2d, The spring catch, F, in combination with the spiral shank, B, and tube A, as herein described, for the purpose specified.

80,584.—CAR COUPLING.—William S. Anderson, Shelbyville, Tenn.
I claim the combination of the lever, C, bolt bearer, D, bolt, E, and link, F, in connection with the buffer, A, and coupling frame, B, secured to the car by the bolt, H, all constructed and arranged as described, and for the purpose specified.

80,585.—SEED PLANTER.—Moses Atwood, New Sharon, Iowa.
I claim, 1st, The attaching of the seed distributing apparatus to a frame, G, placed on the frame, A, of the machine, in the manner substantially as shown, to admit of the furrow and covering shares being raised when necessary, as set forth.

2d, Operating the seed distributing plates, q, q, through the media of the treadle shaft, B, and bent levers, S, S, arranged substantially as set forth.

3d, The adjustable bar, K, arranged as shown in connection with the bars N, N, on which the seed boxes, M, M, are secured for the purpose specified.

4th, The combination of the frame, G, with the frame, A, provided with track wheels, when said frames are used in connection with a seed-dropping mechanism, as set forth.

80,586.—MACHINE FOR REMOVING WIRE TEETH FROM CARDS.—John A. Baham, Robert C. Wilson, and Samuel French, Aurora, N. Y.
We claim, 1st, The toothed drums, B' and C', the card-guide upon the bar, U, and the adjustable plate, x, provided with the guides, y, y, combined and arranged substantially as and for the purpose set forth.

2d, The tooth wheel, F', when used in combination with the drums, B' and C', as and for the purpose set forth.

3d, The knives, E', and wheel, T', in combination with the drums, F, M and G, constructed and operating as and for the purpose set forth.

80,587.—BEE-HIVE.—Zebiah W. Bassett, Fulton, N. Y., administrator of the estate of N. P. Bassett, deceased.
I claim, 1st, The securing of the comb-hives, G, in the box, C, by means of the screw, q, and spurs, r, as shown and described.

2d, The entrance passage, m, in connection with the entrance passage, h, i, and chamber, j, all arranged substantially as and for the purpose specified.

80,588.—STOCKING DARNER.—Simeon R. Bolton, Prescott, Wis.
I claim a stocking tree, consisting of detachable heads and shaft, the heads being of different sizes, and the shaft provided with a cavity for use as a needle case, all arranged substantially as herein described.

80,589.—DENTISTS' AND BARBERS' CHAIR.—Alonzo T. Boon, and James B. Finckh, Galesburg, Ill.
We claim, 1st, The combination and arrangement of the head-rest, F, crank, G, with a grooved cam, h, and roller, e, all constructed and arranged as herein shown and described.

2d, The combination and arrangement of the support, A, rod, B, spiral spring, C, helical screw, D, and rack, E, with the seat of the chair, substantially in the manner and for the purpose as herein shown and described.

80,590.—LAMP.—S. C. Brockington, Groton, Conn.
I claim the self-acting valve attachment to lamp reservoirs, consisting of the valve, c, attached to a float, E, and made and operating substantially as herein shown and described.

2d, The device set forth in the foregoing clause, in combination with the perforated guard, F, arranged as shown.

3d, The combination of the lamp reservoir, C, with the guard, F, float, E, and valve, c, and with the pipe, B, stop-cock, C, and tank, A, all made and operating substantially as herein shown and described.

80,591.—WEATHER STRIP.—Albert C. Brown, Chicago, Ill.
I claim the combination of the molding, a, with the screw, C, provided with a groove, c, arranged substantially as and for the purposes specified.

80,592.—STEAM TRAP.—Robert Brown, Norwich, Conn.
I claim the arrangement of the steam exhaust chest, A, the perforated partition, F, G, the disk valves, H, I, and their common stem, J, with relation to each other and the cylinder, as herein shown and described.

80,593.—COTTON SEED CLEANER.—Thomas W. Brown, Cudworth, Barnsley, England.
I claim, 1st, Removing the fiber from the hull of cotton seed by successively heating and cooling the same, by means substantially as herein shown and described, and for the purpose set forth.

