SCIENTIFIC AMERICAN

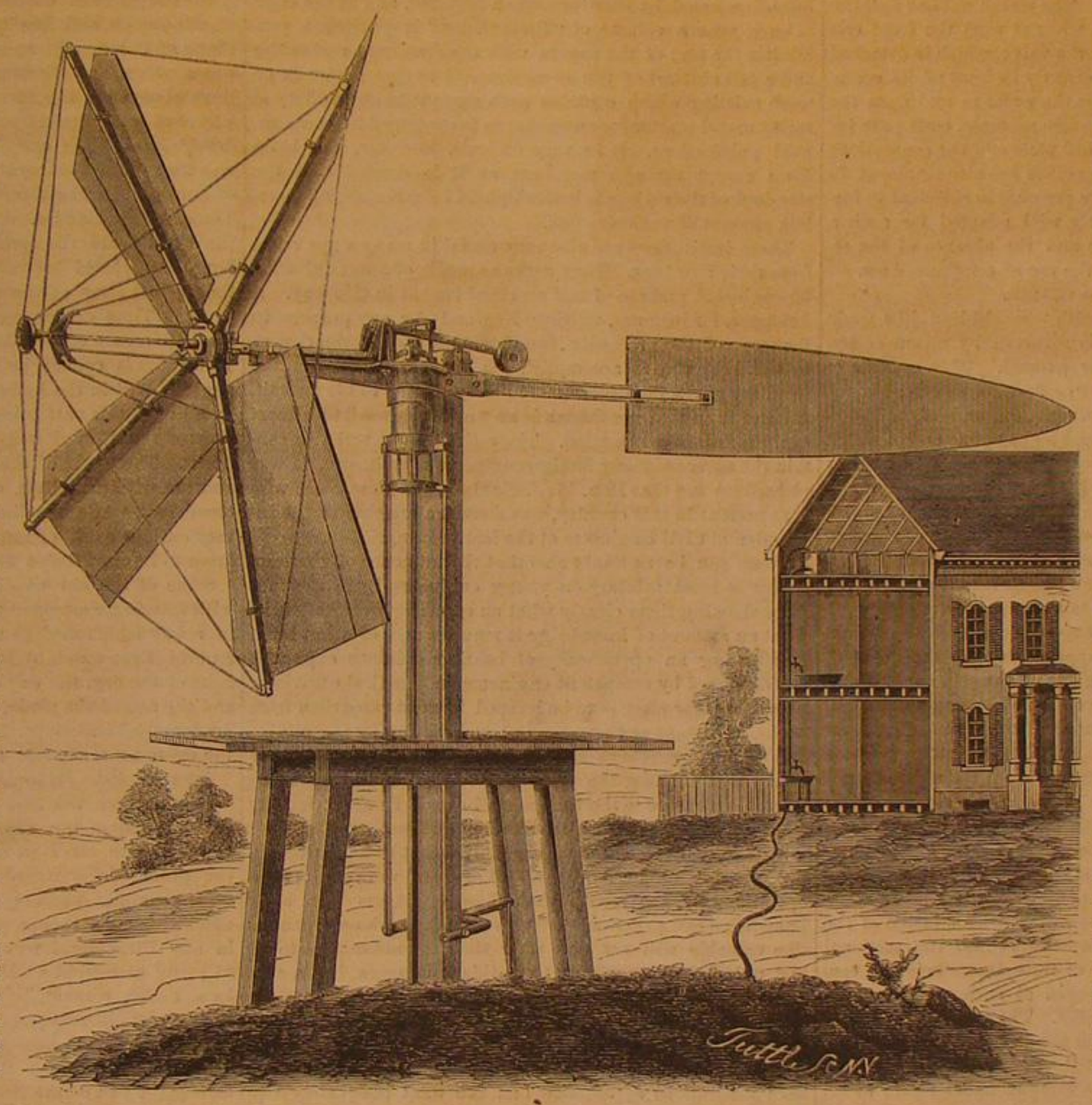
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Improved Wind Mill.

It must have been at a very early period when the attention of men was first directed to the employment of the wind as a motor. Its force being so evident to the senses, there is little doubt but it was one of the first means which man employed as his servant. The lack of regularity in its motion, and the entire failure of motion in a calm has however driven it from competition with steam or water, as a motor for manufacturing purposes where steadiness and reliability are requisites. Still, for some purposes and in some situations, the wind mill is cheaper and as useful as any other motor. The attacks of prejudiced advocates of mechanical progress on this old-fashioned machine have proved as futile as those of Don Quixotte, and the wind mill still holds its own as a valuable adjunct of man's efforts. The dyked level of Holland is thickly studded with these machines employed in raising water, and for this purpose, the wind mill deservedly continues to hold a high position. In this work continuity of operation or steadiness of motion is not very important, as the results of the work performed when the wind blows can be stored up for a season of calm.

A number of wind mills of varying construction have been introduced, but some of them have been planned apparently by men whose ideas on the action of the wind were somewhat crude, and their machines have been in some cases cumbrous or complicated and more or less liable to get out of order. The mill shown in the engraving is the production of a mechanical engineer who has devoted many years to the study and construction of wind mills, and it appears to have been planned on sound mechanical and scientific principles. It is conceded by good authority that the vertical wheel, like that in the engraving, gives out a much larger amount of power than one of the horizontal style does for the amount of surface exposed to the action of the wind; and this is, therefore, the plan of the "Sancho Panza."



HEWITT'S SANCHO PANZA WIND MILL.

The arms carrying the wings are seated in a cast iron hub and braced at their extremities by rods passing from one to the other, and also by others to a collar on the end of the horizontal shaft. From the wings extend other rods which connect with the arms of a "spider" turning loosely on the shaft and made to slide on it. The wings are pivoted to the radial arms so that they can be turned to present their surfaces at angle more or less acute according to the force of the wind. From the "spider" pass rods parallel to the shaft, connected to a collar on the shaft to which connections are pivoted which, by vertical bars, are attached to a lever having a shifting weight. From this lever, rods extend down the upright and connect with another lever and rope, by pulling upon which the sails may be set to any angle desired or directed with their edges to the wind to stop the machine. By means of a crank, motion is given to a pump rod or to any other machinery.

The engraving represents a wind mill forcing water from a well into the upper story of a dwelling, filling a tank from which the water can be led to a bath tub, sink, or any other receptacle for domestic uses. The sails are at all times presented to the wind by the vane.

This mill was patented Feb. 19, 1867, by Frederick Hewitt, of Newark, N. J.

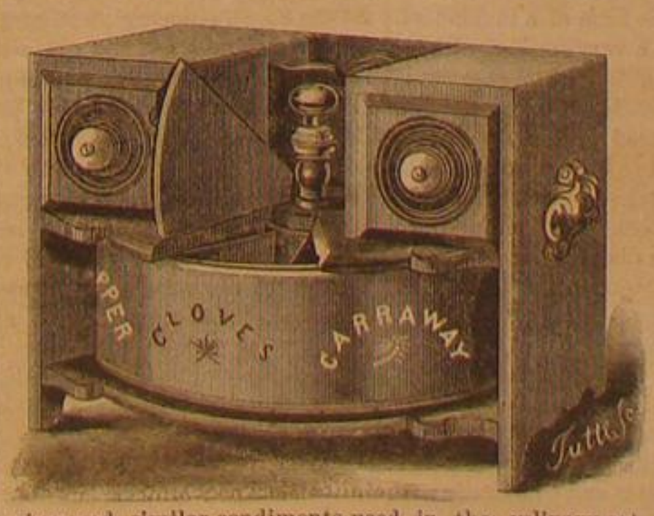
It is very strongly built, is cheap, and always under perfect control. There is no portion of it which cannot be repaired or replaced by any ordinary mechanic. It may be seen at J. D. West & Co's, 40 Courtlandt street, New York city, who will answer all inquiries relative to it.

A Curious Formation.

A London paper states that at a certain point in the Thames where an eddy accumulates a shoal of sand, agglutinating springs rise from beneath and progressively convert the sand into rock, which has to be removed, from time to time, by blasting. Bourne, the engineer, conceived from this circumstance the idea of turning quicksands to firm foundations by a similar process, and actually proposed to do this for the railway bridge over the Soane in India. Quicksands at this point as deep as borings had been made, were to be converted into rock by injecting them, through perforated pipes, with sufficient iron water, from a hill of iron pyrites near at hand, to stick together the whole mass. The line of the road was eventually altered, and the bridge was built at another point; but Mr. Bourne still believes that an expedient of this kind will become a valuable feature in engineering.

WALKER'S IMPROVED SPICE BOX.

The prudent housekeeper is a lover of compactness and of conveniences for storing. The engraving herewith presented is that of an elegant combination cabinet for keeping the



spices and similar condiments used in the culinary art. It needs scarcely any description, as the engraving gives an excellent representation. A case of mahogany, black walnut, or other ornamental wood is provided with drawers at the sides under which is a rotating tin box in the form of a cylinder divided by radial partitions into eight compartments, each having the name of the spice it contains painted on its front. The cover has but one opening, that in the front, and the receptacle is rotated by the knob on the top of the stud on which the box turns. It is neat, handy, and convenient and will commend itself to every housewife.

A patent for this device was issued through the Scientific American Patent Agency August 21, 1866, to A. J. Walker, whom address at Lowell, Mass., for additional particulars.

Cause of Milk Sickness.

This pernicious affection of domestic animals is sufficiently mysterious and important to have induced the Legislature of Illinois, some years since, to vote a handsome reward to any one who should discover its cause. The *Medical and Surgical Reporter* gives information from three separate observers (one quoted from the *Missouri Republican*) tending to throw the responsibility upon a common and hitherto unsuspected plant, *Eupatorium Ageratoidis*. It is a coincidence, that two if not three of the discoveries were originally made in the same year, 1860. Mr. Wm. Jerry, of Edwardsville, Ill., in June of that year, gathered the plant by mistake for the nettle, and (alone) partook of it as boiled greens. On the next day he was suddenly seized with the usual symptoms of milk sickness, violent trembling, prostration and faintness, accompanied on the day after by vomiting, violent retching, and a fevered state of the stomach. He did not recover from these effects in five years, during which period he took pains to make himself acquainted with the plant which had caused them, and tried it upon animals with similar results. When in bloom, animals are said to like it.

Dr. Amos Sawyer, of Hillsboro', Ill., adds his testimony to the above. Mr. R. N. Lee, of Nokomis, had given him information of a plant with which he had repeatedly produced milk sickness in animals, and supplied him with a quantity for examination. His own experiments confirmed the report of Mr. Lee, and a botanical report by Dr. McPheeters, of St. Louis, coincided with that before procured by Mr. Jerry from Mr. Enno Sanders, chemist. The following is the description: "Eupatorium Ageratoidis L. (white snake root), smooth, branching, three feet high, leaves broadly ovate, pointed, coarsely and sharply toothed, long petioled, thin (four to five inches long), corymbs compound." Mr. Jerry promises to try the plant further upon cows the coming season. Dr. Sawyer states that the milk sickness is caused only when cattle range in the woods, and that the disease is always confined within certain well defined boundaries.

[From our Foreign Correspondent.]

LAST WORDS FROM ENGLAND.

LONDON, March 23, 1867.

THE ENGLISH DOCKS—THEIR "WHY AND WHEREFORE."

This letter will be my last from England, as I shall go to Paris next week to be present at the opening of the Exhibition. There are many things, however, of great interest, and that would afford material for study, which we have not been able yet to consider. Thus, it is proper that I should say a few words about the docks so generally in use here, since we have next to nothing of the kind with us, and every body has heard the praise of the Liverpool docks at least. The use of these is rendered almost imperative from the great rise and fall of tide which prevails all over Europe, but especially in the channels by which England is surrounded. At Liverpool this amounts to 25 feet, and at places in South Wales on the Bristol Channel the daily rise is 30 feet. This of course produces a very rapid current, which, added to the inconvenience arising from such a great change of level, would render loading and unloading vessels in the open stream a matter of some difficulty. The bottom is in general soft mud, and at low tide this is exposed in large banks, and vessels are in most cases high and dry upon these, presenting rather an odd appearance. But aside from any reasons of this nature, the

use of docks affords very great facilities for receiving and discharging cargoes, besides giving an amount of accommodation that could not otherwise be obtained. It must be remembered that the extent of water frontage, with depth sufficient for large vessels, that exists in New York, is wholly exceptional, and it is quite certain that no port in Europe compares with it in this respect.

DOCK MACHINERY.

The docks are of course built of the most substantial masonry, and in general are thoroughly provided with hydraulic machinery both for opening and closing the gates and for discharging merchandise from the vessels. Sir Wm. Armstrong has made a specialty of this kind of machinery, and its efficiency is certainly admirable. The power is furnished by a large pumping engine placed at a convenient point, and the water under pressure is conveyed by pipes to the various parts of the dock at which it is to be used. Beneath the pavement are placed little hydraulic engines which are driven from this source, and by means of suitable gearing work the gates. These engines consist of a flat bed plate supporting a short and stout pinion shaft by means of two pillow blocks, the pinion and two eccentrics being placed between them. At each end of this shaft is attached an oscillating cylinder of say 2¼ inches diameter by 18 inches stroke, the trunnions be-being placed near the front end. The piston rod has half the sectional area of the piston, and when at work the front end is constantly under pressure, and the valve, which is detached from the cylinder, being placed directly in front of its eccentric, has only to admit and release the water to and from the back end. The throttle valve is also separate, each part being bolted independently to the bed plate and the connections made by suitable pipes. These engines are also employed in deep mines where the hydrostatic pressure is sufficient to furnish the power, and are obviously well adapted for such a purpose from their compactness and the absence of the refrigerating effect accompanying the use of compressed air.

THE HOISTING CRANES.

The cranes are constructed with wrought iron jibs made fast to a central column which is revolved by means of hydraulic apparatus placed below ground. This consists of three horizontal cylinders of four or five feet length; two for swinging the jib and one for hoisting. The ends of the piston rods carry two or more sheaves and a chain, one end of which is fastened to the cylinder, passes over the sheaves and over corresponding ones bolted to the back end of the cylinder, and thence to the crane. The motion of the piston is thus multiplied four or more times, according to the number of sheaves, for the power required. The water discharged from the hydraulic cylinders is returned by a second set of pipes to the water tank in the engine house, to be pumped over again.

But the way these things are exposed to the weather would never do in our climate. I happened to visit the docks at Penarth, in South Wales, during one of the cold snaps which occurred this winter, and with coal fires burning around the pipes at every point they were unable to prevent them from freezing just as they did in dwelling houses and everywhere else. I have been very much astonished at the utter absence in all these arrangements of any provision to resist the effects of the cold that is always experienced at some time during the winter, a lack which gives rise to endless annoyance.

The pressure employed is very great. At Penarth the steam cylinders of the pumping engine are 18 inches in diameter and the bore of the pump 5½ inches, with a piston of the same size and a rod 3¾ inches diameter, or half the sectional area of the piston, the two ends of the cylinder being in connection so that the water discharged at each stroke is equal to half the contents of the cylinder. The steam is carried at 60 lbs. pressure and cut off near the end of the stroke: this must give, therefore, nearly 1,100 lbs. per square inch pressure in the water pipes. The engine remains under steam at all times but only runs when water is used at some part of the dock, starting automatically as the water is released. To maintain a constant ready pressure at all times, an accumulator is added, consisting of a long vertical ram of about 14½ inches diameter carrying a weight of 80 tuns at its upper end. This falls through a certain distance while the engine is coming to its work, and is then pumped up again by the latter till it reaches the limit of its stroke, when by a connection with the throttle valve it shuts off the steam from the engine.

Very extensive docks have been constructed within the past few years at Marseilles, and they are said to be the finest in the world, next to those at Liverpool.

THE ENGINEERING ASSOCIATIONS.

There is one exceedingly pleasant as well as useful feature of engineering as it exists here, which unfortunately does not find its counterpart in America. I refer to the societies formed among the leading engineers, at whose meetings all matters of interest are discussed. The mere statement of this will strike many, no doubt, as nothing remarkable or unknown. But it should be borne in mind that there is little more resemblance between these meetings and those of the American Institute, for example, than between daylight and darkness. It is easy enough to form a society and to hold meetings, but the interest attaching to these of which I speak is that they are composed solely of the prominent engineers, and the discussions taking place at the meetings are not in reference to somebody's patent invention which is of great interest to himself and of little to anybody else, but relate to important works in progress or embody the results of theoretical research on questions of real moment. When men like Mr. Scott Russell, Mr. Hawkshaw, Mr. Fowler and others of the same class, are regularly present at the weekly meetings it is good *prima facie* evidence that the character of the discussions is such as to make it an object for them to attend. The first place in the number of these societies is held by the Instution of Civil Engineers, whose meetings are held in London every Tuesday evening during the winter. Then there is the Institution of Mechanical Engineers, also composed of men of the highest order of ability, their meetings being held annually at different towns according to appointment, that of this year to be held in Paris. The Institution of Naval Architects is another able body, holding a meeting each spring which lasts two or three days, and besides these there are a number of less pretentious societies, which are nevertheless useful and accessible to many who could not hope for an election to one of the first named.

Every paper read before one of these societies is first submitted to the council and passed by them, and having thus been pronounced of sufficient interest to be brought before the institution, it is read by the secretary and is then open to discussion by the members. When the question is one of interest, the discussion sometimes lasts over several evenings, (in the case of the Institution of Civil Engineers,) and the hall is always crowded. On occasions of special interest the most learned scientific men in the country, such as Prof. Airey, the Astronomer Royal, Prof. Forsday, etc., are often in attendance to take part in the discussion. The writer of the paper before the society is of course present and as usual in such cases has the opportunity of replying to the various remarks that have been made, at the close of the discussion. The papers are fully illustrated by drawings when required, and at the close of each year a volume of "Proceedings" is published, containing the text of the papers with the drawings and tables and a full abstract of the discussions. I suppose there is no work existing which contains such a quantity and variety of really useful matter for engineers as is contained in these annual publications. It is very difficult, however, to obtain them except through members, as it is fancied that the standard of the society is better upheld by maintaining a certain amount of exclusiveness.

These institutions are also very useful in many ways apart from their meetings. They serve as media of communication for engineers, and are of real practical benefit in this way. A foreigner, for instance, visiting England for any purpose in the scope of the profession, can obtain all the information as to the best way to accomplish his object by calling on the secretary of the institution most nearly related to his pursuit. A letter from that gentleman is an "open sesame" to almost every source of information. The rolls of these societies contain the names of many foreign engineers of eminence. I was pleased to see that Hon. W. J. McAlpine, of New York, who is at present in this country, was elected a member of the Institution of Civil Engineers at the last meeting.

There can be no doubt also that the influence of these societies is most salutary on young engineers, by in the first place showing them clearly what an engineer's profession is, what an amount of knowledge it requires and of what kind, by affording an opportunity of hearing opinions expressed and discussed by competent engineers on practical questions, from which far more is to be learned in most cases than from books, important as they may be; and further by placing before them a tangible object of ambition, for I suppose every young man entering the profession looks forward with considerable pleasure to the time when he shall be able to secure an election to one of the first-class institutions.

Something of this kind we certainly ought to have with us, but I fear it would require a deal of hard work to get it in operation, for the reason that those engineers who have knowledge and experience enough to make such an organization valuable will not give their time and attendance to it, and unless they are willing to do this it becomes but a rendezvous for men of one idea desirous of expatiating on their particular hobby. As engineering becomes more respected as a profession, and a higher grade of education becomes general among its members, we shall no doubt find the necessity for such institutions appreciated, and the want adequately supplied.

SLADE.

ODD WATCHES.

From All the Year Round.

Early watchmakers, patronizing the vegetable kingdom, adopted the forms of fruits and flowers. In the Bernal collection (a rare medley of artistic odds and ends) there was a Nuremberg watch in the shape of a pear, in parcel gilt silver. Another, shaped like a melon, was made by a Frenchman. It is only one inch and a quarter in diameter and has a key in the form of a melon-leaf. At the South Kensington Museum is a very small apple-shaped watch, about a century old, with a gold enamel case studded with seed pearls. One of the old watches of Nuremberg has the form of an acorn, and is provided with a small wheel-lock pistol, which is supposed, to have been used as an alarm. One watch, talked about by the archæologists, is in the shape of a tulip, with three crystal faces. Another having the same form, but scarcely an inch in diameter, is so constructed that the leaves or petals of the flower open a little at the bottom of the watch, disclosing a small spring which, when pressed, pushes up the lid and shows the dial face.

Mr Bernal had a watch in which the works were contained within the body of a tiny eagle; the imitative bird opened across the center and displayed a richly engraved dial plate, while the exterior was rendered classical by the story of Jupiter and Ganymede: it might either be worn suspended from the girdle by a ring or be rested on a table by means of three claws. Ducks have sometimes had a share of watchmaker's attention bestowed upon them. Witness a duck-shape watch about two inches and a half long, in the South Kensington Museum, and another in a private collection, in which the feathers of the duck are chased in silver, and the lower half when opened, exhibits a dial-face decked with jewels.

A whole class of watches were for generations known as Nuremberg eggs. One, supposed to have belonged to James I., is of a flattish egg shape, the outer case plain, the inner elaborately engraved; the face has a calendar, and wherewithal for showing the moon's age. Another, existing in a private collection, is an egg cut out of a jacinth, with the dial-face visible through the transparent jewel—a very beautiful mode of indulging in these crotchets. In the Dover Museum is a double-cased egg watch with two movable dials, one for showing the hours of the day in the usual fashion, and the other for the names and days of the month; there are also means for denoting the day of the week and the position of the sun in the zodiac; and—an oddity indeed the hands go the reverse way from those in ordinary watches, or from right to left, as if the artist's notion of time took a backward direction. In Hollar's set of four engravings of the Four Seasons, a lady is represented in the character of Summer, with an egg watch suspended from her girdle.

Surely the most dismal of all watches must have been those shaped in the form of a skull or death's head, intended doubtless, as mementoes of the fleetness of time and the brevity of man's existance. Many examples of this class are contained in various public and private collections. One of these, small in size, is of silver and has a ring at the top to suspend it from the girdle; the lower jaw of the skull opens, and there displays the dial face. Another of the doleful family, made in the seventeenth century, opens at the lower jaw to show what's o'clock, and has inscriptions on the outside. When Diana of Poictiers became mistress to Henry II. of France she was a widow, and the courtiers of the sovereign, to ingraciate themselves with the favorite, wore death's-head watches as a kind of complimentary mourning. But the most celebrated death's-head watch, once belonging to Mary Queen of Scots, was that which the royal lady gave to Mary Seaton her maid of honor, and which afterward came into the possession of Sir Thomas Dick Lauder. It is of silver gilt. The forhead of the skull bears the symbols of death, the scythe and the hour-glass, placed between a palace and a cottage to show the impartiality of the grim destroyer; at the back of the skull is Time destroying all things, and at the top of the head are scenes of the Garden of Eden and the Crucifixion. The watch is opened by reversing the skull, placing the upper part of it in the hollow of the hand, and lifting the jaw by a hinge, this part being enriched by engraved representations of the Holy Family, angels and shepherds with their flocks. The works of the watch form the brains of the skull, and are within a silver envelope, which acts as a musically toned bell, while the dial plate serves as the palate. This very curious work of art, which was made at Blois, is too large to be carried as a pocket watch.

Some of the old watchmakers were remarkably smitten with a taste for astronomy, dealing with the heavenly bodies in a way which modern watches seldom aspire to. There is an oval silver watch by Dupont, with index hands to show the hour of the day, the day of the week, the day of the month, and the age of the moon, while there are other arrangements for denoting something about the constellations; and inside the cover are a sun-dial and a compass.

Jean Baptiste Duboule, of Geneva, made a large watch which denotes the four parts of the day, the hour of the day, the day of the week, the day of the month, the name of the month, the sign of the zodiac, the age of the moon, the phase of the moon and the four seasons of the year; far too complex probably, to be really reliable as an astronomical guide, seeing that the smallest disarrangement in any little wheel would throw sun, moon and earth into awful catastrophe. More practicable was a watch made by a Polish peasant, Kuhaiesky, at Warsaw, which denoted the time at different places under different longitudes—a contrivance which we have seen imitated in a modern English watch. One of these mechanical conundrums was found among the loot of the Emperor of China's Summer palace at Pekin, when captured by the English; it was at the time of Louis XVI., and is supposed to have been presented to the Son of the Sun and Moon by that sovereign: it was a telescope enriched with pearls and enamels; but when we are told that "the object glass is formed of a watch set with pearls," we confess to being puzzled.

Some good people in past times affected the wearing of watches in ways not often adopted just now. Archbishop Parker, in a will drawn up in Latin rather less than three centuries ago, said, "I give to my reverend brother Richard, Bishop of Ely, my stick of Indian cane which hath a watch in the top of it." Several other walking stick watches are still preserved in collections of *bijouterie*; while watches in rings, are still more common. One of the Electors of Saxony used to have a watch in his saddle. The Earl of Leicester gave to Queen Elizabeth, as a New Year's gift, "one armlet or shakell of golde, all over fairly garnished with rubyes and dyamondes, haveing in the closing thereof a clock,"—that is, having a watch in the clasp. The courtly dames of those times often carried a watch suspended to a chattellaine, with keys, seals, minatures, brologues, etc. Cruciform watches were much coveted by pious persons, who reverenced the symbolism embodied in them. One such, about two centuries old, is called a *montre d'Abbesse*, and is supposed to have been made for the lady superior of a religious house; its surface bears numerous scriptural designs in relief. Another, however which was in the Bernal collection, had quite as much heathenism as scripturalism about it: seeing that it was engraved with figures of Diana and Endymion. Once now and then ladies wore watches in the form of a book the cover being pierced to show the hours on the dial.

All sorts of ingenuity were exercised in selecting the materials, forms, and arrangements of watches. They were as is well known, brought into use as substitutes for the hour-glass which was wont to be carried by professors, judges, and other persons who required easy means of determining the

lapse of an hour or any aliquot part of an hour. When the real watch was first introduced there was no metal chain connected with the mainspring, its place being supplied by catgut. A watch of this kind was given by Mary Queen of Scots to an attendant on the night before her execution. Some of the watches were made of crystal to render the beautiful mechanism of the works visible. Some have had the twelve letters of the maker's or owner's name to do duty for the twelve figures on the dial. Some were pedometer watches, one form of which is still used. Napoleon had one that wound itself up by means of a weighted lever which rose and fell at every step: but those now made are for measuring speed in walking, which can only be useful to those who make regular steps of given length a known number of which equal a mile. Some are touch watches, to be used in the dark or by blind persons. There are twelve projecting studs around the rim of the case; an index hand, at the back when moved forward, stops at the portion of the hour indicated by the dial; and the index and studs together enable the time to be felt by the fingers.

The attempts to produce sounds of various kinds in a watch have been numerous. The celebrated French maker, Breguet, was famous for repeating watches of this kind; and the sovereigns of Europe were ready enough to give him two or three hundred guineas for one. Of course alarms are more simple, seeing that the mechanism is required merely to ring a bell at some definite and pre-arranged hour in advance. Charles the First kept an alarm watch at his bedside at night; the outer case enclosed two silver bells which struck the hours and quarters. M. Rangouet, a French maker, about a century ago, is credited with the construction of a musical watch, of the common pocket size, which played duets, and the works of which were so nicely adjusted that the musical portion and the time measuring portion did not interfere with each other. This is far surpassed by a watch about the size of an egg, constructed by a Russian peasant in the time of the Empress Catherine the Second, and now preserved in the Academy of Sciences at St. Petersburgh. This elaborate work is both a repeating watch and a watch that that performs a chant. Inside is a representation of the tomb of Christ with Roman sentinels on guard. On pressing a spring, a stone rolls away from the tomb, the sentinels fall down, angels appear, holy women enter the sepulchre and sing the same chant which is still sung in the Russo-Greek church on Easter Eve. A story is told of some missionaries at Tongataboo which shows that the exhibitors of talking and singing watches are apt to find their own reputation rise and fall with that of the mechanism itself. The real instrument was a cuckoo clock, but it would apply to watches as well. The natives believed that the missionaries' cuckoo clocks were inhabited by a spirit, and regarded them accordingly with oeverential awe. One of them bolder than the rest, picked rne of the clocks to pieces to have a peep at the spirit. Of course he could not put it together again; and the fame of the missionaries was damaged when it was found that they also were powerless in the matter. There is some mention made of watches which actually talked, emitting articulate sounds in the form of words: but this we deem doubtful. Vocalization or singing is a very different affair; this can unquestionably be done by pieces of mechanism much smaller than a pocket watch—as the Swiss Nightingale at the Great Exhibition testified.

One recorded watch was very big—viz., that which was made for the Irish giant, about eighty years ago; the works were very strong, and the watch with the seal and key weighed nearly a pound. Far more numerous, however, have been the tiny watches, marvelous on account of the quantity of mechanism compressed within small spaces. One of these is about the size and shape of an almond. At the first of our great exhibitions, the Swiss exhibited a watch only three-sixteenths of an inch in diameter, inserted in the top of a pencil case; it showed hours, minutes, seconds and the day of the month. An English specimen, the size of a threepenny-piece, was a giant to it. The Annual Register, about a century ago, told of a watch only the fifty-fourth part of an inch in diameter; but this, we suspect, must be a mistake for fifty-four hundreds of an inch—a very different affair. Arnold presented to George III. an exquisite watch of the size of a silver penny, set in a ring: It consisted of 120 separate parts, the whole of which weighed together less than six pennyweights. And so intricate were the works, that Arnold had to make tools himself before he could make the watch. The King was so delighted with the work that he sent Arnold 500 guineas. When the Czar of Russia heard of this, he offered Arnold 1,000 guineas to make a similar one for him; but this the artist refused, determined that his own sovereign's watch should be unique.

NEW PUBLICATIONS.

PARIS EXHIBITION—NEW MAP OF PARIS. New York: Wiley & Son.

A very valuable map of Paris together with views of several prominent public buildings.

BACK BONE.—Edward H. Dixon, M. D. 396 pages.—R. M. DeWitt, New York.

This volume contains a series of very sharply written essays upon medical sense and nonsense which are always amusing and sometimes instructive. Dr. Dixon is a keen writer and has a good deal of slap dash about his style which pleases many people.

A NEW AND PRACTICAL SYSTEM of the Culture of the Voice and Action, and a Complete Analysis of the Human Passions, with an appendix of Readings and Recitations. Designed for Public Speakers, Teachers and Students. By Prof. J. E. Frobisher. New York: Ivison, Phinney, Blakeman & Co. 12mo. 264 pages.

The author lays no stress on originality, but acknowledges a free use of the views and teachings of predecessors. A clear and lively style adapts the work not to the professed student alone, but to all the large class of self-improvers. We trust it may prove to them a valuable instructor in the most manly of arts, the art of public speaking.

Editorial Summary.

SOURCES OF THE GREAT LAKES.—A writer in *Silliman's Journal*, comparing the insignificant river tributaries of the great lakes with the body of water discharged through the St. Lawrence, concludes that they are fed by under-ground currents from distant mountain regions. Although the ample drainage of Wisconsin and Minnesota is discharged mainly into the Mississippi and Red rivers, it does not strike one as very unlikely that a river of the size of the St. Lawrence at its source, should accumulate from the innumerable streams and rills that drain a lake coast of three or four thousand miles. The artesian wells of Chicago are presented as an argument for the existence of subterranean inlets—yet why not outlets also?—in the bottom of Lake Michigan, which lies lower than the supposed water-bearing stratum which sends up its water through those wells to a height of nearly 125 feet above the surface of the lake. We do not perceive how these facts can be reconciled with the theory of any subterranean current in the case, unless by the violent assumption that the current turns a short corner within a few feet of the lake. Certainly this current cannot have any considerable outlet in Lake Michigan and at the same time another 125 feet above it. The circumstances as stated seem almost to require some other theory, such as that of elastic subterranean pressure, to account for the artesian wells of Chicago. That there are springs of more or less volume in the beds of these lakes, which would form streams and a main river if the lakes were drained, may be assumed as a matter of course; but it strikes us that if great subterranean currents intersect the lake, they are likely to flow out of it in the same manner. In other words, a subterranean system of water courses is as unlikely to have its continuity broken up by encountering a lake, as a superficial system.

IRON MOUNTAIN.—There you see over five hundred acres of a single mass of solid iron—hardly an ore. A piece of it is like cast-iron to look at, and apparently as heavy. The road over which we walked was iron; the loose pebbles with which the surface of the mountain is plentifully covered, are all iron. A light soil, bearing some trees and bushes, covers the hill. But in many places and enormous moss-covered blocks of ore just above the surface. In one of the mines in which the men were working, we saw a solid and almost perpendicular face of ore sixty feet high. Pilot Knob too, is an iron mountain, but covered with strange broken crags and wild rocks, crusted together like towers, castles and antique tombs, which had been three-quarters melted at doomsday, and then suddenly cooled. It is a grand and strange hill, rising steeply for nearly six hundred feet; alone in a beautiful country, a quiet, fertile valley sweeping around. In this tranquil lowland lie two villages, and far beyond rises Shepherd mountain, which is a still larger pile of iron ore.—*Philadelphia Press.*

PHRENOLOGY RUN MAD.—A Paris letter gives us an account of the investigations of the "physicians" (?) in the brain of an executed murderer, whose utter insensibility and preternatural depravity had led them to expectations analogous to those which prompted an old lady before them to open her hen. The conceit of finding a tangible store of moral materials or material morals in a man's skull is unphilosophical, however, in comparison with the notion that eggs may be found where they come from. "Huge protuberances" of "sanguinary instincts" were found in the cerebellum of this parricide (who had murdered his father to prevent a distasteful second marriage) and the sapient inference is suggested that the plea of insanity now usually made in cases of murder so foul and unmistakeable as really to exclude every theory but the scriptural doctrine of hopeless depravity, may after all have "a scientific foundation." Certainly it will, when an empirical craniology becomes "science," and determines moreover, that this machine of the soul is but a hand organ bound to grind unalterable tunes in obedience to its progenitor instead of its proprietor.

THE LOCOMOTIVE STRIKE in England is reported to be in a way of being happily averted by mutual concession. Its consequences would have been too serious to the public, and would probably have damaged the cause, if not resulting in abridgement of the liberties, of trades unions in that country. Society must and will exist, right or wrong, whatever else has to be crushed under its necessities; but a strike on the locomotives would have the power almost to paralyze society in an hour, and such a power as that could never be long tolerated by any people. Both parties have done wisely in coming together. Otherwise, the obstinate side would have had a heavy reckoning to meet, proportioned to the public calamity.

THE GREAT EASTERN.—The monster ship, after an absence long enough to cover several of the greatest revolutions that ever took place in national affairs, appeared once more in sight of our harbor on the 9th inst., at six o'clock, A. M., and a few hours later was quietly at anchor off Thirteenth street, attracting as little notice as could possibly be bestowed on so big a ship and so great a stranger, with such an eventful history. Her passage occupied 14 days. The appearance of the ship is not one so flattering to the company who have refitted her, as we had been led to expect. The most important changes she has undergone, have been the renewal of her screw boilers and the introduction of steam steering apparatus.

CHARCOAL from the shell of the cocoanut is found to have extraordinary power of absorbing gases. It is very dense and brittle, and its fracture presents a semi-metallic lustre.

SNOW ANIMALCULES.—A distinction is observable between the taste of snow water and that of rain water, and the use of the former in parts of Switzerland is thought to be the cause of peculiar affections of the throat, including *goitre*. The discovery of numerous shrimp-like animalcules in snow water, by a distinguished chemist, has suggested a possible connection between them and the unwholesomeness of snow water. They prove at least that life is not restricted to the conditions of temperature with which we usually associate it. The fluids which give mobility within these organisms must be such as, unlike those of animals, and like alcohol, resist extremes of cold.

OXYGEN IN THE MARKET.—A company has been formed in Paris under the style of Jos. de Susini & Co., for the manufacture and sale of oxygen to be mixed with ordinary illuminating gases. The calculation is that an addition of one third oxygen will be equivalent to multiplying a given quantity of illuminating gas eight times, the price of oxygen being fixed at only 2½ times that of ordinary gas. The superoxygenated gas will be used in lighting the International Lecture-room of the Exposition.

CHILLED RAILROAD WHEELS.—We are indebted to Mr. W. W. Evans for a communication in favor of the American chilled wheels, which we should publish with pleasure if we had not done so substantially, a few weeks ago. On page 108 (Feb. 16) our correspondent will find the substance of his own letter to *Engineering*. Our paragraph of April 13, representing the opposite view, includes statements and arguments which we should be glad to have answered by anybody who can overcome their force.

HOTTINA.—This is a powder compounded by M. Hottin, of Paris, for making linen fire-proof without impairing its whiteness, when mixed about equally with the starch, a like quantity of gum being also added. It is prepared by adding a little ammonia to a solution of phosphoric acid lime, and filtering with animal carbon, then evaporating until concentrated, when five per cent of gelatinous silicic acid is added and the whole evaporated to a crystal substance and pulverized.

PUBLIC VERSUS PRIVATE ROADS. is to be one of the grand "causes" before the popular tribunals of the age. Our remarks on the subject have been widely circulated in other journals, and original articles in strong terms have presented the question to the people. Among the indications of the general drift, we notice that the Russian Government is negotiating a purchase of the Moscow railway. The price demanded is said to be equal to some $54,000,000.

A NEW ALKALOID, named Rhæadine, has been discovered by Hesse in the red poppy and in opium. It is soluble in water, alcohol and ether, crystallizing from the last in white prisms. Ammonia precipitates it in white crystalline flocculi, bichloride of mercury gives a white amorphous precipitate, chloride of gold a yellow precipitate, and strong acids decompose it in the gold, giving a purple solution.

THE SNIDER RIFLE.—The press report of the unsatisfactory behavior of this arm, which we quoted, has brought out the Duke of Cambridge and General Peel in its defence. The former states that no imputation rests on the Snider rifle and affirms that it is better than any arm possessed by the army of any other nation. A natural and comfortable official belief.

TANNING WITH CHESTNUT WOOD has been introduced to the notice of "La Halle aux Cuirs" of Paris, by J. Algetiere, jr., a tanner at Lyons. He claims that the tannin obtained from this source instead of the the bark, makes leather of peculiar fineness, uniformity and excellence of color, and superior quality in all respects as compared with the best oak tanned.

THE COLORADO GOLD ORES are to be attacked by the Welshmen. A large lot of these difficult sulphuretted ores have been taken out to Wales and there reduced with such success that capital has been raised to bring out Welsh smelters and put up extensive works on the successful plan in Colorado.

SUSTAINED TEMPERATURE.—Evidence that the length of the day has not perceptibly varied since the time of Anaxagoras, is considered to prove that the volume of the earth has not been sensibly modified, and therefore its general temperature has not varied so much as 1-300th of a degree, in 2,000 years.

CARBONIC ACID reveals itself in the spectrum by several new lines coinciding with the spectrum of graphite: one of the most characteristic being a red line rather less refrangible than the hydrogen line.

A JOB FOR ENGINEERS.—The Legislature of Maryland has voted an appropriatien of $150,000 to construct an ice boat for clearing harbors of ice.

GLASS ENGRAVING is said to be done with a solution of fluoride of calcium in hydro-chloric acid, without the danger attending the use of fluoric acid, and equally well.

RATS, it is said, may be destroyed by injecting into their haunts sulphuret of carbon in vapor, equal in volume to one-twentieth the area.

THE FLORIDA AND CUBA CABLE, 110 miles in length, is being made in England by Silver & Co.

GLUE FOR METALS.—Melted glue 16 parts, in which mix gum ammoniac 1 part and then add one part saltpeter acid.

DAMASCUS STEEL.

Probably there are many of our readers who have never seen a genuine Damascus blade either a saber or razor, but there is quite a trade still carried on in these articles notwithstanding the common opinion that the manufacture is to be reckoned as among the lost arts. To the eye the surface of Damascus steel presents a variegated appearance, silvery and dark lines crossing each other in a sort of irregular net work. One of the finest specimens we have ever seen was a sword blade, more than three feet long, a present from a Tartar Emir to a former United States minister to St. Petersburg.

This steel is very generally imitated in appearance by English manufacturers, but their specimens do not possess the rare qualities of the genuine article. As nearly as can be ascertained the foundation of these blades was the Indian "wootz." This is smelted from a magnetic oxide, yielding, by the crude process employed, only about fifteen per cent. About a pound of the ore is placed in a clay crucible with bits of dry wood, covered by green leaves of particular plants. The crucibles are luted with clay and submitted to a blast charcoal furnace. The fire is kept at the highest possible temperature for nearly three hours, and on removing from the fire and cooling, the crucibles are broken and the steel found as a lump or button at the bottom. Selections are made from these lumps and those which are accepted are exposed again to a red heat for several hours and then drawn out under the hammer. This "wootz," or Indian steel, is considered superior for cutlery to any of the English make. It is supposed the Damascus blades were forged from this steel, which is still made in Persia as well as in Hindostan.

It has been supposed that fagoting short bars, remelting, and working them over and over, was the true secret of the superiority of the Damascus blades; but this does not seem to be sustained by experiment. Some years ago Gen. Anossoff, a Russian, made many experiments with great minuteness of detail, and finally he established works at Zlatoosk in the Ural where were mines yielding the ore he desired. His most successful process was melting the ore with graphite in crucibles in the proportion of eleven pounds of ore with five of graphite, and one thirty-second part of iron scales with a small quantity, one twenty-fourth, of flux, as dolomite or magnesium limestone. The crucible is placed in a blast furnace and kept from four to six hours.

The following are Gen. Anossoff's requisites for the best steel; Charcoal of the clearest sort, as that from pine; a furnace of the most refractory materials; the best quality of crucibles; iron very malleable and ductile; pure native graphite or that obtained by pulverizing the best crucibles; flux of dolomite or calcined quartz; a high temperature, and fusion continued as long as possible. The working after the crucible is cold is simply repeated heatings and forgings. The sword blades are tempered in hot oil. The razors made from this steel are of very superior quality, but the cost is excessive; the steel being valued at $1·10 per pound. The blades produced by Gen. Anössoff seem to be of equal value with the original Damascus blades, one of them cutting through a gauze handkerchief floating in the air, cleaving bones and even nails without injury to the edge. Gen. Anossoff died in 1851, and it is said the cutlery made at his establishment is not of so good a quality as when he personally superintended its manufacture.

The Force of Expansion by Heat.

It has been found by experiment that a bar of malleable iron of a square inch in section is stretched one ten-thousandth of its length by the pull on it of a tun-weight, and it has also been found by further experiment that a similar elongation is produced by heating the bar 16° F. Also a tun pressure on the bar, or a cooling of 16°, will produce a contraction of one ten-thousandth of its length. Thus there is established in this case an equivalence of a tun weight and a heating or cooling of 16°. The pushing or pulling of the bar by a tun weight, and the expansion or contraction by the 16° heating or cooling, each involves the same amount of force. But it will be observed that the precise figures arrived at are the results of experiments which are of necessity crude, and that as far as expansion by heat is concerned, they show it as acting only in one direction while in fact it takes place with equal force in all directions.

The whole amount of force concerned in expansion by heat may be accurately calculated in any case from Joule's equivalent. A unit of heat, or that amount of heat which will raise 1 lb. of water 1°, implies a force which will lift a weight of 772 lbs. one foot in hight. Whenever a unit of heat is wholly used in expansion, it follows of necessity that the total force of such expansion is 772 foot pounds. But as the expansion takes place only through short distances, it is necessary to reduce the expression to other terms in order to make more apparent the enormity of its force. Then 772 foot-lbs is equivalent to 9,264 lbs. raised 1 inch, and 9,264,000 lbs. raised one-thousandth of an inch. Thus if the whole force of expansion of a mass of iron which was produced by a unit of heat were exerted in one direction, it could lift a weight of 4,632 tuns to the highth of one thousandth of an inch.

Such calculations show how enormous is this silent force, and how irresistible and terrible it might be against the feeble strength of man. Yet it is so ordered in nature that it acts only a beneficent part. The gentle wind, the refreshing rain, the changes of seasons and the flow of rivers, are only a few of the many natural phenomena which are dependent upon the force of expansion by heat.

The "Cigar Ship" *Ross Winans* has recently made a successful trip in the English Channel.

DIXON'S LOW DOWN GRATE.

Those who have been brought up in the country, or city dwellers whose age enables them to remember the customs of thirty years ago, not unfrequently think with regret on the pleasures of the wide fire place with its generous glowing heat of a brilliant wood fire, or on the ample grate, which distributed the carbon prodigally and insured a perfect ventilation. With all the improvement in stoves and furnaces and the economy in fuel, we have yet to see any method of warming our living rooms so comfortable and pleasant as that of the open fire.