2d, The combination with the heat, r, B, of the feeding rollers, E, F, hopper, D, and spout, G, substantially as and for the purpose herein shown and described.

3d, The combination with the heater, B, of the aritating pan, L, substantially as and for the purpose described.

80,594.—SKIN-SETTER FOR AXLE.—John Burt, Sturgis, Mich.
I claim, 1st, The employment of the slide, h, in crank, D, for adjusting the arm, substantially as and for the purpose specified.

2d, The crank, g, g, when hinged or pivoted at both ends, substantially as set forth, for the purpose of accommodating them to the set of the arm.

3d, Providing the crank, D, with a rocking box, a, and attaching screw sh, h, thereto, substantially as described.

4th, Finally, wheel B, constructed substantially as set forth, in combination with the crank or pinion, and ways, g, g, screw shaft, h, knife block, E, divided nut, e, and crank, D, for the purpose described.

80,595.—PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J., assignor to Henry Seymour and Robert H. Seymour, New York city.
I claim the holder, K, in combination with the movable blade, D, and fixed blade, B, of a pair of pruning shears, when said holder is applied or arranged so as to be operated automatically from the movable blade, D, substantially as and for the purpose set forth.

Also, operating the movable jaw, D, through the medium of the cross arm, I, attached to the shaft, H, which is provided with the crank, G, to which the spring, J, and rod, F, are attached, all arranged substantially as shown and described.

80,596.—CLAMPING KNIVES OR CUTTERS OF MOWING MACHINES WHILE BEING GROUNDED.—Henry J. Case (assignor to Henry Richardson, Auure, N. Y.).
I claim in combination with the clamping and holding bar, A, the series of clamping rollers, actuated through a common lever for fastening and releasing the reaper bar or sickle, substantially in the manner and for the purpose described.

80,597.—MEDICAL COMPOUND FOR TREATING HOG CHOLERA.—N. H. Case, Henryville, Ind.
I claim the compound

herein shown and described, in combination with the long tenon, D, of the dasher handle, C, as and for the purpose set forth.

80,686.—COMBINED PLOW AND PLANTER.—Isaac H. Walker, Newton, Ill.

I claim, 1st, The mold boards, C, C, projecting rearwardly and inwardly from the front mold boards, B, B, at the same or a greater depth, substantially in the manner and for the purpose specified.

2d, The combined arrangement of the seed box, D, D, dropping slide, G, crank lever, F, and treadle, E, all constructed and employed substantially as and for the purpose specified.

3d, The harrow, J, constructed as described, and employed in combination with the plows, B, C, and planter, D, I, in the manner and for the purpose specified.

4th, The combined arrangement of the plows, B, C, planter, D, I, harrow, J, and roller, L, all constructed and operating substantially as and for the purpose specified.

5th, The hollow roller or drill, I, in combination with the mold boards, C, C, and planter, D, as and for the purpose set forth.

80,687.—TIRE COOLER.—John Wampach, Shakopee, Minn.

I claim the combination of the connecting rods, E, lever, D, connecting rod, G, and lever, F, with each other, with the box, B, beams, C, and frame, A, arranged substantially as herein shown and described and for the purpose set forth.

80,688.—CAR COUPLING.—James White, Harrison, Ohio.

I claim, 1st, The pin, C, enclosed within the tight cylinder, B, F, and operated by a spring, E, substantially as and for the purpose specified.

2d, In combination with the above, the lugs or projections, J, K, telescopic hollow stem, L, and spring, M, all constructed, arranged and employed as and for the purpose specified.

80,689.—GRATE FOR STOVES, RANGES, AND HEATERS.—Richard Whiting and Albert Hamilton, New York city. Antedated July 23, 1868.

We claim an "adjustable grate," so constructed that the size of the fire space may be readily increased or diminished, by raising or lowering one section of the grate perpendicularly, or by inclining the other section or sections thereof to any required angle, by means of a cam, lever, or other device, using either movement separately, or both combined in one stove, range, furnace, or heater.

80,690.—THRILL COUPLING.—Hironimus Will, Columbus City, Iowa.

I claim a shaft coupling having pieces, A and B, clutch, D, and spring, E, constructed, combined, arranged, and operating substantially as specified.

80,691.—WEATHER BOARD GAGE AND REST.—Isaac Williams, Westfield, Ind.

I claim the combination of the hollow shouldered part, A, having the parts at the gage, adjustable stem, B, and the sliding wedge, D, all constructed, arranged, and operating as herein described, for the purpose specified.

80,692.—GAGE FOR WEATHER BOARDING.—Isaac Williams, Westfield, Ind.

I claim the bars, A, provided each at its outer end with an adjustable pivoted blade, B, and socketed at their inner ends for the reception of the sliding connection, D, which is adapted to be clamped in the desired position, said bars, A, being provided with flanges, a, all constructed, arranged and operating substantially as and for the purpose herein set forth and shown.

80,693.—TANNING.—W. Windoes, Fond du Lac, Wis.

I claim, 1st, The employment of a sugar and bran dump, in combination with the usual tanning process, all substantially as and for the purpose set forth.

2d, The alum and salt pater tanning liquor, in combination with the preceding process, or other equivalent processes, all substantially as set forth.

80,694.—HARVESTER.—C. W. Witt and B. F. Witt, Indianapolis, Ind., assignors to B. F. Witt.

We claim, 1st, The tipping rake, when constructed and arranged receive the grain as it is cut, and deliver it to the binder, substantially as described.

2d, The box, A, with the sector or binding table, D, in combination with the tipping rake, substantially as described.

3d, The combination of the reciprocating bar, m, and plate, L, having the grooved rollers, c, arranged thereon to form the supports of the bar, m, all substantially as set forth.

80,695.—CAR BRAKE AND STARTER.—John S. Wood, Lansing, Mich.

I claim, 1st, The combination of the cylinder, B, wheel, D, and clutches, E and F, and flanges, G, when constructed and arranged substantially as described.

2d, The combination of the levers, H, flanges, and clutches, E and F, when so arranged that as the flanges are disengaged from the arm, the clutch on the same side will be engaged with the teeth on the hub, substantially as set forth.

3d, The combination of the cylinder, B, and wheel, D, with the flanges, G, when respectively constructed that a projection from the flanges may be made to engage the arms, B, or D, and prevent the revolution of the wheel or cylinder, substantially as and for the purpose set forth.

80,696.—EXCAVATOR.—Charles F. Woodruff, Newbern, Tenn.

I claim, 1st, In a revolving scraper or excavator, the combination of the swinging plates, F, F, and the rounds, d, d, or their equivalents, substantially as and for the purpose specified.

2d, The combination of the lever, M, having the handle, m, and the hook, n, with the pawl, p, ratchet, w, and binding, when the parts are constructed to operate substantially in the manner and for the purpose specified.

80,697.—SLEEVE OF KNITTED GARMENTS.—Wm. H. Abel, Greenville, R. I. Antedated July 31, 1868.

I claim, 1st, Making the short sleeves of under shirts, vests, and similar garments, of tapes or strips which have selvage edges, and in which the courses of stitches or loops run in the same direction as in the body of the garment, for the purpose and substantially as described.

2d, Forming the gusset of such sleeves in the manner and for the purpose substantially as described.

80,698.—STEAM ENGINE SLIDE VALVE.—L. H. Allen and John B. Wilford, Tanawana, Pa.

We claim the arrangement of the bars, m, m, with the exhaust openings, L, L, and passages, i, i, whereby the stroke of the valve, C, so as to make the main steam opening of the ports, substantially as set forth.

80,699.—BUTTON.—Henry Ansley, Washington, D. C.

I claim a button or stud constructed with the parts, A, B, C, and C', arranged in relation to one another substantially as described.

80,700.—LOW WATER DETECTOR FOR BOILERS.—John Ashcroft, New York city.

I claim, 1st, The construction, arrangement, and combination of the low water detector tube, B, and fusible plug, D, with the steam alarm tube, F, weighted valve, H, and steam whistle, I, substantially as herein shown and described.

2d, The steam connection pipe, N, and valve, O, in combination with the fusible plug, D, and steam whistle, I, substantially as herein shown, described and set forth.

80,701.—APPARATUS FOR EXTINGUISHING FIRES.—James F. Babcock, Boston, Mass.