The engravings present two views of a grate which has been in use for many years in Philadelphia and of which a

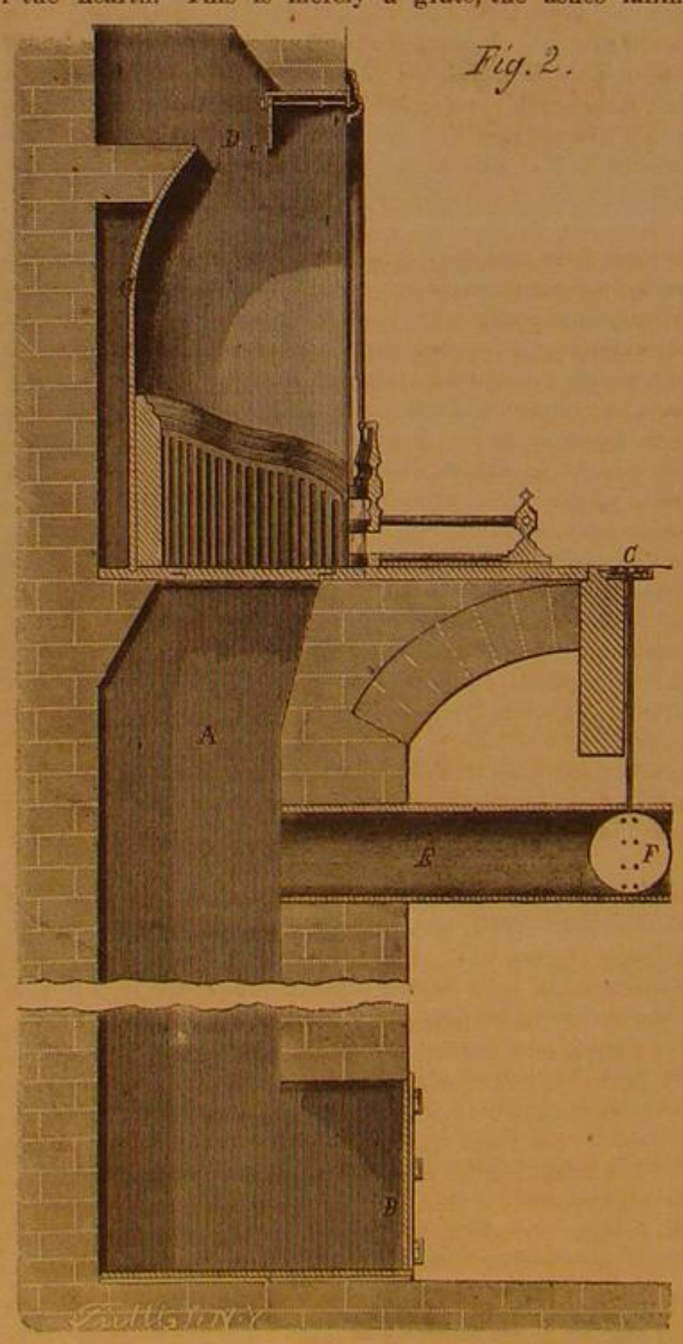
Fig 1



number are now used in this city. Its main peculiarities are in its form, giving out a much larger proportion of the heat of combustion than others, in the fact that it does not exhaust the room of its oxygen, and that the fire is built on a level with the floor, thus warming that portion of the apartment which is always the coolest. Those who have these grates in use speak in the most unqualified terms of praise as to their action and benefits.

The fire grate is on a level with the floor, forming a portion of the hearth. This is merely a grate, the ashes falling

Fig. 2.



through the interstices into an ash pit, A, Fig. 2, of brick, capacious enough to hold the residuum of a season's burning, and which is finally removed through the door, B. The back, C, of the fire place, instead of being rectangular as is ordinarily the case, is concave so that the rays of heat are diverged radially to every part of the room to be heated. The heat rays are thrown downward as much as they are in horizontal *radii*, as the back is of a niche form as seen in Fig. 2, curving over to the front. This back plate is unusually high giving a great distance between the fire and the point of escape for the smoke at the throat, D, of the chimney. The ash pit for the first floor can be built of such an extent, reaching to the cellar, as to receive the products of a winter's combustion. On higher floors a more elevated fire box is used where capacious ash pits are not convenient.

The air for the purposes of combustion is not drawn from the room where the fire is situated but comes either from the cellar or from outside the house through the flue, E, the admission of air being regulated by means of a damper, F, governed by a convenient handle, G, seated in the floor. By this simple arrangement the necessity of a portable blower, which prevents for the time of its use any appreciable heat from coming into the room, is obviated, while the deterioration of the air in the room by the consumption of its oxygen is prevented thus preserving a good quality for breathing purposes and also securing a perfect circulation at all times. The throat of the chimney for the escape of gases is near the front of the fire place so that the products of combustion, traversing the curved back, must yield a large percentage of their heat before escaping.

Any additional information desired may be obtained by addressing the manufacturers, Thomas S. Dixon & Sons, 1324 Chesnut street, Philadelphia, Pa. One of the grates may be seen in the office of our neighbors G. E. & F. W. Woodward publishers of the Horticulturist, 37 Park Row, New York city

HANDY TO HAVE IN THE SHOP.

We present herewith the representation of the working end of a neat, cheap, and effective implement which will fill a long vacant place in the mechanic's tool chest. It is an implement intended for drawing common wood screws the heads of which have been broken. In driving home the ordinary screw the head frequently breaks, and it cannot be turned either way by the common screw driver. The same accident may occur in drawing screws which have been seated in wood for a long time, and then the wood must be cut away in order to apply a pair of pliers or similar instrument.



This tool is simply a left handed, end milling tool, cut into three radial teeth, as seen, and having a small hole drilled in the center. It has either a shank fitting a bit brace or is secured in a handle as a screw driver, and in using is turned to the left, milling off the projecting portion of the broken head until a surface is obtained, when by a few short forward and back movements three depressions are made for the teeth, and the screw is drawn as by a screw driver The small hole is for the reception of a center stud which will be formed on the screw head by the process of milling to retain the tool in position.

The engraving is enlarged from the tool left with us, but it may be made of any size to fit the screw. It is the contrivance of Lewis Garrigus, of Waterbury, Conn., who deserves the credit of presenting it to his fellow mechanics gratuitously

Extracts from Patentees' Letters.

C. W. Royse of Petersborough, N. H. writes under date March 27th as following:—My Letters Patent came to hand to day. Please accept my thanks for the prompt manner in which you have managed my affair. I have received several circulars from Patent Agents soliciting patronage; but be assured that any business that I may hereafter have with the Patent Office will be entrusted to your care. I shall most cheerfully recommend to my friends your Agency as the only reliable one.

Mr. F. B. Moore, of Bridesburg, Pa. under date April 1st writes as following:—My patent came all right a week or so ago. The drawings are good, specifications and claims satisfactory; in return allow me to express my thanks for the promptness and good manner in which you conducted the procurement of the Patent on my Spring Bed Bottom. I am highly pleased and will always be glad to recommend your Agency and your terms to all needing business with the patent office.

Franklin Nelson, of Wyandotte, Mich., under date of April 8, 1867, says:—"I received my Letters Patent about three weeks since, highly pleased with the correctness with which you had the instrument executed. I am fully satisfied that your facility for psocuring patents are unequalled, and it will be with pleasure that I recommend your Agency to all interested. Please accept my hearty thanks."

Steptoe, McFarlan & Co., of Cincinnati, Ohio, who avail themselves of our advertising columns somewhat extensively, add the following P. S. at the end of a business letter: "We find no other medium equal to the Scientific American."

The American Hog-tamer.

Mr. Reuben Hurd, of Morrison, Ill., is the inventor of a nipping instrument to cut hog snouts, to prevent the animals from rooting. The inventor issues a neatly printed circular concerning the improvement, which bears a well executed vignette consisting of his own portrait. It is a standing figure of a good looking individual, somewhat advanced in life, holding in the left hand one of the patent hog-nippers. Opposite the picture, printed in bold italics, is the following motto: "My invention will live on, and after I am dead will still live, until every farmer shall know that I have not lived in vain."

Gopher Trap.—John Grable, of Wathena, Kansas, says his garden vegetables and fruit trees have nearly been devoured by gophers. He has been fighting his enemy for eight years with poison, traps, cats, and dogs, with such poor success that he is almost discouraged, and now appeals to inventors for assistance. He offers a hint which he considers valuable, and thus quaintly expresses it:—"A double-geared subterranean gopher trap so constructed as to catch the gopher both ways in passing through his galleries."

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, April 4th, Prof. Tillman presiding.

THE HICK'S BOILER.

The reading of the customary items was followed by the explanation of the construction of the Hick's upright boiler. The improvement sought over the ordinary upright boiler is the prevention of foaming or priming, and this object is secured by introducing a circular drum around the fire pipes for the purpose of directing the course of the ascending and descending current. The boiler received the highest commendations from the President and members of the association.

THE FIRST SUN PORTRAITS.

A statement was made in these columns a few weeks since that to Dr. Draper of this city, was due the honor of having taken the first portraits from life by photography. This assertion was disputed by Mr. Johnson who maintains that he had anticipated the doctor by nearly a year, his first sun pictures from life dating as far back as Oct. 7, 1839. The claims of this gentleman were substantiated by several members, and the subject was referred to a special committee for investigation.

NOVELTIES.

A flax-pulling machine of ingenious construction was exhibited by its inventor, who stated that throughout the West flax is very extensively grown for its seed alone, the plant, owing to the expense of pulling it by hand being so great, has hitherto been neglected, but with this machine this waste might be utilized.

Prof. Vander Weyde explained the working of a new pantograph, a beautiful instrument imported from France, designed for use in making drawings of any object near or remote with mathematical precision, either on an enlarged or diminished scale. Afterwards the professor gave an interesting and instructive lecture on

THE RELATION BETWEEN LIGHT AND SOUND.

The speaker first alluded to the terms common alike to painting and music, such as color, tone and harmony; he also likened the great painters to the best musical composers. Referring then to the connection existing in theory, he showed that in an octave of music the highest note was caused by twice the number of sound waves that produced the lowest note. So, of light; while red results from 450,000,000,000,000 vibrations of ether in a second, the number of undulations must be nearly doubled before the highest color, extreme violet, is produced. The professor then drew attention to a diagram in which the colors of the spectrum were referred to the middle notes of a piano key board in the following order.

Do	Re	Mi	Fa	Sol	La	Si
Red	Orange	Yellow	Green	Blue	Indigo	Violet
C	D	E	F	G	A	B

The primary colors it will be noticed correspond to the notes of a perfect chord. The actinic rays, which it is known increase in power beyond the violet of the spectrum, are referred to the higher notes of the piano, the calorific rays, which have their maximum heating power beyond the red ray, correspond to a third octave.

It would be contrary to good taste in dress to place the color yellow by the side of green: so the combination in music of the notes E and F produces imperfect harmony. As new colors are constantly being introduced, it seems reasonable to suppose that at some future day we shall be in possession of tints corresponding with the semi-tones in music.

The speaker then gave a brief history of music, referring to the primitive ideas of harmony and the pretentious notation of the Greeks; the simplifying of these musical names by the Romans in the substitution for them of the letters of the alphabet from A even to P and Q. The discovery of the simple octave led to the rejection of all letters beyond G, but the note B natural was for a long time unknown. As originally written, the Scottish air, "The last rose of Summer," did not contain this letter. Afterward, on the general adoption of this note by the musical world, the Germans bestowed upon it the name H, so that their musical scale as amended now reads A. H. C. D, etc.

Prof. Vander Weyde mentioned that he had divided the scale into thirty one equal parts, while Prof. Tillman considered it as composed of fifty three equal divisions.

ACID-HOLDER.—Stalba mentions that glass and porcelain vessels are protected from the action of the hydro-fluoric acid used for engraving on glass, by a coating of paraffine. Carefully dry and heat the vessel, melting some paraffine in it and turning it around so as to coat the whole interior. Why may not the same protector be useful in executing a design upon glass?

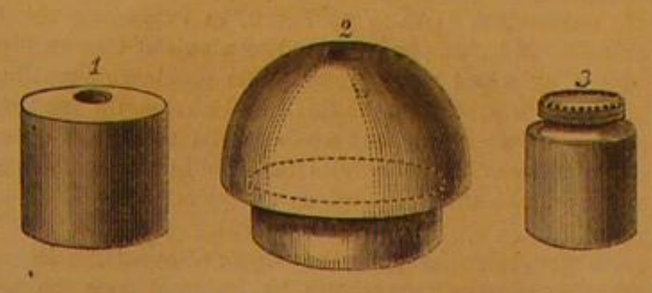
STEAM WHALING.—It is said that Dundee, Scotland, had a fleet of twelve first class whaling steamers ready to sail about the first of March for the whaling ground on the coast of Labrador. After that season is over they are to return home, discharge, coal, and repair to the whaling ground at Davis' straits. The attempt to pursue the whale by steam has been made without success, as the paddles and machinery alarm him before he can be approached near enough for harpooning.

WHAT IS IT?—The Pottsville *Standard* says that in the vicinity of Orwigsburg there exists a peculiar substance, formerly called "Orwigsburg coal," which bears some resemblance to plumbago, or black lead, and has been used for many years by carpenters and others instead of lead pencils, by merely sharpening it at the point. It makes a distinct mark, is soft, and not at all gritty.

STEAM BOILERS---THEIR FORM, CONSTRUCTION, AND MATERIAL.

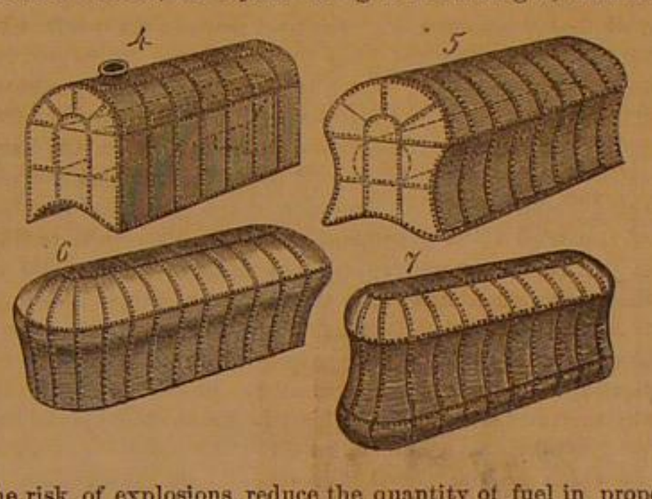
NUMBER ONE.

Under this general head we propose to present some facts, which, although well established, may not be entirely familiar to all of our readers interested in the subject of steam, its generation and application. We shall make this the subject of several articles, in which we shall treat briefly upon the different forms of boilers—boilers for stationary, marine, and locomotive engines—the different materials used; the varying modes of construction; the causes of explosions, so far as can be gathered from experiments and investigations made, and the best methods of setting and managing boilers. We desire it to be understood that we assume no originality of ideas or of treatment, but depend altogether upon the recorded experience and observations of others, our design being merely



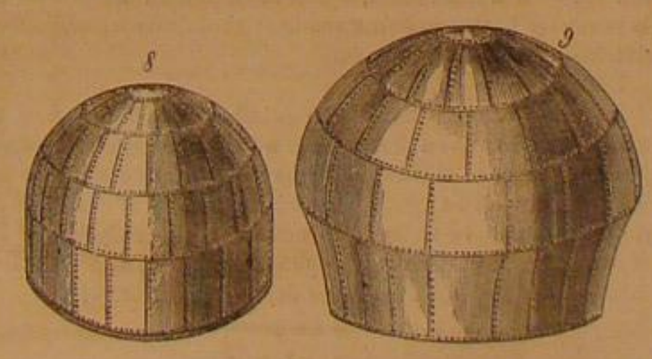
to present, in a succinct form, the most important facts already established. In these articles we shall avail ourself of the very able paper of Edward B. Marten, engineer of the Midland Steam Boiler Inspection and Assurance Company, England, and also of the records of other eminent authorities.

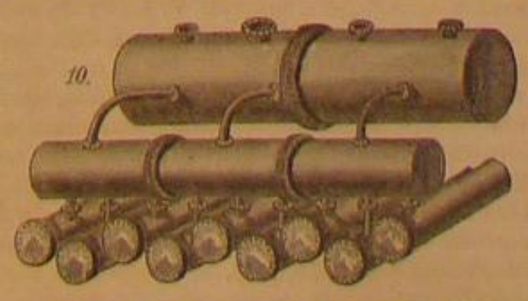
Probably no machine in existence has been the subject of more numerous modifications in form than the steam engine, but the changes in the shape, material, and construction of boilers have been scarcely less. It seems as though ingenuity would have become exhausted in the attempts to improve the steam boiler, the objects being to add strength, diminish



the risk of explosions, reduce the quantity of fuel in proportion to the steam generated, and to adapt the boiler to a special service or a particular location; yet new plans for boilers are continually being introduced to the public, and it will be readily seen that there is ample room for all the improvements projected, when we compare theoretical principles with actual facts.

One pound of coal if pure carbon, actually yields in the process of combustion 11,194,000 foot pounds of force, or one pound of coal burned in one hour gives a force of 5.65 horse power. But the best coal, that nearest the state of pure carbon, known as anthracite, has from three to ten per cent of foreign, incombustible material in its substance. Probably some of the bituminous coals, as the cannel coal, holding hydrogen will, when in combustion the oxygen of the atmosphere unites with its hydrogen, give a greater amount of heat than pure carbon: but our theoretic calculation is sufficiently accurate. Now, we utilize only a small amount of this heat force in our best boilers, as we require from two to eight pounds of coal burned in one hour to produce a horse power. One pound of coal is capable, if all its heat is utilized, of evaporating between fourteen and fifteen pounds of water, but in practice our best results are but eight or nine pounds





of water evaporated to one pound of coal consumed. This one-third, or at least a portion of it, should be saved, and we are not too sanguine in our belief that the time is not distant when we can use the power now wasted through the inefficiency of our mechanical appliances.

Boiler explosions are not confined to modern times. Many of the boilers first used to generate steam as a motor for engines, exploded, sometimes with disastrous results. Mr. Marten says: "there is no doubt many of the earlier explosions were from faults of construction. The stronger materials now used were then found so difficult to manipulate that others easier to work were chosen, and often the shape of the boiler was only selected as the one easiest to make. The early boilers were made of copper, or even cast iron, with lead or wooden tops, and of the weakest possible shape." Such was the Savery boiler shown at No. 1, a mere cylinder, the fire being applied under the bottom, and having no internal braces whatever. Steam was then used at or below the atmospheric pressure, so that there was as much danger from the collapsing of the boiler by outside atmospheric pressure as from internal force. So little was the pressure of the steam estimated in the early stage of steam engineering that boilers were actually constructed of wood, hooped, having internal fire places, and possibly flues, of copper; and even a stone chamber was used as a shell for a boiler, having smoke flues of copper passing through it. Cast iron boilers were frequently used having an internal fire place of wrought iron and they may still be found, says Marten, in use at some of the older works in England. Others of this material but of different forms are shown in Nos. 2 and 3, the first being called the tun boiler and the other the flange boiler. These boilers, except the flange boiler, were cast in one piece and as there would be defects in the casting and very probably one side would be thinner than another the boiler would have an inherent weakness.

When wrought iron boilers first came into use the shapes were much varied and the dimensions increased. One of the earliest forms was that of the wagon boiler, seen in No. 4, having round top, plain, upright sides, and a concave bottom. This is a form illy calculated for withstanding internal pressure, especially as boilers so built had no internal stays. In most cases, says Marten, the explosions of this class of boilers tore off the bottom, owing to the angle iron round it being weakened by the alternate bending backwards and forwards under each variation of pressure, as the sides and bottom must be constantly springing when at work.

An improvement was attempted on this form by the boiler seen in No. 5, which gave greater heating surface, and by the concavity of its sides offered increased resistance to internal expanding force. Still further improvement is seen in No. 6 in which the ends and top were made convex, and in No. 7 where the bottom was made to correspond with the top and ends in convexity. This last was an approach to the cylindrical form now so generally used. All these forms, however, required a great many stays to retain them in shape, and numerous explosions proved their weakness. They generally gave way at the bottom.

The haystack and balloon boilers succeeded, some of them being twenty feet in diameter and containing so much water and steam as to make them terrible engines of destruction in case of explosion. They are seen in Nos. 8 and 9 and were extensively used. They were made as large as twelve or even fifteen feet in diameter without stays, but although the larger ones were stayed, yet many of this form of boiler were exploded, the bottom generally being blown off.

The boiler seen at No. 10 was of cast iron consisting of nine cast iron pipes, about one foot in diameter and nine feet long, set in masonry so that the flame played all around them. These tubes were connected with one of a larger size placed transversely above them forming a steam receiver, and this with still another and a larger one, making a steam chamber. This resembles in form and arrangement of parts some now made and highly valued by their constructors, only the material is of wrought instead of cast iron.

WHAT IS A PEDDLER?

MESSRS. MUNN & CO.:—I have reason for knowing that you would do many of your readers a favor by giving them a few hints upon the latest United States license law, especially its claims upon patentees and their agents. For example: if A, as a patentee, appoints B an agent for a town or county, to sell therein, not rights to make, but patented goods made by A and furnished by him to B at a discount, and B sells said goods in said territory either to merchants in quantity at a discount or to other persons at retail, is B in either or both cases a peddler in the sense of the license law? Again, if C is a manufacturer of articles patented or unpatented, and he delivers, either in person or by proxy, these articles to his customers who ordered them, one article to a customer perhaps, is C in such case a peddler? Or if he fills orders from a distance, by mail, express or otherwise, is he a peddler?

Supposing you able and willing to answer these questions readily, for the general interest of your readers, I have taken this liberty. If I have presumed too much, please excuse me.

A. M. A.

We are not appointed to expound the Internal Revenue law, and for any authoritative decision of his questions must refer A. M. A. to his district assessor, or to Commissioner Rollins at Washington. From the official instructions just issued, however, we make two extracts which may throw light on the first question:—

35. The liability of peddlers and commercial brokers to special tax depends upon the acts done, and is not affected by the fact that the party is employed by others and is acting merely as an agent.

41. Persons traveling about the country as the agents of manufacturers or dealers, *seeking orders* for goods as agents of one person or firm only, and who are paid a salary, but receive no commissions whatever, should not be required to pay tax as produce or commercial brokers.

We should say that if B keeps and sells the goods of A, whether by consignment or purchase, for commissions or for profits, at a fixed place of business, he is taxed as a merchant, wholesale or retail, according to the amount of his sales. He is not a peddler unless he "sells or offers to sell goods at re-

tail, traveling from place to place." The large class of wholesale peddlers, carrying supplies of crackers, cigars and other specialties to country merchants, do not seem to be included under the definition; and yet the exemption in the same section, permitting certain classes of manufacturers to peddle their wares "at wholesale" [*i. e.* to be sold again] seems on the other hand to imply that *other* goods may *not* be carried about for sale to dealers without a peddler's license. Manufacturers and producers of agricultural implements, garden seeds, fruit and ornamental trees, stoves and hollow ware, brooms, wooden ware, charcoal and gunpowder, are exempt from special tax for selling their goods from place to place, at wholesale.

Again, if B, in his capacity as agent, itinerates, soliciting orders for A, but not carrying the goods to be sold, he becomes a commercial broker, provided he acts for a commission, or for different parties, and not as the simple employé of one party. If however, he sells the goods directly, from his own hands and not from A's, the above instruction 41 shows that he may send his salesman to solicit orders, and if so of course he may solicit them himself, without either a peddler's or a broker's license.

In regard to the second question, it is evident that any manufacturer may deliver goods previously ordered of him, no matter by what mode of delivery, without being a peddler. The distinction of a peddler is not that he employs his own vehicle instead of another's, but that he employs a moving vehicle to sell goods from. If C sends or carries only sold goods to those who have already purchased them, he is not a peddler, but if he should carry also spare articles for those who wish to buy them on the way, he would become one.

Correspondence.

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

Action and Re-action.--The Measure of Force.

Messrs. Editors:—I wish to say a few words in reply to the strictures on my previous communication by "A Subscriber," (page 217 current volume of the Scientific American.) It seems to me that he practically begs the question, as he merely cites a precisely similar case to that already considered, calling it a *demonstration* of the disputed principle that force is measured by the space through which it is applied. My position is that there are two entirely different species of quantity to be measured. One of them I consider to be "absolute force," whether correctly or not is the point in dispute. It is measured by the number of equal increments acquired when a body is freely acted upon by a uniform force, as when gravity acts upon a falling body. In other words, in a body containing a given quantity or unit of matter, it is measured by the time the impelling force acts upon it, or what is practically the same thing, by the velocity imparted. This velocity is simply a condition of the body, indicating that it has a certain amount of force associated with it, and it is an absolute measure of that force.

The other measure is of work done or to be done, and is only a relative measure of space effect during the expenditure of force. The foot pound is a familiar unit of this kind of measure, but it can only be applied as a measure of space effects and not of the simple expenditure of force. The number of foot-pounds which a moving body is capable of raising against a uniform resisting force, undoubtedly varies as the square of its velocity, but it is far from being a logical consequence that the absolute force associated with the moving body is in the same ratio. Let us see. A body falling freely one second, acted upon by terrestrial gravity, traverses a space of 16 feet and acquires a velocity of 32 feet, just as the ball in the long gun, cited by your correspondent, is supposed by him to do. But let us suppose, in both cases, that the impelling force is entirely removed at the end of the first second and that the body continues to move freely. Its acquired velocity will carry it, without expenditure of force, 32 feet in the next second, at the end of which it will have passed over 32+16=48 feet, instead of 64 feet as it would if the force were not removed, so that the distance due to the impelling force during the last second in 16 feet, or the same as in the first second. The same reasoning will apply to any number of seconds or other units of time. Equal increments of force are therefore added in equal times, and the entire force is in proportion to the time the impelling force has acted, or to the final velocity. In the case of the gun and ball, your correspondent admits that the intensities of action and re-action are equal during each successive instant, and it inevitably follows that their entire sums must also be equal, so that the force applied is equally divided between the gun and ball, though the amount of work done, or space effect, is unequal.

Work, then, is composed of force and space, and its unit, the foot pound, is made up of both. However valuable when used in a proper manner in practical mechanics, it cannot be set up as a unit of pure force, without involving the absurdity of supposing that gravity and other uniformly acting forces do not act uniformly but with a constantly varying power dependant upon the velocity of the body acted upon, and increasing immensely with that velocity. The unit of work is just as valuable, practically, if we do not insist upon such an absurdity. We have therefore two units of measure, one being the unit of *force*, proportioned to the simple velocity, and the other a unit of *work*, proportional to the square of the velocity, or to the space traversed. All the treatises on mechanics which I have seen give the first as the measure of momentum or "quantity of motion," while the quantity measured by the latter is variously termed "vis viva," "work," "energy," "kinetic energy," etc. It seems to me however, that if our ideas upon the subject are clear and distinct, the two words force and work are fully adequate to designate the two different kinds of quantity.

The subject of this discussion seems to me to have a somewhat important bearing upon the investigation of the nature of force, in relation to which many discoveries in modern physical science seem to indicate that new and important developments are near at hand. It is moreover quite important that practical men should understand the precise nature of the difference in the two measures, as it is of the greatest importance in considering among other things, the action of steam, its expansive power, etc. While I agree of course, with your correspondent, that terrestrial gravity is an absolute force, or more strictly speaking a resultant of many forces, I do not agree with him that steam is such a force. It is matter in motion, and like all expansive vapors or gases is the result of work done in separating the atoms of which it is constituted, and in storing up "potential energy." Of course the work which is done by steam, in expending the force stored up in it, is to be measured by a unit of its own kind, a unit of work and not of force. The problem of getting all the possible work from the fuel by which steam is produced, is a very important one, and needs for its solution a clear understanding of the principles involved in this discussion, as well as of the other conditions and principles pertaining to the subject.

No particular change in the "logic of events," relative to the effect of force upon matter, has occurred since the days of Newton. His views in this respect have since been maintained by the ablest writers on the subject up to the present time with very few exceptions, and the dissenting opinions seem to refer rather to names and definitions than to facts.

Henry F. Walling.

New York, April 8, 1867.

A New Dryer for Raw Oil.

Messrs. Editors:—The process for preparing linseed oil for use in paints and the arts by boiling and the addition of siccatives, has been in use for more than a century and but little improvement, if any, has been made in the result. Chemists, as well as artizans, have overlooked an important point in the boiling of oil, which is coagulation of the albumen. This takes place at the temperature of boiling water, whereby it is changed to a semi-solid form, and when the heat is raised to the point of boiling-oil the albumen chars and when dried becomes brittle. As much of the glaze and toughness of the dried oil is dependent upon the albumen it contains, it will be readily understood that many of the troubles incident to boiled oil arise from the method of preparation.

A gentleman of Boston has been for a long time convinced that linseed oil could be made to oxidize rapidly without even heating, and thereby preserve all the properties of the oil in their natural state. This subject he has made a special study for several months, and the result is the discovery of an article which he has called "siccohast." By the addition of a small percentage of this substance to raw linseed oil in a cold state, the oil is made to dry in any desired time, from four hours up to ten days, its ordinary time. It dries with certainty and with better results, flows more evenly, and has a better gloss than boiled oil, and is more elastic and but slightly discolored. It has been thoroughly tested for outside painting during the past twelve months, and is found free from any disposition to crack, like oil that is unprepared. Paint prepared with this article sets so quickly that the wood does not have an opportunity to absorb nearly as much as of raw oil. It is in a fluid state, mixes readily with linseed oil and is perfectly harmless being made of chemicals which have no detrimental effect on the oil. A. W.

Boston, Mass.

[We hope the process above alluded to is really new and useful. It has been known for a long time that the mucilaginous matter of linseed oil may be separated without boiling. If raw oil be ground up with sulphate of lead and the milky mixture be exposed to sunlight, the sulphate of lead settles, carrying with it the foreign matter, and the oil becomes clear and has admirable drying qualities.—Eds.

Explosion of a Clock.

Messrs. Editors.—Mr. A. Bahn, a silversmith, watch and clockmaker etc. of this place, has a clock of French manufacture which he has kept in his shop as a regulator for ten years. It had an enamel face of iron or steel twelve inches diameter, steel hour, minute and second hands inclosed in a case, wood frame, glass 1-16 inch thick front and sides, 5 feet high 18 inches front 6 inches deep. On the 22d Feb., 1867 5h. 30m. P. M., thermometer 60° Fah., the enamel face of the dial burst or separated from the metal to the extent of one-eighth its surface, irregularly from the figures 8 to 12 and centrally to the axle of the hands, and otherwise cracked over the surface making an explosion similar to blasting in a well, the impression made upon Mr. B. being the crushing in of the skylight overhead of the second story occupied as a photographic gallery.

Neither the glass frame nor hands of the dial, were even injured or displaced, nor did the clock stop, particles of the enamel adhered to the glass in front of the dial.

Will you, or some of your contributors, please explain the wherefores and oblige some of your subscribers in this neck of the woods. P. W. Humphreys.

Austin, Texas, March 20, 1867.

Illuminating Gas is said to be considerably increased in power by heating it and burning it with heated air. It would not be difficult or expensive to pass gas and air pipes, or a double pipe for both, in connection with household furnaces, etc., and apply combination burners.

Hot Blast.

Mr. Crossley, manager of the Ormesby Iron Works, Eng., in the course of a series of papers in the *Chemical News*, expresses the opinion that (theoretically) the saving of fuel in the furnace by heating the blast, with its corresponding result of more and better iron, will be equivalent to four times the amount consumed in heating the blast, until a temperature of blast is reached equal to the temperature of the furnace itself. Notwithstanding other things to be considered besides temperature, he thinks that we may safely aim at much higher temperatures of blast than are at present employed. He also puts forth the following theory of a desirable furnace so far as it can be rendered practicable. The fuel to be put into the hearth by a separate shaft, so closed that no current of gas can circulate through it. The hot gases rising from the point of extreme heat at the hearth, to be ignited by an upper jet of hot blast at a certain point in their passage through the ore and limestone. By an excess of air forced through the upper tweers, the iron would probably be peroxydized near the top of the shaft, and at a lower point the mixture would be melted, and still lower down the iron would be reduced by passing through the atmosphere of carbonic oxide, and in the hearth would meet with the requisite carbon and intensity of heat, and be converted into cast iron.

Mr. Crossley believes, contrary to the received opinion, that the carbonic oxide after de-oxidizing the ore passes off as carbonic acid without a second transmutation. Hence the carbonic oxide from furnace tops is waste fuel, in excess of that utilized in de-oxidizing the iron ore. Ebelman's analyses, comfirmed by observations of his own, convince him that a higher temperature must be had for reducing carbonic acid with carbon (to carbonic oxide) than is used in reducing the iron oxide with carbonic oxide, and of course than can exist further up the shaft. He is also convinced that the calcining process peroxidizes the ore, and thus hightens the temperature and economizes the work in the furnace, at the point where the oxygen of the ore unites with the carbonic oxide.

The Herring Safe Case Decided.

In our edition of January 5th, we reported in brief the leading case of Sanborn vs. Herring *et al.*

The suit involved the question of the liability of the maker and vender of burglar-proof safes, and for the facts we refer to that edition of our paper. On that trial the Jury did not agree and were discharged.

The case was brought on again and has been on trial the past week, and has presented substantially the same facts and points of law. The questions submitted to the Jury were: 1st, Was there a warranty that the safe was burglar proof? The Jury found that there was no warranty, thus deciding absolutely for Herring & Co., and therefore did not read the other points in the case.

This decision follows the English case reported by us, and settles an important principle relating not only to the safe business but extending to the sale of all merchantable goods. Probably but few if any cases have been tried in this country since the famous Gerard Will case, that has excited a more universal interest in the legal profession. The suit was conducted by Barlow and Hyatt and Judge Edmonds, for the plaintiff, and Nash, and Gerard and H. M. Needham, for defendants.

Navigation of the Colorado.

The exploring efforts of Lieut. Ives and Major Bridger at one time appeared to have demonstrated that the most of this magnificent watercourse is forever impracticable for navigation. To Bridger, the upper channel appeared to be a continuous gorge of terrific depth, the table land being inaccessible from the river, and the waters equally inaccessible to travellers perishing with thirst on the land. Fearful cataracts and rapids by their roar frightened the approaching boat expedition out of its boats to clamber for dear life up the impassable precipice and get home by land.

Later explorations by private enterprise, 1864, appear to have deprived Lieut. Ives' examination (if not the examiner) of all credit, and by parity of reasoning to render Bridger's very questionable. The part of the river which Ives declared perfectly impracticable, has been navigated in a steamer 130 feet long, at 4 feet lower water, according to the explorers, with ease and safety. One of them, Mr. Samuel Adams, who is or was lately in Washington endeavoring to induce the Government to make a complete survey and open the river and branches if possible to the interior of Utah, states that the current for over 600 miles now navigated is only about 2½ miles per hour, except the rapids, the worst of which have a fall of four feet in 120 yards, and were ascended by the steamer *Esmeralda* in seven minutes.

From the present head of navigation, some three hundred miles (to the mouth of Green river), are yet unexplored, but are believed to present no insurmountable obstacles; for the Green is navigable thence for 350 miles.

Assuming the probability that the Colorado is, or can be made, navigable to the junction, we have some 1250 miles of water highway, open at all seasons, in a very direct course from the Pacific Ocean to the interior of the trans-Mississippi region, and intersecting the Pacific Railroad. At the mouth of the river is found a safe harbor six miles in length, for ships drawing twenty feet of water. There are now eight steamers on the river, and forty-seven ships and one ocean steamer have been in the harbor at the mouth within six months. The unequaled grandeur of the scenery of this river, which penetrates the rising land through an almost horizontal cut, the sides gradually increasing in hight until they rise perpendicularly a thousand feet, will probably soon render it, if successfully opened, the favorite summer trip for invalids and tourists from East and West, going or returning by the Pacific Railroad.

Recent American and Foreign Patents.

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

STREET CROSSING AND SEWER INLET.—Jos. A. Miller, New York City.—This invention consists in a street crossing made of a series of perforated metal plates supported by a trough which inclines from the ends towards the center of the crossing, and which is provided with a pipe extending from its middle or lowest part down into the sewer in such a manner that all the water and mud which accumulates on the crossing and in the trough can be easily washed down in the sewer, and will be swept down by a copious rain without fail. Patented March 26, 1867. J. E. Stevenson, Agent, 40 Dey street, New York.

REVOLVING SHEEP-FEEDING TROUGH.—Columbus Aulls, Bridgewater, Mich.—This invention has for its object to furnish a simple and easily constructed trough for feeding grain, roots, etc., to sheep.

CLOTHES PIN.—David M. Smith, Springfield, Vt.—This invention relates to a pin for securing clothes on clothes lines. The object of the present invention is to dispense with the wire joint hitherto used for connecting the two jaws of the pin together, by substituting a wooden joint which is less expensive to apply, reducing very materially the cost of the manufacture of the pins.

HEATING ROOMS.—Samuel A. Halladay, Marrilla, N. Y.—This invention relates to the manner in which the heated gases and products of combustion are retarded and made to part with their caloric before entering the chimney.

GATE.—W. D. Armstrong and W. J. Armstrong, Harlem, Ill.—This invention has for its object to improve the construction of the gate invented by W. J. Armstrong, patented August 21, 1866, and numbered 57,432.

PURIFYING AND PREPARING GLASS ORE.—Enoch Carter, Newburgh, N. Y.—The object of this invention is to so purify and prepare the rock called glass ore—a recently discovered mineral—as to adapt it to many useful and ornamental purposes.

BALANCED STEAM VALVE.—Edwin Parker and Thomas S. Parker, Schenectady, N. Y.—This invention consists in so forming the slide valve that the steam is admitted to its inside, whereby the pressure on the upper and under sides of the valve are nearly balanced.

RESPLITTING MACHINE.—Edwin Westcott, Hudson City, N. J.—This invention relates to an improvement in the feed gear of a re-splitting machine, the feed rollers being so arranged that each pair can be moved in and out by turning a screw or other suitable means, and at the same time the connection between the feed rollers and the driving gear remains unbroken, said connection being effected by an endless screw which gears in worm wheels on the shafts of two of the feed rollers, in such a manner that the motion of said feed rollers remains unchanged whatever the position of the feed rollers may be. One jaw of the gage and one pair of feed rollers are rendered yielding by adjustable cushions placed on thin set screws, so that they can readily accommodate themselves to the varying width of the timber to be cut. The boxes of the saw arbor are so arranged that by means of a set screw the saw can be brought in an oblique position.

PEAT MACHINE.—Marvin S. Roberts, Lewiston, N. Y.—This invention relates to improvements on a machine for the manufacture of peat, secured by letters patent granted on the 15th of August, 1865.

COTTON CULTIVATOR.—Wallace & McClain, Murfreesboro, Tenn.—This invention relates to a device for cultivating cotton, and it consists in the employment of two shares arranged o operate one at each side of a row of plants, and scrape the earth therefrom, and using in connection therewith a rotary chopping wheel constructed and arranged in such a manner as to cut or thin out the plants as the machine is drawn along, the scraping and cutting or thinning out operations being performed simultaneously.

DOUBLE SHOVEL PLOW.—Jacob M. Eby, Warren, Ill.—This invention has for its object to furnish an improved double shovel plow, simple in construction, durable and cheap, and which will not be liable to weather, heat, sun crack, or break.

WASHING MACHINE.—J. S. SILLS, Cedarville, Ill.—This invention has for its object to furnish a convenient and cheap washing apparatus which may be readily attached to a wash tub, and easily removed, so that the tub can be used for other purposes if desired.

SAW SET AND GUMMER.—John Gardner, Virginia, Wis.—This invention has for its object to furnish an improved instrument for setting and gumming saws.

STOOL FOR FOR FENCE POSTS.—George Ipe, Kent, Ohio.—This invention has for its object to furnish an improved stool for fence posts, simple in construction, cheap and durable, which will not sag, and cannot be thrown up by the frost.

LOCK.—Abner S. Hardeig and Nicholas Reed, Otisville, N. Y.—This invention relates to a lock of that class commonly known as commutation locks, the operation of which depends upon the position of a series of disks which are marked on their circumference with letters or figures, and perforated with central holes and radiating slots through which the bolt slides. The bolt is composed of a bar which fits the central holes of the disks, and from which radiate arms which can be made to pass through the radiating slots of the disks, provided said disks are turned to the proper position. The disks are inclosed in a case one side of which is hinged and fastened by means of a screw which is concealed under the shackle when the device is locked. By removing the screw and opening the hinge the disks can be removed and the set of the lock changed.

FARM GATE.—Elijah C. Sears, Crystal Lake, Ill.—This invention relates to an improvement in the construction of farm gates for board fences which instead of swinging on hinges slides on rollers and guides for opening and closing.

BRACKET FOR ROOFING.—Hiram Beckwith, Grass Lake, Mich.—This invention consists in constructing from a single bar of iron a portable bracket designed for scaffolding in roofing buildings which may be used with the greatest convenience and safety.

STREET-CAR STARTER.—Thomas B, Jordan, Gloucester, N. J.—This invention relates to an improved device for starting street cars to relieve the horses of the first strain required to overcome the inertia of a standing car.

EXTENSION SCAFFOLD ELEVATOR.—Russel Loomis, Saratoga, N. Y.—This invention relates to an improved arrangement of mechanism for raising a scaffold or platform which may be applied to various useful purposes instead of a ladder, and consists in a pair of revolving disks in connection with friction rollers for opening and closing a device known as "lazy tongs" which are mounted on a portable frame moved about on wheels or in any other convenient manner.

STUFFING BOX FOR OIL WELLS.—J. B. Pettey and Jerome Fredricks, Conneaut, Ohio.—This invention relates to a stuffing box for keeping the surface water from oil wells instead of a "seed bag" now employed for that purpose.

GRAIN CLEANER.—Geo. Stevenson, Zionsville, Ind.—This invention relates to an improvement in screens or cleaners of wheat and other small grain especially designed for rubbing and scouring seed grain to free it from cockle, chess, and all other obnoxious seeds and foreign substances usually associated with and adhering to the grain causing the farmers in the Western States particularly great trouble and loss.

WAGON BRAKE.—Wiley Tash, Berlin, Ill.—This invention relates to an improvement in a wagon brake to render it self operative and consists in connecting the front axle and bolster with a sliding reach in such manner that in descending a hill the brakes or rubbers will be pressed against the hind wheels and lock or retard their movement just in proportion to the steepness of the descent and the necessity for preventing the wagon from running upon the team.

HORSE HAY RAKE.—Watson King, Springfield, Ill.—This invention relates to a device for operating a horse hay rake so that it will easily be adjusted to its work and be raised and lowered with the greatest facility, and the invention also relates to an improved manner of attaching the rake teeth to the head and also in a novel construction of the teeth

CORN PLANTER.—Wm. Hunter, Hastings, Minn.—The object of this invention is to supply the farmers in the West with a cheap and simple labor-saving implement for planting corn on the level prairie lands.

HAND LOOM.—Adam Reslnberger, Brandonville, West Va.—This invention consists in erecting a post upon the cross center of a hand loom and in attaching to the said post four forked shears.

SLAT FASTENING.—Alexander Warner, Brooklyn, E. D., N. Y.—This invention relates to a device whereby slats of window blinds may be easily locked and held in any desired position by securing a bolt to one of the slats of the blind and arranging a semicircular sheet-metal plate which is attached to the frame of the blind, said plate being provided with a series of holes or recesses wherein the end of the aforesaid bolt may be held, thus securing the slats in any desired position.

CHERRY STONER.—George Geer, Galesburg, Ill.—This invention relates to a device for taking the pits or stones from the cherries leaving the pulpy portion entire or intact and which will admit of the work being done much more rapidly than by the ordinary hand process.

SMOOTHING AND POLISHING MACHINE.—S. L. Myers and George Willison, Massillion, Ohio.—This invention relates to a machine by which boards and woodwork of any description may be nicely polished and smoothed said machine being also provided with an apparatus for holding and feeding to the polishing surface such articles as spokes for wagon wheels, etc.

SHEET-METAL BOILER.—John Carroll, New York City.—The object of this invention is to so construct copper or other sheet-metal boilers such as are used in dwellings for heating water and especially that class of boilers which is stationary, arranged upon ranges and stoves, that the same may be made of sufficient strength and durability out of very thin sheet metal and that either one or both heads of the cylindrical vessel may be easily attached to or removed from the same.

HOLDER FOR CHUCH PEWS, ETC.—N. A. Wright, Prairie du Chien, Wis.—This invention relates to a device more especially intended for use in churches, halls, lecture rooms, and other public buildings and is to be applied to the back of church pews, settees, etc. This holder is intended for hats, caps, or other articles of wearing apparel, books, etc., in the pew or on such settee, etc.

SCAFFOLD.—John P. Wright, Canton Lenora P. O., Minn.—This invention consists in so constructing a scaffold that it may by means of a screw and proper gears be elevated or lowered with facility by the side of a building or any other desired place. It is peculiarly adapted to the use of builders and painters as it is portable and can be conveniently transported.

ROAD SCRAPER.—Georgh H. White, Huntington, N. Y.—This invention has for its object to furnish an improved scraper for roads by means of which the dirt may be scraped up and spread evenly over the road way or over any desired part of said roadway.