I claim a liquid ejecting apparatus having a main water or liquid chamber or reservoir, A, and a gas generating tube, D, this tube having provision at its upper part for holding the gas generating composition to be burned, and the tube and main chamber being constructed and arranged substantially as described.

80,702.—CENTRIFUGAL MACHINE FOR FILTERING, DRAINING, AND DRYING.—Robert J. Barry, Philadelphia, Pa.

I claim, 1st, A forked bar, E, having a yielding bearing, and arranged adjacent to and bearing with its forked end against the suspended shaft of a centrifugal drying machine, substantially as and for the purpose specified.

2d, The said bar secured in a frame hinged to the outer casing or other permanent part of the machine, for the purpose set forth.

80,703.—CAR SEAT.—Samuel G. Blackman, Waterbury, Conn.

I claim a reversible or adjustable seat, constructed in the manner described, that is to say, the two parts which form the back and seat, according to the position in which the seat is adjusted, are pivoted upon a common center, so that both are turned to reverse the seat, substantially in the manner herein set forth.

80,704.—UNION VALVE COUPLING.—Sanford O. Blanding, Smithfield, R. I.

I claim a combined coupling and check valve, constructed and arranged substantially as described, for the purpose specified.

80,705.—LAMP.—Henry H. Boucher, Doylestown, Pa.

I claim, 1st, The combination with a lamp and a separate oil reservoir communicating therewith, of the tubular level regulator, E, two-way cock, G, and tube, F, arranged and operating substantially as described.

2d, The tube, F, in combination with an oil reservoir and an escape cock, substantially as described.

80,706.—STOVE LEG.—George W. Burling, Trenton, N. Y.

I claim the circular slot, A, when combined with the grooved recess, a, and the dovetailed lip, C, or their equivalents, substantially as and for the purpose specified.

80,707.—GLOVE.—Remue D. Burr, Kingsborough, N. Y.

I claim, 1st, Cutting the front of the hand, thumb, and all the fingers, joined in one and the same piece of material, substantially as shown and described.

2d, In combination with the iron, cut in one piece, as above claimed, cutting the whole or three sides of the fore finger, also joined in said piece, substantially as described.

3d, Cutting the back of the hand and thumb, and the back and sides of the middle and little fingers, all joined in one and the same piece of stuff, substantially as described.

4th, Cutting the back of the hand with the back and sides of the middle and little fingers, all in one piece, as shown and described.

5th, In combination with the back of the hand and the middle and little fingers, cut as above claimed, the back and sides of the ring finger, cut in one piece and sewed to the back, substantially as described.

6th, In combination with the elements of the first claim, cutting the back of the thumb separate from the back of the hand, and joining it thereto by a seam.

7th, In combination with the elements of the third and fourth claims, cutting the front of the thumb separate from the front of the hand, and joining it thereto by a seam.

8th, In combination with the front of a mitten, cut as claimed in the first claim, cutting the back of a mitten with the back of the thumb in one piece, substantially as described.

80,708.—WATER CLOSET.—Wm. S. Carr, New York city.

I claim, 1st, A water closet hopper or container, having the inward flange, e, at the upper end, in combination with the pan, d, the parts being formed substantially as specified, so that the pan can be introduced or withdrawn through the opening in said flange, e, and the pan, when in place, shall set up against the under side of said flange, as set forth.

2d, The divided axle, k, m, formed as shown, in combination with the pan, d, and socket, o, as and for the purpose set forth.

3d, The slotted adjustable link, u, in combination with the lever, r, and pull, w, v, as and for the purposes set forth.

80,709.—NON-CONDUCTOR OF HEAT.—James Chalmers (assignor to James Chalmers, Jr.), London, England.

I claim the mixture, in the proportions above described, of glutinous and siliceous clay, as the basis of a non-conducting compound, the calcination or half charring of saw dust, in the manner proposed, so as to preserve its fibrous nature and non-conducting qualities, and the use of wood and other pulp or fiber, and hoods, prepared as above, for holding and consolidating the non-conductor compound, and for adding to its non-conducting qualities.

80,710.—FASTENING FOR BUTTONS.—Geo. D. Clark (assignor to himself and Clark and Cowles), Plainville, Conn.