GATE.—E. R. Dobbs, Poughkeepsie, N. Y.—This invention relates to a gate, of that class which are opened automatically by a vehicle in its passage to the gate and closed automatically by the vehicle in leaving the gate after having passed through it. The object of the invention is to obtain a simple means to effect this end and one which may be economically constructed and applied and which will operate in the most efficient manner.

PARLOR SODA FOUNTAIN.—A. D. Schnackenberg, Brooklyn, N. Y.—This invention relates to a soda fountain in which the valve can be easily opened or closed and in which a very simple mechanism for operating the said valve is used.

BOLT CUTTER.—Homer H. Handy, Niles, Mich.—This invention has for its object to furnish an improved tool for cutting bolts, etc., simple in construction and reliable and effective in operation.

PULVERIZER.—J. B. Fields, Jersey City, N. J.—This invention relates to a device for crushing and pulverizing substances, reducing the same to an impalpable powder. The invention consists of a rotating hollow cylinder the inner surfaces of which is provided with a chilled cast iron or other hard substances for a crushing surface, said cylinder being provided with openings at its sides which are coverd with screens, and having within it a rotary crusher or pulverizer, the periphery of which is also of chilled cast iron or other hard substance. The crushing or pulverizing surfaces of the hollow cylinder and the crusher within it are of V-form and the former moves rather further than the latter in order to obtain a grinding action, all being so arranged that substances, however hard, such for instance as gold-bearing quartz, may be reduced or pulverized in a perfect manner.

BOILING KETTLE.—Anthony L. Whitney, Brooklyn, N. Y.—The object this invention is to so arrange a kettle for culinary purposes, that without removing the contents from the vessel in which they are held, the same may be boiled and then steamed, and kept out of the boiling water if desired.

LATCHES FOR GATES.—W. T. Wells, Decatur, Ill.—This invention consists in so hanging the latch upon the gate, that it can be adjusted to be thrown more or less into the catch or keeper provided for it, to accommodate it to the sagging of the gate.

MOP HEAD.—William A. Lewis, Springfield, Vt.—This invention relates to a mop head of that class in which the movable jaw is operated by a screw. The object of the present invention is to expedite the movement of said jaw or give it a more rapid motion than hitherto, and to this end the invention consists in the application of the screws, one fixed on the end of the mop handle and the other being a tubular one provided with an internal thread to work on the fixed screw, and also provided with an external thread on which a nut connected with the movable jaw works.

HAND SEWING MACHINE.—B. W. Collier, Oxford, Mass.—This instrument is held in the hand and operated by means of handles similar to those of a pair of shears; it can be easily carried from place to place and is of simple and durable construction.

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 50 cents a line, under the head of "Business and Personal."

E. H., of Ill.—We know of no better and cheaper cement for an aquarium of tin or zinc frame than one of red and white lead, equal parts, mixed to a putty-like consistency with boiled linseed oil. If the joints are brought together and secured while dry for a day it will not be affected by water.

B. and E., of Wis.—We cannot give a reply to your question as to grate surface and hight of chimney unless we know the diameter as well as the length of your boiler, and the situation of your manufactory as to the hights in its vicinity, as regards the dimensions of chimney. We intend to publish an article on setting boilers, such as you suggest, very soon.

N. J. L., of Pa.—A belt on a smooth surfaced pulley is more effective than on a rough pulley because it has adhesion to a larger surface. It is reasonable in theory and efficient in practice.

J. P. H., of Mass.—The toy marbles generally used are made largely in Saxony. They are chipped into cubes from a hard calcareous stone by the hammer, and then placed in concentric furrows cut in a fixed slab of stone over which a platform of hard wood is revolved, while water is kept flowing on the stone. A very few minutes serves to give the cubes the form of perfect spheres.

J. P., of Mount Jackson.—Marble is polished by oxides of lead or tin known as "marble putty." That of tin is the best and is prepared by dissolving tin in nitro-muriatic acid, and after filtering, precipitating the oxide by ammonia. It is then collected, washed with water, and pressed dry in a cloth filter. Afterward it is broken up, dried in the air, powdered on a glass plate, and heated in a crucible to a white heat. It can be obtained, ready prepared, of any marble worker.

J. S. P., of Col.—We cannot supply the numbers of the SCIENTIFIC AMERICAN you wish.

C. E., of N. Y.—We are not acquainted with the method of producing the high polish on the fine steel work of watches. We suppose it to be by the use of crocus and rouge on the buff wheel and revolving brush or by hand, as the shape of the article demands. Probably some of our correspondents can answer the question.

T. A. M., of N. J.—If your tank is of equal diameter from end to end multiply the area of a cross section by its hight in inches and you have the square inches. Divide the product by 144 and you have the square feet. If your tank is a frustrum of a cone—larger at the bottom than the top—find the area of each end add them together and multiply by the slant hight. The area of a circle is its diameter multiplied by 3.1416. The reduction from inches and feet to gallons you can find in any hand book of mechanics or arithmetical treatise.

C. J. B., of N. Y., asks what is the extreme length, breadth, and hight above high water of the suspension bridge at Cincinnati, Ohio. We reply that the total length, including approaches from Front street, Cincinnati, Ohio, and Second street, Covington, Ky., is 2,252 feet; length of main span from center to center of towers, 1,057 feet; of each land suspension, 281 feet; width in the clear, 36 feet; hight above low water 100 feet. Our correspondent may know the difference between low and high water, and if so he will have a complete reply to his question.

T. P. H., of N. Y.—We think the largest water wheel in this country is one running at Troy, N. Y., which is over sixty feet in diameter.

D. S., of N. Y.—A "back action" engine is one in which the cross head is beyond the crank, or the crank is between the crosshead and cylinder. The object is to get long connections with a compact engine. It is in great favor for thwartship propeller-engines and is used occasionally for stationaries. It is simply one of the many modifications of the form and arrangements of engines, hardly any two of which are alike. There is no necessity of our "ventilating" so familiar a subject through our columns; most mechanics thoroughly understand it.

R. W. T., of Ky., desires to know something about the manufacture and makers of coiled springs. Coiled and spiral springs are merely wound, one of flat steel or brass and the other of round steel, iron, or brass It is a process any machinist can perform, and we are not aware that there can be any secret in the manufacture.

J. B., of S. C.—Ordinary soft solder will fasten the ribs of gun barrels without the heat necessary for brazing. Clean the barrel and rib from grease and wash with dilute muriatic acid, then tin both with solder and proceed as in soldering tin.

S. J. H., of Ill.—Crank pins or any journals of wrought iron may be faced with steel by welding a sleeve of steel over the iron with borax, or, if the work admits, boring the sleeve, turning the iron and shrinking the sleeve on.

C. M., of Col.—Packing rings for steam cylinder pistons are largely made of cast iron. We have seen them made of steel, and also of brass filled in with Babbitt metal, but we think steel packing rings are not now used. The springs are of steel. The disagreement between you and your opponent probably arises in a misunderstanding as to the terms "ring" and "spring."

J. K., of Ill.—Boulton and Watt's rule for finding the sectional area of a fly wheel per horse power is: "multiply 44,000 times the length of the stroke in feet by the square of the diameter of the cylinder in inches, and divide the product by the square of the number of revolutions per minute, multiplied by the cube of the diameter of the fly wheel in inches. The result and number will be the proper sectional area of the fly wheel rim in inches." For further particulars and examples we refer you to Bourne's Hand Book on the Steam Engine page 229. . . We cannot understand how Ebaugh's boiler annealing is applicable to multitubular boilers.

J. H., of N. Y. says, in reply to P. Y. on the "Crank Motion" in our issue of March 30th: "As the distance traveled by the four feet crank in one-half a revolution (12·56 feet, is to that of the piston (8 feet) in the same time, so is the length of the crank (4 feet) to the average leverage, (2·54) feet. J. L. F., of Ohio, says: seven tenths of the distance between center of shaft and of crank pin will give the average leverage of a crank; in this case, of a four feet crank, the distance being 33 6-10 inches, the average leverage.

G. W. T., Wheeling, W. Va.—Metaphysical and ontological disquisition lie not quite near enough to the practical interests of mankind for our purposes. Besides, they require, from their nature, a great deal of room, which is out of the question in a newspaper.

J. W. B., of Miss.—The rank and persistent odor of ordinary benzine is due to matter which is foreign to the pure article. The ordinary essential oils will easily disguise the odor of a well manufactured article. The red coloring matter of most of the preparations for the hair is extracted from alkanet roots.

D. C., of Mass.—To prepare bichromate of ammonia, add a solution of chromic acid to aqua ammonia till the odor of ammonia disappears; thus you have chromate of ammonia. Now add as much chromic acid as you have already used, and you have a solution of bichromate of ammonia. By slow evaporation you may obtain the salt in crystals.

J. S. L., of N. C.—We still consider Appleton's Cyclopedia one of the best works of the kind extant. . . . Your description of what you want is so imperfect that we cannot help you. We know of no spectacles which are at the same time adaptable to near and long sightedness.

C. T. H., of O.—There are electro platers who find it most convenient to strengthen their solutions by dissolving the metal by means of the battery. It is a very good plan when the battery can be spared for the purpose.

R. P. V., of Md.—The gases used for the lime light at the theaters of this city are condensed into wrought iron cylinders.

E. F. K., of C. W.—"Does the face of the river St. Lawrence maintain a level from its source to its outlet, if we except the perceptible declines"? Water never runs up hill. The outlet must be lower than the source. The outlet of the Mississippi is said to be further from the center of the earth than some of its sources, so that to suit the case of the Mississippi we must give a limited signification to the expression up hill. As the outlet of the St. Lawrence is northward of its source, the outlet might be a trifle lower than gravity alone would bring it.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Manufacturers of golden sulphuret of antimony for coloring rubber please address P. O. Box 397, New Brunswick, N. J.

A "subscriber" wants to know where the "Stark Mills'" bag is made, and by whom.

Manufacturers of No. 22 Brass Chain send address and price to J. Gurd & Son, London, C. W.

A. Fellows, Mayuoketa, Iowa, has a valuable patent with no means to improve it. Wishes to correspond with men of capital with a view to have them furnish means for a share. $5,000 sufficient. A splendid opportunity.

EXTENSION NOTICE.

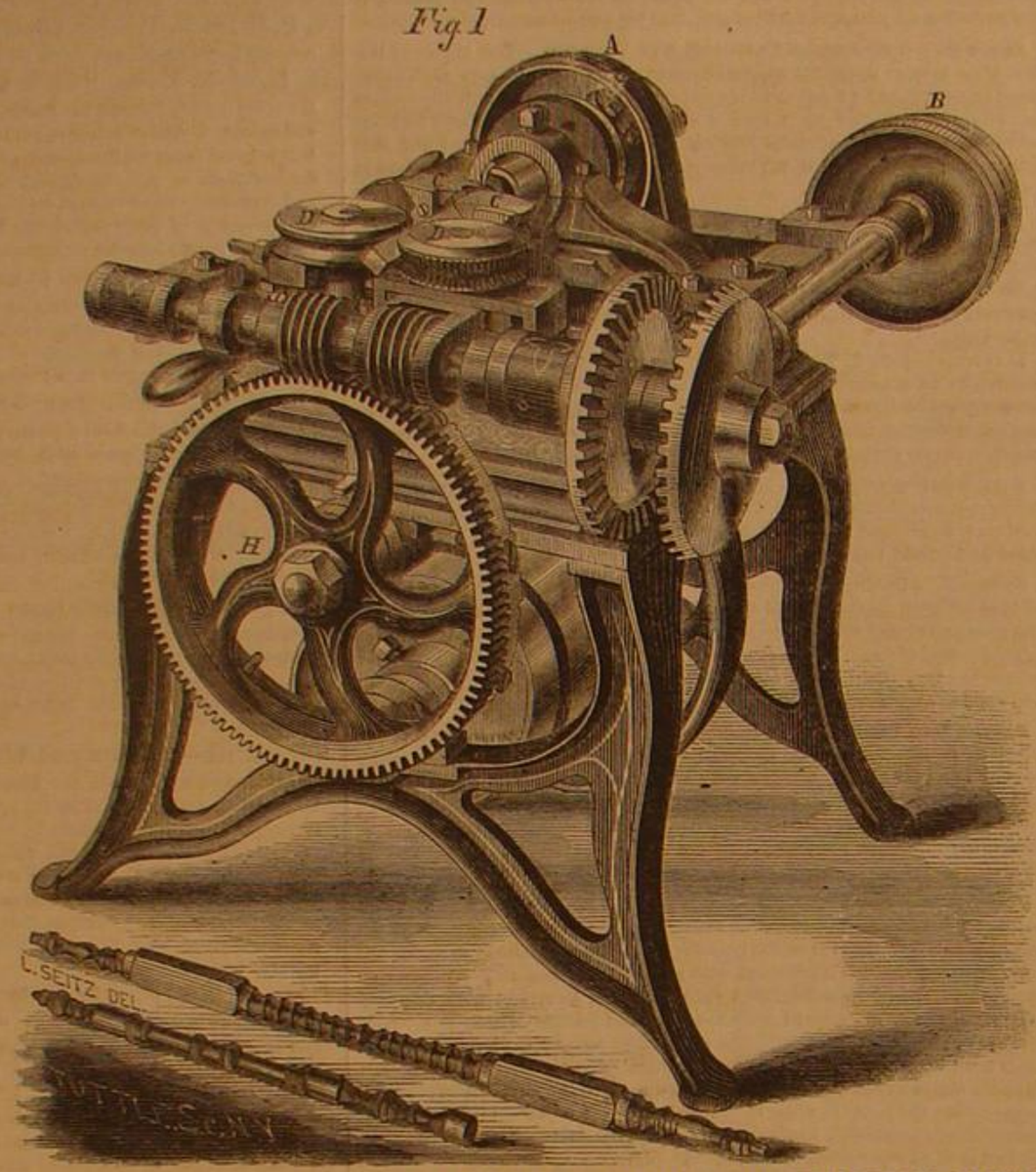
William E. Ward, of Port Chester, N. Y., having petitioned for the extension of a patent granted to him the 28th day of December, 1852, for an improved method of heading screw blanks, rivets, etc., for seven years from the expiration of said patent, which took place on the 28th day of December, 1866,—this application having been authorized by Act of Congress,—it is ordered that the said petition be heard at the Patent Office on Monday the 24th day of June next

Improved Automatic Lathe.

The engravings herewith given represent a very ingenious machine for turning beaded and plain wood work, for handles, chairs, settees, spokes, stair railings, and many other purposes. It is compact, direct acting, and certain in its operation. It will cut or plane in a square, octagonal, or any polygonal form, and turn plain or beaded at the same operation. Fig. 1 is a perspective view of the complete machine, and Fig. 2 the working side of the head for turning the round work.

The machine is driven by the lower shaft, which, by means of belts, gives motion to the cutter head, A, and the cone pulley, B. It also, by suitable connections, revolves the cutter heads, C. The head, A, turns loosely on a hollow arbor which is fitted with dies of different form to guide the work. In Fig. 1, the die shown is square to accommodate the square piece seen passing between the feed rollers, D, in Fig. 1. One of these rollers is toothed and the other plain. They are adjusted by springs to open or close together to admit the work to be turned, and they feed it to the heads, C, which also can be similarly adjusted. From these cutters the wood passes through the hollow stationary arbor and is turned by the cutters on the head, A. These cutters are V-shaped as seen in Fig. 2 at E. The cutters are secured by hook bolts to bell cranks, F, pivoted at the junction of the angles, and held pressed in toward the center of the wheel by springs, G. The outward movement of the cutters is assured by dogs attached to the crank levers, F, by means of slots through the pulley. These dogs connect with a lateral sliding bar, not shown, the end of which engages with the pattern plate secured to the large worm gear, H, seen in front of the machine, Fig. 1. This pattern is of sheet steel or iron, the edge formed to present a section of the work to be done, and one can be changed for another at will. The wheel carrying this pattern is driven by one of the worms on the front horizontal shaft, the other driving the feed wheels, D. This shaft is driven by the cone, B, with the aid of bevel gears, as seen, which may be thrown in or out of gear, as desired, to actuate or stop the feed rollers or the pattern wheel. This is done by a lever operating a clutch in the usual manner.

Fig. 1



A stick may be introduced into the machine between the feed rollers, D, and pass to the cutters, C, which may be of and shape to give the form required; thence through the die in the hollow arbor until the cutters on the head, A, engage with it and turn it to any form desired, their motion to or from the center being controlled by the action of the pattern on the rod, which opens them, and the pressure of the springs, G, which close them.

This machine is the subject of a patent issued Aug. 24, 1858. A patent is also pending through this office on other improvements. For further information address Frederick Baldwin, Brattleboro, Vt.

American Iron Manufacture.

The statistics presented at the last meeting of the American Iron and Steel Association show a product for 1866, in pig iron of nearly a million (939,956) tuns; in rails, new and rerolled, of 339,764 tuns: in nails of 129,858 tuns; in castings (over 10 lbs. weight), 946,613 tuns, etc. The following is the complete table, in which the very large import strikes the eye, the native product of pig iron being overbalanced by the castings alone:—

	Tuns of 2,000 lbs.
Pig iron of all kinds	939,956
Rails, new and rerolled	339,764
Iron advanced beyond blooms, slabs and loops, but not beyond bars	184,751
Bars and rods made from iron on which a duty of $3 has been paid	23,073
Blooms, slabs and loops	14,516
Band, hoop and sheet (all sizes)	142,829
Plate iron (all sizes)	57,771
Rivets, nuts, washers and bolts	29,281
Cut nails and spikes	129,858
Castings for bridges and other prominent structures	32,909
Castings exceeding 10 lbs in weight	946,613
Stoves and hollow ware	62,905
Iron advanced beyond blooms, slabs, etc., the duty to which it was liable in the forms of blooms, slabs, etc., not having been paid	18,855
Wrought railroad chairs, etc.	17,265

A comparative view of the proportion of the several states in the above product will be found interesting, as follows:—

Of the 939,956 tuns of pig iron made,

	Tuns.		Tuns.
Pennsylvania produced	197,584	Massachusetts	11,156
Ohio	118,498	Kentucky	9,722
New York	93,565	Vermont	8,743
New Jersey	29,768	Wisconsin	2,289
Maryland	27,080	Tennessee	1,171
Michigan	15,923	West Virginia	781
Connecticut	14,338	Virginia	674
Missouri	14,046		

Of the 339,764 tuns of rails there were produced in

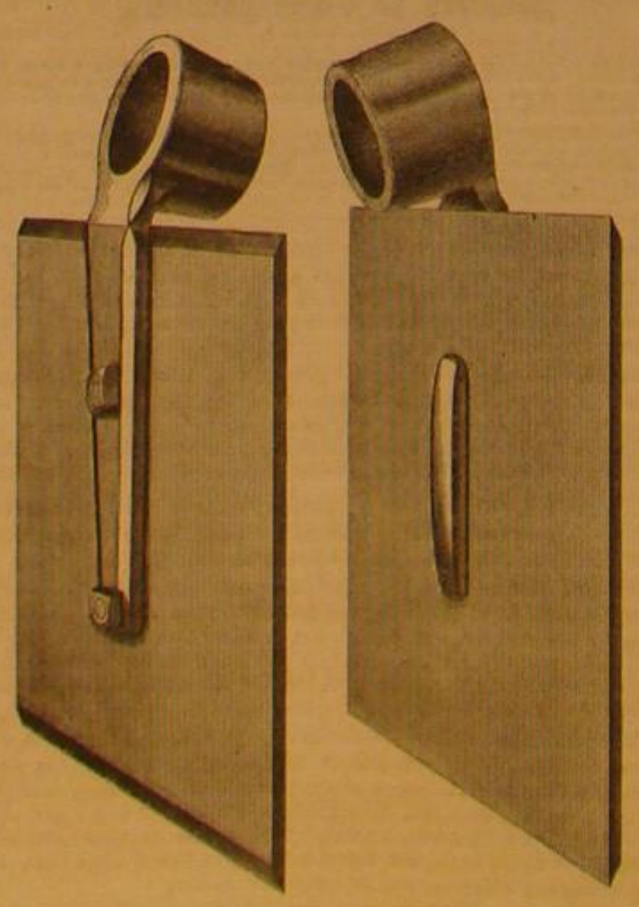
Pennsylvania	150,864	Michigan	11,669
New York	54,415	Kentucky	9,258
Illinois	17,646	New Jersey	5,023
Massachusetts	29,575	Tennessee	3,448
Ohio	26,117	Maryland	3,279
Indiana	15,92 [illegible]	West Virginia	3,215

Medical Education.

Dr. McDermott, Surgeon General of Ohio, says of the candidates for army surgeons in the late war, that none but graduates of regular medical schools were admitted to examination, and yet over eighty per cent of these were rejected for incompetence. The ignorance betrayed by many of the candidates was deplorable, proving that the diploma of a medical college has ceased to be of any value as evidence of capacity. Of course this per centage does not indicate the condition of the medical profession, but only of the dregs, or at least the rawest portion of it, seeking employment for want of practice; but it proves that the title of "M. D." is worse than useless as now administered, to indicate the learned in medicine. The suggestion of Dr. Butler in the *Medical and Surgical Reporter*, commends itself strongly in this state of things. It is that the American Medic. Association should take this matter out of the hands of the multiplying and easy-going medical colleges, by appointing Examining Boards with authority to review the pretensions of all practitioners within their respective districts, and on whose report the Association shall act in according or withholding the degree of Member of the American Medical Association, as a universal substitute for the abused and worthless "M. D." Of course the cabalistic letters would be the initials of some Latin synonyon of the above title, as the letters M. A. M. A. do not spell the right designation for a regular doctor.

Rose's Reversible Hoe.

"Dull as a hoe" is an old-fashioned saw, but has hardly the force of truth in these times of improvement, when a sharp edge and a steel plate is considered so necessary to the efficiency of this agricultural implement. A dull hoe is a poor tool to work with, and if there can be two edges to a hoe so that when one is dulled the other may be in good order, something is gained in the saving of time. There have been hoes made double bladed so as to be reversed at will, but the unused side threw the other out of balance and interfered with the proper "hang" of the blade.



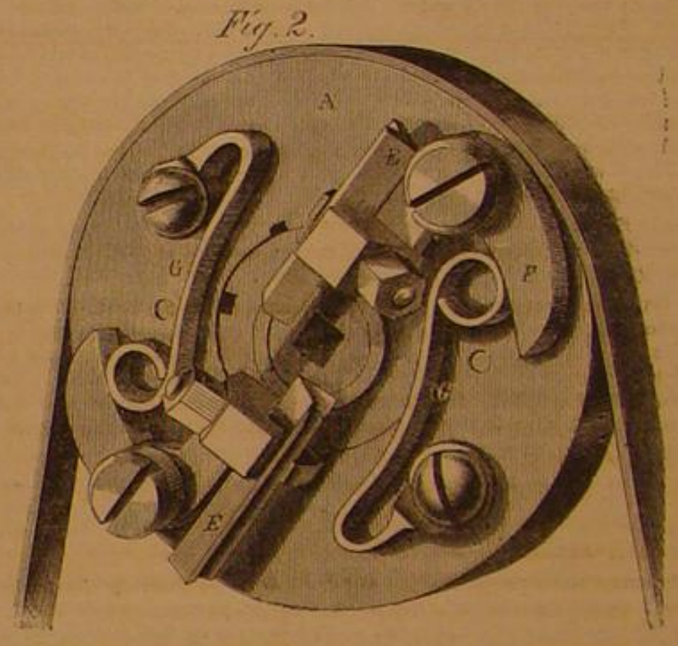
The device seen in the engraving is intended to obviate these objectionable features, and would seem to be effectual. The eye has a shank which passes part way across the blade and is secured with bolts and nuts. A strengthening piece is attached to the face of the blade which holds the bolts, and may be made a part of the blade or secured to it in any proper manner. The bolt holes are so spaced that they fit the bolts equally well when either edge is down. No further description is necessary for a proper understanding of this improvement.

It was patented through the Scientific American Patent Agency, January 1, 1867, by C. A. Rose, of Columbus, Ga. For additional particulars address Thomas G. Orwig, at 119 Nassau street, New York City.

The Cashmere or Angora Goat.

The valuable and elegant shawls imported into this country from Turkey and other localities in Asia, and often styled camel's hair shawls, are made from the wool of the Cashmere, Angora, or Thibet goat, as they are indifferently styled. Probably there is no generic difference between those bearing these separate names, the variation in their points being the result of difference in climate and cultivation. These shawls, when genuine, are held at high prices, being often estimated by thousands of dollars. Attention was first directed to them by the forwarding of one to Paris by the commander of the French expeditionary army to Egypt under the first Napoleon. A single fine shawl sometimes employs the labor of four persons for a whole year. The English obtained them from India. The best are worth at the place of production from $500 to $800. The ordinary qualities have been and still are imitated in France on the Jacquard loom. In the fine, genuine Cashmere the figures are produced in the same colors and precisely alike on both sides. Imitations of these are rarely attempted on account of their cost.

Fig. 2.



The goats were first brought to France in 1819, from thence they were introduced into England. In 1849, Dr. James B. Davis, of Columbia, S. C., procured seven females and two males of the pure Angora breed, and since then they have been largely raised in many states, especially in the West. In Ohio alone, during the past six months, at least $100,000 have been paid for these goats. The fleece of these goats is from eight to fourteen inches long, a specimen now before us, not selected, measuring over twelve inches. It cannot be called a wool, as it is mainly a mass of nearly straight, very fine hair, with a brilliant silky luster. It resembles the silk as generally imported from China and Japan, and is white or nearly so. The goats are shorn twice a year, are hardy, prolific, and in addition to the value of their fleece are excellent for the table.

This silky hair is not, however, all the material of the fleece. Next the skin is a down of wool so fine that ordinary wool is not to be compared to it. From this the delicate fabrics of Asia are produced. Fine specimens of the animal are raised in this country and sold not unfrequently at prices varying from $800 to $1,500. It appears that we have as yet no proper machinery for the manufacture of the fleece into the most valuable products. The hand process in use in Asia, where the labor costs only from three to twelve cents per day, is impossible here. Dress goods can be readily produced on our present machinery, but at considerble waste of material.

Mr. Israel S. Diehl, for many years our consul at Batavia, has been commissioned by our Government to proceed to Europe and Asia for the purpose of investigating the modes of manufacture and selecting for this country a number of the most valuable animals. The attention of our mechanics and inventors is directed to the production of suitable machinery to render more valuable this superior material of manufacture. Communications seeking information may be addressed to Charles S. Brown, President of the American National Bank, No. 80 Broadway, New York City.

Swann's Safety Valve.—In our description of this valve in No. 15, current Vol. an error occurs in the address of Messrs. Teschemacher & Stearns. It should be No. 13 Exchange street, Boston, Mass.

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VOL. XVI., No. 17....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 27, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

*Improved Wind Mill	261	Recent American and Foreign Patents	267
A Curious Formation	261	Extension Notice	267
*Walker's Improved Spice Box	261	*Improved Automatic Lathe	268
Cause of Milk Sickness	261	American Iron Manufacture	268
Last Words from England	261	Medical Education	268
Odd Watches	262	*Rose's Reversible Hoe	268
New Publications	263	The Cashmere or Angora Goat	268
Editorial Summary	263	Gas Meters—Wet and Dry	269
Damascus Steel	264	A Trial of Cut-offs	269
The Force of Expansion by Heat	264	How Steamers are Burned at Sea	269
*Dixon's Low Down Grate	264	Patents in "The Dominion of Canada"	269
*Handy to Have in the Shop	264	Patents in Prussia	269
Extracts from Patentees' Letters	264	Ocean Telegraphy	270
The American Hog-tamer	264	A Chemical Theory of Cell Formation	270
Gleanings from the Polytechnic Association	265	Coloration of Glass by Sunlight	270
*Steam Boilers—Their Form, Construction, and Material	265	Contraction and Crystallization	270
What is a Peddler?	265	Death of an Inventor	270
Action and Reaction—The Measure of Force	266	Patent Claims 271, 272, 273,	274
A New Dryer for Raw Oil	266	Inventions Patented in England by Americans	274
Explosion of a Clock	266	*Miller's Adjustable Circular Saw Teeth	276
Hot Blast	266	*Elder's Combined Milk Cooler and Butter Preserver	276
Navigation of the Colorado	266		
The Herring Safe Case Decided	266		
Answers to Correspondents	267		

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK Row, and not at No 39.

GAS METERS---WET AND DRY.

The employment of illuminating gas as an artificial light is so general throughout the country that all information relating to the subject must prove of universal interest. Especially should the construction and management of gas meters be familiar to every consumer, for its testimony is the only provision made for showing the standing relation between producer and consumer. A few weeks since we referred to the report of a committee from the Boston Common Council, appointed to investigate the gas manufacture, giving our readers some general facts on the subject gathered from the great mass of testimony therein presented. From the same source we draw the following in relation to meters:

That payment should be made by the consumer according to the amount of gas actually used, is eminently just and was recognized as such from the first general introduction of illuminating gas. The apparatus first contrived accomplished its object in a very crude and imperfect manner, and improvements have been made, from time to time, for the last fifty years, during which period perfection has been sought for two classes of instruments known as the wet and dry meters. As the older form, the construction of the water meter should first claim our attention The main principle extending through all its varied forms may be thus explained. When a number of vessels of a certain capacity—for example, 1 cubic foot—are so arranged that, without loss of gas in the interval, one after another shall be filled by the gas in passing, it follows that just as many cubic feet will have passed as there are vessels that have been filled. As usually constructed, the meter is arranged similarly to an inverted overshot water wheel, its buckets being replaced by a revolving drum having four compartments of equal and known capacities. The gas coming in at the bottom of the meter rises through the water, which occupies a little more than one-half of the drum—fills one of these chambers, by its pressure turns the wheel and escape into the upper part of the apparatus whence it is conducted as desired for supplying the burners. While one partition is rising another is being brought under the water, thus rotation is produced and the revolution of the buckets gives motion to a series of toothed wheels adjusted so as to register on the dial plates the number of cubic feet passed through. For accuracy in the instrument the water level must be perfectly preserved, for if the meter is inclined backwards it will measure in favor of the company from thirty-five to fifty per cent constantly; if tipped forward, gas is burned that is not paid for. If the meter is set with too little water originally, if it is afterward evaporated, or if drawn off by accident or fraud, the registration of the meter would be too slow and the company would be the losers. Another serious objection to the use of the wet meter is the liability of its freezing in the winter, thereby entirely shutting off the gas supply. Substituting alcohol or spirituous liquors would overcome this difficulty, but in addition to their costliness, all these liquors evaporate so readily that the change would be in the end of no permanent benefit. The ease with which fraudulent means may be employed by dishonest consumers for underestimating the amount of gas burned, and the difficulties attending the use of this meter above specified, have caused the construction of a variety of measuring instruments in which the employment of any liquid is dispensed with.

The dry meter measures the gas by the number of times that a certain bulk will fill a chamber capable of undergoing expansion and contraction by the passage of the gas. The apparatus consists of a box divided in two compartments. The gas from the main pipe enters one of these and finds its only outlet through a slot which opens into a flexible bag of leather called a diaphragm. When filled by the gas the expansion, by a suitable connection closes the inlet, at the same time a valve is opened into a second compartment outside the diaphragm into which the gas passes and by its pressure upon the diaphragm drives the contained gas through a third slot into the outlet pipe. That the supply to the burners may be uninterrupted, two or three diaphragms are employed the arrangement being such that a certain number of movements of these shall correspond to a certain amount of gas, the number of cubic feet being registered on the dial plate. The dry meter is preferable in this respect that it needs no care to be taken of it even in the coldest weather. On the score of accuracy one meter is equally as good as the other when both are new and properly adjusted, but the dry meter will continue in order much longer than the wet.

The same reliableness in working is not experienced with meters standing idle for some time as with those constantly in use, for in the former case particles of dirt and tarry matters clog the valves and the gas passes through unrecorded; loss must also accrue to the company if any rent should be made in the diaphragm. On the other hand the consumer suffers when from the action of the coal tar upon the leather the latter becomes so stiffened that a full stroke is registered when the diaphragm does not entirely fill. Instances are given when from this cause the meter of the house which had been closed during the summer months, measured too fast or against the consumer, from thirty to forty per cent. Neither class of instruments, then, are perfect and both are susceptible of vast improvement, but the dry meter is unquestionably the better one for both parties concerned, and the whole community are interested in securing the most accurate apparatus, for it is nothing in favor of a meter that it benefits the individual at the expense of the company, in this case the amount burned and not paid for being charged by the company upon the corporation and thus the individual gain is public loss.

That there is abundant room for improvement in both styles of instruments is evident and the attention of inventors is called to the existing need. When at length we have been put in possesion of a perfectly accurate instrument, one fruitful and unfailing source of grumbling on the part of careful householders will be forever removed.

A TRIAL OF CUT-OFFS.

We have received a report of the performances of two marine engines with different cut-offs, which may be interesting to marine engineers and others, the main facts of which we will briefly rehearse.

The New York and Virginia Steamship Company built, over a year ago, for their line—the vessels of which ply between New York and Richmond, Va.—two ships, each a counterpart of the other, the hulls being built by Westervelt, of New York, at the same time, from the same molds and patterns. It was designed to make them twin vessels as nearly alike as possible. The machinery of both vessels was made at the Allaire Works, New York, from the same patterns and at one and the same time, the only difference between the two engines being that one—that of the *Niagara*—had the Stevens cut-off, and that of the other—the *Saratoga*—the Winter's cut-off.

The two vessels have been running regularly for a year on the same route and engaged in the same business. These conditions appear to have been well suited for a satisfactory test of the relative value of the two cut-offs. The Stevens cut-off hardly requires an explanation, as it is so extensively used that there are few machine engineers or builders of marine engines, who do not thoroughly understand its construction and operation. It is conceded as giving excellent results. It is operated by two eccentrics on the main shaft, one to move the steam valve rock shaft and the other the exhaust, each independent of the other, thus permitting the setting of the toes and wipers on the rock shaft, so that the steam can be made to cut off at any desired part of the stroke without disturbing the exhaust motion.

The Winter variable cut-off may not be so generally known, although it is in use on a great many vessels—naval, mercantile, and pleasure yachts. It is called a "rotary cut-off," and is operated by one eccentric on the main shaft. This eccentric gives rotative motion to a shaft on which are secured four cams, two for the exhaust and two for the steam inlet valves. The motion of the steam valves is made variable by interposing between the cam and valve-lifter swinging toes which are alterable while the engine is working, so that the steam can be cut off at any point of the stroke without affecting the exhaust, which exhaust motion is so arranged that it gives the quickest possible action in lifting the valves, and retains them in an open position as long as may be desired. Thus the steam may be utilized under the ordinary amount of lead without having back pressure on the piston.

The two vessels used coal from the same heap and a strict account was kept of their performances. The result was that the *Saratoga* with the Winter cut-off, in forty round trips between the two points, going and returning, used less coal by four hundred tuns than the *Niagara* having the Stevens cut-off and made the shortest average time, beside forcing her way over the bar in the James River when the *Niagara* could not, thus saving the expense of a steam tender, and in a heavy following sea the engineer could keep the engine from hanging on the centers by allowing the steam to follow the piston to any required point of the stroke.

The trial extended through a period of over seven months, the average amount of coal burned per trip being on the *Saratoga* in round numbers, 70 tuns, and on the *Niagara* 80 tuns. It is but fair to say that both vessels improved in the economy of coal during their thirty trips, but the result shows rather favorably for the *Saratoga* with the Winter cut-off. Our engineers must draw their own conclusions.

HOW STEAMERS ARE BURNED AT SEA.

An able contribution anonymously published in a daily paper of this city, so well sums up the criminal defects common among our steam craft of all descriptions. in regard to the hazard of fire, that we need make no apology for repeating in brief the catalogue. A list of 336 American ocean and coasting steamers of every grade is printed, with their fire rates annexed, purporting to be as recorded on the books of the underwriters in the United States and Europe. Of all these only the small minority of 73 are rated "good" in point of security and provisions against fire. The other 263 are all rated "indifferent", or "insufficient."

A steam vessel becomes from the nature of the case one of the most inflammable structures in the world. Fervid heat from the furnaces dries and chars the very portions of woodwork most exposed to danger, until they are ready to take fire like tinder from a spark or the proximity of unusual heat. In such circumstances the most minute and complete precautions ought to be religiously observed, and neglect of this plain duty is the cause of nearly all marine disasters by fire. Boilers with external furnaces of brickwork should rest entirely on their standards, and the brickwork should be cased with accurately fitted plate iron, so that fire working down into cracks and crevices cannot possibly get through, and no woodwork should be allowed within one foot of them, while that directly over them should be sheathed with metal closely nailed. All boilers should be jacketed with felt or hair cushioning, else the accident of low water and overheated surface may at any time set on fire the hot and half charred wood nearest; whereas the covering of animal fiber will quickly reveal by its peculiar odor the commencement of over-heating in any part. Boilers with internal furnaces should certainly have water bottoms; otherwise openings which will at some time or other appear will deposit fire beneath, or over-heating will take place from the bottom surface. Natural draft should always be secured, and blowers be outlawed altogether. Blowers urge every spark and flame to every possible outlet, crevice or joint of door, and many steamers have been thus destroyed by them. Whenever the passenger hears the deep thrumming roar of a blower, let him mark the name of that steamer in his note book as one to be avoided in future if possible. Woodwork around boilers, steam chimneys, etc., should be well set off, sheathed with metal within, the laps upward, and *not* employed as a closet for brooms, buckets and other combustible articles. Chimney rooms should be large enough to admit the passage of a man around the chimney, and should be without floors to obstruct free ventilation of heated air. All steamers should be provided with one or more independent steam fire and bilge pumps, placed on the main deck so as to be in no case inaccessible or unmanageable in time of danger, and fitted with abundance of hose to reach all parts of deck or hold. It is stated that scarce a week passes without some vessel being saved from burning or sinking solely by the services of one of these pumps, or lost by the want of them, under circumstances where the engine pumps are from their position inadequate or powerless. Store rooms should be located away from the fire room and boilers, instead of being placed, as they often are, to utilize a space too hot for passengers, freight or anything else, except the oils and cotton waste of the engineer! All these combustibles should be kept in a room by themselves, in fixed metallic tanks, where artificial heat and light need never come, and lighted at night by a fixed light outside. Movable lamps should be entirely dispensed with in engine and fire rooms by ample provision of light from fixed lamps. Why should not these and other securities suggested by experience, be embodied in a general law and enforced upon the owners of all steam vessels?

PATENTS IN "THE DOMINION OF CANADA."

The British North American Provinces, shortly to be united together under the name of "The Dominion of Canada," are as follows:—Canada, New Brunswick and Nova Scotia. The union of these Provinces will doubtless be perfected during the present year when a general Patent Law will be passed; but whether under its stipulation foreigners non-resident in the dominion will have the privilege of obtaining patents for their inventions, is uncertain. At the present time patents are granted in Canada, only to British subjects, who must be residents in the Provinces as well as the discoverers of the invention. In New Brunswick, however, all foreigners resident or non-resident, may obtain Letters Patent for their inventions for a period of fourteen years, renewable for an additional term of seven years.

Under the act of Union all patents previously granted in each separate Province prior to the Union, will, when confederation takes place, extend over the entire dominion. We have received this information from an eminent patent soliciting firm at Montreal, and regard it as correct.

We are prepared to take out patents in New Brunswick, in anticipation of the union of that Province with the Canadas. Particulars furnished on application at this office.

Patents in Prussia.

We have received a communication from a Commission appointed to prepare a system of Patent Law and Practice for the enlarged Kingdom of Prussia. We have responded to the committee in detail, and we trust ere long to be able to announce the introduction of a Prussian patent system

fully up to the demands of the time. In our communication we endeavored to embody the best features of our own and other systems, none being in our opinion what they should be. Prussia is a rapidly rising country, and has just at this moment a very crude and unsatisfactory patent code.

OCEAN TELEGRAPHY.

Though a hundred thousand miles would not measure the present extent of telegraphic wires that are stretched over the continents, for reasons that may be better understood hereafter, about one third of the period during which the above was constructed has been expended in completing the first project for a line across the Atlantic.

Although capitalists have invested with great courage and liberality, and doubtless every attention has been given by those connected with the practical performance of sinking a cable between the shores of Ireland and America to proposals or mechanical suggestions that would in their opinion form any auxilliary to success; still, whether means had been overlooked or otherwise, that would have led to earlier success, the work has been accomplished, according to good authority, only through the advantages of "suitable weather," and, it may be added, the use of an enormous ship whose great gravity, particularly when heavily loaded, yields but little to the motion of an ordinary seaway; in short, fortunate circumstances have furnished a means for the establishment of a telegraphic communication between the two continents, but at a cost that prevents its becoming of general public utility.

It is now admitted that a properly insulated wire works better, and at all times more certain, at the bottom of the ocean than those ordinarily used overland, and supposing the possibility of means being employed for submerging a cable with about the same certainty and safety that a ship can ordinarily cross the Atlantic, considering also the reduced cost of laying it as compared with that of stretching one the same distance overland, it is evident that a message could be sent between London and New York at ten shillings, as well as at ten pounds, and the enterprise be a more certain investment for capital, as the employment would in such case be more permanent. Every attempt to lay an Atlantic cable previously to the last one, has been attended with repeated obstacles, injuries, and fractures, and many experts have questioned the adaptability of the mechanical devices employed.

Should a fisherman, whose float is some distance from the end of his rod jerk up suddenly a portion of his line that may have sunk between himself and the float, the resistance of the water to the movement of the slender line will bend his pole, and the writer has in his experience broken his fishing tackle without gaining a fish.

The generality of ships are liable to pitch and tumble at sea and even the *Great Eastern* can perform a "grand swing." These movements, which are irresistible, or even a violent cross sea, are severe on a cable of any ordinary thickness, which on the other hand is subjected in its movements frequently to some miles of friction in the water, and much of it at great depth. Being liable to the strains and tension of these contending mechanical and elementary forces and resistances, a cable needs to be paid out from some contrivance that will yield readily and neutralize their effect.

Such a contrivance was not only not used in the transatlantic cable laying expeditions, but it will be seen that a device was employed that would in a rough sea surely aid in its destruction; hence the chapter of misfortunes to cables that had been pronounced perfect, even after they were placed on shipboard.

The passage of the cable into the sea was limited in its speed by friction brakes, the action of which in the first attempts at Atlantic cable laying was controlled by a man, who, in order to compensate for or neutralize the effect of the ship's pitching, commonly eased the brake as her stern dropped between the swells, that the cable might run out freely as she rose again. And it was attributed to the probable mismanagement of the brake that the cable of 1857 was lost. (See Chief Engineer Bright's Report, Aug. 18, 1857). In subsequent undertakings an improved system of brake was employed, the action of which was controlled by a weight upon a lever that was moved back or forth to regulate the running out of the cable. This device would probably have been subject to no serious objection, had it been connected with a proper dynamometer, but the one used from first to last consisted of a dead weight of some hundreds of pounds suspended upon a few yards of the cable between two sheaves or pullies.

This inert body which was intended to indicate by its position the weight of the cable hanging upon the ship, naturally increased the liability to injury exactly in proportion to the promptness of the pitching of the vessel, and the angular direction of the cable over and under the pulleys added greatly to the above peculiar source of danger.

The tendency of this device is to cause an apparent regularity of movement, and nothing short of the parting of a cable would convince an unconscious observer that any undue strain had been imposed upon it. Hence the mystery and questionable explanations as to the many injuries to the different cables accompanied with the very common report of the beautiful working of the machinery.

So vast a destruction of property in a moment of time, as the snapping of a cable intended to span the Atlantic, has given rise to many propositions in view of greater safety, but they have related chiefly to floats, buoys, or the like or some peculiar construction of cable.

Mr. Thomas Silver, of this city, proposes a plan of paying out machinery which is a modification of one of his several descriptions of marine engine governors, possessing differential resisting features that restrain the movement of a cable, whether in paying out or hauling in from the bottom of the sea so long as is consistent with safety, and releases it when its further restraint would be injurious. The paying out is performed with a drum or winding disk of usual diameter, but of preference made of wood to avoid weight, around which the cable is wound a sufficient number of times to prevent slipping, but instead of the drum being flat and using as, heretofore, a so-called "knife," to force the coils of the cable laterally, to prevent its overwinding itself, or a duplicate drum to control its direction, the drum in the present case has a crescent or semi-circular groove into one side of which the cable is guided from where it naturally finds its way to the lower part of the crescent which prevents the possibility of overriding itself. In hauling in, the cable would of course, be guided to the opposite side of the crescent and the action would be the same as above.

The shaft on which the drum is fixed bears also a pinion, which gears into a toothed wheel having cast to it a second pinion, the latter working into a second wheel which operates against the force of a spring, or for greater security, several springs may be applied, the opposite end of said spring being connected with a friction clutch or brake that may be held to any degree of resistance considered prudent to restrain the cable. A dial is moved by the action of the spring which indicates exactly the weight of cable overboard, sustained by the brake or other device used for limiting the movement of the drum or egress of the cable. When paying out, the drum is allowed to turn only in the paying out direction, and any slack of cable that may be caused by the sudden lifting and fall of the stern of the ship, or lateral blow of a sea will be absorbed by the onward movement of the vessel. The machine will automatically adapt the proper supply of cable to the varying depths of the sea, and can be arranged for obtaining soundings of the same.

At the stern of the vessel the cable passes over a sheave and through a tube widened laterally at the bottom and having a bearing and working on the axis of the sheave, but carrying with it when moved up and down by the laying angles at which the cable may be running out, a shaft, the opposite end of which controls the position of a pointer that indicates to the engineer in charge of the speed governer as to whether the cable is running off too slack or too taut that he may regulate the egress accordingly, and this avoids the necessity of any consideration as to the speed of the ship.

In case of hauling in the cable, steam or other power is applied to a shaft bearing a pinion that gears into the differential arrangement, and while it turns the drum and winds inward the latter will nevertheless cease its motion when the cable reaches its limited strain, or will even allow it to run out again rather than be overstrained, resuming its inward motion as soon as the cable becomes relieved, the engines in the mean time working on irrespective of the action of the drum.

It was for the want of an equivalent arrangement to this that the cable of 1865 was lost, but it is of primary importance that means are employed in paying out that may avoid causing the damages that made it hitherto requisite to haul in.

There will be ample employment for a number of transatlantic cables when they can be worked at reasonable charges, which, however, need not be expected if we are to await a streak of good weather and the use of the *Great Eastern*. The real source of success in 1866 is probably explained by Capt. Sir James Anderson, in his response to the Chamber of Commerce, of Liverpool, in September last, when he said "they should not forget that they owed it to a Higher Power in having been favored with suitable weather, without which success could not have been achieved." A. T.

Contraction and Crystallization.

The familiar axiom that every force acts in the line of least resistance, admits of many interesting applications. Take the contraction of substances in drying or cooling. The heat which forced the particles apart or the solvent that penetrated between them, having been withdrawn, the force of cohesive attraction draws them together again. But the mass being contained within certain walls, or at least resting on a bottom to which its adjacent particles adhere, and also being confined by its own gravity, is restricted in movement, and its contraction as a whole becomes less and less effective as it proceeds, until in some directions it altogether ceases; while the contraction in the structure by the mutual approximation of particles, must go on with a perfectly uniform force at all points—supposing the structure homogeneous and uniformly affected. The result must be a separation or division into minor masses; and when we ask by what law? the answer must be "on the lines of least resistance." What are they?

Look at the bed of a dried-up pool in the clay. If the bed be of soil and mixed materials, no law of symmetry will be traceable in the cracks; but if of fine homogeneous clay, a rude hexagonal form will often be traceable in the cleavage, for miles along the roadside. Starch, being of very fine and equal quality, shrinks in drying with great regularity into minor hexagonal masses. The lines of least resistance in the rent mass evidently approximate those of the hexagon, in proportion as the mass is homogeneous and uniformly affected. In the absence of any predetermining form impressed upon the particles, we account for these hexagonal lines of cleavage by the fact that they are the shortest by which a given mass may be divided, and hence the shortest by which a given tension equal in all directions may be released. Of course the shortest line, other things being equal, is the line of least resistance.

If crystallization uniformly produced hexagonal forms, we should be likely to conclude that this simple application of the most obvious line of least resistance, explained the whole mystery of crystallization. It seems evident that *planes* of cleavage characterize all forms of crystals, in obedience to the line of least or less resistance.

Why those planes should be of so much greater aggregate area in proportion to the subdivision effected, in some substances than in others, remains a mystery. The subdivision is effected in regular planes by a shorter aggregate of clefts than could be made in curves or irregular fractures, and thus the regularity and angularity of form are accounted for. But the causes that determine the selection of square, hexagonal, or octohedral forms, differing greatly from each other in extent of surface for the same mass, must be sought in some inherent property of the substance characterized by each form of crystal. Possibly the planes are multiplied by the greater gravitating force or freedom of particles, tending to approximate the spherical form, with modifications, however, from the differing rates of contraction in the mass, fixing the form in some substances when less matured, in others when more.

Death of an Inventor.

We regret to announce the death of William Bullock, of Pennsylvania, well known as the inventor of the Bullock newspaper press, by which both sides of the sheet are simultaneously printed. His death was the result of an accident. A few days ago while superintending the adjustment of one of his new machines at the *Ledger* office, Philadelphia, his foot was crushed by a belt. Amputation became necessary, with fatal result.

Mr. Bullock was one of the most ingenious, enthusiastic, and industrious of inventors. After years of laborious toil, struggling with many difficulties, he had succeeded in perfecting his printing machinery, and almost in revolutionizing the art of newspaper printing. His machines have for some time been in use in the *Inquirer* office in Philadelphia, and *The Sun* office New York. His new machinery for the Philadelphia *Ledger* is described as a marvel of beautiful workmanship.

The problem of printing both sides of the newspaper sheet at once, rapidly and well, has been many times attempted, but we believe that to Mr. Bullock belongs the credit of producing the really successful machine. Its work is from 15,000 to 20,000 sheets per hour, printed on both sides, and hence cheaper as well as more rapid work than can be down on one press of any other kind.

Coloration of Glass by Sunlight.

Mr. Thomas Gaffield, at a recent meeting of the Massachusetts Institute of Technology, made a communication on the action of sunlight in changing the color of window glass, giving the results of experiments now extending over more than three years. Isolated cases of such change had long been known, but they were attributed to some defect in the manufacture. His recent experiments confirm his first results, viz., that almost all kinds of plate, crown, and sheet glass undergo a change of color from the influence of the sunlight, the white glass becoming first yellowish, then brownish, and then pink. That the color permeates the body of the glass, and is not confined to the surface, nor produced by reflection therefrom, has been proved by grinding off about one sixteenth of an inch from both surfaces, and the four edges of a duplicate exposed specimen, which, after repolishing, exhibited the same color. Really colored glasses, so manufactured, as far as his experiments go, do not change except in the purplish tints becoming darker.

The cause of the change has been referred to the presence of oxide of manganese, the oxide of iron, sulphur, etc. He thinks it is due to the presence of oxide of manganese, which is used to give glass a white color. If the materials were pure this substance would be unnecessary, and the change would not occur; the glass made from the very pure Berkshire sand very seldom changes. No change is observed in lead glass, unless manganese is present. This change must not be confounded with what is called "rust" in glass, which is a mere mechanical disintergration of the surface, from the washing out by the rain of the soda contained in the glass. He exhibited an extensive series of specimens, showing the effect of exposure, to be seen for periods varying from one month to more than three years. Fuller details on this interesting subject will be found in the next number of the *American Journal of Science and Arts*. K.

A Chemical Theory of Cell Formation.

Dr. C. Montgomery has written a very remarkable paper, read before the Royal Society, December 20, 1866, on the above subject. The whole paper has a very particular interest, and his facts are well worth verifying by all who have an opportunity of doing so. From preliminary observations rationally treated, the above gentleman made the following experiments: A viscid substance was required, and myeline, after a long search, was found to be the one. When to myeline in its dry amorphous state water was added, slender tubes were seen to shoot forth from all free margins, being sometimes wonderfully like nerve tubes in appearance, flexible and plastic. From this crystallization was inferred, and this extension was prevented by an intimate admixture with the white of an egg; clear globules resulted from imbibition by a viscid substance. By further extensions of this observation and similar ones, globules with lively molecular movement were found. A typical cell with nucleus, and even nucleolus, and the "white margin so often mistaken for a cell wall, was always present." This latter fact will be a decisive answer to Mohl's theories. Mother cells were formed. Lastly, globules were obtained with another inclosed smaller globule, and this was sometimes multiple, like the typical pus cell. If, instead of water, serum be added to the thinly-spread myeline, bi-concave disks will form, only generally much larger than blood corpuscles. The changes in theory effected by these precise facts will, of course, be very great. The author observes that 'cells' being thus merely the physical result of chemical changes, they can no longer afford a last retreat to those specific forces called vital.—*Chemical News*.



ISSUED FROM THE U. S. PATENT OFFICE,

FOR THE WEEK ENDING APRIL 9, 1867.

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	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On 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)	$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.

63,603.—ANIMAL TRAP.—H. L. Anderson, Smithville, Ind.

First, I claim the revolving box provided with two platforms so arranged that in each semi-revolution of the box an inverted action of the platforms take place causing the trap to be again set in the same position as before.

Second, The employment of rod, s, and triggers, M M, so arranged that the animal in trapping himself, forces said rod back leaving it in position to reset the trap upon each semi-revolution of the box.

63,604.—POTATO DIGGING MACHINE.—O. W. Baldwin, and F. H. Pope, Greenfield, Ohio.

First, We claim the concave digger, in combination with the rotating endless slated apron or separator, all constructed and operating substantially as described.

Second, The rotating separator, in combination with the digger and shaker, all constructed, arranged and operating substantially as described.

Third, The slotted rake, E, in combination with the digger, and the mechanism by which the peculiar motion of said rake is given to it, by means of the driving wheels.

Fourth, We also claim hinging the digger, the separator, and the shaker, all upon one pivot at the rear, so that all may be elevated and depressed together, substantially as shown and described.

Fifth, We also claim the rock frame, F, in combination with the digger for the purpose of elevating and depressing the latter, substantially as described.

Sixth, In combination with rock frame, F, for elevating and depressing the digger, we claim a drivers seat so located that the driver can operate said frame by his feet, substantially as described.

63,605.—CARTRIDGE EJECTOR FOR BREECH-LOADING FIRE-ARMS.—C. H. Ballard, Worcester, Mass.

I claim the shell extractor consisting of one piece, c, notched at its one end, substantially as specified to gear with a fixed pin or stop, e, and having its other end beveled, to cause it to protrude and recede by the swinging motion of the barrel on its pivot, a, substantially as specified

63,606.—STRAW CUTTER.—William A. Bickle and Robert Chestnut, Richmond, Ind.

First, We claim the combination and arrangement, substantially as set forth, of the cutting and feeding mechanism of a straw cutter having a straight or curved serrated knife, L, and adjustable feed rollers, C and C.'

Second, The combination of the shaft, pitman, H T-formed lever, G, and feed rods, E and F, with the ratchet wheels, D and D', substantially as and for the purpose set forth.

Third, The combination of the springs, M, roller, C ratchet, D, and feed rod, F, hinged to the lever, G, substantially as and for the purpose set forth.

63,607.—SEWING MACHINE FOR SOLING BOOTS AND SHOES.—Franklin H. Brown, Chicago, Ill.

First, I claim the combination of the punch, g, with the lever, B when constructed and operating to force the thread through the leather, after being paid out by said lever, substantially as and for the purpose set forth.

Second, The arrangement and combination of the lever, B, with the cylinder head, G, spring, s, and punch, g, the whole operating substantially as set forth.

Third, The lever, B, when applied and operating to pay out the thread as set forth.

Fourth, In combination with the lever, B, applied and operated as and for the purpose set forth, the screw, 12, for adjusting its extent of vibration.

63,608.—HORSE HAY-FORK.—J. S. Brown and William Frank Browne, Washington, D. C.

We claim sharpening the upper edges, f f, of the tripping bar in combination with the shoulders, C C, substantially as described, for the purpose herein specified.

We also claim the combined construction and arrangement of the hook, B, and pulley, I, located in and closing the mouth of the hook, substantially as and for the purpose herein specified.

We also claim the combination of the elevator substantially as herein described, and a noose band, L, substantially as and for the purpose herein specified.

63,609.—JOURNAL BOX AND BEARING.—James B. Caryl, Candor, N. Y.

First, I claim the journal box, B, having the rollers, R, arranged as shown in combination with the balls, D, mounted in the ring, H, and arranged to operate in the grooves in the end of the box and collar, C, substantially as shown and described.

Second, I claim providing the inner end of the box, B, with the circumferential groove, s, and arranging the flange, t, of the collar, C, to project over the same, substantially as shown and described.

63,610.—PLOW.—Rainsford Cantelon, Montgomery, Ala.

I claim the rim wheel, A, constructed in the manner herein represented, or in any other manner, substantially the same when used with the necessary devices for forming a plow as is herein specified.

63,611.—METHOD OF CASTING TYPE ON PRINTING WHEELS.—Dexter H. Chamberlain, West Roxbury, Mass.

I claim, First, The movable mold sections, C, in combination with the mold block, B, whereby impressions may be cast upon the perimeter of a circular disk or wheel or the surface of a cylinder, substantially as set forth.

Second, The mold block, B, provided with recesses for the reception of the mold sections, substantially as specified.

Third, I claim confining the mold section in place by means of a divided ring in combination with a spring or springs as and for the purpose specified.

63,612.—MACHINE FOR DIGGING POTATOES.—Albert F. Chandler, Winthrop, Me.

I claim the improved machine for digging potatoes consisting of the chute, B, with its ploughshare or pointer and the sifter or grid, c, applied to the beam, A, and operated by the mechanism before described, consisting of the shaft, D, beveled pinion and gear band, E, and driving wheel, F, substantially in manner and to operate as before described.

I also claim applying the adjustable standards or bearings g and f to the beam, A, in manner and for the purpose essentially as set forth.

I also claim combining with the beam, A, the tubular chute, B, as and for the purpose as explained.

63,613.—CONNECTING TELEGRAPH STATIONS.—Stephen Chester, New York City.

I claim, First, The arrangement of several telegraph lines each in connection with magnets and batteries and converging to a common center by which the several lines and several batteries may be united as one line and one battery, or as distinct lines, and distinct batteries, or combinations thereof by the operation of any one or more of said lines without the presence of any one to control or direct the movements at the common center, substantially as described.

Second, The application of such connecters that when one or more of several lines forming one line or circuit, has been cut out of the general circuit by reason of breaks existing, and a new circuit embracing the remaining lines has been formed, that said broken lines being restored to continuity in themselves, will instantly resume their normal position in the general circuit without disturbing the normal condition of the remainder of the lines and without the presence of any one at the point where the several lines are connected together to direct or control the movements.

63,614.—HEAD BLOCK FOR SAW MILL.—Gilbert H. Clemens (assignor to himself and John C. Crane), Cincinnati, Ohio.

I claim, First, The manner of constructing, supporting, and adjusting the upper saw of a circular saw mill by the use of a hinged frame, L S, pinions, H H', racks, G G', and nuts, J J', as also the use of the set screws, I' P', in combination with the above, and for the purposes set forth.

Second, The upper saw arbor, provided with a single V-shaped collar, d, in combination with the recesses, d' d'', in both the bearing and cap.

Third, The use of the oblique teeth, in combination with the construction of a rack and pinion for the specified purpose of circular saw mills only.

Fourth, The bearing rollers, 2 2', formed with conical ends and screw-thread periphery in part only, for the specified uses herein mentioned.

Fifth, The roller housing, 3, as constructed in combination with the rod, making part of mill frame, as also the set screws, 4, all to operate in the manner and for the purposes set forth.

Sixth, The vertical vibrating frame, V, lever, Z, pivoted to the bridge, U, as also the pulleys, W W', and pulleys, S s and T, all in combination with each other, for the purpose of feeding and reversing the log carriage, as explained.

Seventh, The log-carriage side, formed of the metal tubular couplings, 7, as also the cylindrical sections of timber, 6, united together by a series of bolts, 13, and eyes, 14, the tubular couplings constituting the housings for the supporting truck wheels, substantially as described.

Eighth, The construction and application of the perforated tubular axle, 10, oil feeder, 11, and supporting wheel, 8, all in combination with each other, substantially as described.

Ninth, The tubular form of head blocks, 16 16', when provided with the partially concave flanged supports, 17, underneath, and the V-shaped projections, 18, and continuous slot on top, as also a series of indentations upon one or both sides of same, constructed in combination with each other, and for the purposes set forth.

Tenth, The adjustable knee, 20, and circular arc, 21, when hinged to the base, 19, and guided by the counter arc, 22, and held in position by the pin, 25, and provided with anti-friction rollers to operate in conjunction with each other for the purposes as substantially described.

Eleventh, The combined arrangement of the setting screw, 28, ratchet wheels, 30, pawls, 31, lever, 32, counterbalances, 34 35, and connecting rod, 33, constructed and operating substantially as and for the purpose set forth.

Twelfth, The application of the tappet, 36, secured to the rod, 33, also, the roller set, set in suitable housing, and stationed in position to produce a simultaneous and automatic setting forward of the knees, substantially as set forth.

Thirteenth, The use of the adjustable intermediate support, in combination with and for the purposes set forth in the foregoing claims.

63,615.—HAND SEWING MACHINE.—B. W. Collier, Oxford, Miss.

I claim the combination of the levers, A A' B B, case, C, arm, D, needle, H, rotary looper, E, hook, E', bobbin, F, pinion, L, cog, M, rod, N, spring, O, and spool, I, all arranged as herein described for the purpose specified.

63,616.—WINDOW FRAME.—Charles Croley, Dayton, Ohio.

I claim the pocket piece, D, having the catch, e, or its equivalent, and its arrangement with reference to the window frame, A, and sash, B and C, in the manner substantially as and for the purpose described.

63,617.—DOUGH TRAY.—Joseph G. Denins, Camden, Ohio.

I claim the tray, A, provided with a metallic bottom, in combination with the damper, E, and firebox, B, as and for the object explained.

63,618.—COATING WOOD.—P. S. Devlan, Jersey City, N. J.

I claim the coating of wood with the compound of silicate and vegetable fiber, substantially as and for the purpose specified.

63,619.—AIR AND GAS ENGINE.—David Dick, Meadville, Pa.

I claim, First, A generator for heating the air for an air engine by burning a combustible material contained in a close chamber connected with the generator, substantially as described.

Second, A mechanism, substantially such as described, for alternately producing and extinguishing combustion in the generator of an air engine.

Third, The combination of the section, C, of the generator, with the tube, L, and shaft, G', substantially as described, to alternately transfer the combustible material from the closed chamber to the generator, as set forth.

Fourth, A mechanism, substantially such as described, for simultaneously expelling the products of combustion from the generator and introducing fresh air therein.

Fifth, The combination of the stationary diaphragm, O, with the rotating partition plate, Q, and generator, A, substantially as and for the purpose set forth.

Sixth, The igniting tube, H, combined with its piston, I, substantially as and for the purpose set forth.

Seventh, The combination of the igniting tube with the generator and closed chamber, substantially in the manner and for the purpose described.

63,620.—BOAT DETACHING TACKLE.—William C. Dodge, Washington, D. C.

I claim, First, A boat detaching device consisting of two locking points or bolts connected by a rigid sliding bar, and having no loose or working joints between said locking points, arranged to operate in combination with the eye-blocks, E, substantially as described.

Second, The sliding bar, B, having its rear end bent as shown in fig. 4, for the purpose of enabling both ends to be disengaged from the eye blocks simultaneously by a single movement, substantially as described.

Third, The combination of the sliding bar, B, with the spar, H, or its equivalent, when arranged for joint operation, as and for the purpose herein set forth.

63,621.—CURTAIN FIXTURE.—Edward Doen, New Britain, Conn.

I claim the combination of the glass or porcelain festoon prong knob, d, with the ratchet or holding plate, b, as and for the purpose described.

63,622.—POWER LOOMS.—John Earnshaw, Providence, R. I.

I claim, First, An eye-pointed filling thread carrier in combination with mechanism for carrying an interlocking selvedge thread, substantially as set forty.

Second, In combination with an eye-pointed filling thread carrier and mechanism for carrying an interlocking selvedge thread, I claim the reed, substantially as described.

Third, The spring, f, arranged to operate the eye-pointed filling thread carrier, substantially as described.

Fourth, The within-described method of weaving by passing a doubled thread of filling between the warp threads, locking the filling by an independent selvedge thread crossing the warps and binding, and beating up the filling, substantially as set forth.

Fifth, The shuttle, e, operating in a vertical plane, and crossing the head of the filling thread carrier transversely, substantially as set forth.

Sixth, The vibrating arm, n, which actuates the shuttle, in combination with the arm, j, and lever or cam, i, for operating it, substantially as described.

Seventh, The notch or recess, l, in the shuttle race, for supporting or steadying the filling thread carrier when the shuttle is passing through the loop of the filling thread, substantially as described.

Eighth, Providing the eye-pointed filling thread carrier with a notch, m, as and for the purpose set forth.

Ninth, The combination of the needle stock, D, with guides, a a, substantially as and for the purpose set forth.

Tenth, Forming the eye in the needle, substantially as and for the purpose set forth.

63,623.—COTTON PLANTER.—Joseph L. A. Edwards, New Orleans, La.

I claim the employment of the roller, B, in connection with the separate parts, substantially as and for the purpose set forth.

Second, The arrangement of the holes on the drum wheel, I, and the arrangement of the wheels, substantially as and for the purposes set forth.

Third, The combination of the harrow, C, the groover, F, the seed box, G, and the scraper or coverer, O, as also the agitator, K, and brush, N, substantially as for the purpose set forth.

Fourth, The arrangement of the above devices above claimed, all connected and operating substantially as for the purposes described.

63,624.—SWITCH CHAIR.—S. T. Emerson (assignor to himself and J. B. Edams), Amboy, Ill.

First, I claim the shape of the bottom of the switch chair, viz., that portion of it that comes in contact with the cross tie or head block, said shape being a surface inclined from either end down to a given point half way between the ends, and not parallel to the face of the chair, and the planes of the bottom being slightly concave from either side to a joint half way between the sides, substantially as herein described and specified.

Second, The switch chair, with a bottom as described, in combination with india-rubber seat, as herein described.

63,625.—PIN FOR THE ATTACHMENT OF BOWS AND ROSETTES.—Lavinia H. Foy, Worcester, Mass.

I claim an improved article of manufacture in a bow and rosette pin, constructed substantially as shown and described.

63,626.—SPRING BACK FOR BOOKS.—Lewis Francis (assignor to himself and Cyrus H. Loutrel), New York City.

I claim the mode substantially as described of making spring backs for blank books.

Second, I claim as a new and useful article of manufacture a spring back for blank books, when the same shall be constructed substantially as described.

63,627.—MEDICAL COMPOUND.—Obadiah V. Garnett, Versailles, Ky.

I claim the combination of the medicines in the compound herein set forth.

63,628.—MODE OF MORTISING HUBS OF WAGON WHEELS AND THE TENONS OF SPOKES TO FIT THE HUB.—David B. Goervy, Birmingham, Pa.

I claim corrugating the tenon of spokes of wheels, and bracing and uniting the end of said tenons in their mortise, so as to form a solid part of hub as herein described, and for the purpose set forth.

63,629.—FRUIT BOX.—H. H. Gridley, Auburn, N. Y., and Mary L. Gridley, Burlington, N. J.

We claim the joining of the ends of the shell by hooking them together, as shown, and introducing a slide key or other equivalent device, as described, to assist in keeping said ends firmly together.

Also, securing the bottom in its place by means of projections on the inside of the shell, formed from the material thereof, either above or below the bottom, or both above and below.

Also, the shrinking of the wet or green shell upon the dry bottom, when in combination with the above devices.

63,630.—CHEESE VAT.—L. C. Hains, Bedford, Ohio.

I claim the arrangement of a vat heater in sections, A B, and central flue, C, provided with the damper, D, as and for the purpose specified.

Second, The sliding dampers, H, in combination with the flue, C, damper, D, and fire box, B, as and for the purposes set forth.

63,631.—LOOM FOR WEAVING PILED FABRICS.—William G. Hartley, Saxonville, Mass.

I claim a bill or guard finger, 21, provided with a slit or opening forming two cutting edges when employed in connection with a circular revolving knife, w', substantially as and for the purpose set forth.

I also claim the within described arrangement and combination of the mechanism for operating the knife, w', consisting of the shaft, Q', crank, o', connecting rods, k', and Y', upright lever, 8', pulleys, V' W', drum, 30, and bevel wheels, 16 and 17, substantially as and for the purpose set forth.

63,632.—CHURN POWER.—Joseph V. Hartman, Marathon, Ohio.

I claim the dash handles, G G', levers F F', links, E E', bar, D, and pendulums, C, arranged and operated as above described, and for the purpose set forth.

63,633.—PHOTOGRAPHIC CAMERA STAND.—John Haworth, Frankford, Penn.

First, I claim the combination of the board, I, uprights, c c, ratchets, E E, pawls, F F, pillar, A, the several parts being constructed and arranged in relation to each other, substantially as described, and for the purpose specified.

Second, The combination and arrangement of the spring, G, and lever, H, with the pawls, F F, substantially as and for the purposes set forth.

63,634.—HORSE HAY-FORK.—G. W. Heath, Burlington, Pa.

I claim the arrangement of the adjustable link, B, in combination with the short arm, A, lever, C, and bar, D, in the manner and for the purpose shown and described.

I also claim providing the upper end of the short arm, A, of the fork with a series of two or more perforations in the manner and for the purpose described.

63,635.—CHECK REIN.—Thomas Heaton, Cornwall, N. Y.

First, I claim the arrangement of the check rein, main rein, and loop, C, in the manner described, for the purpose specified.

Second, The main reins, B, provided with loops, f, in combination with the check rein, A, whereby the latter can be removed and applied at pleasure, and adapted to an ordinary rein in the manner as and for the purpose specified.

63,636.—VENT PLUG.—Thomas R. Hicks, New Britain, Conn.

I claim as a new article of manufacture, a spring pressure vent plug, constructed substantially as and for the purpose described.

63,637.—ROLLING MILL.—William W. Howell (assignor to himself and M. Marshall), Philadelphia, Pa.

I claim the combination of the recessed roller, B, roller, A, shields, E, and springs, a, the whole being arranged and operating as described.

63,638.—STEAM ENGINE.—Lafayette Huntoon, Milford, Mass.

First, I claim the combination with the steam cylinders, of the steam chest and valve and ports for conducting the steam to and from the said cylinders, under the arrangement herein specified, so that but one valve and steam chest need be employed with the said cylinders as set forth.

Second, I claim the arrangement of the herein described mechanism for operating the valve, the same consisting of the rocker shaft, S, vibrating recessed arm, R, connecting rod, C, with its dove-tail stud, b, and the rocker shaft, W, with its crank, V, and finger, Z, the said mechanism being connected with the eccentric rod, Q, substantially as and for the purpose set forth.

63,639.—CHURN.—George W. Hurst, Chestertown, Md.

I claim the upright square shaft, D, with its square dasher, J, with oblique apertures, K, with extended arms, H, and atmospheric tubes, E, and valves, G, when arranged, constructed and combined, as herein described, and for the purpose set forth.

63,640.—RAILROAD RAIL.—Isaac B. Hymer, Warsaw, Ind.

I claim the rail, D, having a dovetailed tenon clasped between the side plates, B B, which are supported against and upon the bed rail, A, substantially as described and represented.

63,641.—BEEHIVE.—Zalmon L. Jacobs, Hebron, Conn.

First, I claim the narrow board, C, in combination with the board, D, substantially as and for the purpose specified.

Second, I claim constructing and arranging the hooks, O, so as to connect with each other directly or without intermediate staples or pins, substantially as and for the purpose described.

Third, I claim, in combination with the frames, L, the employment of the extensible hooks, O, when the same are made extensible by means of coils, Q, or their equivalents, substantially as and for the purpose described.

Fourth, I claim the combination and arrangement of the reversible box, s, the cloth, V, and the receptacle, U, substantially as described, and for the purpose of feeding bees.

Fifth, I claim the adjustable or changeable appendages, c, in combination with the case, A, or its equivalent, substantially as and for the purpose described.

63,642.—BUTTON.—John Jenk, Washington, D. C.

I claim the diaphragm, f, confined in the head of a button, substantially as described and employed in connection with the shouldered shank, a, and disk or fixed piece, b, in the manner and for the purpose set forth.

63,643.—HAND SEED-PLANTER.—G. Herva Jones, Rockford, Ill.

First, The combination of two single hand seed-planters, for joint operation, by means of the fulcrum link or cross bar, and the adjustable hinge, arranged and operating as described.

Second, The combination of the thrusting handles, with the slotted hinge and adjusting screws, when constructed and arranged as described.

Third, The hings, constructed of two leaves, each the counterpart of the other, and united by interlocking the hooks and eyes, for the purpose of dispensing with a pivot-pin, and of securing economy of construction, as set forth.

63,644.—WASHING MACHINE.—Eleazer Marble, Hanover Wis.

I claim the combination and arrangement of the two series of corrugated rollers, E and F, with the adjustable pendulum bars, P, substantially as and for the purposes set forth.

63,645.—CARPENTER'S BENCH.—Alden B. Marshall, Medfield, Mass.

First, The application to a carpenter's horse of a tool box, so as to admit of its being adjusted lengthwise or crosswise to the said horse, or detached therefrom, the said box being constructed and arranged substantially as shown for the purpose herein set forth.

Second, I also claim securing the legs of the horse to its body by means of the elastic bands or their equivalents, substantially as hereinbefore explained.

63,646.—HEATING STOVE.—John Martino, Jacob Beesley, and John Currie (assignors to Stuart Peterson & Co.), Philadelphia, Pa.

We claim the cast iron body, B, of the stove, the upper portion of which has a number of inclined flat sides, and the lower portion of which is cylindrical, in combination with the ring or ledge, W, and with the cap, F, cylindrical casing, H, oven chamber, K, and flues, L and J, the whole being arranged substantially as and for the purpose described.

63,647.—CULTIVATOR TEETH.—Don C. Matteson and T. P. Williamson, Stockton, Cal.

First, we claim the double-pointed adjustable bit, A, and the beveled foot of the curved standard, C, resting on the said bit in combination with the double mold board or shovel, B, the same fitting over the standard and bit, substantially as described, for the purpose specified.

Second, The oblong blade or share, D, in combination with the manner of fastening the teeth together by bolts passing through the mold board bit or share, substantially as described.

63,648.—PRESSURE GAGE.—John Mathews, Jr., New York City.

I claim the corrugated disk made more sensitive or capable of greater action on one side of its axial line than on the opposite side thereof, by giving a varied or unequal construction to the corrugations substantially as and for the purpose or purposes specified.

63,649.—CHECK ON CAR CONDUCTOR.—Patrick Francis Milligan, Washington, D. C.

I claim the employment in a car or other similar vehicle, of the checks or tickets, C, check box, B, drawer, D, and tubes, a b, when constructed and arranged substantially as and for the purpose specified.

63,650.—STOP JOINTED MANURE DRAG.—Simon B. Minnich, Landisville, Penn., assignor to himself and H. K. Burkholder, Lancaster County, Pa.

I claim the arrangement of the notched lever, E F X, with the stop, g, on the jointed hook, G K, in combination with the box, H I, constructed and operating in the manner specified for the purpose set forth.

63,651.—ANIMAL TRAP.—William Morris, Elkhart City, Ill.

First, I claim the combination of the revolving wings, B, the coiled spring, D, or its equivalent, the oscillating platform, E, latch, F, and catch, G.

Second, The combination of the latch, F, the detent, H, and guide plate, I, substantially as set forth.

Third, The combination of the oscillating platform, E, the spring, E', detent, H, revolving wings, B, latch, F, and catch, G, substantially as set forth.

63,652.—METHOD OF PROPELLING STREET CARS.—George S. Petry, Troy Grove, Ill., assignor to himself and George W. Snyder.

First, I claim the driving wheel, A, coiled spring, B, idle wheel, H, toothed bars, I m, and sliding frame, D D, in connection with the axle pinions, l L, all related to each other and operating substantially as and for the purpose herein specified.

Second, I claim the hand lever, O, elbow lever, P, connecting rod, q, rock shaft, C, and ratchet sleeve, c, with pawls, z f, for giving tension to the coiled spring, B, substantially in the manner and for the purpose set forth.

63,653.—MODE OF PROTECTING CHINA GLASS AND OTHER ARTICLES.—Alonzo C. Rand, Union Mills, Penn.

I claim the bottoms of vessels of china earthern porcelain or glass ware, with grooves or depressions for the purpose of applying therein elastic rests, substantially as herein shown and described.

63,654.—PLASTIC COMPOUND FOR PROTECTING METALLIC AND NON-METALLIC SURFACES FROM THE EFFECTS OF AIR AND WATER.—Francois Louis Roux, Toulon, France.

I claim the preparation substantially as herein set forth, of a plastic compound, applicable to the protection of metallic and non-metallic surfaces, from the action of water, air, and other causes of deterioration to which they may be exposed.

63,655.—MACHINE FOR MAKING NAILS.—Jacob Russell (assignor to himself, H. T. McCoun, J. L. Romer and T. T. Buckley, Brooklyn, N. Y.

First, I claim the combination with a stationary nail plate feeding table, or

its equivalent, of cutters, nipper, gripper and headers, arranged for operation together on a bed or frame having an oscillating motion about an axis perpendicular or nearly so with the horizontal clipping edges of the cutters, substantially as specified.

Second, The arrangement relatively to the cutters and headers of the nipper, K, operating to turn the blank by striking it at or about the middle of its length, essentially as herein set forth.

Third, imparting to the headers, M M, an oscillating movement in unison towards and from opposite sides of the mail plate feed, in addition to their heading motion by means substantially as shown and described.

63,656.—DIVIDER AND CALIPER.—Sylvanus Sawyer, Fitchburg, Mass.

I claim the combination of the screw or worm gear A D, with the stirrup and binder F, or its equivalent, as applied to dividers and calipers, the whole being constructed and operating substantially in the manner herein described and set forth.

63,657.—LAND ROLLER.—Joshua S. Shafer, Plymouth, Mich.

I claim hinging the frames B B, to the common end piece A, in which end piece rollers C C, have their bearing for the purpose of making a flexible roller substantially as specified.

63,658.—SAW MILL.—Warren Shumard, A. Lyon and Jasper N. Robbins, Goshen, Ohio.

We claim the arrangement of oblique adjustable bar M, on the sash H, in combination with the screw N, lever P, paul Q, and segmental rack G, for the automatic feed of the rest B, in the manner set forth.

63,659.—POTATO DIGGER.—Philander Sisson, Brant, N. Y.

I claim the hinged platform C, having a sharp cutting edge c3, projecting forward of the axle of the driving wheels and having stationary rake teeth j, projecting in rear of the axle, in combination with a revolving reel having fingers f, with flat connecting bars f2 substantially as described.

63,660.—BOW IRON FOR CARRIAGES.—George W. Slater, New Haven, Conn.

First, I claim the casting of rivets or projections upon the bedplate a, substantially as and for the purpose set forth.

Second, The thimbles E E, as constructed and applied in combination with bow irons C C, substantially for the purpose set forth.

Third, The back plate D, in combination with the bed plate a, when both are constructed as and for the purpose described.

63,661.—EXCAVATING AND DREDGING.—William Sooy Smith, Oak Park, Ill.

I claim the combination and arrangement of the receiving chamber, A, tubes, b b, ejection pipe, a, caps, c c, rack, d, pinion, d', car truck, B, movable rail, e e, upon the sliding frames, g g, of the sills, h h, substantially as herein set forth, for the purpose specified.

63,662.—CAR COUPLING.—John P. Spangle, Hopewell Center, N. Y.

First, I claim the jointed upper lever, C D, in combination with the coupling pin and the receiving draw head, operating substantially as described.

Second, the lower lever, G, in combination with the hook, F, the spring, M, and draw head, I, operating substantially as described.

63,663.—SWITCH.—Geo. W. Spaulding, Norton, Mass.

I claim a safety switch for railroads composed of the grooved rail, a, and the parts, b and d, when constructed and operating substantially as above set forth.

63,664.—GARBAGE AND ASH BOX.—Charles W. Stafford, Saybrook, Conn.

First, I claim a garbage or ash box placed within a case provided with a lid or cover, and arranged as herein shown and described, to admit of being elevated and tilted or dumped in order that its contents may be discharged into a cart, substantially as described,

Second, The rod, H, attached to the bottom of the garbage or ash box, D, and provided with the rack, c, the hollow part, C, of the case, A, in which the rod, H, works, the pinion, F, on shaft, G, and the chain, all arranged to operate in the manner substantially as and for the purpose set forth.

63,665.—ASH OR GARBAGE BOX.—Charles W. Stafford, Saybrook, Conn.

I claim a portable garbage and ash box constructed of iron or other suitable metal, having a roller, B, in its base, fixed and movable semispherical covers, E F, and suitable handles, all constructed and arranged substantially as herein shown and described.

63,666.—BRIDGE.—J. Dutton Steele, Pottstown, Pa.

I claim the combination of the two series, substantially as set forth, or their equivalents, made either of wood or of iron, in the manner and for the purpose hereinbefore described.

63,667.—MACHINE FOR CARBURETING AIR TO PRODUCE INFLAMMABLE GAS.—Levi Stevens, Fitchburg, Mass.

I claim the use of the meter wheel for the purpose of carbureting atmospheric air, in the manner substantially as described.

I also claim the flowage regulator constructed of the several parts specified and arranged substantially as described and for the purposes set forth.

63,668.—WHEEL CARRIAGE.—A. K. Stone, Oronoco, Minn.

I claim the combination as well as the arrangement of the two main springs, D D, and the four elastic braces or brace springs, c c c c, with the two axles and the sweep bar, as specified.

I also claim the combination as well as the arrangement of the elastic braces, d d, with the four elastic braces, c c c c, the two main springs, D D, the two axles and the sweep bar, the whole being substantially as hereinbefore explained.

63,669.—WHEEL CARRIAGE.—A. K. Stone, Oronoco, Minn.

I claim the above described arrangement of four main springs, D D E' E', with each other, the carriage body, the rear axle and the sweep bar of the front axle.

I also claim the combination as well as the arrangement of the auxiliary or transverse brace springs, F F, with the main springs, D D and E' E', arranged and applied to the carriage body, the rear axle and the sweep bar of the front axle, substantially as specified.

63,670.—FURNACE FOR STEAM BOILERS.—Wm. S. Storms, Middletown, Ohio.

First, I claim the combination with the fire chamber of a furnace or other heater of an auxiliary chamber communicating with the fire chamber and outside air through flues and passages arranged substantially as shown and described.

Second, The combination of the fire chamber and boiler with the upper arch and lower arch or fire bridge of the furnace, under the arrangement and for operation as shown and described.

63,671.—CORN SHELLER.—Wm. D. Stroud, Oshkosh, Wis.

I claim the movable plate, c, and the stationary plate, b, with the diagonal setting of the teeth thereon relatively one to the other on the respective plates, the lever, d, the inside rim, n, the outside rim, m, the hopper, E, the adjustable screw, s, the adjustable spring bearing, g, and the screen, f, when constructed and arranged relatively to themselves and to the frame, a a, substantially as described for the purposes set forth.

63,672.—PISTON PACKING.—Edward Sullivan, Pittsburgh, Pa.

First, I claim the recess, c, between the packing rings of a piston head of a cylinder of a steam engine, as herein described and for the purpose set forth.

Second, The plates, g and h, when used in combination with a joint or joints in metallic and expansive packing of a piston head, as herein described and set forth.

Third, In connection with the above the valve, x, constructed, arranged and operating substantially as herein described and for the purpose set forth.

63,673.—PLANING MACHINE.—John Tesseyman, Dayton, Ohio.

First, I claim the provision in a planing head of an obliquely faced washer or tool holder, H, adjustable about an axis tangential or nearly so to the path of the bit, substantially as set forth.

Second, A tool holder for a disk or conical planer consisting of the oblique faced and serrated washer, H, slotted bolt, D E f, nut, E, and serrated head, B, for the purpose set forth.

63,674.—MACHINE FOR POUNCING HATS.—Chas. H. Vanhouten and Joseph M. Crane, Newark, N. J.

We claim the sliding rim block, provided with the ring, G, for adjusting the same and having a hinged ring or button, H, in combination with the hat block, D, when arranged to operate substantially as herein shown and described and for the purposes set forth.

63,675.—QUARTZ MILL.—Thos. Varney, San Francisco, Cal.

I claim the combination of the slots in the smooth grinding surfaces filled with wood with the peculiar form of the revolving grinder, m, and stationary grinder, p, when constructed and operating substantially as described and for the purpose as set forth.

63,676.—MANUFACTURE OF LIGHT BREAD.—W. J. Walker (assignor to Caroline M. Walker), Baltimore, Md.

I claim the combination of super-phosphate of lime and muriatic acid in nearly equal quantities and bi-carbonate of soda in such quantity as when united in the dough will in process of baking evolve sufficient gas to make light bread or pastry, substantially as above described.

63,677.—DISH WASHER.—Wm. Way, Samuel B. Way, and Samuel C. Pomeroy, South Butler, N. Y.

We claim the depression, C, in the bottom of vessel, B, for collecting all the water in the machine immediately about a wheel, D, which is in diameter considerably smaller than the diameter of the main chamber, B, substantially in the manner and for the purpose set forth.

The washing wheel, D, having buckets with concave faces in a radial direction, and arranged spirally in a longitudinal direction, substantially as and for the purpose set forth.

The lateral sliding shaft, f, and coupling, e, in combination with a horizontal washing wheel, D, and rack, E, substantially in the manner and for the purpose herein specified.

63,678.—EVAPORATING PAN.—James A. Webb, Madison, N. J., and Christopher Cory, Lima, Ind., assignors to Christopher Cory.

First, We claim the application of steam or its equivalent to evaporating pans by means of under channels with or without valves, so arranged as to produce the greater amount of heat and ebullition either at the center or at one side of the pan or at certain given portions thereof as desired, while other portions of it shall be less heated and agitated, as herein set forth.

Second, We claim the applying of steam beneath the pans so that their interior shall be left unobstructed for the work of the operator.

Third, The combination with an evaporating pan of a steam channel or chamber, substantially as above set forth.

Fourth, The application of non-conductors of heat to the under steam channels or chambers of evaporating pans, substantially as set forth and described.

63,679.—SAWING MACHINE.—Edwin Wescott, Hudson City, N. J.

First, I claim the screw spindle, J, and worm wheels, f f', in combination with the feed rollers, D D', constructed and operating substantially as and for the purpose described.

Second, The adjustable boxes, l l', gudgeons, m, set screws, n, and saw spindle, L, when constructed and arranged as herein set forth, for the purpose specified.

63,680.—NOZZLE FOR HOSE PIPES.—Albert M. White, New York City.

I claim the combination of the socket, A, pipe, B, and collar, C, with the valve, g, and valve seat, e, all constructed arranged and operating substantially as herein shown and described.

63,681.—ROCK DRILL.—T. R. White (assignor to himself and W. G. Bedford), Philadelphia, Pa. Antedated March 29, 1867.

First, I claim the combination of a drill stock and detachable cutters, D E, when the latter are constructed and adapted to each other and for attachment to a stock, substantially as and for the purpose specified.

Second, The detachable block, C, in combination with the drill stock and with the detachable cutters, D E, their rods, c, and nuts, d, or their equivalents, the whole being constructed and arranged substantially as and for the purpose set forth.

Third, A rock having three radial and three curved cutting edges, arranged in respect to each other as shown and described.

63,682.—WELL-BORING APPARATUS.—T. B. White and W. G. Bedford, Philadelphia, Pa. Antedated March 29, 1867.

First, We claim the revolving disk, E, with its slot and spring catches, b b', or their equivalents, in combination with the sliding block, F, connected to the drill rods and the projection, d, or its equivalent the whole being constructed and operating substantially as and for the purpose described.

Second, The rod, H, and spring bar, p, screw, I, and nut, G', secured to the drill rods, in combination with the bracket, G, and its inclined projections, n n, and the within described operating devices or their equivalents, the whole being constructed and arranged for joint operation substantially as specified.

Third, The swivel, e, with its ratchet, j, in combination with the rod, H, and its spring pawl, i, substantially as and for the purpose set forth.

Fourth, The shaft, D', its wheels, N and K, in combination with the rod, J, wheel, k, cam disk, L, and rod, M, the whole being arranged and operating substantially as described.

63,683.—MELODEN.—A. W. Wilcox, Worcester, Mass.

First, I claim the combination with chamber, B, of the valves, 1' 2' and 3', for the purposes stated.

Second, The combination with chamber, B, and swell box, C, of the valves, 1' 2' and 3', and D E, arranged for joint operation as set forth.

63,684.—BIT BRACE.—Wm. H. Woods, San Francisco, Cal.

I claim the brace head consisting of the collar, D, the block, E, the pin, g, and the steps, m and n, with the nut, G, substantially as and for the purpose described.

63,685.—SEED PLANTER.—A. R. Worth, Nantucket, Mass.

I claim a seed wheel, N, provided with a number of cups exactly corresponding to the number of seed required to be planted in a single hill, or so placing the cups at such a distance apart as will regulate the required distance of the seed from each other when planted in a drill.

I also claim the block, m, with its spring, o, in combination with the bar, U, with its spring, s, inclined portion, r, and stop, q, operating substantially as and for the purpose set forth.

I also claim a hopper or seed receptacle, M, with its partitions or plates, b, and having its opening, i, to the seed passage, constructed substantially as above described, in combination with a revolving seed wheel, N, provided with a number of seed crips, g, equal to the number of seed to be planted in a hill, substantially as set forth.

I also claim a hopper or seed receptacle, M, made removable in the manner and for the purpose set forth.

I also claim the hoes, X, and roller, T, in combination with the frame, R, arranged and operating substantially as and for the purpose set forth.

63,686.—CATTLE CAR.—J. H. Aldrich, Nashua, N. H.