I claim the herein described button fastener as an article of manufacture, consisting of the plate, A, with the slot, a, and one or more projections, d, substantially as set forth.

80,711.—CHANGABLE STENCIL PLATE.—James J. De Barry, Brooklyn, N. Y.

I claim the within described slots, C, D, E, F, arranged relatively to the opening, a, and the strips, B, the whole being adapted to form an adjustable stencil plate, possessing the advantages and characteristics herein set forth.

80,712.—BASE BURNING STOVE.—T. Parsons Dickerman, New Haven, Conn.

I claim in combination with the reservoir or cylinder, B, of a base burning stove, the slide or cut-off, D, arranged and applied substantially in the manner herein set forth.

80,713.—HOMINY AND PEARLING MILL.—Edwin A. Duer (assignor to Geo. W. Patterson), Decatur, Ill.

I claim the combination and arrangement of the cylinder, B, having recesses, D, diaphragm, I, passage, K, a d slotted sliding gate, M, rotary shaft, C, provided with beaters, a, rotary screen, Q, fan blow, r, N, deflector, O, chutes H, P, hopper, E, vibrating shoe, F, and conveyor on shaft, G, all substantially as herein shown and described, for the purposes specified.

80,714.—WATER METER.—A. B. Edmunds, Melrose, Mass.

I claim a water meter or motor made with valve blades or flaps, hinged to and swinging against and from an axial drum, such blades being rotated by pressure of the water entering the meter case through the education pipe, and each valve blade being thrown out from the drum as its outer edge passes the abutment or wall, substantially as set forth.

80,715.—PLOW.—John Fisher, Middletown, Pa.

I claim the adjustable wing, C, when used in combination with a subsoil plow, B, and constructed and arranged as and for the purpose herein fully set forth.

80,716.—BEEHIVE.—Samuel P. Forgy, Allensville, Ky.

I claim the application to the box or frame, of the self-adjusting transparent light on pivots, which will, at a given or proper time, allow the bee both ingress and egress, as herein described, using for that purpose any transparent substance which will produce the intended effect.

80,717.—HAND LOOM.—Wm. S. Freeman, West Union, Ohio.

I claim, 1st, The driving shaft, M, pawl, P, ratchet wheel, Q, shaft, R, with tappets, S, and treadles, C, all constructed, arranged and operating substantially as described, for the purpose set forth.

2d, In combination with the elements of claim first, the picker staff, U, u, and strap, V.

80,718.—MEDICINE.—Emil Frese, San Francisco, Cal.

I claim the above described composition for cathartic tea, made of the ingredients enumerated, mixed and compounded in about the proportions specified.

80,719.—VENTILATOR.—John F. Frye, Lowell, Mass.

I claim the combination of a metallic chimney with an adjoining heat conducting flue, the chimney being attached to the flue by the chimney, and conveyed to rooms above the level of the fire, said tube or box being controlled by valves at both ends, so that it may be used as a ventilator in the warm season.

80,720.—COMPOUND FOR EXTINGUISHING FIRES.—Edward A. Galbraith, Boston, Mass.

I claim, 1st, A solution of salt cake of commerce in water for extinguishing fires.

2d, A solution of chloride of magnesium and silicate of soda, in combination with salt cake of commerce, or its equivalent, for use in extinguishing fires, substantially as set forth.

3d, A solution of any soluble silicate, Epsom salts, and bicarbonate of soda, in combination with salt cake or sal-sulphur, or their equivalents, for the purpose set forth.

4th, A solution of chloride of calcium, and soluble silicate, any bicarbonate of soda, in combination with salt cake of commerce, or its equivalent, for use in extinguishing fires.

80,721.—TUCK FOLDER FOR SEWING MACHINES.—Charles H. Gardner, Rochester, N. Y.

I claim, 1st, The piece, B, constructed as described, and consisting of the parts, L, u, H, spring, a, with open eyelet, e, all constructed as and for the purpose set forth.

2d, In combination with the above, the part, A, consisting of the raised block, H, and adjustable plate, H', all constructed as described, and operating together for the purpose set forth.

80,722.—VISE.—O. H. Gardner, Fulton, N. Y.