I claim the combination and arrangement of the water and feed trough, separated by the lid, when constructed and used upon a cattle car, in the manner and for the purpose herein described.

63,687.—GATE.—W. D. Armstrong and W. I. Armstrong, Harlem, Ill.

First, We claim the combination of the eccentric pulley or wheel I, with one of the central posts, B, and with the cord or chain, S, of the heavy or balance weight, R, substantially as herein shown and described and for the purpose set forth.

Second, Pivoting the lower ends of the side levers, J, to the central posts, B, by a long bolt, K, substantially as herein shown and described and for the purpose set forth.

Third, Attaching a spring catch, V, to the forward end of the gate, and operating it by the cords or chains, M, by which the gate is operated, substantially as herein shown and described.

Fourth, The combination of the guards, L, with the sides of the gate, G, and with the side levers, J, substantially as herein shown and described and for the purpose set forth.

Fifth, The combination of the long pulleys or friction rollers, N and U, with the central posts, B, and with the cords or chains, M and S, substantially as herein shown and described, and for the purpose set forth.

63,688.—SHEEP-FEEDING TROUGH.—Columbus Aulls, Bridgewater, Mich.

First, I claim constructing the trough, A, with one side board, a', extended beyond the ends of the trough, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the counterbalances, E, with the trough, A, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the standards, B, having slats or braces, D, attached to them, with trough, A, substantially as herein shown and described and for the purpose set forth.

Fourth, Hinging the trough, A, to the standards, B, substantially as herein shown and described and for the purpose set forth.

63,689.—PIPE WRENCH.—Robert Bain, Brooklyn, N. Y.

I claim, in combination with the jaw levers, A and B, the sliding strap, C, with its screw, D, and wedge or gib, F, for operation together, essentially as herein set forth.

63,690.—CONVERTIBLE RIFLE SIGHT.—Edgar B. Beach, West Meriden, Conn.

I claim the combination of the covered sight, c, and open sight, d, constructed and arranged so as to be changed to present either the one or the other, substantially in the manner described.

63,691.—APPARATUS FOR UPSETTING TIRES.—George M. Beardsley, Fentonville, Mich., assignor to himself and C. D. Bontell, Deerfield, Mich.

I claim, First, In combination with the levers, d, and a device for operating the same, the leaves, B, rod, g, and cams, h, when the latter are used in connection with movable or stationary jaws, r r1 r2, the arms, H, substantially in the manner and for the purpose set forth.

Second, The self-clamping lever cams, h, in combination with the jaws, r1, forming a clamping device, as herein described.

Third, The movable jaws, r1 r2, in combination with the arms, H H, swinging upon the same center, for the purpose herein set forth.

63,692.—STRAW CUTTER.—George M. Beardsley, Fentonville, Mich., assignor to himself, C. D. Bontell, and G. Carpenter.

I claim, First, The knife, C, when shaped as shown, and set eccentrically upon a fly wheel solid except as to a slot conforming to the knife, substantially as and for the purpose set forth.

Second, The endless bands, E, in combination with the pulleys, G, constructed, arranged, and receiving motion, substantially in the manner and for the purpose set forth.

Third, A mechanism for operating automatically and simultaneously the jaws, P and Q1, in relation to the knife, C, substantially as and for the purpose set forth.

63,693.—SCAFFOLD BRACKET.—Hiram Beckwith, Grass Lake, Mich.

I claim a roof bracket, constructed substantially as as herein shown and described, with two blades, with their back pieces, and supported by the brace, D, for the purposes set forth.

63,694.—ROTARY STEAM ENGINE.—John P. Birch, Philadelphia, Penn., assignor to himself and G. W. Paterson, Newburyport, Mass.

I claim, First, The combination with the steam cylinder and eccentric piston case of the pistons under the arrangement herein described, so that the said pistons, although revolving upon a common axis or center of motion, concentric with that of the steam cylinder, shall be unconnected with and separate from each other and the said cylinder, substantially as shown and described.

Second, The combination of the hollow piston case, mounted upon a shaft, having its bearing in one end of and eccentrically to the steam cylinder, with the pistons separate from each other, but revolving upon a common axis, which is also the axis of the steam cylinder, substantially as shown and set forth.

Third, The arrangement of the steam cylinder with reference to its three bearing points located one upon each side of the cylinder, and the third upon the shaft of the piston case, substantially in the manner and for the purposes herein specified.

63,695.—FLUE SCRAPER.—F. A. Blake and H. A. Tyrrel, Worcester, Mass.

I claim, First, The combination with rod, A, of the spiral spring, substantially as and for the purposes strated.

Second, The combination of spring, B, with rod, A, and pins, a a and b b, substantially as and for the purposes set forth.

63,696.—CAR COUPLING.—A. T. Boon and D. M. Osborn, Galesburg, Ill., assignors to A, T. Boon and Thomas R. Markillie.

I claim the pivoted catch or dog, B, curved guides, F, rubber bar, c, and lever, C, as arranged, and combined, and operating in combination with the forked arm, D, and link, E, substantially in the manner and for the purpose as herein set forth.

63,697.—WOODEN PIPE.—A. Brisbane, New York City.

I claim, as a new article of manufacture, wooden pipes or tubes formed by bending boards, slats, or strips of wood longitudinally, as herein described.

63,698.—CULTIVATOR.—H. C. Bristol, Ravenna, Ohio.

First, I claim the movable frames, C, provided with the adjustable standards, G, and shares, H, as arranged and connected in combination with the levers, D, draft chains, P, and carriage, for the purpose and in the manner set forth.

Second, The jointed standard, I, provided with the shovel, J, and guide stay, K, in combination with the standards, G, shares, H, and carriage, as and for the purpose described.

63,699.—LET-OFF MECHANISM FOR LOOMS.—Mahlon Brookfield, Brookfield, Iowa.

I claim the graduated scale beam, F, combined with a feed screw, H, and weight, suspended from a friction strap or device, on the warp beam, and to be used in connection with different sets or speeds of gear, substantially as described and represented.

63,700.—BLACKING CASE.—Clarence E. Brown (assignor to himself and the Florence Manufacturing Company), Northampton, Mass.

I claim a blacking case composed of the exterior shell or case, A, surrounding and containing the brushes, B C, the latter brush, C, being provided with a rim, b, formed so as to fit over and support the blacking box, D, all these parts being arranged in the manner and for the purpose herein shown and described.

63,701.—SHEEN-METAL BOILERS AND OTHER VESSELS.—John Carroll, New York City.

I claim providing the cylindrical body, A, of sheet metal vessels, with spiral corrugations, which extend from end to end of the body, for the purpose of strengthening the same, as well as to facilitate the attachment of the heads, B B, to the body, which heads are also corrugated, substantially as herein shown and described.

63,702. PURIFYING AND PREPARING GLASS ORE. Enoch Carter, Newburgh, N. Y.

First, I claim melting the glass ore or rock, in a reverberatory or other furnace, with or without alkalies or salt as a flux, and using the product in lump as it comes from the furnace, or dropping it in water as "cullett."

Second, The use of this "cullett" for the manufacture of glass, either alone or in combination with the crude ore with alkaline, sand, lime, quartz, or other materials.

63,703.—MACHINE FOR STRETCHING AND WINDING SILK THREAD.—Michel Cellerier, Philadelphia, Pa

First, I claim in combination with a silk reeling machine, constructed as described, an adjustable lever brake, applied to the pulley of the spindle which carries the bobbin from which the silk thread is reeled, for the purpose of subjecting the thread to a uniform tension, and thus equalizing its quality, as specified.

Second, The removable friction reel R R', constructed, arranged, and operating as described.

63,704.—COMBINED ROLLER AND SEEDER.—H. S. Connelly, Clymer, N. Y.

First, I claim resting the inner journals of the main rollers in adjustable bearings, and connecting said bearings with the driver's seat, substantially as and for the purpose set forth.

Second, The combination of the cross arm, f, with the adjustable bearings, c c, and the seat, C, for the purpose of allowing the one seat to act upon the two rollers, substantially as specified.

Third, The combination with the subject matter of the preceding claim of the joints formed of the elongated tenons, d, and mortises, e, for allowing each roller an independent action, as specified.

Fourth, The combination of the pivoted scrapers, G, with the adjusting roller, B, as shown and described and for the purposes specified.

Fifth, The arrangement of two or more seed slides, K K, resting in compartments, v v, and connecting by screws and slots, w x, or equivalent, with the single head, u, in such a manner that the escape of the contents of each compartment may be exactly gaged to produce the desired mixture, as specified.

Sixth, The special construction and arrangement of the machine, as herein set forth.

63,705.—CARRIAGE WHEEL.—Joseph M. Coombs, Boston, Mass., assignor through mesne assignments to Charles W. Chipman and John Raddin, Lynn, Mass.

I claim an elastic wheel constructed with a provision for contraction of the bearing surface of the felly towards the hub, when also so constructed that the expansion of the sides of the wheel produced by such contraction is resisted by springs, substantially as set forth.

63,706.—BOLT AND BOLT HEADS.—Joseph Crompton, Little Falls, N. J.

I claim, First, The eccentrically-headed screw bolt, C, in combination with the nut, E, and the eccentric collar, H, placed around the bolt, substantially as described.

Second, I also claim the combination of the bolt, C, having an eccentric head, F, with the eccentric collar, H, or its equivalent, the patch or plate, B, and the boiler plate or article to which the plate, B, is united, substantially as shown.

63,707.—CUTTER HEAD FOR WOOD-MOLDING MACHINES.—David Cumming, Jr. (assignor to himself and Stephen W. Smith), New York City.

I claim a cutter head formed with a guide both above and below the cutter in combination with mechanism for raising or lowering the cutter relatively with the bed, so that the pattern and wood to be planed can be laid either side upwards on the bed (according to the direction of the grain of the wood when planing) and the cutter and guides be brought to their proper places relatively to the wood and the pattern, as set forth.

63,708.—CHURN.—John T. Dawson, Frostburg, Md.

First, I claim the revolving dasher, D, constructed substantially as described and operating in combination with the rectangular vessel or its equivalent, essentially as set forth.

Second, The pan, E, arranged and operating in combination with the dasher, D, substantially as specified.

63,709.—DENTAL APPARATUS.—William H. Dibble, Bordentown, N. J.

First, I claim placing the air valve which allows the escape of air when the pump is compressed, below the reservoir which receives the liquids drawn from the mouth, substantially as set forth.

Second, I also claim placing the rest which supports the upper jaw, upon the same frame which sustains the tongue-holder or plate, K, substantially as set forth.

Third, I also claim connecting the tongue-holder or plate, K, directly with the tube which receives the saliva and other liquids from the mouth, substantially as shown.

Fourth, I also claim perforating the tube, J, at any suitable point on that side which is protected by plate, K, from contact with the tongue, so that saliva and other liquids can be drawn out of the mouth without interruption, substantially as shown.

Fifth, I also claim making the apparatus flexible in some convenient part, by inserting a flexible division as in the tube, H, or by a joint where the tube is left rigid, substantially as set forth.

63,710.—GATE.—E. R. Dobbs, Poughkeepsie, N. Y.

I claim the pivoted or adjustable ways, D J, with the gate, B, resting thereon, in combination with the platforms, M M, connected with the ways to operate in the manner substantially as and for the purpose herein set forth.

63,711.—DOUBLE-SHOVEL PLOW.—Jacob M. Ely, Warren, Ill.

First, I claim an improved iron double-shovel plow, formed by the combination of the beam, A, handles, B, standards or supports, E, and braces, D and G, with each other, when said parts are formed and arranged substantially as herein shown and described.

Second, Making the uprights or standards, E, substantially in the shape herein shown and described and for the purpose set forth.

63,712.—GRINDING MILL.—Jacob Fickinger, Kingsville, Ohio.

I claim the fans, F, caps, G, and openings, c, in combination with the mill stones and curb, as and for the purpose set forth.

63,713.—QUARTZ MILL.—James B. Fields (assignor to himself and Peter Fields), Jersey City, N. J.

First, I claim the hollow rotating cylinder, B, in combination with the crusher, G, the latter being placed within the former, and having their crushing or pulverizing surfaces, c g, moving with different speeds, by the means substantially as and for the purpose set forth.

Second, The shields, E, attached to the inner surfaces of the sides, a a, of cylinder, B, in combination with the openings, d, in the sides of the cylinder, B, covered with screens, and the crusher, G, all arranged to operate in the manner as and for the purpose specified.

63,714.—BRIDGE.—Albert Fink, Louisville, Ky.

I claim as a new and useful improvement in bridge trusses, the peculiar connection of wooden braces with the upper and lower chords of a bridge truss, by means of cast-iron shoes, G H and F, brace straps, J J and K, and plates, I I and I, for the purpose of forming a firm connection either for the resisting of compressive or tensile strains, substantially as described in the above specification.

63,715.—SAW SET AND GUMMER.—John Gardner, Viroqua, Wis.

I claim the cam lever, E, pivoted to the posts, F, rest, G, hammer, B, spring, D, anvil, J, and rest, I, when all are constructed and arranged upon the bed plate, A, as herein set forth for the purpose specified.

63,716.—CHERRY STONER.—George Geer (assignor to himself, J. G. Hadley and William Hamilton), Galesburg, Ill.

I claim, First, The rocking shaft and the curved forked plungers with the handle or lever made and arranged and operating in the manner as and for the purpose herein shown and described.

Second, The upright plate for the combined purpose of arresting the downward stroke of the plungers and stripping the cherries from the forks, made and arranged substantially as shown and described.

63,717.—CULTIVATOR.—Alexander Gordon (assignor to H. D. Gordon), Rochester, N. Y.

I claim, First, The adjustable or swinging clamps, a, in combination with

the mold board, B, for the purpose of holding the wings, w, substantially as shown and for the purposes specified.

Second, The skeleton metallic cross bar or tie, C, constructed as shown and described, and arranged in connection with the shovel and teeth or hoe standards, for the purposes set forth.

Third, The diagonal guide or extension bars, b, in combination with the teeth bars, D, as shown and described.

63,718.—CARPET FASTENER.—C. Gullmann, Poughkeepsie, N. Y.

I claim the combination of the protecting rod, A, and detaining rod, B, substantially as and for the purpose described.

63,719.—HORSE HAY FORK.—James J. Hall, Trenton, N. J., assignor to himself, John T. and Isaac Pierce and H. I. Fowler.

I claim, First, The use of the guards, m, when used in combination with the cross head, A, and yoke, B, as herein described and for the purpose set forth.

Second, In combination with the above the pawl, i, and ratchet wheel, C, when used for holding the tine, f, in a fixed position, as herein described and for the purpose set forth.

63,720.—STOVE-PIPE DRUM.—Samuel A. Halladay, Marrilla, N. Y.

I claim the inverted hollow arch, A, supporting the heater, its ends connecting the spiral flue, D, with the short pipe, a, for the passage of the products of combustion, as herein set forth for the purpose specified.

The ring, G, and the shelves, f, in combination with the flue, C, and the drum, B, as and for the purposes set forth.

63,721.—BOLT CUTTER.—Homer M. Handy, Niles, Mich.

First, I claim securing the curved and abutting handles, A and B, one to the other by means of the plate, a and a', and b and b', rivetted to said handles and the pivot or journal, z, all as herein set forth.

Second, Pivoting the jaws, C and D, to each other by means of the tongue, c', and straps or plates, E and F, substantially as herein shown and described and for the purpose set forth.

63,722.—COMBINATION PADLOCK.—Abner S. Harding and Nicholas Reed, Otisville, N. Y.

I claim the hinged lid, e, of the case, A, in combination with the screw, g, shackle, E, disks, C, and bolt, B, constructed and operating substantially as and for the purpose described.

63,723.—CHURN DASHER.—M. B. Hudson (assignor to himself, J. S. Robinson and J. G. Hudson), Canandaigua, N. Y.

I claim the special combination and arrangement of the valve, C, with the conical dasher, A, the said valve being situated outside the dasher and being removable from the dasher and rod and covering all the ports when in use, as herein set forth.

63,724.—CORN PLANTER.—William Hunter, Hastings, Minn.

I claim the combination of the hollow cylinder, B, with the slide bars, c c c, the hoppers, f f f, and the lever, h, constructed and arranged for planting corn, substantially as herein described.

63,725.—FENCE POST.—George Ipe, Kent, Ohio.

I claim an improved stool for fence posts made of cast iron cast solid in one piece and in substantially the form herein shown and described; that is to say, consisting of the base plate, a1, inclined side plates, a2, and top plate, a3, having flanges, a4 a5, formed upon its upper side, as and for the purpose set forth.

63,726.—STARTING APPARATUS FOR STREET CARS.—Thomas B. Jordan, Gloucester, N. J.

I claim the combination of the lever, b, eccentric block, c, the cord, e, the sliding cross bar, f, the latch, l, and the spring, h, with the sliding tongue, C, the car wheels, B, and the axle, a, arranged and operating substantially as and for the purposes herein described.

63,727.—BURNING FLUID.—Jacob J. Kamm, Fort Wayne, Ind.

I claim the combination of the within-specified ingredients in the manner described for the purpose of forming an illuminating non-explosive burning fluid.

63,728.—CHURN.—Richard Keese, Bennington, Ohio.

I claim the adjustable dashers, D E G, and thumb screws, C, constructed and arranged in relation to each other, as specified, and in combination with the shaft and body of the churn, operating as and for the purpose set forth.

63,729.—HORSE RAKE.—Watson King, Springfield, Ill.

I claim, First, Extending the crank arms, a, below the axle of the wheels so that the traces may be attached to these extensions, for the purposes herein shown and described.

Second, The combination with bar, C, the thills, D, the cleaning teeth, G, and hinge, c, of the rake head, A, all arranged substantially in the manner and for the purpose herein shown and described.

63,730.—SASH SUPPORTER.—W. M. Kirkpatrick, Littleton, Ill.

I claim a sash supporter consisting of a stationary rubber cushion or disk inserted in a recess in either the sash or the frame with its outer face protruding therefrom sufficiently to press upon the corresponding face of the frame or sash and hold the sash in place, substantially as herein shown and described.

63,731.—MOP HEAD.—W. A. Lewis (assignor to himself and H. H. Mason and Jos. Messenger), Springfield, Vt.

I claim the operating thumb nut, C, provided with external and internal screw threads in combination with the fixed screw, B, on the handle and the sliding jaw, F, substantially as and for the purpose described.

63,732.—CATTLE PUMP.—Wm. Lindsey, Oberlin, Ohio.

First, I claim the spring, C, link, b, valve, n, and collar, D, as arranged in combination with the plunger, E, pipe, F, and cylinders, A B, for the purpose and in the manner as specified.

Second, The sleeve, J, platforms, L, and arms, M, as arranged in combination with the pipe, F, plunger, E, spring, C, for the purpose and in the manner as described.

Third, Standards, N, links, P, arms, K, and trough, Q, as arranged in the manner and for the purpose herein specified.

63,733.—COMPOUND FOR PRINTERS INK.—Henry Loewenberg, New York City, assignor to himself and Emile Granier.

First, I claim a printer's ink made of sirup, molasses, honey or other saccharine substance in combination with suitable coloring matter, substantially as and for the purposes described.

Second, A printer's ink composed of sirup, molasses, honey, or other saccharine substance in combination with glycerin, or oily matter or both and with suitable coloring matter, substantially as and for the purpose set forth.

63,734.—MARKING COMPOUND.—Henry Loewenberg, New York City, assignor to himself and Emile Granier.

I claim a marking compound either in a liquid or solid form, containing iodine, or bromine either, or both, substantially as and for the purpose set forth.

63,735.—FIRE ESCAPE LADDER.—Russel Loomis, Saratoga, Springs, N. Y.

I claim the revolving disks, D D, having in their sides, the scroll grooves, c c, the friction rollers, l l, on the cross bars, d d, and the cap, h, in combination with the lazy tongs, B, arranged and operating substantially as and for the purpose herein described.

63,736.—OX BOW PIN.—John Low, New Britain, Conn.

I claim the construction of the plate, a b c, with arm, n, and spring, t, in the manner and for the purposes herein specified.

63,737.—SPIKE.—George W. McGill, Washington, D. C.

First, I claim a spike split into three parts or prongs the center prong being longer than the side prongs and said side prongs being so beveled that on being driven into the wood they will spread and diverge from the center prong in opposite directions, while the said center prong goes down into the wood, perpendicularly, substantially as shown and described.

Second, A spike split into three parts or prongs throughout the whole extent of the shank that is to be driven into the wood with the side prongs beveled as described so that the spike may be driven into the wood and the side prong made to spread and diverge without boring, substantially as described.

63,738.—SPIKES.—John Merlett, Bound Brook, N. J. Antedated April 1, 1867.

First, I claim the wedged shaped ribs, c d, forming shoulders, c' d' at their upper ends and arranged upon the lower portion of the spike, substantially as herein set forth for the purpose specified.

Second, The lug, g, constructed with a cutting edge, n', and with inclined sides, g', in combination and arranged in relation with the wedge shaped ribs, c d, and with the body of the spike, substantially as herein set forth for the purpose specified.

63,739.—CARRIAGE.—J. H. Moore, Warren, Mass.

I claim the combination of the carriage body, its seat, thorough braces, springs and perches, when arranged with respect to the fore and hind axle of a carriage, substantially as shown and described.

63,740.—MACHINE FOR POLISHING WAGON SPOKES.—S. L. Myers and George Willison, Massillon, Ohio.

First, We claim the board, D, pivoted at d, to the frame, A, and having the braces, f f, sliding shaft, G, with arms, H H', the latter bearing the chuck, K, and crank, L, when all are constructed and arranged in such a manner that the operator may when desired impart a combined revolving vibrating reciprocating motion to the spoke, substantially as herein set forth.

Second, The concave horizontal table, C, covered with an elastic cushion upon which the polishing material is placed when constructed and operating as herein set forth for the purpose specified.

63,741.—SCREW CUTTER.—Jacob K. Nelson, Greenpoint, N. Y.

I claim in combination with the revolving head, B, the detachable socket, D, fitted with loose or detachable blocks, F F G or H, forming chasers cutters, steadying blocks or grippers and made capable of radial adjustment from the outside of the revolving head of the hand tool or wrench, substantially as and for the purposes herein set forth.

63,742.—DIES FOR FORMING HINGES.—James O'Kane, New York City. Antedated April 1, 1867.

I claim the two communicating slits or channels, r r, arranged with reference to the circular groove, s, of a draw plate, as and for the purpose set forth.

63,743.—SASH SUPPORTER.—Dwight J. Osborn, Windsor Locks, Conn.

First, I claim the arrangement upon the plate, A, of the part, B, operated by the handle, D, in combination with the pieces, c c, having projections upon them for the purpose of entering and supporting the sashes, substantially as set forth.

Second, In combination with the supporter constructed as above the piece, G, for fastening the handle, D, substantially as set forth.

63,744.—APPARATUS FOR DYEING, BLEACHING WASHING, AND DRYING YARNS AND THREAD.—Isaac Osgood, Utica, N. Y., and Alexander Munroe, German Flats, N. Y.

First, We claim the apparatus for dyeing, bleaching or cleansing threads or twists of any fibrous material consisting of the perforated metallic bobbins or cop tubes when used in combination with the tanks, C and D, force pump, E, pipes, b and c, and vertical pipes, r, the whole arranged and operating substantially as described.

Second, The use of a perforated cop tube in combination with a perforated cop-sheath, substantially as set forth.

Third, The method of dyeing bleaching or cleansing threads or twists of any fibrous material, substantially as hereinbefore described.

Fourth, An article of manufacture a perforated metallic bobbin consisting of stem, n, and base, m, when constructed substantially as described.

63,745.—STEAM ENGINE SLIDE VALVES.—Edwin and Thomas S. Parker, Schenectady, N. Y.

We claim in the valve, B, constructed substantially as herein shown and described with the cavity, C, the apertures, c c, as and for the purposes set forth.

63,746.—KNITTING MACHINE NEEDLES.—B. F. Peaslee, Lake Village, N. H.

I claim forming fixed journals, a a, on the latch of the needle, substantially as and for the purpose herein specified.

63,747.—STUFFING BOX FOR DEEP WELL PUMPS.—J. B. Betty and Jerome Fredricks, Conneaut, Ohio.

First, We claim an elastic stuffing box for oil wells formed of a rubber cylinder cased in leather, or its equivalent combined with a hollow taper screw forming part of the well tubing and working in a female screw within the cylinder divided into two or more longitudinal sections, constructed and operating substantially as and for the purpose herein described.

Second, We claim the perforated collar, f, placed on the tubing below the stuffing box and the washer g, on the screw e, above the stuffing box in combination therewith constructed as and for the purposes herein described.

63,748.—FAUCETS.—Joshua Regester, Baltimore, Md.

In combination with the perforated disk valve, d, cut off plate, b, and longitudinal stem, c, having two bearings, b and g, I claim the construction of the handle, C, with a flange h', adapted to operate substantially as described.

63,749.—DEODORIZING PETROLEUM.—Thomas Resticaux, Boston, Mass.

I claim the application of quicksilver to petroleum and any of the products of petroleum as herein described using for that purpose the aforesaid solution or any other, substantially the same and which will produce the intended effect.

63,750.—CAR COUPLING.—C. M. Reynolds, Champaign, Ill.

I claim the arrangement of the bumpers, A A', constructed as described with the jaws, C C, springs, b b, and cam, D, when used in combination with the draw bar, B, provided with springs, a a, and connected to the bumper, A, by the pin, T, as and for the purpose herein specified.

63,751.—PEAT MACHINE.—M. S. Roberts, Lewiston, N. Y.

First, I claim the so hanging and arranging the outer section of the conveyor frame to its main portion that it can be raised or lowered, and set at any desired angle with regard thereto, substantially as and for the purpose described.

Second, Forming the bottom of the mill of a series of knives or cutter blades fixed in a common revolving frame in combination with the partition or plates hung across such portion of the mill, substantially as and for the purpose described.

Third, The fixed partition plate of the mill in combination with the side opening thereof, substantially as described for the purpose set forth.

Fourth, The arrangement of the series of scrapers in the bottom box of the mill as and for the purpose described.

Fifth, The open endless distributor having a series of partitions or cross plates, in combination with the bottom of the frame in which it moves, substantially as and for the purpose described.

63,752.—HAND LOOM.—Adam Rosenberger, Brandonville, W. Va.

First, I claim the combination with the roller, P, staples, O, and pivoted frame, Q, of the hooks, H I, treadles, G, attaching pieces, F, and levers, S S, all constructed and arranged in the manner described and employed to effect the shifting of the harness as set forth.

Second, In combination with the above I claim pendant, K, thumb screw, L, pulley, J, and cords, e, arranged as described and employed for adjusting the harness as specified.

63,753.—GRIDIRON.—E. P. Russell, Manlius, N. Y.

I claim the two halves, A C, and B D, when constructed so that the bars of one half shall cross the bars of the other, and when combined and arranged with the square heeled hinge, E F, operating as described so as to form a reversible gridiron.

63,754.—STARCH GLOSS.—Henry Sawyer, Boston, Mass.

I claim the use or employment of paroffine in combination with starch substantially in manner and for the purpose as before described.

63,755.—MILK VAT.—Levi C. and John M. Schermerhorn, North Gage, N. Y.

We claim the perforated steam and water pipes introduced into the space between the exterior and interior vats, for the purpose of heating regularly with steam and instantly (when necessary) shutting off the steam and applying jets of cold water to cool the contents of the inner vat, by means and for the purposes herein described.

63,756.—PORTABLE SODA FOUNTAIN.—A. D. Schnackenberg, Brooklyn, N. Y.

I claim closing the end of the high pressure tube b, directly with a conical plug B, without the use of a leather or other washer or packing for the valve, all made and operating substantially as and for the purpose herein shown and described.

63,757.—FARM GATE.—Elijah C. Sears, Crystal Lake, Ill.

First I claim in the construction of a board gate the arrangement of the double guide e, and the friction rollers g g' in the rear cleat b, in combination with the upper board d, of the fence A, operating as herein described.

Second, I also claim the single guides m m', at the top and bottom of the cleat k, in combination with the roller g' and the upper and lower boards of the gate B, arranged and operating as herein set forth.

Third, I also claim the notch l, in the centre post h, to clear the double guide e, when the gate is opened or closed as herein specified.

63,758.—WASHING MACHINE.—J. S. Sills, Cedarville, Ill.

I claim the corrugated board I, in combination with the upper rubbing board E, having the slats D, rim G, handles F, the lower rubbing board consisting of the semi-circular boards A, and slats B, substantially as herein set forth for the purpose specified.

63,759.—CLOTHES PIN.—David M. Smith, Springfield, Vt.

I claim the wooden key B, for connecting the two jaws A A, consisting of the central peice d, having slotted cylindrical ends c c, held in place by means of the pins e e, as herein shown and described.

63,760.—MACHINE FOR FORMING THE BRANCH TUBE OF VALVE CASE FOR CORNET.—Lewis W. Spencer, (assignor to Schreiber Cornet Manufacturing Company), New York, N. Y.

I claim the combination of the mandrel, the slide on the chuck of the mandrel, the index plate with its spindle at right angles to the axis of the mandrel and also to the slide, and the sliding stock or tool holder, substantially as and for the purpose described.

63,761.—MACHINE FOR FORMING THE BELLS OF CORNETS.—Lewis W. Spencer, (assignor to Schreiber Cornet Manufacturing Company), New York, N. Y.

I claim the combination of the die, the leaden or equivalent disc, the former, and the follower, substantially as and for the purpose described.

63,762.—HITCHING HOOK.—Charles Starbuck, Philadelphia, Penn.

I claim the construction and application of the cam lever A', so that it will operate in combination with the main portion A, of the hook substantially in the manner described for the purposes specified.

63,763.—GRAIN CLEANER.—George Stevenson, Zionsville, Ind.

I claim the stationary cam disc C, and the spring i, in combination with the screen B, for operating the rubber bar n, arranged substantially as herein described.

63,764.—PORTABLE FENCE.—James W. Suidter, Sharon, Wis.

I claim the portable fence constructed with panels A, cross braces B, and foot pieces C, with or without the pin D, said parts being respectfully constructed and the whole combined substantially as set forth.

63,765.—WAGON BRAKE.—W. Tash, Berlin, Ill.

I claim the rollers s s, upon the guide rods s g, of the bolster d, in combination with the guide bars s s', box A, substantially as herein shown and described.

63,766.—MACHINE FOR SHAPING AND HEADING BARS OF METAL.—Hiram Thompson, Worcester, Mass.

First, I claim the arrangement for giving motion to the jaw, a, and die, f, of the knuckle joint, b, and wheel, B, as described.

Second, The combination with the revolving wheel, A, jaw, a, and die, f, of the wedge, o, and set screws, 1 and 2, said parts being constructed and arranged for operation substantially as and for the purposes set forth.

63,767.—COTTON CULTIVATOR.—John Robert Wallace and Benjamin A. McClain, Murfreesboro, Tenn.

We claim the scrapers or shares, H, arranged or applied to the front part of the machine so as to be capable of being adjusted higher or lower to penetrate a greater or less depth into the soil and also capable of being raised entirely therefrom, substantially as set forth.

63,768.—WINDOW-BLIND FASTENING.—Alexander Warner, Brooklyn, N. Y.

I claim the slat fastener consisting in the combination of plates, b and b', when provided with holes or recesses, the bolts, a and a', substantially as and for the purposes herein shown and described.

63,769.—GATE LATCH.—W. T. Wells, Decatur, Ill.

I claim an improved gate latch formed by the combination of the adjustable bolt, D, and pivoted lever handle, F, with each other and with the frame of the gate, B, substantially as herein shown and described.

63,770.—CENTRIFUGAL MACHINES FOR DRAINING SUGAR AND OTHER SUBSTANCES.—D. M. Weston, Boston, Mass.

I claim the construction of centrifugal machines made to separate liquids from other substances by suspending such machine at the tops by flexible connections, operating substantially as above described.

I claim the construction of the openings, i i i, in the bottom of the cylinder, g, in such machines and the valve, J, for the purpose and operating substantially as above described.

63,771.—ROAD SCRAPER.—Geo. H. White, Huntington, Mass.

First, I claim the scraper plate, A, constructed substantially in the form and manner herein shown and described.

Second, The combination of the pivoted caster wheels, E, with the scraper substantially as herein shown and described and for the purpose set forth.

Third, The combination of the pinion wheels, J, and racks, I, with the pivoting blocks, D, of the wheels, E, substantially as herein shown and described and for the purpose set forth.

63,772.—STEAMER FOR CULINARY PURPOSES.—Anthony L. Whitney, Brooklyn, E. D., N. Y,

I claim the combination of the vessels, A B, and D, with each other, substantially as and for the purpose herein shown and described.

The intermediate vessel or pan, D, made and operating substantially as and for the purpose herein shown and described.

63,773.—MACHINE FOR GRINDING SAWS.—Baxter D. Whitney, Winchendon, Mass.

I claim reducing the plates of cylindrical saws to an even and uniform thickness, by means of the sliding frame, B, on which the saw, E, is supported revolved and moved laterally, by the action of the reversible screw, L, slide, P, and lever, M, in combination with the grind stone or grinding wheel, K, arranged and operating in the manner substantially as herein described for the purposes set forth.

63,774.—EGG BEATER.—William Wickersham, Boston, Mass.

I claim the device in egg beaters of giving the segment gear and consequently the beater knives, c c c c, a vibrating motion by means of a crank and connection rod frame, and arranged as described.

63,775.—SCAFFOLD.—John P. Wright, Canton, Minn.

First, I claim the arrangement of the post, P P, with the platforms, o, in combination with the screw shaft, E, substantially as described.

Second, I also claim the shaft, L, and bevel wheel, M, in combination with the shaft, E, and nuts, N N, substantially as and for the purposes set forth.

63,776.—BOOK-HOLDER FOR PEWS.—N. A. Wright, Prairie du Chien, Wis.

I claim the spring holder, C, when adjustable through the slot, a, in the socket, H, to regulate the tension of the spring, when combined and arranged as and for the purpose specified.

63,777.—BURNING FLUID.—I. B. Wiggin, Washington, D. C.

I claim the incorporation of microcosmic salt with the above-named compound of hydrocarbons, reference being had to the use of denser materials both in the composition of the hydrocarbons and the microcosmic salt, so as to make a fluid that can be burned in any kind of lamp, without smoke, bad odor, or danger of explosion.

63,778.—CORSET.—Edward Drucker, Paris, France.

I claim a corset or other similar article made of two or more sections united by seams running in a transverse curvilinear direction, or nearly so, instead of in a vertical direction as usual, substantially as and for the purpose set forth.

RE-ISSUES.

2,543.—SHOE PAD FOR HORSES' FEET.—Samuel Adlam, Jr., Charlestown, Mass., assignee by mesne assignments of John Haseltire. Patented July 25, 1865.

I claim a cushion or protector for horses' feet, made of rubber or rubber compound, and to fit the foot substantially as set forth.

2,544.—MODE OF LUBRICATING THE BEARINGS OF SPINNING FRAMES.—Albert H. Gilman, Milford, Mass., assignee by mesne assignments of himself. Patented June 14, 1864.

I claim a spindle step cap combined or to be connected with the spindle so as to revolve with it and made so as to extend over and embrace or go around the spindle step, and so applied to the spindle as to be capable of being moved lengthwise thereon and fastened in place thereon by a clamp screw or its equivalent, the whole being substantially as and for the purpose or purposes as explained.

I also claim a spindle gear made so as to be movable lengthwise on its spindle and provided with a screw or its equivalent to fasten it in place thereon, and so constructed that the gear itself shall form a cap for and pass down over or around the step without being in contact with it, substantially in the manner and for the purpose shown and specified.

I also claim the combination and arrangement of the grove, v, with the step, a, and with the cap, G, made so as to extend over and embrace or go around the said step, as specified.

2,545.—PUMP FOR DEEP WELLS.—Robert Cornelius, Philadelphia, Pa. Patented March 13, 1866.

I claim forming an annular chamber around the body of the pump at the top of the stroke and connecting this chamber by a series of openings with the interior of the chamber in such a manner that when the piston rises above the openings the liquid from above will flow into the body of the pump and displace the gas, substantially as described.

2,546.—ORNAMENTING ARTICLES OF GLASS OR OTHER VITREOUS MATERIALS.—Anton Schwitter, New York City. Patented Sept. 27, 1864.

First, I claim giving to the tool or cutter used in ornamenting articles of glass or other vitreous material, a motion toward and from the work by hand at the will of the operator, while the work is secured to a movable spindle or carriage, in contradistinction to the ordinary process of cutting glass, in which the work is held in the hands of the operator and pressed against the cutter, which revolves in stationary bearings, substantially in the manner and for the purpose set forth.

Second, The use of the rotary tool in combination with the spindle of an ordinary rose engine, or engine turning machine, either with a circular or with an up and down motion, substantially as and for the purpose described.

Third, The adjustable head, d, and swivel head, g, in combination with the extension spindle, I, carrying the tool, H, all constructed and operating substantially as and for the purpose set forth.

Fourth, The slotted plate, J, carrying the bearing for the tool spindle, I, and arranged in combination with the slotted table, A, in the manner and for the purpose substantially as described.

Fifth, The swinging shaft, K, arranged in combination with the adjustable tool spindle, I, in the manner and for the purpose substantially as set forth.

2,547.—WRINGING MACHINE ROLLER.—The Bailey Washing and Wringing Machine Company, Woonsocket, R. I., assignees by mesne assignments of S. A. Bailey. Patented April 29, 1862.

We claim in elastic cylinders of wringing machines the shaft, A, in combination with the rods, ribs, or bars, C, substantially as and for the purpose set forth.

2,548.—TIE FOR COTTON BALES.—G. N. Beard, St. Louis, Mo. Patented July 16, 1861.

First, I claim the shape and proportion of the cleat device, A, with respect to the loop holes, B, substantially as herein set forth.

Second, The fixed combination of a double-hooked cleat having prongs or engaging points of unequal length, with one end of a metallic band having an elongated aperture in its other end, when the length of said aperture is less than the united diameter of the shank of said cleat and length of its longer prong, all substantially in the manner and for the purpose herein set forth.

2,549.—REVERBERATORY AND OTHER METALLURGIC FURNACES.—John R. Grout, Detroit, Mich. Patented July 24, 1866.

First, I claim in a reverberatory or other furnace for treating metals having a bridge wall, or its equivalent, and a combustion or melting chamber, the atmospheric passage way, a a' a'', through the bridge wall so constructed that a thin and broad current or currents of atmospheric air heated in passing through the wall shall be discharged at or near the top of the bridge wall and in rear of the same diagonally across the course of the currents of the gaseous products of combustion on entering the combustion or melting chamber after passing from the fire room.

Second, In such a furnace the atmospheric passage way, b b' b'', through the arch over the fire room and bridge wall so constructed that a broad and thin current or currents of atmospheric air heated in passing through the wall shall be discharged at a line over or nearly over the rear side of the bridge wall downwardly and diagonally across the course of the current of the gaseous products of combustion on entering the combustion or melting chamber after passing from the fire room.

Third, In such a furnace the combination of an atmospheric air passage way constructed through the bridge wall with a similar passage way through the arch over the same, said passage ways being respectively constructed substantially as described.

Fourth, The passage ways, a a' a'', or b b' b'', when constructed respectively in the bridge wall and arch and subdivided in such manner as to discharge the hot air as set forth through two or more orifices with narrow openings, the series extending across or nearly across the entire width of the passage over the bridge wall.

Fifth, The atmospheric passage ways, a a' a'', and b b' b'', constructed so that the air will be heated in passing through the furnace walls when so arranged with valves or other throttles that the flow of air through them may be regulated at discretion, substantially as set forth.

Sixth, The bridge, c, across the bridge wall above the valve for the protection of the same, substantially as described.

Seventh, So constructing such a furnace that the heat absorbed by the furnace walls may be taken up by currents of air passing through passage ways constructed in the furnace walls which air flowing through them is afterward discharged into and mingled with the gaseous products of combustion after the same have risen from the fuel upon the grates and passed out of the fire room, substantially as described.

2,550.—Pegging Machine.—Alfred B. Ely, Newton, Mass., assignee by mesne assignments of Luther Hall. Patented March 8, 1864.

First, I claim so constructing the awl as to use it as a peg driver.

Second, Interrupting the motion of the awl and employing it as a driver on each alternate downward stroke.

Third, Interrupting the upward motion of the driver on every alternate ascent to prevent the feeding of the peg strip until the hole is made to receive the peg.

Fourth, The boss, I, in combination with the block, G, and switch, d, or their equivalents, substantially as and for the purpose set forth.

2,551.—Auger.—A. C. Kasson, Milwaukee, Wis., and N. C. Gridley, St. Louis, Mo., assignees of A. C. Kasson. Patented January 15, 1867.

First, We claim an auger having a twist whose front or working faces are concave and whose rear surfaces are convex, substantially as represented in Fig. 2.

Second, An auger constructed substantially as herein shown and described which permits the formation of cutting lips at any point in its length by simply cutting off the twist at any given point in a plane coincident or nearly so with the axis of the auger and sharpening its edges

Third, In an auger constructed as described we claim the cutting lips, B, formed with sharpened edges following the concavity of the twist from the screw or center point to the periphery and inclined to the axis of the auger substantially as shown and described.

Fourth, The combination of the twist, the cutting lips, and the cutting edges of the twist, substantially as herein shown and described.

2,552.—Method of Increasing Traction in Locomotives.—C. W. Theodore Krausch, Philadelphia, Pa. Patented January 29, 1867.

First, I claim the means substantially as herein described of increasing adhesion of driving wheels of locomotive engines or other draft carriages upon their rails or upon the ground consisting in transfering a portion of the weight of the load to be moved to the said draft carriage by the act of starting this carriage, substantially as described.

Second, The employment of steam or other power in conjunction with a coupling lever, S, or its equivalent, for the purpose of enabling the engineer to increase or diminish the weight upon the frame of the draft caariage at pleasure, substantially as described.

2,553.—Brick Machine.—Egbert C. Bradford, James H. Renick and Obadiah A. Clough, New York City, assignees of Henry Martin. Patented June 27, 1865.

First, I claim the mixing box, A, and press box C, with its grate, c c, in combination substantially as described with each other and with the gate, j, operating to close the press box against any admission of clay while the molds are being filled, as set forth.

Second, The manner of regulating the rise and fall of the plunger, h, by means of the adjustable tapering slide or gage, 14, on the slotted lever, 12, in combination with the pins, 13, on the toothed segment or wheel, i, substantially as set forth.

Third, The manner of working the plunger, d, in the press box, c, by means of the crank, F, with its wrist, the slotted lever, 12, with its adjustable tapering slide or gage, 14, the toothed segment or wheel, i, with its pins, 13, and the rack, h, attached to the plunger, all combined and operating substantially as and for the purpose specified.

Fourth, The cog wheel, l, and slotted lever, 12, operated by the wrist of the crank, F, in combination with the rack, k, attached to the gate, j, substantially as and for the purpose set forth.

Fifth, The devices for operating the molds under the press box, c, consisting of the lever, P, rock shaft, e, arms, F, connecting links, g, and pusher, E, all combined and operating substantially as and for the purpose specified.

Sixth, The gate, m, raised and lowered by the lever, n, or its equivalent, in combination with the press box, c, for the purpose described.

2,554.—Cotton-bale Tie.—Joseph W. Branch and Joseph Crookes, St. Louis, Mo., assignees of John F. Milligan. Patented Nov. 6, 1866.

First, We claim the application of the buckle, B, for the joining of the ends, A and A', of a hoop or band, when the said ends, or either of them, are passed through a mortise, c, of said buckle, without cutting or otherwise weakening the ends or end so passed, and when the parts thus joined are held by the expansive forces of the compressed bale, substantially as herein fully set forth.

Second, The buckle or tie plate, B, provided with a projection, b, when combined with an oblique slot, c, to receive and secure the ends of the bale hoop, substantially as and for the purpose herein set forth.

2,555.—Lantern.—J. H. Miltimore, Chicago, Ill. Patented August 8, 1865.

First, I claim the upper portion of the base, B, when so constructed as to admit of the passage of an adjustable globe through it and made a part of the guard, and also connected with the lower or flanged portion by a hinge and spring, substantially as shown.

Second, The combination of the lower portion of the base, B, which supports the lamp, with the upper vertical portion which forms a part of the guard in a lantern having the globe removable through such upper portion of the base, substantially as specified.

Third, The disk or ring, D, provided with the lugs, e, in combination with the projections, o, of the base, B, arranged and operating as and for the purposes set forth.

Fourth, I claim the band, F, provided with the inclines, l, in combination with the rod, n, substantially as and for the purposes set forth.

Fifth, I claim securing the lamp by means of the bar or strip, f, and arms, g, when arranged to operate substantially as described.

2,556.—Mode of Finishing Soles of Boots and Shoes.—James Purinton, Jr., Lynn, Mass. Patented January 26, 1864.

I claim, as a new article of manufacture, a boot or shoe having a finish imparted to the heel or sole, by covering the outer surface of the same, in whole or in part, by paper or other material, substantially as set forth.

2,557.—Lantern.—A. B. Ely, Newton, Mass., assignee by mesne assignments of Sumner Sargent. Patented Sept. 17, 1861. Reissued January 23, 1866.

First, I claim constructing the lantern with an aperture or opening in the case through which the wick regulator extends so as to be reached and operated on the outside, when used in combination with such wick regulator, substantially as described.

Second, In combination with the above an opening and closing plate, or its equivalent, for covering and uncovering the opening in the case, substantially as described.

Third, The arrangement of the perforations, l l, in the base flange of the lamp, the draught collector, n, and guard cylinder, B, or any two of them, in combination substantially as and for the purposes described.

DESIGNS.

2,611.—Cook's Stove.—J. Martino, J. Beesley, and J. Currie (assignors to Smith, Wells and Co.), Philadelphia, Pa.

2,612.—Plates of a Cook's Stove.—J. R. Rose and E. S. Caley (assignors to Cox, Whiteman & Cox), Philadelphia, Pa. Antedated March 12, 1867.

2,613.—Bottle.—Charles Gautier, Washington, D. C.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

539.—Fastening for Driving and Other Belts or Bands.—John A. Greene, Brooklyn, N. Y. Feb. 26, 1867.

550.—Screw and Bolt.—Wm. G. Angell, Providence, R. I. Feb. 27, 1867.

560.—Brake for Sewing Machines.—John A. Minor and Robert Bowman, Middletown, Conn. Feb. 28, 1867.

569.—Apparatus to be Used as Spinal, Abdominal, and Pelvic Truss Supports.—Edmund P. Banning, New York City. Feb. 28, 1867.

571.—Steam and Gas Engine.—Chas. E. Emery, Brooklyn, N. Y. Feb. 28, 1867.

599.—Breech-loading Fire-arm.—Benj. S. Roberts, Major-General U. S. Army. March 4, 1867.

619.—Repeating Breech-loading Fire-arm.—Valentine Fogerty, Boston, Mass. March 5, 1867.

621.—Steam Engine and Pump.—Hart F. Pease, Brooklyn, N. Y. March 6, 1867.

629.—Means for Producing Optical Illusions.—Milton Bradley, Springfield, Mass. March 6, 1867.

630.—Coupling for Baling Bands.—Geo. N. Beard, St. Louis, Mo. March 6, 1867.

632.—Insulator for Telegraph Wires.—David Brooks, Philadelphia, Pa. March 7, 1867.

642.—Manufacture of Porcelain.—Waldron J. Cheyney, Philadelphia, Pa. March 7, 1867.

644.—Steam Hammer.—Wm. Sellers and Coleman Sellers, Philadelphia, Pa. March 7, 1867.

646.—Actuating Fan Blowers by Steam Power.—Geo. W. Lemley, Paterson, N. J. March 7, 1867.

652.—Reducing and Refining Metallic Ores and Converting Iron into Steel, and Apparatus to be Used in Connection Therewith.—Silas C. Salsbury, New York City. March 7, 1867.

670.—Apparatus for Starting Street or Horse Railroad Carriages.—Samuel Ward, New York City. March 8, 1867.

708.—Breech-loading Fire-arm.—Edward L. Sturtevant, Boston, Mass. March 19, 1867.

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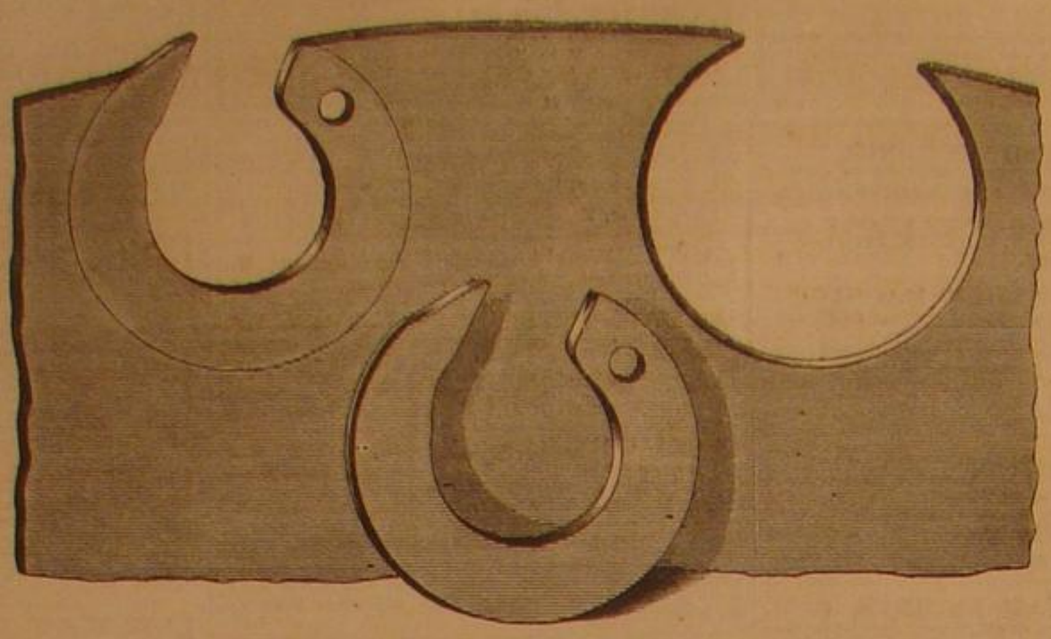
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MILLER'S CIRCULAR SAW TEETH.

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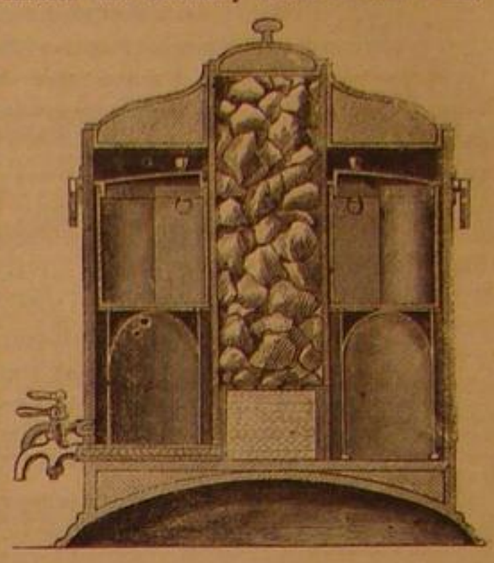
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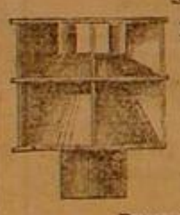
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Improved Switch Signal and Alarm.

The most careful men are liable to mistakes. The deeply cut grooves of habit and method may at times be left for some erratic course, and where human weakness fails we must depend upon the infallibility of mechanism. Carelessness and thoughtlessness become criminal where human life is at stake, and this is particularly the case with the railroad switchman. Many lives are annually sacrificed and much property destroyed for the want of some reminder of duty to the switchman and some timely signal to the engineer of a train. A patent for such a device was secured through the Scientific American Patent Agency by Thomas S. Hall, of Stamford, Conn., Feb. 26, 1867, and is now in successful operation on a portion of the New York and New Haven Railroad.

The switch is worked by a hand lever in the usual way. On the under side of one of the rails, at its free end, is a downward projecting pin which engages with a horizontal lever by means of a slot near one end of the lever. To the other end of the lever is secured a cylindrical pendant plug, having on its lower end a snug with two parallel sides that fit in a suitable pipe of metal sunk in the ground, the top of it at the surface. A cap with rubber packing prevents the entrance of moisture into the tube. Below the lever plug is a wooden cylinder having two metal plates secured to its sides but not touching the tube, and projecting above the wooden cylinder on each side of the parallel sided snug. Now it will be evident that if the switch is shifted, the horizontal lever at the surface of the ground will be correspondingly moved with the switched rail, and the snug will be turned so that two opposite corners will come in contact with the projecting metal plates on the wooden cylinder. Consequently, if these plates are connected by insulated wires, one with the pole of a battery and the other with an electro magnet, the circuit may be closed or broken as the switch is moved in one or the other direction. This is precisely the principle and the operation of this device. The wires are inclosed in an insulating material and carried under ground (for explanation in the engraving, shown above ground) to a battery and gong or bell placed in a cupola on the roof of the station house, as in the engraving, or in any other convenient place to give an alarm. When the switch is in line with the main track the circuit is broken and no alarm will be given, but when the switch is misplaced the circuit will be completed and a hammer will vibrate against the gong and continue the alarm so long as the switch is off the main line. It will be seen that the switchman will thus have a perpetual reminder of his duty if he neglects to replace his switch, or that some employé will have his attention directed to the oversight.

In addition to this alarm addressed to the ear, a signal is shown simultaneously with the alarm by similar means. In the engraving the signal is shown on a post at a distance from the switch sufficient to enable the engineer to stop his train before reaching the switch. In the daytime this is the ordinary red and white signal, and in the night the red or white light. Of course this signal may be placed as far away from the switch as may be desired, the connection being made by the wire passing under ground.

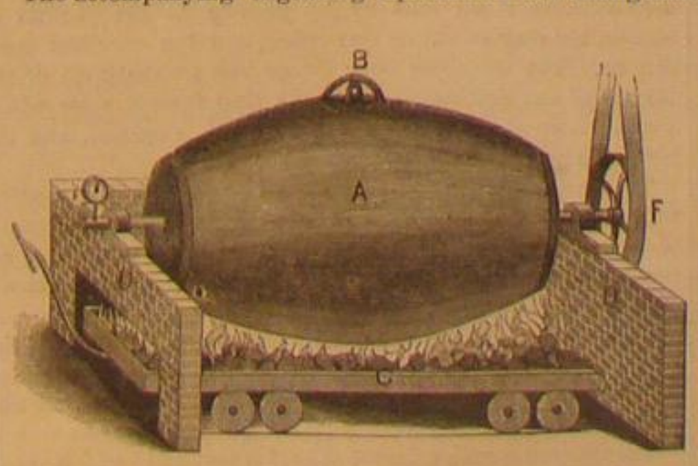
This device may be seen in operation at the Merchants' Union Express Company's Office, 365 Broadway, corner of Franklin street, New York City. It is being introduced already on several railroads, and as there is no machinery to get out of order and the cost of keeping in operation is only that of replenishing the batteries once in two or three months, and its operation is certain, it may be considered as an effectual preventive of accidents from misplaced switches and the draws of bridges to which it can be as readily attached. Any inquiries addressed to the patentee at Stamford, Conn., will meet with prompt attention. Patents have been secured in foreign countries through this office.



HALL'S SWITCH SIGNAL AND ALARM.

A NEW AMALGAMATOR.

The accompanying engraving represents a new amalgamator and desulphurizer. Recent trials have been made upon some of the most refractory ores with remarkable results, so much so that its owners anticipate a complete revolution in gold and silver mining. A, represents a wrought iron cylinder; B, man hole plate through which the cylinder is charged and emptied; C, a truck upon which there is a fire; *d d*, side walls upon which the cylinder rests; E, steam gage; F, belt wheel; G, safety valve.



The powdered quartz, mercury and sufficient water are placed in the cylinder, which is then closed air-tight and made to revolve slowly over the fire until the steam gage indicates 70 or 120 lbs. steam according to the nature of the quartz. If the quartz does not contain much refractory ore, 70 lbs. of steam is sufficient, if it does contain much, 120 lbs. of steam is necessary in order to thoroughly desulphurize and liberate the gold and silver. As soon as the required amount of steam is attained the fire is withdrawn and the cylinder is kept revolving until cool. It is then opened and emptied and is ready to repeat the operation. The machine will treat from 1500 to 2000 lbs. of quartz at a time, inside of three hours, at very little expense.

It is claimed for the above process, that the steam not only desulphurizes but drives the heated mercury through the quartz in every direction, and the revolving of the cylinder constantly intermingles the quartz and mercury, so that every particle of the gold and silver must come in contact with the heated mercury and consequently be taken up, thereby accomplishing a most perfect system of amalgamating and desulphurizing. Patented Dec. 22, 1865. Address John I. Staats, Patentee, 83 Amity Street, New York.

Cast Iron Boilers.

A correspondent from Indianapolis speaks unfavorably of cast iron boilers of the Harrison style, because one of cast iron rings which he used proved inefficient. He says his boiler was a series of circular pipes, one above the other, and connected at three points in the circle by upright tubes through which passed wrought iron bolts secured by nuts at top and bottom. These bolts, under pressure, would expand and the joints of the pipes leak badly, and at length one of the pipes burst. When taken apart the interior of the pipes had a coating three-eighths of an inch thick. The fire was made inside the coils.

Such a boiler we should expect to be a failure, but except being made of cast iron and bolted together we cannot discover any points of resemblance on which to make a comparison with the Harrison boiler.

RUBBER-CEMENT.—Caoutchouc 3 parts, naphtha 34—heated and stirred to solution—then add finely powdered shellac 64 parts.

PARIS EXPOSITION--THE CHAOTIC STAGE.

PARIS, March 29, 1867.

A FAIR ADMISSION.

It seems to have been the fashion among those who have written in reference to the coming Exhibition, whether speaking of the building or speculating on the probable interest of the articles to be exhibited, to give only the most qualified praise of the one and to express serious doubts as to the other. Of course if one is desirous to convey the impression that nothing whatever can be so imposing as to awaken any new sensation in the mind of the writer, he must express no extravagant admiration of what he beholds, no matter what his own impressions may be. As, however, for my own part I feel more anxious to convey to the minds of those who are not able to see for themselves, the impressions that are produced on a disinterested observer, as nearly as possible as they exist in his own mind, than to assume any affected indifference to the achievement of another nation, I shall admit frankly, that I experienced no little astonishment in walking around yesterday through the various departments of the main building and among the numerous additional edifices with which the surrounding park is filled. It must be admitted that no very extensive view is obtained from any one point, but this defect to the mere sight-seer will, I think, be amply compensated by the many beautiful promenades which will be prepared outside of the building, and which will no doubt, in the hight of the season, present as brilliant a spectacle as one can well imagine even in Paris.

EXTERNAL APPEARANCE.

It is extremely difficult, I am aware, to convey any idea of the size of such an inclosure, and therefore I shall not repeat the number of acres comprised in the park or occupied by the building. Perhaps some comparative notion may be formed from the statement that the central garden, which has an area equal to one twenty-fifth of the whole of the main building, is of about the length of Union Square, New York, by perhaps half the width of that park. Of the concentric elliptical rings of which the building is composed, the outer and in every way the largest one is devoted entirely to machinery. Outside of this, however, is a continuous restaurant more than half a mile long but not having the hight of the rest of the building, and therefore not prominent when the latter is viewed from a distance. The outside of this is entirely of transparent glass, and a very pleasant prospect is therefore presented to one while sitting at the tables of the surrounding grounds and buildings, as well as to promenaders under the roof which projects outward from this portion or appendage of the building. I was not particularly struck with any resemblance of the building to a gas holder, as the large round-topped windows of which the sides are principally composed relieve very much the unornamental appearance which I had supposed it to have. In order to give a clear space in the interior of the machine department, the main uprights in the walls of wrought iron are made very stiff and carried up to such a hight above the springing of the roof as to allow the necessary ties to pass above the crown of the arch. This adds very much to the appearance of the interior. The roof is, as might be supposed, tastefully painted, and though the girders and beams of which it is formed are all in sight, it is much more pleasing to the eye than where a maze of tie rods and braces breaks up the view.

INTERIOR OF THE MACHINERY HALL.

The large windows which, as already stated, occupy nearly the whole of the outer wall from the level of the exterior restaurant to the roof, are hung with ornamental shades bearing paintings of the well known antiquities of engineering or inscriptions appropriate to the nationality of the section in which they are situated. . . . . The moving machines are all arranged near the longitudinal center of the hall; on each side of the moving machinery are aisles for spectators; and on the wall sides of the hall are arranged the machines not in motion and kindred objects. The arrangements for bringing articles to their places in the building are very simple and good. From the lines of railway in the park, branches enter the building at each or many of the radial aisles or streets, as they are called. Then at each intersection with one of the circular aisles a turn-table is placed, and these aisles are themselves at present occupied by lines of rails, so that each article is brought by steam or horse-power directly to its intended position and there deposited by a steam crane also traveling on the same railway. The various sections are decorated in styles appropriate to the nations to which they are allotted, and in some cases the appearance is very rich, while in all the effect is much more magnificent than any thing that one can often see elsewhere.

FRENCHY GARDENING.

The gardens are certainly laid out with great taste, though one sees many things which are peculiarly French, in the way of trained trees whose branches are made to assume the most unnatural and fantastic forms, and similar fanciful extravagances. Along one of the promenades is a continuous bed of these. At the ends are trees whose branches are all in two directions at right angles to each other, thus forming appropriate corner pieces, while at other points they are arranged in symmetrical forms of all imaginable kinds. Artificial streams have been formed, or rather the beds of cement for them are prepared though the water has not yet been admitted, and over these are rustic bridges also formed of cement, but molded and painted in such a way as to form a very good imitation of the bark of wood. The grounds are full of ornamental buildings and cottages of all kinds, which though interesting and even elegant in many cases give it rather a crowded and heterogeneous appearance. Still, though the general effect is not the most pleasing, each part is in itself enjoyable and will afford instruction and amusement to the thousands who will visit it.

SLADE.

Science Familiarly Illustrated.

How Cast Iron is Made.

Many of our readers probably suppose that what we commonly call iron is an elementary natural substance, and would be surprised to learn that like steel it is an artificial article of a complex character, answering to nothing found in nature. At the same time it is remarkable how imperfectly both the character and the formation of an artificial product may be understood by those who make it. It is not many years since real iron was first refined from the chemical compound of that name, and found to be a white soft metal, looking like silver, and easily pared with a knife. Even now, no one can tell us precisely what is done in the interior of those great, glowing piles where "ironstone" is melted up with limestone and comes out in the hard, brittle, granular, gray substance known as cast iron. It is a process that has come down to us from antiquity, where it was developed by experiment with little aid from science. Important as the improved and extended iron industry is to modern life, it is impossible for us to conceive of the hungry need that pricked on the primitive men in their search for the precious material of tools and above all of weapons. Nothing else could account for the success with which they felt their way to processes and results in manufacture, of the chemical nature of which they had not the slightest conception, and which we but imperfectly understand. Mr. Wm. Crossley, F.C.S., manager of the Ormesby Iron Works, England, in a series of papers lately published in the *Chemical News*, confesses this singular ignorance, and gives his theory of the process, and what it ought to be, from which we have already quoted as interesting to our more expert as well as youthful readers.

A blast furnace, we should first explain, is not a mere melting furnace, but a chemical retort for separating oxygen from the oxide of iron, by means of the superior affinity of the former for carbon. It is substantially an upright tube, varying from fifty to a hundred feet in hight; not to afford a chimney draft, for that is superseded by a mechanical blast, but to afford room for the chemical process demanded. By this process the iron is set free from the oxygen to which it had been subjected in the state of nature; but it exchanges that master for another—carbon—making it a carbide of iron, impure with other foreign matters, such as sulphur and phosphorus, which it derives from nature or the fuel and minerals in which it is smelted.

The smelting retort, as we will continue to call it, is made of various diameters, according to the hight, and the weight of ore intended to be reduced at a charge. Some lately built are as much as 102 feet in hight and 29 feet inside diameter. First, a hot fire of coke or charcoal is made on the hearth at the bottom, fed from the top and gently urged by a pressure of air through two tweers or inlet tubes, 2 to 4 inches in diameter, placed near the bottom and connected with blowing engines which will be made to drive a blast of great power through the retort, as soon as it is charged with ore. On the top of the fuel, which extends in the first place well up the shaft, the ore is fed in, mixed with limestone, both previously calcined by roasting in the open air, to drive off moisture and organic matter. The ore consists of iron in combination with oxygen, and this oxide (the same thing as "rust") is also mixed with various proportions of earthy matter which is chiefly silicic acid. To disengage this earthy matter from the ore, and to prevent the ore when melted forming with the silicic acid a silicate of iron (glass) and thus being lost, limestone is mixed with it, and the first effect of the hot gases passing upward is to decompose this as in a lime kiln, yielding lime. The lime, and the silicic acid or earthy matter mingled with the oxide of iron, now begin to act upon each other and form a crude silicate or glass which will soon be easily melted, and is then called slag. It is probable that at about the same time the carbonic oxide (carbon imperfectly oxidized, having only half the oxygen it will take) finds the iron oxide sufficiently heated and freed to deliver up its oxygen, which the carbon seizes, becoming carbonic acid, and leaving the iron free from oxygen and ready to melt as soon as it has settled a little further down into the intense heat. Here the slag or impure silicate melts, and a little later and lower the freed iron also melts, and at the same time probably combines with a portion of carbon from the fuel and thus subjects itself to what we have called its new master, becoming a carbide as it was before an oxide of iron. The carbide of iron (which we call iron for shortness, and because we used to think it so) falls by its gravity to the bottom or hearth, the slag swims on its surface, and the chemical work is done. The workmen open a door just at the level of the surface of the iron, and haul off the slag from it, after which a small hole at the bottom of the hearth is opened, and the iron runs out into molds.

This operation has occupied from 24 to 48 hours, according to the hight of the retort, and meanwhile alternate charges of fuel and minerals are fed in at the top until the whole retort is filled and kept full by continued charging as fast as the contents descend and make room.

Entering (mentally) with the blast at the bottom of the retort, let us trace the operations of the fuel and air ascending the shaft, as we have traced the descending materials, ore and limestone.

For many ores such a degree of heat is required—and for most it is advantageous—that the air blast must be heated before it enters. The blast has lately been brought to a temperature as high as 1,100°, and a great advantage in the heat from a given fuel is obtained by feeding it with hot air—Mr. Crossley thinks four fold, up to the point where the blast shall be as hot as the fire itself. The first operation is probably the formation of carbonic acid by the union of two parts oxygen with one of carbon, and this evolves heat enough at this point to enable another portion of the carbon to recover an equivalent of oxygen from the carbonic acid, reducing the latter to carbonic oxide, which ascends until it meets the iron oxide and regains from it one equivalent of oxygen, becoming again carbonic acid and leaving the iron free, as we have before seen. In the improved modern furnaces, the carbonic acid, escaping carbonic oxide, free carbon or smoke, and other gases, are caught at the top of the shaft in contrivances for the purpose and taken off in pipes to reservoirs, whence they are fed into independent furnaces and burned with other fuel and air blast, to heat the blast for the smelting furnace and raise steam for the engines.

BUSINESS AND MANUFACTURING ITEMS.

WESTERN MANUFACTURES.—The age of our eastern manufactures not only renders them the representatives of American manufacture in general, but has established the East as the only seat of home manufacture worthy of notice in the eyes of most of men interested in our national activity.

In the mean time the rich western states are working quietly and slowly on, and before long they will step in beside the ponderous eastern production of skill and handicraft.

As an instance of this silent progress we mention the town of Peoria, Ill., little noticed and hardly ever mentioned in connection with manufactures, while in these it surpasses many a place of double its population, standing behind none in proportion to the latter.

Peoria is situated on the west bank of the Illinois river and lake Peoria, which is simply an enlargement of the breadth of that river midway between Chicago and St. Louis. An immense bed of bituminous coal underlying it, the town possesses one of the great elements of manufactures, abundant fuel, which costs in Peoria about one third of what it is worth in Chicago, St. Louis or Cincinnati, and about one half of what it does in Pittsburgh; its price varying from seven to eight cents per bushel or about two dollars per tun, which is about twice the value of that material before the war. This coal is produced from one hundred and three coal banks, actively worked around the city.

The communications of the city with the world by rail and water are quite respectable, eight different lines of railroads meeting there, while the Illinois river, by way of canal and lakes gives a desirable water communication with the East, and by the Mississippi and tributaries with the South and West. Being situated in an agricultural district the chief branch of manufacture is that of highwines, of which seven hundred and sixty-two barrels are produced daily, in fourteen distilleries.

The revenue which accrues (or ought to) to the government from this single branch of industry in Peoria, amounts to the neat little sum of $60,960 a day; which is doing pretty well for a city of 20,000 inhabitants. Three distilleries burnt down within the last two years had even a greater capacity than any of those now existing. There are also eleven rectifying establishments in Peoria, producing in the aggregate 375 barrels of cologne spirits per day.

Eight establishments produce two hundred barrels of beer per day, and four vinegar factories, sixty barrels of vinegar, which is said to be sufficient to sour the entire population of the town, otherwise very amiable. The Peoria Pottery Co. formerly produced all kinds of pottery, but is now confined to yellow stoneware. The clay for the works is brought from a distance of eighty miles. It is mixed with water by exceedingly heavy machinery to a uniform mixture, having the consistency of milk, which passes through screens, where sand and other coarse impurities are retained.

The liquid passing through the screens travels over a long inclined plane, where the coarsest clay is again deposited, while the finer, suspended in water, runs into large tanks, where it is deposited by rest. Afterward the clay paste is transferred into a huge sheet iron pan, and dried by heat to a consistency adapted for molding. The clay remains upon the plaster molds for twenty-four hours. The earthenware is then dried around stoves for a few days, then introduced into mufflers and placed in a large furnace.

The Peoria Paper company manufacture all kinds of wrapping paper, but chiefly straw paper, the material for which is there cheap and abundant.

An equally extensive establishment, The Peoria Starch factory, produce at the rate of a tun and a half per day. There is also a woolen mill, three coffee and spice mills, eight flour mills with a daily product of 1930 barrels of flour, and barrel factories of a capacity to supply all the establishments before mentioned. All these establishments require founderies and machine shops, of which there are four, beside two brass founderies, two boiler shops, two copperworkers and two millbuilders. Four plow factories, for cultivators, and two for cornplanters; two for pumps and wooden tubing, one for water buckets and drawers, three for sash, doors, and blinds, five for brooms, two for lard oil and candles, and wagon, saddle, and harness factories etc., as abundant as in most other cities, complete our survey of Peorian manufactures. About ninety engines are employed in these establishments.

JOSEPH HIRSH.

THE GATLING BATTERY is attracting favorable notice in England, where a trying experiment has been sustained by it under direction of the Government, at Shoeburyness. Owing to an accident, one of the barrels could not be fired; nevertheless, 76 shots were made in 80 seconds, discharging 1,216 bullets, 668 of which were counted on the target in spite of a strong cross wind.

Editorial Summary.

ANOTHER CAST STEEL PROCESS.—As the Bessemer method consists in the simple oxidization of the carbon contained in iron, by penetrating it throughout with a blast of oxygen mixed with nitrogen (air) it is evident that mixing with the iron any substance capable of evolving oxygen would effect the same result. Mr. Bessemer patented this idea; but the substances, such as the nitrates of soda and potash, most available for yielding oxygen to iron, are very destructive to the vessel employed in the process. To meet this difficulty Mr. John Heaton, now of the Langley Mill Steel and Iron Works, Nottingham, patented, about a year ago, the plan of placing the salts in pockets within the fireclay lining of a revolving converter, so that all parts of the whirling mass might be brought in contact with the re-agent. It appears that about 5 per cent by weight is a sufficient proportion of the nitrate to be added to the iron for its conversion into steel. Samples of the product are spoken of as showing a fine silky fiber at the fracture.

ALUMINIUM IN DENTISTRY.—Dr. J. B. Bean announces in the *Dental Cosmos* that he has succeeded in discovering a process for fine casting in aluminium, which will enable the profession to make plates for artificial dentures preferable in all respects to those of any other material, from gold to vulcanite. In strength and rigidity he affirms that the aluminium plate, when properly cast with very slight and suitable alloy, is far superior to gold and platinum of the same condition and thickness, while its extreme lightness is one of the most desirable of qualities. In cleanliness nothing can be better: it has no more taste than porcelain, its brilliancy is much more lasting than that of silver, plates worn for weeks without cleaning exhibit no change, and sulphur and sulphuretted hydrogen, which attack silver and gold, have no effect whatever on aluminium. Its lightness is the great difficulty in casting it in fine molds, and a peculiar process had to be originated, which the inventor generously declines to patent, although he thinks the apparatus used should be covered by a patent, as an article of manufacture. Eminent dentists are said to have pronounced it "the great desideratum attained."

ARTIFICIAL PERCEPTION.—It has been suggested that the supposed odylic force (animal magnetism) may possibly, if there is such a thing, be brought to artificial tests and measurements, by means analogous to those by which we separate and exhibit the distinct forces contained in light, or the allotropic states of the threefold substance to which oxygen belongs. What could be the nature of an odylic battery, wherein this mysterious force might be caught, stored, concentrated and brought under examination? All we know is that it must be some arrangement of those living leyden jars (too often cracked) which in all ages have more or less perambulated wi h startling if not shocking effect. It is unfortunate that most of the attention hitherto devoted to this subject has been that of persons to whom the rigor of scientific inquiry is foolishness.

ENDLESS HOIST.—A recent English patent presents a very simple and efficient application of the endless hoist principle, commonly used for grain and flour, for building and general purposes. Two parallel endless chains pass over separate parallel pulleys widely enough apart for the hoisting boxes or cages to swing clear between them, and are connected at proper intervals by iron bars from the centers of which the cages are suspended. Four of these pulleys being arranged equi-distant like the four wheels of a car truck, at each end of the hoist, permit a constant succession of cages to pass each other going up and down, remaining always right side up.

BETTER LEATHER.—The *Shoe and Leather Reporter* argues a reasonable prospect of improvement in American leather, from the energy stimulated in the manufacture by the war. Although capital and energy were then turned in the direction of rapidity and quantity at the expense of quality, yet there is nothing now to prevent this power being transmuted from speed to force, and applied to thorough and excellent work, removing the stigma of inferiority from American leather and transferring to our own manufacturers the demand which now goes abroad.

SILICA IN GRAIN STALKS.—Pierri, the French chemist, has re-examined the grasses and has apparently thrown some further light on the agency of silica, which was once erroneously supposed to give the stalk its rigidity. He finds on the contrary that in the wheat plant the silica accumulates chiefly in the leaves and least of all in the hard knobs or joints of the stalk; the latter containing less than one seventh as much as the leaves, and the stalk between the joints less than one-fourth. Hence, the more silica the more leaf, the more shade, the less hardness in the stalk, and the greater liability to break down or "lodge."

PROFESSOR AGASSIZ' immense collections in Brazil have been in good part opened and arranged (except about sixty packages) in the museum of Comparative Zoology at Cambridge. They include 50,000 specimens of fishes, representing over 2,200 species, 2,000 of which are supposed to be new to science. This collection now exceeds those of the British Museum and Jardin des Plantes united, containing altogether more than 9,000 species.

SUBMARINE TELEGRAPHS to the number of 72, with 12,008 miles of cable, are now in successful operation; 23, of 9,053 miles, have have been worked but have since given out, and 9, of 862 miles, have been total failures. In addition to these there are 95 lines under American rivers.

EXCAVATOR.—A new railway bridge is being erected over the Clyde, at Glasgow, on cast iron cylinders 8½ feet in diameter, filled with concrete and penetrating through the sand to the bed rock at a depth of 85 feet. An excavator invented by Mr. John Milroy is used with great advantage in sinking these tubular piers. Its construction may be illustrated by supposing an octagonal disk of steel plate to be divided on all its diagonal lines, so as to make eight triangular plates. Let these plates be each hinged by its external side on an octagonal frame filling the interior of the cylinder like a piston head, so that when free they will hang vertically, points downward, and may be forced downward into the sand as spades; and when drawn up again to a horizontal position by chains attached to their points, they will converge and form a tight bottom, supporting the sand brought up with each spade. The further details necessary for working the plan may obviously be adjusted without difficulty, and the novel piston be made to pump the sand from the bottom of the cylinder as fast as it can rise and fall.

EARLY STRUGGLES.—The Illinois eight-hour law encounters great difficulty in getting into practical operation, from the want of a general concert of manufacturing states in the movement. It is of course impossible for employers to pay the excess of wages over their competitors in other states, and they will be obliged, and are preparing, to close their factories and shops, unless the hands consent to have the twenty per cent taken off equally from the work and the wages. Of these alternatives, neither working on four-fifths time nor being turned out of employment altogether, is the entertainment to which the operatives were invited. It would seem to be their only policy, at this stage of their movement, to content themselves with the initiation of the eight-hour standard of day's work, adding two hours overtime for the old wages at present, and leaving the advance of wages until a period when it can be made simultaneous and so practicable in all states.

GAS LIGHT IMPROVEMENT.—Any of our readers who burn gas can test for themselves a simple device by which a Mr. Scholl of London proposes to increase the illuminating power of a common gas burner by more than 50 per cent. Hold a strip of thin sheet brass or other metal, one third or half an inch wide, in the centre of the flame, splitting its thickness (not its breadth) and nearly touching the two holes whence the gas issues, so as not to obstruct the passage, but to divide the jets and check the velocity of their upward current. The division and the check will favor a more intimate access of oxygen to the gas, and hence a more perfect and brilliant combustion. Mr. Scholl uses a platinum strip resting in slits in a brass ferrule fitted over the burner tube.

SHARPENING FILES.—J. S. C., of New York City, says that when files become clogged and dulled they should be bathed in strong potash water to remove all grease, and then immersed endwise in a jar of one gallon soft water, two ounces tartaric acid and half a pint of sulphuric acid. Let them remain a few hours, remove them, and after washing in clear water put a little oil on the teeth. A second immersion in the acid before oiling and after washing is sometimes an advantage. The acid etches the teeth, or rather the interstices, and sharpens the file. We have heard of this before, but have never tried it.

A FRENCH WAY OF RIDING ON HORSEBACK.—Make a pair of enormously large wheels, and place a carriage body over the axle and shafts so high that the horse can travel under it and between the wheels. You will have a most symmetrical turn-out, such as they use in Paris, a beautiful dissolving view of driver, horse and carriage in one, defying man's wit to tell where either begins or ends, and a lofty perch where you can both see and be seen.

THE STABILITY OF OXIDE SURFACES is illustrated by a curious little experiment. It is said that writing in ordinary ink on the molded surface of an ingot of pewter, will remain after the metal has been remelted and cooled again within the same mold, even though it may have been stirred during the operation. It is supposed that an oxide is formed by the writing, which is not reduced by the melting.

HARD HYDRAULIC CEMENT.—A cement which is said to have been used with great success in covering terraces, lining basins, soldering stones, etc., resisting the filtration of water, and so hard that it scratches iron, is formed of sixty-three parts of well-burned brick and seven parts litharge, pulverized and moistened with linseed oil. Moisten the surfaces to which it is to be applied.

A SENSIBLE SILVER FORK.—An obvious improvement has been introduced by a Birmingham manufacturer, which consists in making the fork whole and hollowed or fluted for about two thirds its present length, leaving the prongs of the sufficient length of half or three fourths of an inch, the implement becoming thus a partially "split spoon," convenient for small particles, liquid or semi-liquid ingredients, peas, and the like.

SOLIDIFIED GLYCERIN.—An English company are now manufacturing a toilet soap with which solidified glycerin is amalgamated in equal proportions by weight. The result is a semi-transparent tablet which lathers well and wears well, and deserves a wide popularity.

STEEL BOILERS.—The Paris and Orleans railroad has 13 locomotives with steel boilers, the Southern has fifteen, and the Paris and Sceaux has a number. The substitution of steel for iron in this direction is making rapid progress.

ACETYLENE.—A colorless gas, consisting of two equivalents each of carbon and hydrogen, is contained in small quantities in coal gas, and is supposed to have been the cause of certain mysterious and hitherto unaccountable gas explosions. It may be separated from the coal gas by passing the latter through a solution of ammonia-sulphate of copper, precipitating a reddish brown deposit of acetylide of copper. This being very explosive, igniting with slight friction, is supposed to have been the cause of several explosions which have occurred in moving copper gas pipes and in altering meters where the brass work had been much in contact with the gas, and a deposit of acetylide of copper might naturally have been formed. It is a curious fact that if chlorine gas is turned into a jar of acetylene gas even in darkness, an explosion will ensue, but not so if the acetylene be turned into the chlorine, unless a moderate degree of light be present. In the latter case, the chlorine unites with the hydrogen, setting the carbon free, so that the vessel, which previously held a mixture of colorless gases, is instantly filled with a mass of inky black smoke, giving the jar the appearance of patent leather. These observations are derived from a late lecture by Prof. Frankland.

MINING EXPLOSIONS are rare in this country, from the very limited number and depth of bituminous coal workings. The late explosion in the Clover Hill mines, Chesterfield, Va., is, however, a sad warning, and proves that stringent regulations and improved safeguards are matters of deep interest in this hemisphere as well as the other. Our bituminus coal beds are of vast extent, and destined yet to be as extensively worked. It seems in this instance, gross neglect of both rules and specific orders caused an inexcusable calamity by which sixty-nine persons were cruelly put to death. The removal of the door that closed a disused upset, or gallery, and neglect of an order to replace it, and a further neglect on the fatal day to make the regular examination for dangerous gas at the same place; these were the conditions, naturally leading to the possibility of a disaster which might otherwise have been prevented. There were two deputy gas men, each of whom successively neglected their examination at this point, at morning and at noon; the first by his own admission, and the second, who was killed by the explosion after ostensibly completing his examination, and of course could not have performed his duty, else his life and those of sixty-eight others would have been saved.

THE PARIS BOURSE has been connected with the Grand Hotel by a pneumatic dispatch tube about three quarters of a mile long and 2½ inches in diameter, through which a cylindrical box containing forty envelopes can be sent in one minute. The atmospheric pressure is obtained gratuitously by means of the ordinary pressure in the water pipes. The water is introduced into a close reservoir of two chambers, the first connected at the top with the second by an escape valve, and when the first is filled with water, of course two atmospheres are in the second: then the water is drawn off and outer air admitted, and water is again allowed to run in as long as its force suffices to inject it. Nothing remains but to leave the apparatus in this condition, while drawing off water as it is wanted for ordinary purposes, air entering as water is removed, through an inlet valve.

DEODORIZING PETROLEUM.—M. Joule, chemist of London, patents the application of deutoxide of nitrogen, or nitrous gas obtained from nitric or fuming nitrous acid and metallic filings, and conducted by a tube into the bottom of the vessel of petroleum, until the fumes reach the surface, when it is thoroughly agitated, and closed until a satisfactory result is perceived. Or, the gas may be mingled by pressure with the vapor of petroleum in the still. Or, three or four lbs. of the acid may be thrown into a 40 gallon cask of petroleum and thoroughly agitated, after which thrust in two lbs. moistened metallic filings, and repeat the process with further additions if necessary. Afterward, wash the petroleum with suitable alkaline substances, and agitate with it about 6 lbs. of fresh slacked lime to the cask.

BREECH-LOADING ARMS IN EUROPE.—The Belgian War Office having instituted an inquiry into the armaments now going forward, finds the following numbers of breech-loaders now ordered and in process of construction or conversion, viz:—Prussia 1,100,000, France 480,000 (Chassepot), England 350,000 (Snider, converted), Austria 600,000 (Wanzl, converted), Russia 600,000 (Carlo needle-gun converted). Italy, Spain, Portugal, Greece, Belgium, Holland, Denmark, Bavaria, Wurtemberg, Baden, Hesse-Darmstadt, are all making or procuring breech-loading arms, or have voted funds for the purpose. Breech-loading and rifled cannon are also largely ordered.

PURE SILVER.—At a recent meeting of the California Academy of Natural Sciences, Mr. Gutzkow presented a sheet of chemically pure silver, three feet in diameter, three ounces in weight, and as thin as fine paper. The color was beautifully white, and the texture like fine lace. This sheet was made by mixing solutions of protosulphate of iron and sulphate of silver in a large dish, and the silver rose to the surface, and there formed into a sheet. Successive sheets will rise with each stripping. This easy mode of obtaining chemically pure silver is of much practical value.

STABLE'S PROCESS OF BEEF PACKING, now in use in Texas, consists substantially in substituting carbonic acid for air in contact with the meat. A little salt is used, and the bone removed, and the meat is placed in cans in carbonic acid in an air-tight box.

THE TRICKS OF THE ALCHEMISTS.

During the sixteenth and seventeenth centuries the practice of alchemy was held in the highest repute by men of learning, while princes and even kings were seized with the popular delusion. At the same time spurious alchemists infested the country, passing from town to town and by the most specious deceptions imposing upon the inhabitants. These practitioners with the greatest ease procured from their dupes necessary funds which they—as the pioneers in the cause of science and on the point of making the grandest discovery that had ever enriched the world—required to complete their costly experiments. The more readily to attain their ends the pretended alchemist would exhibit to the gaping multitude, sometimes an apparently rusty nail which he, with great gravity and muttering some cabalistic words, would plunge into the wonderful liquid of transmutation: after the lapse of a few moments the nail is shown with its lower portion turned into the precious metal. With such proof before their eyes the credulous audience could not withhold the small pittance, their insignificant offering on the shrine of science, which the learned operator needed to renew his wonderful liquor and the cunning pretender repaints his gilded nail, fills again his vial with pure water, and passes to the next village. Sometimes a lump of lead was exhibited into which a piece of gold had previously been introduced. On heating, the lead was gradually oxydized, leaving the precious metal behind: or a crucible, concealing beneath a false bottom a bead of silver, is exposed to the action of heat, some simple powder being now thrown in, the vessel is cooled, broken, and the silver is discovered. Even such a shallow deception as washing a coin with quicksilver, thus giving it a silvery appearance, proved sufficient to deceive the simple populace.

But while these impostors were thus successful, the study of alchemy was faithfully pursued by such scholars as Augurello, Cornelius Agrippa, and the unfortunate Bombastes Paracelsus. Hitherto the sole aim of these enthusiasts had been the transmutation of the base into the precious metals: but about this time a new object to be attained presented itself. The success which had attended the use of mercury, antimony and several chemical preparations in the treatment of certain diseases awakened, the hope that by diligent study the discovery would be made of some universal menicine which should heal all disorders, and prolong human life indefinitely. This new field was occupied by new zealots, and one of these was Paracelsus, who, maintaining that strong distilled alcohol was the desired elixir vitæ, fell a sacrifice to his enthusiasm by drinking too freely of this preventive of old age.

The decline of alchemy may be dated from the middle of the sixteenth century. Few writers of reputation after that time wrote professedly on this subject, though a kind of half belief in its truth was long after cherished by even the most eminent chemists, and occasionally individuals appeared boldly claiming success in the science: such men were Agricola, Denis Zachaire, Dr. Dee and his co-laborer Edward Kelly and, as the last of the alchemists, Helvetius, Jean Delisle, the Count de St. Germain and Cagliostro. Even so late as the year 1784 Dr. Price, F. R. S., publicly proclaimed his ability of creating gold at will, but an investigation into his process being determined upon by the Royal Society, finding detection inevitable, the would-be alchemist finished his course by committing suicide.

The poverty of the alchemists as a class became proverbial, thus though avowedly in possession of the art of making gold, they were at any time willing to divulge this secret merely for a small amount of what they pretended to produce in any quantity. Although it cannot be claimed that the researches of these philosophers were in the domains of true science, yet in their fruitless efforts for obtaining the philosopher's stone, or the elixir of life, the world acquired information of far more value than the possession of either would have conferred upon it, in the advancement made in the rudiments of what has since their day developed into the grand science of chemistry.

The Engineer's Alphabet.

First obtain a fair familiarity with the mode of working out all ordinary arithmetical questions, and also a knowledge of algebra as far as simple equations. Learn also the elementary problems in mensuration, and how to measure hights and distances, and how to level and survey land.

Next gain some general knowledge of the principles of chemistry and of geology, and of the qualities of stones and cements, the action of the tides, the force of the winds, and the amount of rainfall.

Next obtain a thorough familiarity with the strength of materials, and acquire a distinct apprehension of the laws of virtual velocities and of the conservation of force.

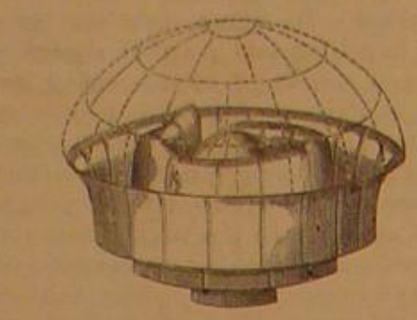
The law of virtual velocities enables the strain placed upon any part of a machine or structure to be immediately computed when we know the weight or force applied to any other part, and by this expedient, joined to a previous knowledge of the strength of materials, it can easily be determined whether any machine or structure is strong enough. Thus in a crane, if the interposed gearing is such that the travel of the handle through 100 in. will cause a tooth of a certain wheel to move through 1 in. then we know that the strain upon that tooth will be 100 times greater than the force applied to the handle, and so in all other proportions. So, also, in a beam or girder of iron of which the top flange is incompressible, if we wish to determine the breaking strain acting upon the bottom flange when the beam is loaded in the middle, we have only to suppose that the beam has been broken, and if we find that the broken edges separate only 1 in. while the weight falls through 6 in., then the strain at the edge of the beam seeking to sever it is six times greater than the weight.