I claim, 1st, The combination of the spring, J, with the ball, H, formed upon the lower end of the shank, g', and with the cylindrical slide bar, I, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the sliding dog, O, with the shank, g', of the front jaw, G, and with the outer end of the cylindrical sliding bar, I, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the spring catch, P, with the shank, g', and with the sliding dog, O, substantially as herein shown and described, and for the purpose set forth.

4th, The described construction of the flanged plate, D, and the recessed and slotted plate, E, the former being attached to the shank of the jaw, B, by a screw, in order to be removable, as herein shown and described.

80,723.—EXTENSION WARDROBE FRAME.—Elias Gill, New York city.

I claim, 1st, An extension skeleton frame, for portable wardrobes, constructed and operating substantially as described, so that it can be longitudinally and laterally extended and contracted and folded together, as set forth.

2d, The posts, A, A, B, when connected and combined with the grooved bars, C, C, and in order to be removable, as described, and with the joined levers, H, H, or their respective equivalents, all made and operating substantially as herein shown and described, for the purpose specified.

80,724.—MACHINE FOR PICKING AND SEPARATING COTTON WASTE.—Darius Goff, Pawtucket, R. I.

I claim, 1st, A cylinder, B, armed with claw hooked teeth, L, so constructed that when set their points shall travel foremost as the cylinder revolves, substantially in a line concentric with the surface of the cylinder, in combination with the feed roller, G, or other suitable feeding mechanism, as described.

2d, The combination of the cylinder, B, as described, with a casing or jacket, m, constructed with a suitable opening, H, and a door for closing the same, substantially as and for the purpose specified.

3d, The combination of the cylinder, B, as described, with the feed roller, G, and retaining bar, R, or other suitable mechanism for delivering and retaining a hold of the material, substantially as described, while it is subjected to the action of the cylinder, as specified.

80,725.—MACHINE FOR CUTTING AND FOLDING SHEET METAL.—A. G. Gray (assignor to himself and James T. Magee), St. John, New Brunswick.

I claim, 1st, The rectilinear reciprocating cutter head, E, and knife, B, as arranged with an independent pressure bar, F, of the cross section shown, and a rectilinear reciprocating and rocking lower knife and folder, substantially as described.

2d, The connecting rod, I, having its opening about shaft, M, elongated vertically, as connected with trunion blocks, h, coupling screw, n, lifting and depression pins, m, and o, and cams, p, and q, substantially as and for the purpose described.

3d, The pressure bar, F, having notched standards, f, as arranged with cutters, E, spring, z, and cams, e, as and for the purpose specified.

4th, The arrangement of the pressure bar, F, as described, in combination with the rectilinear reciprocating and rocking folder, N, carrying knife, C, substantially as described.

80,726.—MACHINE FOR MAKING WHEELS.—Harrison Haag, Bernville, assignor to himself and George W. Yager, Reading, Pa.

I claim, 1st, A disk, J, adjustable, as described, on a standard, I, and carrying a tool, K, so that when in an elevated position it will serve to retain a hub, and when depressed will hold a felloe, all as and for the purpose specified.

2d, The cross head, G, with its arm, v, v, and screw rods, H, and z, sliding on the vertical standards, F, F', so that when in an elevated position it will serve to retain a hub, and when depressed will hold a felloe, all as and for the purpose specified.

80,727.—WASH BOILER.—Alex. W. Hall, New York city.

I claim the combination of the circulating chamber, C, attached to the boiler, A, with the boiler, A, provided with aperture communicating with each, all constructed and arranged substantially as described.

80,728.—FIRE PROOF SAFE.—J. L. Hall, Cincinnati, Ohio.

I claim, 1st, Arranging a series of bars or other anti-corrosive vessels, C, containing water, or other suitable liquid, when the same are embedded in concrete, hydraulic or other cement, between the inner and outer casings, B and A, respectively, of fire proof safe, substantially as and for the purpose specified.

2d, The combination, in the construction of safes, of the case, A, bars, a, and the angle and bars, b, when arranged as described.

3d, The perforated lining, B, to permit the escape of the steam to the interior of the safe, substantially as and for the purpose set forth.

80,729.—CLOTHES DRYER.—George H. Hammond, Davenport, N. Y.