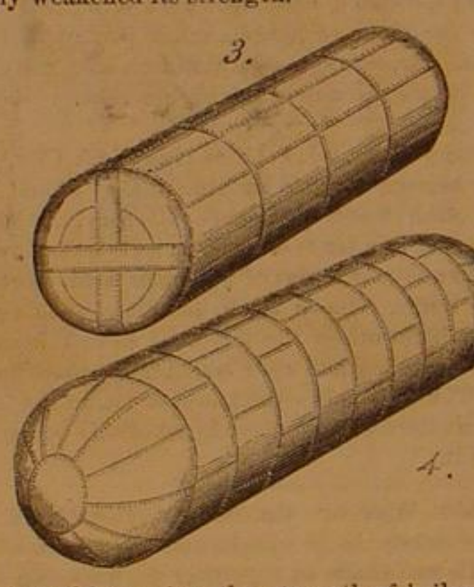
The law of the conservation of force teaches that a force once existing cannot disappear except in the creation of some equivalent force, and one corollary of this law is that no form of mechanism can create power. Hence in a steam engine, if the steam were to be condensed by a jet of cold water immediately as it issued from the boiler a certain volume of hot water would be produced. But if the same steam be allowed to flow through the engine, and be finally condensed in the condenser, the resulting volume of hot water will be less in the proportion of the power exerted by the engine. Heat being a form of power, it follows that if a certain portion of it goes to generate mechanical power in the engine, there is less to expend in raising the temperature of the water by which the steam is condensed.—*Engineering.*

STEAM BOILERS---THEIR FORM, CONSTRUCTION, AND MATERIAL.

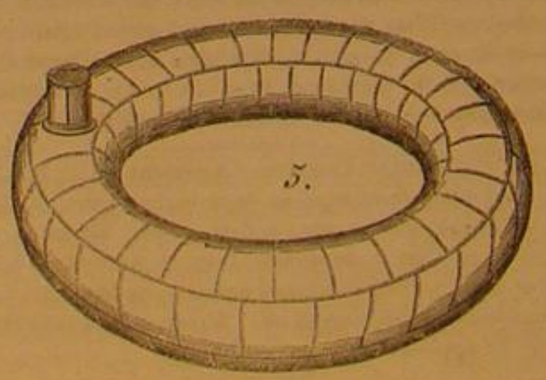
[NUMBER TWO.]

The balloon or haystack boiler, two engravings of which appeared in our article of April 27th, was attempted to be improved by increasing its heating surface by constructing a central dome-like fire place with a curved flue conducting the gases of combustion through one evolution within the boiler before passing around the outside. It is shown in No. 1. The dotted lines show the exterior form of the boiler. Its construction, although improving the boiler for a steam generator, greatly weakened its strength.



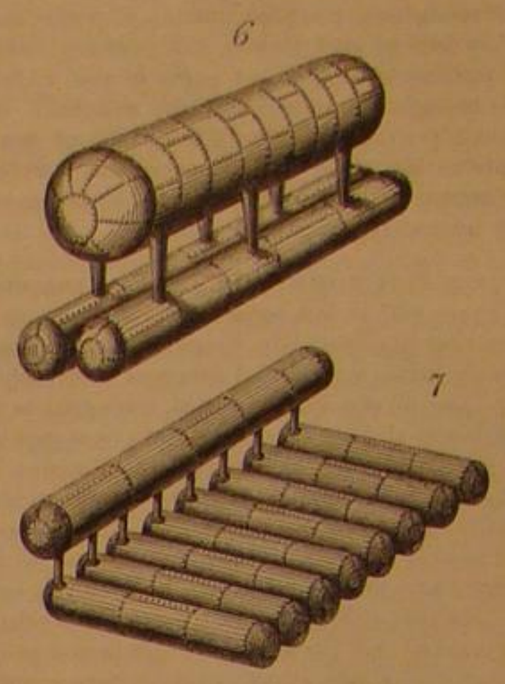


The object of increasing the strength of boilers by diminishing their diameter led to the construction of boilers of a cylindrical form. They, however, had flat ends generally of cast iron, as are hundreds still in use in this country. The flat surface has much less resisting power than a convex surface, and as cast iron will not yield much without breaking, the blowing out of the boiler head is the usual form the explosion takes in case of accidents to this class of boilers.



Long stays running from end to end are employed to keep these heads rigidly in place; in flue boilers the flues themselves are the stays. This tendency to cracking of the cast iron head suggested the wrought iron head, seen in Nos. 2 and 3, and in some cases the employment of bands crossing at right angles as in No. 3. To further strengthen the shell of the boiler the seams of the plates were sometimes made to run diagonally, as in No. 2.

No 4 shows an improved form of cylindrical boiler in which the ends are hemispherical. This form is now so extensively used in England that boilers of this shape greatly outnumber those of all others. This shape renders them very strong, as the whole body of the boiler is in simple tension and internal pressure has no tendency to alter the form. Plain cylindrical boilers externally fired have the advantage of being easily cleaned internally and are accessible to necessary repairs; but that part upon which the flame impinges is liable to be weakened by the action of the heat, especially when the boiler is of great length, as seventy or eighty feet, not—an uncommon length—and the heat has to act upon a large body of water at one point or on a circumscribed and limited area. Mr. Marten, from whom we largely quote, says he has seen a modification or rather extension of the cylinder boiler where great surface was obtained and extreme length avoided by curving the shell until both ends met, making an annular or ring boiler, seen in No. 5. It had a diameter of five feet for the cylinder with an external diameter for the ring of twenty-five feet, giving a total length of about sixty-three feet. It has worked for years well although exposed to the heat of six puddling furnaces.



As large diameter for boilers is a source of weakness, and the immense body of water just over the fire is a hindrance to the rapid generation of steam, the elephant boiler or as commonly known, the French boiler, so called from its general use in France, has been designed. It is seen in No. 6 and is merely a combination of small cylinders connected by upright conical tubes. The large upper cylinder is the steam chamber. The disadvantages of these boilers are difficulty in cleaning or examining internally, and the exit for the steam from the generator to the steam cylinder being cramped, tending to priming and hindering the free generation of steam. The same objections apply to the retort boiler No. 7, although both of them expose a large surface to the action of the heat, and consequently are better generators than the plain cylindrical boiler.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, April 11th, Prof. Tillman presiding.

MISCELLANEOUS PROCEEDINGS.

The chairman read a collection of scientific items, after which a long discussion arose respecting the merits of corrugated iron in the construction of boilers. Dr. Bradley followed, explaining a plan for preventing incrustation of boilers, which was simply passing a continuous current of free electricity through the iron. After some further transactions the society listened to a paper from Mr. H. F. Walling advancing a new hypothesis relating to

MOLECULAR MOTIONS.

Mr. Walling proposed to refer all the forces of nature to one simple or universal force. Gravitation, he considered to be the resultant of equal infinite and opposite forces, intercepted by matter, thereby causing a diminution of the two opposing forces between the atoms, and a preponderance of the external force, thereby impelling the atoms toward each other. All molecular attractions are the results of gravitation in atoms, repulsion being due to the excess of momentum over gravitation. Heat, the great repulsive force of nature, is simply the momentum or centrifugal force of atoms.

In the molecular hypotheses advanced by Boscovich, Mossotti, and Prof. Norton, the conditions of solidity and fluidity are explained by supposing the ultimate atoms to be solid and encompassed by an elastic etherial atmosphere, but the inquiry suggests itself, whence is derived the atomic solidity and fluidity? In this hypothesis, the only properties attributed to ultimate matter are position, and inertia, or the capacity for associating with force and acquiring motion. Repulsions, attractions, impenetrability, elasticity, etc., are the manifestation of this associated force, and are not the inherent properties of matter. Atoms, the speaker supposed, actually moved around each other in pairs, describing in three intersecting planes, circular or elliptical orbits upon the surface of imaginary spheroids. The intersections of these orbits form six poles, each a central point in a face of an imaginary circumscribing prism. Since heat is momentum, uniform temperature is maintained in atoms of different weights, when the products of mass into velocity are equal. It follows that pairs of heavy atoms move slower than pairs of lighter ones. This explains the spheroidal forms of certain molecules, from which all forms of crystaline structure arise. Solidity and liquidity are due to the interlinking of the orbits of adjacent molecules at the six poles, a single interlinking producing liquidity, a double one solidity. The rigidity of solids is the result of this polar attractive force. The conversion of solids into liquids and liquids into gases by increasing temperature, is caused by accelerated momentum of the atoms overcoming the interlinking or polar force. A reverse action takes place when heat is dimin-

ished. In gases the centrifugal force predominates and there is a constant tendency of the atoms to separate.

Mr. Walling exhibited drawings and models, and gave a mathematical demonstration of the stability of a system made up of atoms moving as described, and proposes to pursue further the investigation of the subject.

[For the Scientific American.]

BREAKAGE OF CAR WHEELS--THE CAUSES AND REMEDIES.

The subject of car wheels has not had the attention its importance demands, and so important is it to the public that many have thought a Government Inspector should be appointed to inspect every wheel before it is put in use. The lives of millions of our citizens are constantly in jeopardy while traveling over our railroads, and what may insure greater safety should receive the earnest attention of the National Government. If the inspection of boilers on steamboats is necessary, surely the same precaution is desirable in railroad trains.

Cast-iron wheels are so fully established in this country, that it is scarce worth while to attempt the introduction of wrought iron or any other kind of wheel, but what may improve the quality of wheels is worthy the attention of all railroad managers, car and locomotive builders. A proper chill on poor iron may insure a wheel under favorable circumstances to wear as long as a wheel made from iron of a better quality. If, however, any unusual strain comes on the wheel, the poorer iron may fail in the time of need, when the better iron would have withstood the shock. Cheap wheels seem to be more sought after than those of a better quality costing more. The best charcoal iron, remelted in a cupola, always deteriorates in quality. It becomes anthracite iron and assumes all the qualities of anthracite iron, and will rarely show a tenacity of over eighteen to twenty thousand pounds to the square inch. High tenacity, when the proper degree of mottle is maintained, will always produce the best wheel, as it not only has tensile strength but a greater degree of toughness. This has been fully demonstrated by General Rodman in the manufacture of his incomparable guns, which are unequalled by any other made in any part of the world.

To insure good wheels the tenacity should never be less than thirty thousand pounds to the square inch, and this without the iron being too high, so as to endanger brittleness. If an inspector would require this tenacity we would seldom hear of broken wheels. Car wheels, like carriage wheels, will wear out, and good wheels, if replaced in time, will generally insure against accidents. The same may be said of car axles. Hammered axles are better than rolled axles, and yet rolled axles are coming into general use because they can be made cheaper. Let us have Government Inspectors for each, and greater safety will be the result.

Cold-blast charcoal iron is best for both car wheels and axles, and yet but little is used by the manufacturers of car wheels. Many of the manufacturers of wheels are interested in furnaces which are hot blast because the yield is greater with hot than with cold blast.

Charcoal iron remelted in reverberatory furnaces, if not permitted to become too high, will not deteriorate in quality, but Nos. 1 and 2 pig will improve in strength till it reaches No. 3, after which it deteriorates.

Some car-wheel manufacturers mix anthracite iron with charcoal iron in their wheels. Anthracite iron is usually much poorer in quality, and never uniform, and the practice should be discountenanced and condemned.

Castings from reverberatory furnaces are always superior in strength and toughness to those made from cupolas, and machinery castings, chilled or sand rolls, and car, wheels, should only be made from iron remelted in reverberatory furnaces. MULHOLLAN.

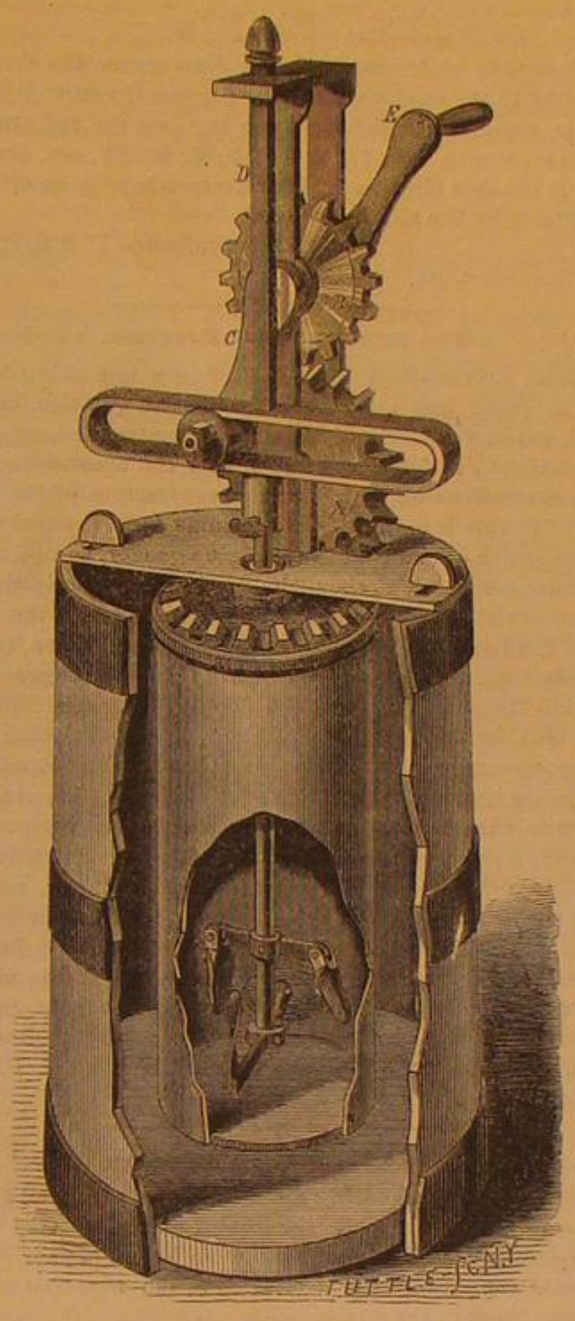
[Mr. H. C. Luce, of Jersey City, N. J., has addressed to *Engineering* a temperate, matter-of-fact statement of the case of the American car wheel, neither claiming nor admitting more than is reasonable. He says that the best American wheels sometimes break, and sometimes wear out in a few months; and yet, if made from good iron and treated properly, are the best wheels in use. He puts down the average wear under large business, at two years in passenger traffic and from three to seven years in freight. It is estimated that 25 per cent of the best wheels will fail in the first year in one way or another: the remainder will run for very various periods beyond the above average; sometimes as high as fifteen years. —EDS.

Proscription of Merit.

The only point upon which the English railway managers stood out against the demands of their locomotive hands, appears to have been that of uniformity of wages and uniformity of promotion. The motive to this demand is obvious. The meritorious hands to whom more than average wages or promotion had been accorded were of course a minority. The others could conceive of no reason but favoritism for any one being preferred above themselves, and being the majority were able to vote as the sense of the Union that all discriminations would be in practice controlled by favoritism, and ought to be abolished; so that long and faithful service, skill, care and courage should be qualities henceforth of no use to the possessor, but a free gift to the employers and the public. The obvious interest of the payers of wages would be potent enough to secure a valuable equivalent for extra pay in general, although favoritism might sometimes succeed in defeating that object; and a system of merit records to determine promotion and exclude favoritism might easily be arranged if the argument were sincere. But so long as excellence *is* excellence—*i. e.*, the exception and not the rule—for first-rate men in any craft to submit themselves to the dictation of a majority in trade matters, is equivalent to surrendering their well-earned rank and its just rewards to the envy of their inferiors. Wherever merit "wont pay," universal deterioration and loss of prosperity must follow, and the last state of that craft will be worse than the first. It ought to be a fundamental and unalterable part of the constitution of every trade association, for their own permanent advantage, that no check shall be imposed upon individual promotion or pay.

LIPP'S ICE CREAM FREEZER.

The process of procuring that delicious compound for summer weather, known so favorably as ice cream, is sufficiently familiar to all. It is merely the thorough and even freezing of eggs, milk, and sugar, so that the mass shall be of the same consistency, without lumps and perfectly homogeneous. On the even freezing of the mixture much of the delicacy of flavor and satisfactory results depend. We have known good ice cream produced by simply turning an ordinary covered



tin pail filled with the sweetened compound in a freezing mixture of ice and salt in a common tub, but it was a labor requiring time, elbow grease, and patience. We give an engraving of a machine intended to shorten the time, reduce the amount of labor, and secure superior results.

In this machine the ordinary shaped ice receptacle is used, inside of which is a can which rests and turns upon a stud and step, one on the can bottom and the other on the ice tank. By means of a bevel gear which forms the top of the cream can, to which it is secured by a simple clamp, the can is rotated by a crank on the horizontal shaft which carries the gear, A, that meshes into that on the top of the can. The upper gear, B, also engages with A and gives motion, when so engaged, to the crank, C, and by a roll sliding in the horizontal loop, to the dasher shaft, by means of the guide, D, in a reciprocating, vertical movement. This dasher shaft has two arms, the lower one carrying a fixed curved scraper and a curved disk pivoted to the cross bar, while the upper one has two spoon shaped scrapers which assist in removing the frozen cream from the inner circumference of the can and throwing it toward the center. The times of motion between the revolving cream can and the upward and downward movement of the dasher shaft with its appendages are so arranged that they are not in unison, and consequently the contents of the cream receptacle will be removed from the sides as fast as frozen and sent to the center, while that in the center, not exposed to the freezing mixture, will be thrown by the centrifugal force of the revolutions of the can to the outside. The crank, E, can be placed on either shaft to revolve the can alone, or to give the vertical reciprocating motion to the dasher shaft. For this purpose the gear, B, is made to be shifted from a feather or fixed key on its shaft to a smooth place where the turning of the shaft will not affect it. It may therefore be used to raise and lower the dasher shaft or not, as may be required, or slipped into and out of gear to suit the progress of the work.

This improvement was patented through the Scientific American Patent Agency, February 26, 1867, by Lewis A. Lipp, whom address at Coatesville, Pa.

MAGNESIUM LIGHT is introduced into the human mouth in dentistry with great advantage, enabling operations to be performed at all hours, better than by the light of day.

Correspondence.

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

The Philosophy of the Cracking of a Whip.

MESSRS. EDITORS:—In No. 16, Vol. XVI., April 20th, E. L. B. of N. Y. inquires "What is the explanation of the sound produced by the cracking of a whip." You reply, "The concussion of the lash with the air and the concussion of the air in closing up the vacuum left in the path of the lash. The sound produced by the concussion of air with air is illustrated by the whistling of a bullet."

Not so clear. Why is the report occasioned by the lash louder than the whistling of the bullet? The bullet is larger than the *end* of the lash—which produces the report. Is the vacuum or concussion less? A lash without a "cracker" *will not* make a loud report. A whipstock without a lash will produce a whistling sound.

Again, why the well known difference, if the lash has a silk thread instead of tow-string or other cracker? If the report is due solely to concussion and displacement of air, why the difference in sound produced by a lash tipped with metal and one tipped with silk thread? The metal as in the case of the bullet will make some sort of whistling sound. The cracker will make a loud report.

If you are cornered please "face the music" and let us have more light, for that is what we expect to get out of the SCIENTIFIC AMERICAN. T. M.

Allegheny City, Pa.

[The ordinary sensation of sound is dependent upon rapid movements or vibrations of the air. This motion of the air is always the result of impact or collision, either of air with air, or air with another substance. The striking of solid and liquid substances should only be considered an indirect cause of sound; for the immediate antecedent to the movement of the air is not the striking but the movement of the substances which results from it, and which movement by collision is directly communicated to the air. The ringing of a bell, therefore, may be looked on as a case of collision of a solid with air. If the cracking of a whip is not included in this theory, which is simply another way of stating our answer—we are cornered and will face the music. It may be complained by some who accept the theory that it does not sufficiently take account of the details of the case of the cracker. For such we add further explanation. The sharpness and loudness of the crack depend on the suddenness of the impact and the size of the cracker. A metal cracker, on account of its inertia, would interfere with the suddenness of the impact; its weight would act to stretch the elastic lash and so to ease off the motion. A silk cracker on the other hand has little inertia and is brought up suddenly at the greatest extension of the lash; moreover its greater bulk compared with metal or tow gives a greater volume of impact, and consequently of sound. A cracker for a given lash may be too heavy or too light, too large or two small, and for a given cracker a lash may be too long or too short, or too light or too heavy. There is a chance on this subject for a mathematician to write a book.—EDS.

A Correction.

MESSRS. EDITORS:—I have subscribed to your paper for many years, and seldom read a number without getting some new ideas to store away for future use. But do you not think you are getting careless in your replies to your correspondents, many of whom—mere tyros—esteem every opinion and rule of yours as an axiom and indisputable? In your last number you tell T. A. M., of N. J., to multiply the hight of a tank by the area, and divide by 144 when you mean 1728. Again, you tell him the area of a circle is its diameter multiplied by 3·1416 when you know that it is the "square of the radius," multiplied by that number, or more simply the square of the diameter by the fraction of 0.7854, which is the same thing. It would be absurd to accuse you of ignorance on such elementary matters, but very much harm may be done, as you well may conceive by this carelessness, especially when you take into consideration the class of your enquirers who have had little or no education.

[Our correspondent is somewhat severe, but he is perfectly correct. We do not pretend to infallibility, but we desire to be right in our replies to inquiries. In this case two answers became unaccountably and inextricably "mixed."—EDS.

Testing of Boilers.

A section of the new water tube boiler invented by Mr. J. Howard, the agricultural machine maker, of Bedford, Eng. was lately tested with a hydraulic pressure of 1200 pounds to the square inch. Every joint remained absolutely tight; yet one of the tubes was afterward disconnected and taken out in five minutes, and not over ten minutes were required for replacing it as before. *The Engineer* makes this incident the text for a discussion of the question of over-testing. It would seem that if anything could spoil a good boiler and prepare it for mischief, it might be this excessive test. It is a little like the old-fashioned hydraulic test for witches: if they floated they must be burned, if they sunk they must of course be drowned. Our contemporary opposes the usual plan of taking as a basis the maximum working pressure demanded, and calculating the proper test by multiplying it. It is recommended on the contrary, to take the calculated strength of the structure, and apply a test equal to say one third of what it ought by analogy to bear. The theoretical strength of the boiler is thus tested practically to one third of its extent: if not started by this, there is a margin of twice as much probable strength to resist any injury from the strain. Assuming the test point therefore as a safe point, the proper working pressure may be taken from that datum with any proper margin for further security.

Hints for Inventors on Steam Condensers.

Messrs. Editors:—In the article under this caption, published Feb. 2d of this year, two important facts were presented, viz:—

(1.) That upon depriving water of the air incorporated with it—in other words, in distilling it—it is rendered incapable of ebullition, and upon converting it into steam in this condition it explodes with force.

(2.) That this explosion takes place not at the boiling point, but at 45° to 75° F. above it—generally at about 260° F., though frequently not under 300°.

Upon these data, well established by Donny, Tyndall, and other experimenters, it is assumed:—

(*a.*) Than if a condenser enforce or permit the escape of air from its vacuum, it should on the contrary provide for its impregnation with the "feed" to supply the loss and to preserve the normal status of the water.

(*b.*) That all gases, oils, etc., corrosive or explosive *per se*, or rendered such by combining with air, or each other, should be discharged, absorbed, or otherwise disposed of and disarmed.

If condensers are not constructed in subjection to the first principle (*a*) set forth, they increase the liability of boilers to burst, for they tend to exhaust the "feed" of its air, thus carrying the boiling point above its legitimate place and approximating it to that of explosion.

To illustrate: if upon trial, with the engine at rest, the pressure in the boiler is found to be only 30 lbs. to the square inch, while the temperature of the water stands above 241° F., say at 300°, the engineer should apprehend imminent danger, because it is evident that the heated liquid is nearly freed of air and may at any moment be converted into steam with destructive energy. The injection of cold water into the boiler at such a crisis would instantly precipitate the catastrophe.

In the face of these facts, every boiler, whether working with a condenser or without one, should have delicate and accurate instruments attached for registering two things, viz., the *pressure* of the contained steam and the *temperature* of the water under it. A thousand disasters charged to high pressure, unequal expansion and contraction, hot flues, gases, oil, etc., might thus be readily avoided, or traced home to their true cause.

The following table may be of use to novices or skeptics in conducting experiments in this direction entitled to confidence:—

PRESSURE AND TEMPERATURE OF STEAM.

Pressure in lbs. per sq. inch.	Corresponding temperature, F.	Pressure in lbs. per sq. inch.	Corresponding temperature, F.
15	212°8°	130	352·1°
30	251·6°	150	366·4°
45	276·4°	170	373·6°
60	295·6°	190	382·9°
75	311·2°	210	391·5°
90	324·3°	230	399·4°
110	339·2°		

From this table it may be observed that when the pressure is that of the atmosphere (15 lbs.) the temperature of the water is at about 212° F. It should however be borne in mind that these figures are not correct when the water is not quite pure. Thus if common salt be added, the boiling point, under the 15 lbs. aforesaid, ascends to 224° F.; if the liquid be saturated with nitrate of potash, it rises to 238°; if with chloride of calcium, to 264°, and so on.

Hence the importance of knowing the condition of the water used and of relieving it of impurities. Whatever carries the boiling point above its true level, under assigned pressure causes undue consumption of fuel and may provoke alarming consequences.

If condensers are not constructed in subordination to the second principle (*b*) laid down, the explosive and corrosive gases, oils, and other agents generated or introduced, may inflict serious injury by accumulation or combination and expose the boiler to convulsions or explosions. Hence full and effectual provisions should be made for ridding the vacuum of these facile and refractory elements and thus guaranteeing the purity of the feed water on the one hand and its integrity on the other.

From these considerations it would seem that inventors in this field should aim to produce condensers—

1st, Which free the steam of all obnoxious and explosive constituents, or which, by combining with each other or with air, may be rendered such.

2d, Which restore to it or the feed water the air lost from any cause, thus preserving the "feed" in a normal condition with respect to its constituents of air and water.

From these considerations it would also seem that manufacturers and others who make or use boilers or condensers should look well to their plan of construction and their system of operation, not only in contemplation of safety but of interest.

Have we boilers constructed with the *registers* noted attached?

Have we condensers built in conformity to the two principles above enunciated? Suggestor.

A Simple Plan of Determining the Ordinates of Circles.

Messrs. Editors:—A few days ago I was obliged to calculate the ordinates for a part of a circle of 500″ rad., the tangent taken as axis. By using the formula, $y = R - \sqrt{R^2 - x^2}$, I found:—

$x = 1'', 2'', 3'', 4'', 5'', 6'', 7'', 8'', 9''\ldots$
$y = 0{\cdot}001'', 0{\cdot}002'', 0{\cdot}003'', 0{\cdot}004'', 0{\cdot}005'', 0{\cdot}006'', 0{\cdot}007'', 0{\cdot}008'', 0{\cdot}009''\ldots$ } No. 1.

the ordinates representing in the third decimal the squares of the numbers 1, 2, 3, 4, 5....with sufficient accuracy for abscissas not exceeding 25″.

It seems to me that this fact might come very handy to draftsmen and engineers generally for drawing parts of circles of large radii, because it is very easy to keep in mind the above progression. This progression, however, enables us to find by one single division the ordinates for circles of 4, 5, 10, 25, 50, 100, 125, and 250 rad., no matter whether inches, feet, or yards—abscissas and ordinates being of the same unit respectively.

Suppose the ordinates for a circle of 125′ rad. are wanted: 125 is the fourth part of 500—thus we find by dividing progression No. 1 by 4:—

$x = \frac{1}{4}', \frac{2}{4}', \frac{3}{4}', 1', 1\frac{1}{4}', 1\frac{2}{4}', 1\frac{3}{4}', 2'\ldots$
$y = 0{\cdot}00125', 0{\cdot}0031', 0{\cdot}00375', 0{\cdot}005', 0{\cdot}00625', 0{\cdot}0075', 0{\cdot}00875', 0{\cdot}01125'\ldots$ etc.

If we do not mind the trouble of a single division and following multiplication, we are able to find also the ordinates for 6, 8, 9, 12, 14, 15, 16, 18, 21, 22, 24....radius.

For instance, the ordinates for a circle of 24′ rad. would be calculated thus:—We have to calculate first the ordinates for a radius of 4′ by dividing the progression No. 1 by 125 (or multiplying it by $\frac{8}{1000} = 0{\cdot}008$:—

$x = 0{\cdot}008', 0{\cdot}016', 0{\cdot}024'\ldots$
$y = 0{\cdot}000038', 0{\cdot}000032', 0{\cdot}000072'\ldots$

If we multiply these figures by 6, the result will be the ordinates for 24′ radius:—

$x = 0{\cdot}048', 0{\cdot}096', 0{\cdot}144'\ldots$
$y = 0{\cdot}000048', 0{\cdot}001192', 0{\cdot}000432'\ldots$

It is easy to understand that we must choose the abscissas according to the scale used and the purpose the curve is drawn for. It would be sufficient in the last case (24′ rad.) to take from progression No. 1 only $x = 3'; 6'; 9'; 12'$, etc., because $x = 3'$ is the first abscissa which corresponds with an ordinate measurable by the aid of dividers.

A. Hardt, Draftsman P. & E. R. R.

Williamsport, Pa.

The Grammatical Problem.

Messrs. Editors:—It is an exceedingly rare thing to find in your paper any statement on which a question can be raised, but in your issue of March 30th, under the head of "A Grammatical Problem," you imply that the apostrophe and s in the possessive case of nouns is a contraction of the word "his." If this is so, how does the same form ('s) make also the possessive of nouns of the feminine gender, as well as the possessive plural which should be, on the same principle, a contraction of their? Does not the apostrophe denote the omission of the letter e of the old Anglo Saxon genitive case in es? The Anglo Saxon gives no authority making the possessive plural in the same way, but the English language finding a good form for the possessive singular adopts the same form for the possessive plural. The rule then for the formation of possessives becomes very simple; for the possessive singular add es to the nominative singular, which for compactness drops the e; for the possessive plural add es to the nominative plural, which for the same reason, drops the e, and to avoid the hissing sound of two s's coming together, drops also the final s. This explains why the apostrophe comes before s in the singular and after it in the plural, which has always been a puzzle to schoolboys. It also makes your ground perfectly tenable, that the s in possessive cases of nouns ending in a sibilant can be properly omitted. C. P. G.

Boston, Mass.

The Roman Numerals.

Messrs Editors:—Being a constant reader as well as subscriber to your valuable hebdomadal, I was lately very much interested in the plausible theory given by one of your correspondents concerning the derivation of the numerals now in use from those of the Arabs.

Can you enlighten me as to the origin of the Roman numerals? We can readily understand the C and the M, the initial letters of the Latin words, *centum* and *mille*, but why should V represent five, and X ten? In Worcester's Dictionary we are told that the letter V was used to designate the number 5 "perhaps from its resemblance to an outspread hand." Will Shakespeare says, "Our fathers had no other book but the score and the tally, thou hast caused printing to be used." These primitive sticks or tallies, one of which was in the hands of the creditor, the other of the debtor, were cut or notched simultaneously so that they might tally together. Now, may it not have been that when the tally among the Romans was superseded by the arts of writing and printing, that the numerals notched on the sticks, one, two, three, four, then crossed by a diagonal line to denote five, may have been supposed to bear a resemblance to the letter V? Might not the X in the same manner have been suggested by the two diagonal lines of the tally. E. M. G.

Baltimore, Md.

THE GOLDEN HEGIRA.

At the date of the discovery of America the whole amount of gold in commercial Europe was estimated at $170,000,000. During the succeeding one hundred and twelve years the opening of new fields of supply added about $6,387,500,000, so that had there been no loss nor shipments, there should have been at the commencement of the present century $6,557,500,000 in the commercial world. If to this we add the enormous receipts from California and Australia developed in late years and the continued supplies drawn from the older fields, the statement will seem incredible that instead of accumulating, the stock of gold in Europe is actually on the decrease. The inquiry then naturally arises, what becomes of the precious metal?

In a paper read before the Polytechnic Association Dr. Stephens stated that of our annual gold product, full fifteen per cent is melted down for manufactures; thirty-five per cent goes to Europe; twenty-five per cent to Cuba; fifteen per cent to Brazil; five per cent direct to China, Japan, and the Indies; leaving but five per cent for circulation in this country. Of that which goes to Cuba, the West Indies, and Brazil, full fifty per cent finds its way to Europe, where, after deducting a large per centage used in manufacturing, four fifths of the remainder is exported to India. Here the transit of the precious metal is at an end. Here the supply, however vast, is absorbed and never returns to the civilized world.

The Orientals consume but little, while their productions have ever been in demand among the western nations. As mere recipients therefore, these nations have acquired the desire of accumulation and hoarding, a passion common alike to all classes among the Egyptians, Indians, Chinese and Persians. A French economist states that in his opinion the former nation alone hide away $20,000,000 of gold and silver annually, and the present Emperor of Morocco is reported as so addicted to this avaricious mania that he has filled seventeen large chambers with the precious metals. The passion of princes, it is not surprising that the same spirit is shared by their subjects, and it is in this predilection that we discover the solution of the problem as to the ultimate disposition of the precious metals. This absorbtion by the Eastern nations has been uninterruptedly going on since the most remote historical period. According to Pliny, $100,000,000 in gold was in his days annually exported to the East. The balance of trade in favor of these nations is now given as $80,000,000 annually.

Actual loss to the world, to a great amount, is yearly caused by sinking in the ocean, and in some of the processes employed in the arts, as plating and gilding. In concluding, an estimate concerning the actual loss of coin in circulation by abrasion may be proper. In a report made by the director of the United States mint a few years since, is given the following results of some careful and comprehensive experiments made at the mint to ascertain this loss, showing that waste of gold and silver by this cause has been generally greatly overestimated. "On our silver coins taken promiscuously the average amount of loss from abrasion was ascertained to be one part in 6·30, while the gold coins tested seperately showed an average loss on the half-eagle of one part in 3550; the double eagle one in 9000; and a careful estimate as to the proportions of the various sizes of coins actually in circulation in the United States, made of two metals, led to the conviction that the yearly loss does not exceed one part in 2,400."

Life-Saving Inventions.

The session of the Board of Commissioners, appointed under the authority of the Secretary of the Treasury, to examine in to the merits of inventions of a life-saving character, seems likely to be quite a protracted one. About three hundred inventions have been registered for examination, but a small proportion of that number have as yet been put to a practical test. Having, however, now thoroughly systemized their labors, the work will be pushed forward with greater speed. All the inventions presented for examination have been ranked under the following classes:—

1. Boilers, safety valves, steam and water gages, anti-incrustators, steam pumps and siphons, hose and hose couplings, fusible alloys.

2. Life boats and rafts, detaching gear, lowering apparatus and life preservers.

3. Steering apparatus, drags, windlasses and capstans.

4. Fog signals, signal lights, devices for reefing top sails, and nautical instruments of all kinds.

Under a fifth division are classed all other life-saving inventions not specially included in either of the foregoing. The first section has been disposed of and the Board are at present engaged in testing the numerous devices of disengaging tackle.

The Commissioners consist of the following gentlemen: Joseph Cragg, Local Inspector of Steamers, district of Baltimore, Md.; Supervising Inspectors—Asaph S. Bemis, Ninth district, Buffalo, N. Y.; Alfred Guthrie, eighth district, Chicago, Ill.; J. V. Guthrie, sixth district, Louisville, Ky.; William Rogers, tenth district, New Orleans, La.; Col. Chas. L. Stephenson, fifth district, Galena, Ill.; John M. Weeks, Local Inspector, district of New York,; Capt. Wm. M. Mew, General Superintendent of Steam Inspection. A. S. Bemis, esq., is President, and M. A. Clancy, Esq., Secretary.

Coal Oil as a Lubricator.

D. W. S. of St. Louis says: "I have found after three years' use of an article styled in the market 'lubricating oil,' which costs here fifty cents per gallon, that it answers my purpose quite as well as lard oil. Our machinery runs very fast, from 1,000 to 4,000 revolutions per minute, and I find the bearings to be in a better condition than when we used lard oil. At first we were not successful in procuring a good article."

Our correspondent asks where menhaden oil can be obtained. This is not the first inquiry we have had for this oil, and the manufacturers would do well to advertise it. It is manufactured extensively on Long Island, but we cannot give the name of any party engaged in its sale.

Alloy for Hard Tools and Bells.—20 parts iron turnings or tin waste, 80 steel, 4 manganese, and 4 borax. To increase the tenacity, the proportions may be varied and two or three parts wolfram may be added.

The Trades of France are to be represented at the Exposition by delegates both male and female, elected by their constituents. Every working man and woman of Paris is to be allowed one free admission.

Production of Aniline.—By adding to nitro-benzole an acid solution of chloride of tin, a strong reaction is obtained in a few moments, great heat is evolved and aniline is produced.

WHAT IS THE THEORY OF THE WATER POLISH?

This is a question of a correspondent, and although in our practice as a machinist we had, times without number, used water in taking the finishing chip for shafts, journals, etc., we had never considered the question. Upon inquiry of other practical men and of scientists we find the same ignorance prevailing, and, in their attempts to explain, a difference of views. These questions are valuable as leading to new improvements and discoveries. If a workman merely knows that a certain process will produce a certain result, without knowing the why and wherefore, he stands at the threshold of the temple and must ever remain in the outer court. The reason why can be found only within.

One theory presented is that the friction of the iron against the edge of the tool produces heat, however slowly the work is performed, and that the edge is therefore disintegrated and roughened which prevents it from leaving a smooth or rather a polished surface. That the only use of the water is to keep the edge of the tool cool and therefore intact. We do not accept this theory. To be sure water is sometimes used in turning iron for the purpose of keeping the cutting edge of the tool intact by preventing it from heating when a heavy chip is taken or the lathe driven rapidly. This use of water, however, is only a make-shift intended to facilitate work by saving time.

If the only use of water in turning wrought iron is to keep the tool cool, why is soapy water, or water containing a solution of carbonate of soda used in preference to clear water? They are of no lower temperature than pure water. Again, if the roughening of the edge of the tool is the cause of its not leaving a polish when used without water, this roughening must take place instantly; for every machist knows that without water he cannot leave a polished surface even in a part of one revolution.

We prefer to attribute the result of the combined action of the tool and water to lubrication. In ordinary turning the "diamond point" or "bossing tool" is used. Its action, as it is fed along while the shaft is turning, is to cut on the shaft a screw thread, differing from the ordinary screw thread only in being much finer than the thread of screws commonly used. However slow may be the lateral feed the result is a screw, if the diamond-pointed or V-shaped tool is used. Now the surface of the turned iron is a series of depressions and elevations; a longitudinal section would show serrated edges. To produce a perfect surface these projections must be removed. This is what the square-nosed finishing tool does. But this square-nosed tool, if used without water or oil, while it will leave a smooth surface, will not produce a polished one; the lubricator—water or oil—does this. The water fills the spaces between these projections on the surface of the iron and interposes between the tool and the solid surface; the finish cut merely scraping this solid surface.

That water is a lubricator cannot be denied, as it is the only lubricator that ever reaches the stern bearing of a propeller shaft, and it is used to lubricate the steps of the spindles of turbine wheels. The grease and alkali forming a diluted soap in suds or soda water is a better lubricator.

Recent American and Foreign Patents.

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

LATHE.—H. L. Morse, New Bedford, Mass.—The object of this invention is to construct a lathe on which straight work may be turned as well as tapering and the latter as good as the former.

SELF-LOCKING APPARATUS FOR FERRY BOATS.—James L. Canham, Newark, N. J.—This invention has for its object to furnish an improved self-acting lock by means of which the boat may lock itself in the slip.

DUNG HOOK.—Jacob G. Good, Rapo, Pa.—This invention has for its object to furnish an improved hook by means of which the dung and bedding may be easily and expeditiously drawn out of stables.

MATTING.—John Michell, West Farms, N. Y.—This invention has for its object to furnish a cheap and serviceable matting to take the place of cotton and other mattings, and the coarser varieties of carpeting.

MACHINE FOR SAWING SHINGLES.—Rev. Enoch Conger, Lexington, Ohio.—This invention has for its object to furnish an improved machine by means of which one or more tapering shingles may be sawn from a block at one operation.

BLIND FASTENING.—Ebenezer B. Beecher, Westville, Conn., and Joseph G. Davis, Henry S. Frost and Anthony Davis, Watertown, Conn.—This invention has for its object to furnish a simple and convenient means by the use of which a blind or shutter may be securely locked in any desired position.

BUTTON FOR FASTENING CARRIAGE CURTAINS, ETC.—Solomon Bidwell, Bordentown, N. J.—The object of this invention is to construct a device whereby carriage curtains can be easily buttoned to the body of the carriage or to the bows of the wagon top, or to any other part of the carriage or vehicle, and whereby the curtain will be securely held in the desired place but can be easily unbuttoned again when desired.

SEED PLANTER.—E. E. Chesney, Abingdon, Ill. This invention has for its object to furnish an improved seed planter by means of which corn or other seeds may be planted accurately in check rows or in drills, as may be desired

STUMP EXTRACTOR.—M. Mellen, Richland Station, N. Y.—This invention relates to a stump extractor which will do its work with the greatest efficiency and which is so constructed that power may be applied to it on either side or on both as may be required, and which will furthermore allow of an easy adjustment of all its parts and may be conveyed easily from one place to another.

CAR COUPLING.—Narclase Reeves, DuQuoin, Ill.—This invention has for its object to furnish an improved coupling for railroad cars which shall be self coupling and at the same time simple and strong in construction and reliable in operation.

WINDOW SASH AND BLIND FASTENER AND LOCK.—Leander Pollock, Fishkill Landing, N. Y.—This invention has for its object to furnish a convenient means for fastening and locking window sashes and blinds.

BACK REST FOR LATHES.—H. C. Berry, Wauseon, Ohio.—This invention relates to an improvement in a back rest for lathes used for wood turning and consists in a movable segment placed vertically in the lathe in place of the ordinary back rest and provided with two adjustable friction rollers which bear against the piece of timber to be turned, and hold it steady.

VENTILATOR FOR RAILROAD CARS AND BUILDINGS.—Robert C. Graves, Barnesville, Ohio.—This invention relates to an improved ventilating apparatus to be applied to railroad cars, vessels, vehicles, public halls, churches, dwelling houses, etc., and consists in a metal or other pipe running through the car, vessel, or building having funnel-shaped openings on the outside for the admission of fresh air and provided also with peculiar arrangements for directing the fresh air into a car or room, in its passage through the pipe and for the discharge of foul air.

BOTTLE STOPPER.—Robert Robinson, Brooklyn, N. Y.—This invention has for its object to furnish an improved stopper that will close the bottle securely against the escape of gas therefrom, and which shall be so constructed that the greater the pressure the closer and firmer the stopper will be secured in its place.

MACHINE FOR MIXING COMPOSITIONS.—Albertis Eagle, Trenton, N. J.—The object of this invention is to construct a machine, in which two or more ingredients can be united promiscuously into a compound. It is chiefly intended for mixing powdered slate with tar, for a roofing composition, but may be used with equal advantage for other compositions.

STALK CUTTER.—William Dexter, Augusta, Ill.—This invention relates to a machine for cutting up standing corn stalks on the field, so that they may be plowed under the soil and rendered available as a manure or fertilizer, thereby avoiding the labor and expense of cutting them by hand and transporting them from the field, or piling them up and burning them.

CLAMP FOR HOLDING ARTICLES WHILE BEING PLANED OR MILLED.—S. A. Morse, New Bedford, Mass.—This invention relates to a clamp for securing articles firmly in position while being planed or milled. The object of the invention is to obtain a device for the purpose specified which will admit of the articles being, not only clamped with facility, or very expeditiously but also in proper position relatively with the cutting tool in every instance.

ALARM LOCK FOR TILLS.—D. K. Miller, Bernville, Pa.—The object of this invention is to obtain a simple and efficient alarm lock for tills, one which may be economically manufactured and applied and be capable of having a number of changes or different combinations effected in the arrangement of certain working parts so as to require different manipulations thereof in order to admit of the till being opened.

ATTACHMENT FOR VEHICLES.—Edward Nason, William Nason and Oliver K. Nason, Orneville, Me.—This invention relates to a draft attachment for vehicles and has for its object the ready attachment of a horse to a vehicle and ready detachment therefrom, and a strong and durable construction and arrangement of parts.

AUGUR.—Charles Boernicke, Philadelphia, Pa.—The object of this invention is to arrange an auger so that the hole bored may be gradually enlarged at the bottom, for the purpose of more securely joining two pieces of wood.

CULTIVATOR AND CORN PLANTER.—Isaac H. Chappell, Lawrence, Kansas.—This invention consists in so constructing and combining a cultivator with a corn planter that the ground may be cultivated, and at the same time corn may be planted in the most perfect manner.

MATCH SAFE.—John Roebuck, Brooklyn, N. Y.—This invention relates to a match safe of simple construction, which is arranged with a design to cheapness and simplicity, while it answers all the purposes for which it is intended. The invention consists in the arrangement and construction of a match safe, the lower part of which forms a match box and is closed by a falling lid, which is hinged in a peculiar manner. The upper part of the device is so shaped that it is capable of receiving and holding waste matches.

CATTLE PUMP.—Miles D. Wilder, Laporte, Ind.—This invention relates to a class of pumps designed for supplying cattle and horses with water, and by which they are made to pump the water which they drink from wells or reservoirs in fields or yards.