I claim a clothes rack, having folding radial arms, b, ropes, f, and jointed braces, d, e, in combination with two hubs fixed rigidly on a central shaft, A, all substantially as shown and described, and for the purpose set forth.

80,730.—CAR COUPLING.—C. R. Hardy, Lexington, Ind.

I claim the slotted coupling bar, A, pivoted block, B, spring, C, and mortised spring bars, D, with each other and with the draft bars of the cars, substantially as herein shown and described, and for the purpose set forth.

80,731.—FIREPLACE.—D. Hattan, Zanesville, Ohio.

I claim, in combination with a fireplace back, providing with a sliding plate, C, one or more air tubes, E, arranged in and through the back, beneath the plate, substantially as set forth.

80,732.—PATTERN FOR TRIMMING HAT BRIMS.—C. M. Hawes, New York city.

I claim the revolving plate, C, with upright springs or elastic bars, F, attached, provided with pins, a, at their upper ends to fit in holes in the pattern, D, all arranged substantially in the manner as and for the purpose set forth.

80,733.—MACHINE FOR BLOCKING AND STRETCHING HATS.—George H. Hawkins, New York city.

I claim the combination of a block or former, to form the crown and body from the inside, and a rim or former, to form the brim from the upper side, with a base rim, to aid in holding the material while it is being molded or formed, substantially as described.

80,734.—BELT PUNCH.—Eben Hester, Suffield, Conn.

I claim a belt tool, constructed substantially as and for the purposes described.

80,735.—CAR COUPLING.—Omer Hewes, Kankakee, Ill.

I claim the lever jaws, E, pivoted in the angle between the bumper head, B, and the side bars, C, and attached at their inner ends to the slotted springs, F, in combination with the cam, G, whereby the coupling pin, D, is released from the lever jaws by the action of the cam upon the springs, as herein shown and described.

80,736.—SUPPORT FOR CAR SEAT BACK.—George Higginson, Newark, N. J.

I claim, 1st, The elastic bearings, consisting of the spring, E, and sliding blocks, C, G, for car and other seat backs, made and operating substantially as herein shown and described.

2d, The blocks, C, G, when combined with the springs, E, and cases, D, and when having pins, e, that fit into the slotted or grooved cases, substantially as herein shown and described.

80,737.—METHOD OF SEPARATING FIBRES FROM MULBERRY TREES.—Wilhelm Holzman, New York city.

I claim the method herein described of producing silk from mulberry trees.

80,738.—VALVE FOR STEAM ENGINE.—Wm. D. Hooker, San Francisco, Cal.

I claim, 1st, The recesses, o, o', in the piston, B, arranged with reference to the ports, h, h', substantially as herein set forth and shown.

2d, The arrangement, with relation to the cylinder, a, valve chamber, c, and the additional puppet valve chamber of the valves, d, d', with its recesses u, u', supply port, f, ports, g, g', h, h', i, i', e, o', vents, q, q', exhaust ports, j, j', ports, s, s', and puppet valves, r, r', substantially as herein described and shown.

80,739.—AMALGAMATOR.—Alfred Horn, Silver City, Nevada.

I claim, 1st, In combination with the annular chambers, B and B', the connecting groove or grooves D, D, substantially as and for the purpose specified.

2d, The incline projection or scrapers, F, F, cast at the end of the shoe, conforming to the natural wear of the shoes and dies without adjustment, substantially as described.

3d, Attaching the wings, G, G, by the beveled slots, H, H, and lugs, H', H', substantially as described.

80,740.—APPARATUS FOR DISTILLING SPIRITS.—Clark S. Hutchinson, Burlington, N. J.

I claim, 1st, The flat upright condenser, O, having arranged within it the shelves, d, d', overlapping each other, and shaped as described, with outlets for the escape of spirits of different grades, substantially as shown and described.

2d, The pools, d', either inside or outside of the condenser, C, in combination with the outlet pipes, g, g', arranged and operating substantially as described.

3d, The doubler, M, constructed as described, between the still and the condenser, having the two pipes, m, m', intermediate valve, p, and inlet pipe R, and operating substantially as shown and described.

4th, The arrangement and combination of the condenser with its shelves, d, d', the pool, n, with its exit pipes, g, g', and doubler

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