COOKING KETTLE.—Benjamin W. Dunning, Brooklyn, N. Y.—This invention relates to a simple and valuable combination of the ordinary and indispensable culinary kettles, pans, and pots used by every family, whereby all the heat is made available, the different parts being so arranged that each one may be used for itself or in combination with the rest, as may be desired.

ATTACHMENT TO SLEDS, ETC.—Philip Bourne, Williamsbridge, N. Y.—This invention relates to a novel attachment to children's sleds, by which they can be readily propelled or moved over the surface of the ground.

STOVE.—Obadiah G. Kennel, Ezrah Smith, and Gardner L. Morrison, New York City.—This invention relates to stoves, in which gas, coal, and other oils, etc., are employed and burned.

BRIDLE.—James Harris, Kansas, Ill.—This invention consists in the combination with the bridle bit of tubes through which the check-straps pass. To these cheeks a pair of reins are buckled, which reins are in addition to the ordinary driving reins hung to the bit-rings.

TOOL.—Philip Weck, Brooklyn, N. Y.—This invention relates to a tool for securing the covers to cams by compressing such covers about the sides of the cams.

CAR BELL.—A. Borronman, New York City.—This invention consists in pivoting the hammer of the bell and in connecting the end or rope directly thereto.

BOOT JACK.—H. D. Boss, Williamsburgh, N. Y.—This invention consists in the use of india-rubber within and around the jaws of a boot jack, for the purpose of obviating any slip of the boot, when being pulled off the foot.

ATTACHMENT FOR STOVE PIPE.—Ira S. Bullard, Geneva, N. Y.—This invention relates to a regulator for stove pipes, whereby the draft of the stove, etc., can be more perfectly regulated or adjusted.

CORN HUSKING SHIELD.—Almon C. Robinson, Louisiana, Mo.—The object of this invention is to provide a metal shield to be worn on either thumb for protection of the hand against the rough cutting surfaces of corn husks, when they are stripped from the ear, and to expedite the work of corn husking by the more effective operation of the instrument than that of the naked hand.

GLASS CLEANER.—J. B. Dunlop, New Haven, Conn.—The object of this invention is to provide an article for cleaning glass and other substances, on the surface of which have accumulated hard stains of paint, dirt, etc. For this purpose I have a small plate of metal, such as hardened iron or steel, on the upper side of which I form a handle by which the cleaner is held. On the under surface or face of the cleaner I form flutes or V-shaped grooves, which run diagonally across its face, and form a series of knife edges thereon; between each groove is left a flat surface, in order to prevent the glass or other article from being cut or scratched. When this cleaner is brought in contact with a pane of glass on the surface, on which have accumulated stains of paint or other substance, and rubbed to and fro, a thorough cleaning thereof is accomplished.

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 50 cents a line, under the head of "Business and Personal."

J. B. M., of Ind., certifies to the good effect of cold water in alleviating heart burn. He takes it in doses of about 2 oz. every 5 minutes. He has used the remedy for years and has found it infallible.

F. C., of Ind.—We have heard of castor oil for softening and preserving leather, but never tried it. We can recommend good neats-foot oil as excellent.

A. D. B., of Mass., asks: "What is the actual horse power of an engine, diam. of cylinder, 13 1-8 inches; stroke, 30 in.; revolutions per minute, 72; pressure of steam in boiler 80 lbs.; steam cut off in cylinder at half stroke." Your question does not contain all the data necessary to a correct answer. You say you have 80 lbs. in the boiler; you do not say whether you have a governor throttle between boiler and cylinder, nor give the length and size of steam and exhaust pipes. If, however, you get your boiler pressure—80 lbs.—on your piston cutting off at half stroke, the mean pressure would be be 67.4 lbs. and the gross horse power would be 99.978. The indicator is the only reliable method of determining the amount of power developed by your engine.

E. B. C., of Conn., asks if the pressure on the lower part of a steam boiler is greater or less than in the upper part, the weight of water not being considered. As we understand it, the pressure of steam is the same in every direction. Why not?

C. F. S., of N. Y., asks: "What is the rule for calculating the speed of pulleys driven by belts from larger pulleys?" We reply: As the speed of the driver is to that required for the driven, so is the diameter of the driven to that of the driver. Ex. A pulley 36 in. diameter turns 150 times per minute. Speed of the driven to be 450. Required, size of driven pulley. As 150 is one-fourth of 450, so the driven should be one-fourth the driver—9 inches, . . . The best oil we know of for valves and cylinders is good sperm or lard oil. Pure tallow is also good, as the heat of the engine keeps it in a liquid form.

C. R. C., of Pa.—In Wheatstone's and Siemen's experiments described in No. 14 Vol. VI complete magneto-electric machines were employed. The obscurity of the notice occurred from omitting to say that the armatures were combined with magnets in the usual way. The error was the fault of the foreign reports.

P. D., of C. W.—Three methods have been used for determining the quantity of steam used by an engine. 1st. Measuring the water which is put into the boiler. 2d. Using as data for calculation, the cubical capacity of the cylinder, number of revolutions and pressure of steam. 3d. The use of the indicator. The last method is the most accurate and least troublesome. But when great exactness is sought for, the three plans should be employed at the same time, in order to serve as checks against the errors of either.

J. D. H., of Minn.—"How many round balls an inch in diameter can be put into a cubical box one foot on a side?" This is a very good nut for the juveniles to crack. J. D. H. has been informed that a large prize has been offered for a solution of the problem, but we do not believe it.

J. W. L., of N. Y., supposes air to be condensed in a cylinder to half its volume by pushing down the piston half way, and another cylinder with piston same diameter, but half the length. Now let a quantity of compressed air equal to that in the first cylinder be let under the piston of the second cylinder, will it have as much effect as the compressed air of the first? Certainly.

A. C. R., of N. Y.—"Does the axis of a vertical wheel in motion impinge on the same points of its bearing that it does when in repose?" No. The tendency of the wheel in motion, is to roll up one side of the axis.

G. B. M., of Iowa.—Your cellar seems to be damp for want of ventilation. If this theory be correct, you can no doubt easily prevent the evil, by means of some simple arrangement of partitions and inlets and outlets of fresh air. The outlet might be connected with the chimney.

R. S. T., of Mass.—1. The sphere and spheroids were once common forms of the electrical machine. They are not so convenient as cylinders. 2. Leyden jars coated with the amalgam used for mirrors would operate pretty well, but it would be very difficult to make them. 3d. Substitutes for the Leyden jar are often made by coating flat glass plates. 4. A battery may be made by arranging the jars concentrically in a nest. In this case the jars of course must be wider at top, than at the bottom.

E. V. W., of Pa.—If you boil tar the more volatile portion is expelled and the residuum is pitch. The pitch or asphaltum as it is often called, of coal tar is used for roofing and as a cement.

J. P. B., of M.—The ordinary oil paint seems to be in most common use for marking by the stencil plate. All colors of paint work well. Any water solution or mixture of color and sizing, of the proper consistency also answers the purpose.

J. H., of Minn.—Rancid butter is much improved by reworking in ice cold water. The sweetening is hastened by adding to the water a small quantity of bicarbonate of soda.

A. T. B., of Mass.—We are not aware that any distinctive name has been proposed for the solids which have an elliptical base.

C. A. G.—Only the inventor or his agent can obtain information at the Patent Office concerning a case prior to the actual issue of a patent.

W. S. M., of Ohio.—1. Emery is used in grinding lenses and rouge in polishing them. 2d. The best cast steel should be used for the springs of fire arms. 3d. Paper is made sensitive to light by brushing over it solutions of salts of silver.

J. M., of N. Y.—"Which would be the easier to drag up grade 3,000 lbs. on 44x48 inch wheels or the same weight on 48x32 inch wheels. Or which will run easier up grade large or small wheels." The effect of wheels on vehicles is simply to lessen the friction of the draft, and large wheels are more efficient than small ones. The size of wheels is determined, however, mainly by the hight from the ground of the line of draft, in other words the hight of horses. In going up or down grade the same principles apply. On a grade, however, the hight of the load might be of practical importance, as the direction of the weight of load with reference to the axes of the wheels would be changed. The more direct answer to J. M.'s questions would involve more data than he has given, such as hight and habits of his horses, etc.

L. M. C., of Iowa.—There are several new processes for making artificial stone, but we have not yet learned that any of them have proved entirely satisfactory or a commercial success. The ancient process of baking clay into brick has stood the test of all ages and climes. It is scarcely to be hoped that we shall have any successful rival to brick.

A. D., of Mass.—Starch water spread on glass makes an excellent substitute for ground glass to be used in backing up stereo-transparencies.

G. H. H., of Mich.—1. When heated from 32 deg. to 212 deg. zinc expands at the rate of 1 in 340, lead 1 in 351, silver 1 in 524, brass 1 in 536 copper 1 in 582, untempered steel 1 in 926. 2. The rate of expansion increases slightly at higher temperatures. 3d. It will be seen from the above figures that there is no definite relation between the specific gravity and expansibility. 4. Tubes and rods expand in length at the same rate. 5. The temper of metals affects their expansibility. 6. Address Henry Carey Baird, Philadelphia, for a treatise on watch making.

H. L. N., of Mass.—"Fill a wine glass so full of wine that another drop will make it overflow. Now you may drop into the wine as many needles as an empty glass of the same size can hold, and the wine will not overflow." Something like the above is constantly floating about in the newspapers, and it has been so often repeated that a great many people really believe it. The statement has little encouragement from science or experience. A needle or any other solid body, in proportion to its bulk, will displace the liquid in which it is immersed.

W. P. B., of Wis.—Naked wire was much used in the early days of electro-magnetism for making helices. With proper care in winding, electro-magnets so made are quite as good as others. The layers of the helix are well enough kept apart by common paper. Silk thread used for the same purpose would be no improvement. . . . . A dozen Grove's cups will give a good light by way of heating platinum wire. Fifty or more are required to give a satisfactory light from carbon points.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

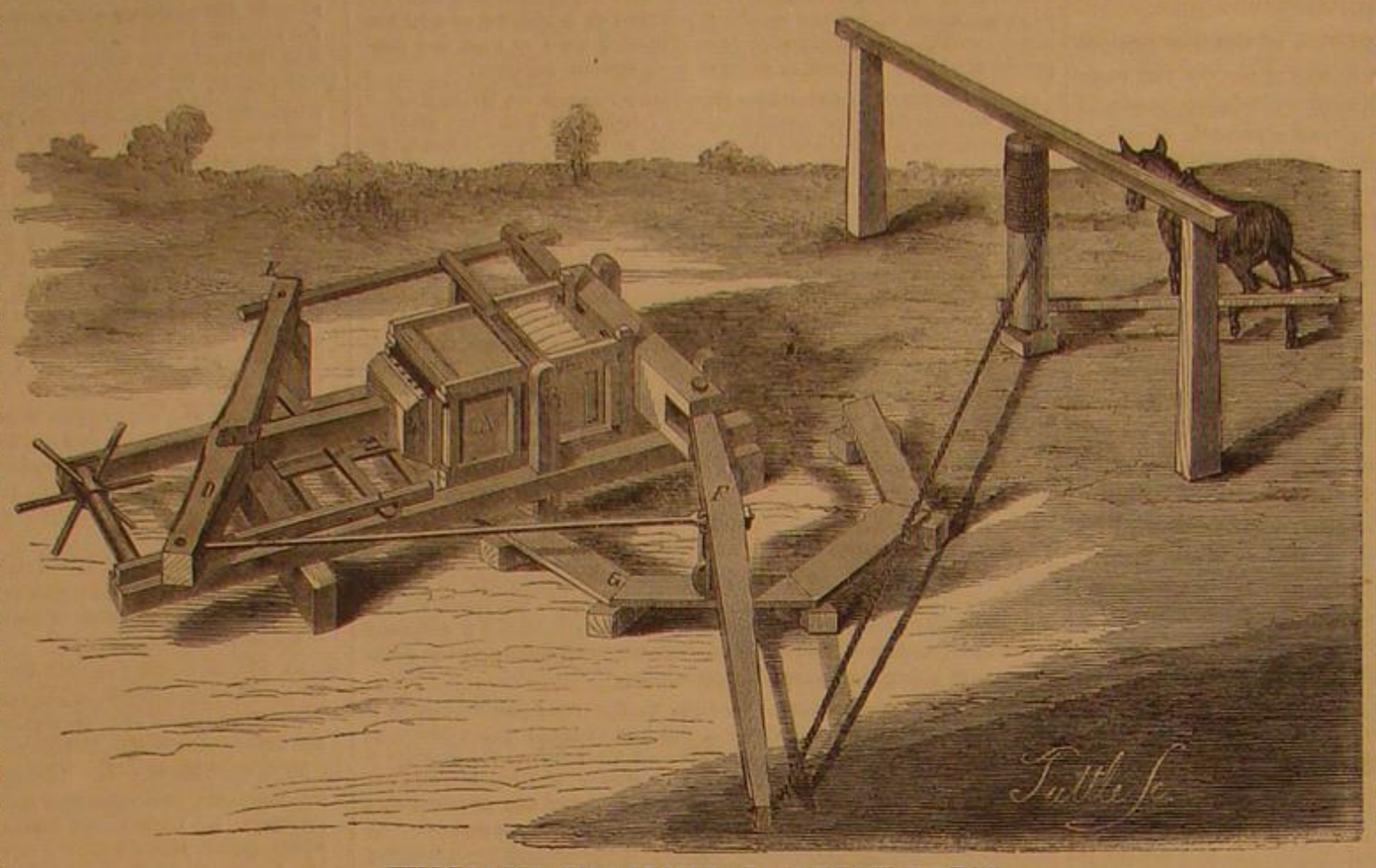
R. Miller, Perth, Lanark county, C. W., wishes to communicate with manufacturers of screw and stud machinery, separately or combined.

A. Tweedy, Collinsville, Ohio, wishes to correspond with an aeronaut.

Horizontal Cotton Press.

For transportation of bulky bodies, as cotton, hay, and cloths, the work of compressing into convenient sized bales is almost imperative. Facility of handling as well as economy of room is thus assured. The screw is often used for this purpose, but it is well known that the power to be exerted increases with the resistance to be overcome, so that there is a limit to its use. The hydraulic press is costly and not always convenient to procure. The engraving represents an efficient baling press so simple in its parts and operation that it may be constructed on the plantation or farm by any one with ordinary mechanical skill. Its combination of levers gives it immense power and its operation is certain.

A suitable frame of timber is secured to the ground or the floor of a building, upon which is mounted a box, A, by being pivoted by a cross brace to the uprights, B, to allow it to take a horizontal or nearly perpendicular position. In the back end of this box, when in a horizontal position, enters a follower, C, which nearly fills its cross section. This is connected by a pivoted bar to the lever beam, D, pivoted to an upright standard at E, and connected by a bar to the traversing lever, F. This lever's weight is sustained by a roller which moves over the segmental platform, G. At the extreme end of the lever is a rope connected by a hook, and winding on an upright windlass or capstan, which may be turned either by manual labor or horse power.



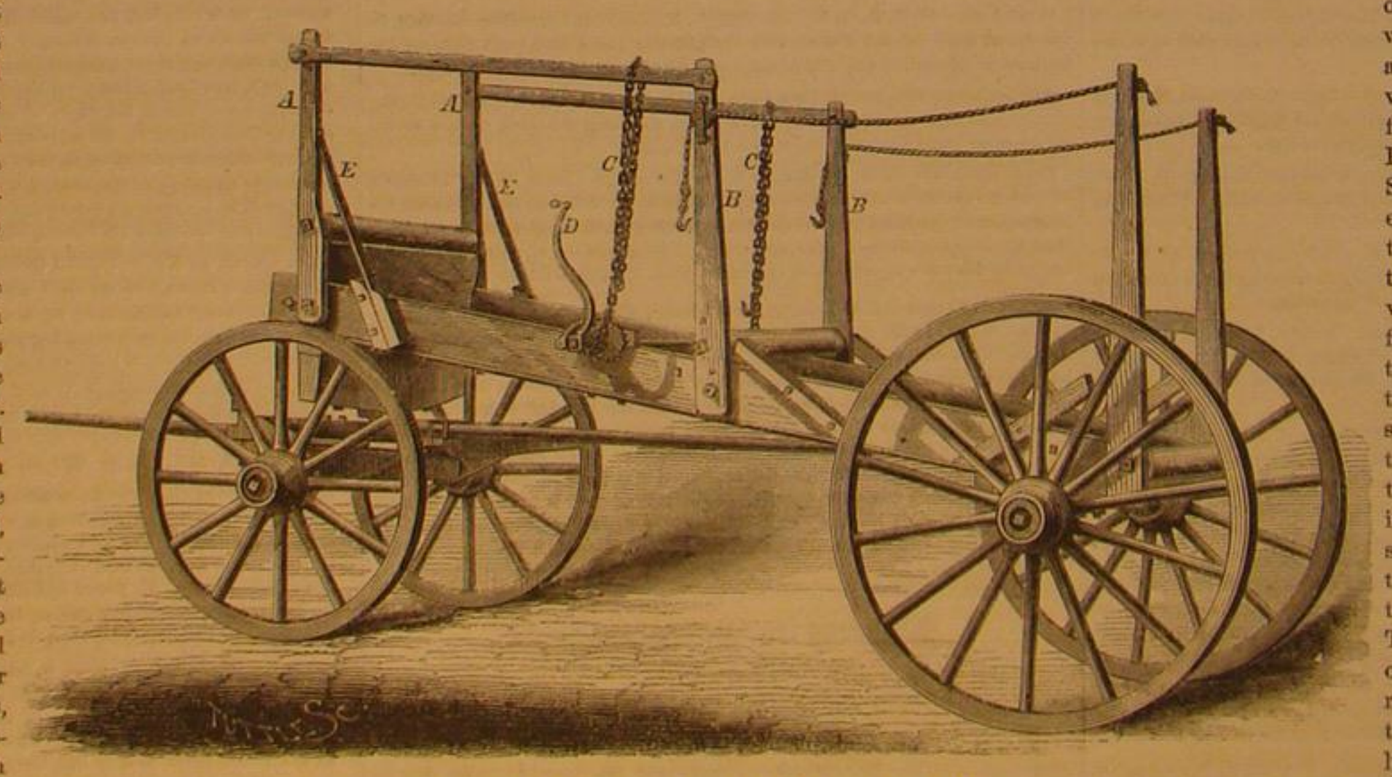
WILLIAMS' HORIZONTAL COTTON PRESS.

In operation, the box, A, is turned into a nearly perpendicular position and the hay or cotton pressed in until full; it is then swung into a horizontal position and the follower, C, inserted and brought home by the leverage. That portion of the box, A which holds the bale has a hinged top and bottom, the former seen open in the engraving, for convenience in roping or strapping the bale and for delivering it when finished. The windlass on the rear of the machine is for "tumbling" the box, A, which is done by a cord attached to the box and winding on the windlass beam. The top and bottom of the receiver are held in place, when closed, by a double swivel latch and the box is secured when in a horizontal or vertical position by a suitable catch. This apparatus was patented through the Scientific American Patent Agency, Oct. 2, 1866, by John I. Williams of Meridian, Miss.

Comstock's Lumber Wagon Rack.

When drawing lumber on wagons for short distances the labor of loading and unloading takes more time than to convey the load. Two men are necessary to load and to unload; one must be on the team and one on the ground. The employment of a roller near the driver's seat and one at the rear of the wagon at different elevations to give the load a backward incline is often used, but the binding of the load, its unbinding, and discharge still required considerable time and labor.

In the rack represented in the engraving the body of the wagon is inclined by means of bolsters of differing hights, that on the forward end being the highest. The upright stakes are pivoted to the sides of the frame and in them turn the pivots of the rollers. The uprights, A and B, are connected together by pivoted bars at their top so that they move in unison, and the rear uprights may be connected to B by lines which pass over pulleys on B, or through staples, and from these they can be attached to the chains, C, which are intended to be wound up on the shaft forward of the stakes, B, which shaft is turned by the crank, D, and held in position by the ratchet and pawl seen in the engraving. By a forward movement of the uprights, A and B, and backward of the rear stakes the rollers are lifted from the bolsters and allowed to turn free, which assists in the process of loading. This position of the stakes and rollers is assured by hooking the hooks of the lines into the chains, C, and turning the crank, D. This compels the rollers to bear the weight of the load. The diagonally affixed pieces on the sides of the wagon near the middle and rear uprights, prevent them from moving back too far when the rollers are raised. The pivots of the stakes, A and B, are in the rear of those of their respective rollers, and those of the rear stakes are forward of those of that roller. This gives an eccentric motion which insures the raising of the rollers and also their easy seating on the bolsters to prevent their turning.



COMSTOCK'S LUMBER WAGON RACK.

When the rack is loaded the hooks of the ropes are disconnected from the chains, allowing the rear stakes to be forced back by the load which will bear on the rear bolster at the same time the middle and forward stakes are released, so that the remainder of the weight is taken by the middle and front bolsters, a movement which is aided by the springs, E, bearing against the forward stakes, A. The chains are then passed over the load and one of the hooks passed through a link of the other chain and secured by winding the chain by the crank which is held by the pawl and ratchet. In unloading, the chains, C, and the ropes are connected, and by turning the crank the load is supported on the rollers, which discharge it in a compact pile.

By a long test with these devices it is found that half or more of the labor and time is saved than by any other method in use for loading, teaming, and unloading lumber. This improvement was patented through the Scientific American Patent Agency, February 5, 1867, by Charles C. Comstock, Grand Rapids, Mich., whom address for additional facts.

Probing Gun Shot Wounds.

From Dr. V. Gelcich of Los Angeles, Cal., we have received a communication relative to the above subject which is worthy of notice. He says that there is much difficulty in discriminating between bone and the ball by the use of the ordinary probe. His probe is simply a piece of white pine wood, made in the shape of a probe, introduced into the wound, rub, bed against the suspected object, and quickly withdrawn-when, if it has touched the ball, traces of lead will be found upon it. He says, by this simple instrument, while a medical officer in the United States Army, he saved the limbs of two men on whom amputation was about to be performed for gunshot wounds in the lower extremities; what was long supposed to be bone proving to be lead by the aid of the white pine probe.

A porcelain probe has been used to show the presence of lead in the same manner, but it is probable that a softer substance like wood is better. At least where the channel made by the ball is straight, or nearly so, and in many cases where a probe is not at hand, this, which could be extemporized from a bit of wood, would prove extremely valuable. In cases where the ball did not take a direct course it seems as though a piece of pine wood might be secured to the metallic probe and do its office in a superior manner. Dr. Gelcich offers his discovery to the attention of surgeons.

Science and Art in China.

These curious people (the Chinese) are at once remarkably knowing and ignorant. They have, for instance, as wide an acquaintance with *Materia Medica* as we, and perhaps as much knowledge of properties and effects; but they have no reasonably philosophy of treatment and next to no knowledge of pathology, physiology or anatomy. Their physicians think every pulse they find an independent manifestation; having no idea of the circulation of the blood. A physician would undoubtedly be put to death if he attempted to dissect the human body, and surgery is unknown. Prescriptions are potent according to the multitude of ingredients, often from fifty to eighty, which they stew all together and then administer. The blood of any animal is a favorite specific for deficiency in qualities that distinguish that animal. The medical art is merely a trade, in which every man keeps his knowledge and discoveries secret for his own benefit, a condition sufficient of itself to account for its backward and utterly unprogressive state.

A more amusing illustration is the deficiency of this most ingenious people in the art of music, of which they seem to have no idea, and yet they must possess abundance of musical capacity, from the fact that under the circumstances they can be taught a tune at all. A gentleman in Hong Kong is teaching a Chinese class to sing, and has succeeded in creating from it a choir for the Union Church which can sing a simple tune at sight, without error. He thus describes the state of music in the celestial regions:

"I believe this to be almost the first attempt to teach the reading of music to this wonderful people. The Chinese themselves have no tunes and no idea of music. Their instruments can only produce two or three tones, and their singing is screeching in falsetto to no kind of tune. Their voices are harsh to a painful degree, and their talent for flattening wonderful. They must never be asked to go above D, and after half an hour's singing lose all command of their voices. They also incline to bawl."

Trichiniasis.

The scavenger habits of the rat certainly render the contents of his entrails living poison to the viler animal that devours them, and thus a prolific source of trichinæ in swine. A committee of the Vienna Medical Society have made an elaborate report in which they maintain that the disease also originates in the rat; a large percentage of rats examined in different towns and countries having been found trichinized. It is also found that the germs of trichinæ may be conveyed from infected meat to other food by the larvæ of flies; which shows how a rat or other animal may become trichinized without eating either trichinized flesh or intestinescontaining germs. Prof. Brown, in a lecture before the Society for the advancement of Science and Art, in this city, stated that this parasite originates almost entirely in the swine, and is there invisible to the naked eye. When flesh containing the trichinæ is introduced into the human stomach, the flesh is dissolved and the parasite unloosed from its cell. When this occurs the parasite is about one thirtieth of an inch in length. Birth is then given to trichinæ, which straightway proceed to penetrate the whole muscular and flesh system through the alimentary canal. These young trichinæ are at first only $\frac{1}{340}$ of an inch in length, and resemble a worm in spiral coil. By the time they traverse the system, however, they increase in size many fold, and then begin to make felt that terrible disease to which they have given the name. As first introduced into the animal they cause trouble only by the production of their offspring. The disease is first made apparent by pains in the joints, the head, and the spine, and the patient gradually wastes away and dies. The trichinæ do not create disease by eating away the flesh—which they are not fitted to do—but by hindering or closing up the forces and processes by which health is preserved. From one of the limbs of a girl who had died in this manner lately in Springfield, Mass., a portion of muscle was detached and subjected to microscopic examination. A square inch of this disclosed from 30,000 to 80,000 trichinæ.

Welding Composition.—Fuse borax with one sixteenth its weight sal ammoniac, cool, pulverize, and mix with an equal weight of quicklime, when it is to be sprinkled on the red hot iron and the latter replaced in the fire.

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Contents:

(Illustrated articles are marked with an asterisk,)

*Improved Switch Signal and Alarm 277
*A New Amalgamator 277
Cast Iron Boilers 277
Paris Exposition—The Chactic Stage 278
How Cast Iron is Made 278
Business and Manufacturing Items 278
Editorial Summary 279
The Tricks of the Alchemists 280
The Engineer's Alphabet 280
*Steam Boilers—Their Form, Construction, and Material 280
Gleanings from the Polytechnic Association 280
Breakage of Car Wheels—The Causes and Remedies 281
Proscription of Merit 281
*Lipp's Ice Cream Freezer 281
The Philosophy of the Cracking of a Whip 281
A Correction 281
Testing of Boilers 281
Hints for Inventors on Steam Condensers 282
A Simple Plan of Determinating the Ordinates of Circles 282
The Grammatical Problem 282
The Roman Numerals 282
The Golden Hegira 282
Life-saving Inventions 282
Coal Oil as a Lubricator 282
What is the Theory of the Water Polish? 283
Recent American and Foreign Patents 283
Answers to Correspondents 283
*Horizontal Cotton Press 284
*Comstock's Lumber Wagon Brake 284
Probing Gun Shot Wounds 284
Science and Art in China 284
Trichinasis 284
Are Our Coal Fields Inexhaustible? 285
Phonography and Photo-Phonography 285
The Dangers of Our Artificial Lights 285
Our Street Pavements 285
American Exhibitors at the Paris Exposition 286
Extension Notices 286
Patent Claims.....286, 287, 288, 289, 290
*Fay's Roofing, Flooring, and Weather-boarding Paper 292
Tests of the Potter Rail 292
*Custer's Improved Toe Calk for Horses' Feet 292

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

ARE OUR COAL FIELDS INEXHAUSTIBLE?

Some sneers were indulged in when, a few months ago, English *savans* debated the question of the exhaustibility of the coal fields of Great Britain, but it might be well even for us, whose area of already discovered coal is seventeen times as great as that of England, to consider the question as applied to us.

A few days ago a gentleman residing in this city informed us that the heating and cooking apparatus of his dwelling had consumed since November last—less than five months—thirty-three tuns of coal. This is no exceptional case; it can be duplicated and even exceeded in hundreds of instances. But the consumption of coal for domestic purposes is as the drop in the bucket compared with the consumption in manufactories, on railroads, and in steamships. If coal is in process of formation now the process is a very slow one. We have no atmosphere of carbonic acid, no forest of gigantic ferns and mosses, no sluggish sea, nor perpetual hot-house summer which might form a coal bed of three feet in thickness in as many weeks, while it would now, under our present circumstances, require 7,400 years to produce a deposit of equal thickness.

The coal beds of Great Britain cover an area, according to Taylor, of 11,859 square miles. Prof. Hitchcock estimates the area at 12,000; other authorities average 7,995, and Prof. Rogers calls it only 5,400. Probably, when the deductions for "faults," "trap dykes," and "worn out" territory are made, about 5,600 square miles will give the present available resources of the English coal fields. Every vertical foot will yield 1,500 tuns of coal to the acre, and 50 feet total thickness will give 75,000 tuns per acre.

Our known coal area is estimated at 206,939 square miles, of which only about 470 square miles is anthracite, yet of 22,000,000 tuns mined in 1864, 10,000,000 were anthracite. When it is considered that the amount mined represented only the current demand, or rather that which was produced for the market, and did not comprise that wasted, lost in pillars, etc., it may excite some inquiry in regard to the ultimate exhaustion of our anthracite beds. The population of the entire East, a portion of the South, and the Northwest, over 12,000,000, draw their supplies from the Pennsylvania anthracite fields, and large quantities are exported to Canada and shipped to other countries. The natural increase of the anthracite coal trade is over two and a half per cent per annum, so in 1870 the demand will be not less than 15,000,000 tuns, probably much more. Estimating an average of sixty vertical feet in thickness our anthracite fields contain 18,000,000,000 tuns, which, at the present rate of increase in demand, would entirely exhaust them in 600 years. But about one half of this is lost and wasted by our present system of mining, and should the anthracite trade ever approach the dimensions of the English coal trade, our supply would melt away in about 180 years.

Some impure anthracite is found in Massachusetts and Rhode Island, and Oregon contains a limited field of the same, but owing to superiority in quality and advantages of location, Pennsylvania will probably continue to be the source from which the nation's supplies will be mainly drawn. While the anthracite of Pennsylvania underlies only 470 square miles of her surface, her bituminous deposits have an area of 12,656 square miles, and all the great Western and the Southern coal fields hold only this hydrocarbon. This will not be used for manufacturing purposes (iron) so long as the nearly pure carbon can be obtained, and will be employed for household and other purposes only when its comparative cheapness offsets its advantages. What the hitherto unexplored regions of the country west of the Mississippi may contain in the way of a mineral fuel, can at present only be conjectured.

PHONOGRAPHY AND PHOTO-PHONOGRAPHY.

The query is not now to be raised for the first time, whether human speech may not be made to record itself. Yet it is in reality a novel question, for we have as yet but vague hints of the possibility, and scarce a hint of the process. Among these hints, the first is the perfectness and definite laws of echo. Since a screen may be erected over against a speaker which will "report" or throw back a *fac simile* of his words, as a likeness is thrown back from a camera—and that by an analogous process, only coarser, *i. e.* the vibrations of a more sensible fluid—why may not the one likeness be embodied and fixed in some way as well as the other? Why may not forces which rebound with such wonderful precision, be brought to make equally precise impressions? Why not a sensitive preparation to be fixed by rays or pulses of sound, as well as of light? If this be attainable, there is evidently no difficulty in securing the reflection of the sounds upon it, in all their perfection and with intensified force.

The difference at once strikes us, that so far as we know, the action of accoustic vibrations is purely mechanical, whereas we have lately discovered that in light there is chemical or actinic power, besides the supposed mechanical action that affects the retina. But how do we know that the sensible effects of luminous and accoustic undulations, or either of them, are of a mechanical and not chemical nature? Who knows that the eye and the ear are not both laboratories, in which a chemical operation is performed in seeing and hearing, as much as in impressing shades upon a sensitive plate? Nay, is it not most probable, that seeing and hearing are or involve chemical processes, equally with tasting and smelling, breathing and muscular action? And if so, is there not probably some means of imitating the process and fixing its results in the case of hearing as of seeing?

Again, an apparent difference between the actual and the supposed art is that the one must in some way be bridged over into the other: the latter is complex, and includes both the former and some *nexus* between them which is precisely the undiscovered element in the problem. But this is perhaps only a *prima facie* necessity, and thus the inquiry here branches off in two directions; on the one hand in quest of a point of contact between accoustic operations and visible phenomena, through which audible undulations may register their effects in visible symbols; and on the other, of a way for the accoustic impulses to be impressed upon secondary agents which shall give them back as the negative does, when properly called for and not otherwise.

If the latter were possible, a reciprocating pair of such agents, properly re-inforced in energy, could maintain the impulses and propagate copies of them *ad infinitum*, and thus the speech of an orator would be handed down to all time and all mankind exactly as it sounded from the lips. All books worth reading *verbatim* would be read to the phonograph by elocutionary experts, and thenceforth read by the phonograph to the hearing (not reading) public, who would thus be saved the labor of reading, and perhaps the art itself would go out of fashion. But it is hardly worth while to anticipate just now all that might be hatched out of such an egg as that. Less extravagantly, we may surmise that an arbitrary language of phonic symbols might be constructed in which dumb things could be made to utter a translatable echo of human speech.

There are some advantages obvious to phonography proper, compared with photography, as original questions. There is the wonderful ubiquity and uniformity of the accoustic undulations, precisely the same to an infinite number of hearers in an infinite variety of positions; whereas the undulations of light are confined to right lines of movement, and no one of them can impress more than a single objective point. There seems no more intrinsic difficulty in concentrating and intensifying the accoustic than the optical undulations, and if this were to become practicable, (by the aid, perhaps, of some imitation of the tympanum) it would follow that a system of accoustic reflectors and conductors could carry human speech not only to indefinite distances but to innumerable auditors. Practical attempts in the distant transmission of the voice are now going on in France, as our readers are aware. But leaving this aside, the fact that an accoustic wave takes effect in all directions and at all points, greatly facilitates the attempt to fix its effect. For, suppose a mechanical or chemical appliance to be invented, so delicately adapted that an individual accoustic wave would in some way make its characteristic mark. Let such sensitive points be brought into exposure and withdrawn in succession as rapid as the contractions of the stylo-glossus in speaking. Or let a surface of this character be covered with a moving protector having a single perforation which should traverse the whole in regular lines, at the proper speed. Every wave would infallibly find its proper objective point and make its mark in its proper order, and the intervals of sound between letters, words and sentences, would be shown with absolute precision by the unmarked spaces, as in print.

The sensitiveness of flames to the accoustic vibrations, on which we had experiments so interesting from Prof. Tyndall, of late, suggests the possible application of gases, incandescent or otherwise, for registering sounds in a variety of ways. Flames would be most naturally expected to register photographically; but they have also calorific, mechanical and chemical effects adaptable to the same purpose. Thus there are four distinct modes in which effects can undoubtedly be transmitted through flames from the sounds of the voice. If it be practicable to find adjustments of flame which shall respond distinctively to each vocal sound and interruption, and with corresponding rapidity, it would seem much easier to register those responses in some of the various modes that already suggest themselves.

Other conjectures might be made, but we have said enough to stimulate thought and inquiry upon the subject; and as that is all we had in view in setting out with these cursory speculations, they may be dropped at this point as well as at another.

THE DANGERS OF OUR ARTIFICIAL LIGHTS.

It is becoming a matter demanding serious inquiry and possibly legislative interference what shall be done to prevent the accidents so commonly occurring from the use of the common means for producing artificial light, or, at least, to diminish the danger. If a correct record could be presented of the catastrophes—the injuries to person and property—which have been caused by the use of gas, kerosene, camphene, and burning fluid the statistics would appal the reader.

Gas explosions are always the result of carelessness or thoughtlessness. It is probably the least dangerous agent for producing light since the relinquishment of whale and lard oil for this purpose, but the ignorance or the thoughtlessness of people make it sometimes a very dangerous substance. Confined in pipes it is perfectly safe. It cannot explode nor even burn until mixed with the oxygen of the atmosphere, and it has the valuable quality of denoting its presence when mingled with the air we breathe. In this form it is dangerous, yet when a meter or the pipes located in a vault or dark cellar leak, it is too common a practice to enter the room with a light to examine the leak, when of course an explosion takes place. This can be readily prevented by first ventilating the room through doors and windows. There can be no excuse for these accidents nor for the blowing out of a gas light leaving the pipe open for the escape of the gas, a trick usually ascribed to country visitors to cities, but not seldom performed by those who should know better. Cases of death by asphyxia in sleeping rooms from this inexcusable carelessness are not unfrequent.

Camphene and burning fluid have been largely superseded by kerosene, yet they are still used to a limited extent, the fluid being burned by a wick in the ordinary manner or used to generate a gas in the lamp itself. In whatever manner employed these mixtures of alcohol and turpentine are dangerous, as many fatal accidents have proved. We know of no method of preventing the danger attending their use, and are glad they are going out of fashion. But it may be doubted whether in exchanging them for kerosene we are not "jumping from the frying pan into the fire."

Kerosene accidents are altogether too common. It would seem that this hydro-carbon might be made at least non-explosive; that it can be made non-inflammable is impossible without destroying its light-producing qualities. But many serious and fatal accidents are continually occurring by explosions of kerosene lamps. A low distillation of the oil would easily remove the more etherial substances in its composition, which, at temperatures not excessive, generate an explosive gas. There should be some simple means of testing kerosene to detect the presence of these volatile elements. Beyond that, only care in the use of kerosene promises to avert its dangers.

It is commonly burned in glass lamps. Now glass is one of the most unreliable substances known, and if not properly annealed will sometimes, even when untouched, fall in pieces as though shattered by a blow. Very likely many of the so-called explosions of kerosene lamps occur by the fracture of the glass lamp containing the oil. An eminent chemist tells us that a few days ago a glass bottle which he had used for years, and which contained collodion, suddenly shivered into fragments while standing on a table where it had remained untouched for weeks, and a flask that he had used for distilling benzine broke in a similar manner after it was laid aside.

The practice of blowing out the light when the flame is full, by throwing the breath down the chimney is pernicious. If the wick is loose in the tube the flame may be forced into the lamp and instantly ignite the surface gas or the oil itself. A better practice is to turn the flame down to a flicker and then blow it out. Lamps of metal would seem to be preferable to those made of so treacherous a material as glass, although they are not so elegant.

It is hardly credible that manufacturers or venders of kerosene would willing deal in a dangerous article containing explosive elements, as their reputation and consequent profits depend upon the quality of the fluid, but the presence of naphtha and benzine in much of it now sold is susceptible of proof. Legislative interference, aided by science, appears to be demanded as a protection to consumers; for it cannot be expected that the people at large are to become analytical chemists in order to judge of the quality of the oil they use. Either this, or we must go back to the use of the old fashioned oil lamp, the breaking of which is attended with no more serious consequences than the formation of a grease spot.

OUR STREET PAVEMENTS.

In our issue of April 13th, we spoke somewhat in favor of the Nicolson pavement, our opinion being founded on the reports of its trial in Chicago. We have received several communications in relation to the subject, our correspondents being much gratified with our expression of opinion. A resident of this city says that the substitution of wood for stone, or the London Mc Adam for our cobble and Belgium pavements, is demanded on the score of mercy to the horse. He asserts that the number of horses permanently injured by our

stone pavements amounts to from 30 to 50 per cent, enough, if only half true, to pay for laying new pavements of wood every three or four years. He sees no reason why our streets could not be made as easy for horses and vehicles as the Park avenues, if paved on the Nicolson plan.

Another praises the pavements of Buffalo which are of the "Medina Rattlesnake stone" which has been well tested there and in Chicago.

We do not know the peculiar advantages of the Buffalo pavements, although we have visited the city several times, but there can be no doubt but improvements can be made on the pavements of New York. It would probably cost much to transport the Medina stone to this city, while the material for the Nicolson pavement can be obtained at every lumber yard.

AMERICAN EXHIBITORS AT THE PARIS EXPOSITION.

The following list of the articles of American Manufacture contained in the sixth group of the American Department of the Exposition in Paris, embraces instruments and processes of common arts:

G. J. Wardwell, Poultney, Vt.—Stone channeling and quarrying machine.
R. C. E. Ganiot, Tamaqua, Penn.—A model of apparatus for breaking up coal; a model of machinery for lifting from mines.
J. R. Harrington, Brooklyn, N. Y.—Self-rarifying tweer for manufacturing iron in blacksmith forges, or in any fire where a blast is used.
Herman Haupt, Philadelphia, Pa.—A gang of three steam drills designed for tunneling.
Philip S. Justice, Philadelphia, Pa.—Power hammer.
Walker & Platt, New York.—Power hammer.
E. E. Myers, Springfield, Ill.—Design for a model American farmhouse.
C. H. McCormick, Chicago, Ill.—Corn-reaping machine and grass-mowing machine.
R. B. Allen & Co., New York.—One combined clipper mowing and reaping machine.
Walker A. Wood, Hoosick Falls, N. Y.—One self-delivering combined reaping machine.
Joel A. Hall, Columbus, Ohio.—Cotton chopper, garden cultivator, and drill.
A. H. Wellington, Woodstock, Vt.—Root cutter.
Oscar F. Burton, New York.—One plow made in the style of the Moline plow now in use.
John G. Perry, Kingston, R. I.—One mowing machine.
D. C. Colby, New York.—Flour sieve, coffee mill.
Joel Nourse, Boston, Mass.—Plows with changeable furrow boards for plowing sod and stubble lands; swivel plows, adapted to level lands and hillsides; expanding horse hoes with changeable teeth; Brown's hay tedder; horse hay rake; Harrington's patent seed sower and cultivator combined; Howe's patent seed sower and cultivator combined; Adams' patent farming mill and grain separator; hand hoe.
Emery & Co., Chicago, Ill.—One American hog tamer.
H. H. Munroe & Co., Rockland, Me.—Rotary harrow.
Deere & Co., Moline, Ill.—One steel plow.
A. J. Fullam, Springfield, Vt.—Machine for shearing sheep and clipping horses.
Morris, Tasker & Co., Philadelphia, Penn.—Hay-band machine.
Hall & Spear, Pittsburgh, Pa.—Iron center plow.
Silas C. Herring, New York.—Bullard's patent hay tedder.
Collins & Co., New York.—Steel plow.
J. C. Bidwell, Pittsburgh, Pa.—Comstock rotary spader, also plows.
Jacob Brinkerhoff, Auburn, N. Y.—A hand Indian-corn sheller, separator, and cleaner.
M. Alden & Son, Auburn, N. Y.—A horse hoe, for cultivating all kinds of hoed crops.
Wheeler, Melick & Co., Albany, N. Y.—Palmer's excelsior horse pitchfork.
Partridge Fork Works, New York.—Manure, spading, and hay forks, rakes, and potato diggers.
L. L. Langstroth & Sons, Oxford, Ohio.—Two improved movable comb beehives.
Williams, Wallace & Co., Syracuse, N. Y.—Johnson's Great Western self-raking reaper.
Samuel J. Wallace, Carthage, Ill.—Grain binder, self-binding and raking harvester.
John W. Free, Richmond, Ind.—Fanning mill and grain seed separator; improved shoe for grain and seed separator; improved straw cutter; grain and seed sower.
Frank Fuller, New York.—Machine for husking Indian corn.
John B. Seymour, Pittsburgh, Pa.—Cotton planter.
S. T. Bacon, Boston, Mass.—Nourse's universal plow.
Silas H. Wooldridge, Venisee, Ill.—International shovel plow.
James A. Saxton, Canton, Ohio.—Ohio reaper and mower.
Glidden & Williams, Wood's Hole, Mass.—Samples of guano.
John H. Noyes, Oneida, N. Y.—Specimens of animal traps, from the rat trap to the grizzly bear trap.
George R. Baker, St. Louis, Mo.—Dough-kneeding machine, for family use.
D. H. Goodel, Antrim, N. H.—Lightning apple-parer.
S. W. Palmer, Auburn, N. Y.—Combined clothes wringers, manglers, and ironers.
Metropolitan Washing-Machine Company, New York.—Washing and wringing machine.
D. M. Somers, Washington, D. C.—Self-acting tumbler washer.
Howard Tilden, Boston, Mass.—Bon-ton flour and sauce sifter; self-feeding tobacco cutter.
Chas. A. Harper, Rahway, N. J.—Hand flour mill.
Morris Tasker & Co., Philadelphia, Pa.—Wringing machine.
Windle & Co., New York.—Mechanical brush for sweeping carpets.
E. K. Sargeant, Boonton, N. J.—Alarm coffee boiler.
J. Ward & Co., New York.—Union washing machine; Union clothes wringer.
Joseph Sedgebeer, Painsville, Ohio.—Farm corn meal and feed grinding mill; crank hand cottage or army mill; house coffee and spice mill.
Louis Elsberg, M. D., New York.—Feat-steaming and pressing machine.
Howard Tilden, Boston, Mass.—Champion egg beater.
John Ross, Stapleton, N. Y., Conical Burr-stone mills with flour-dressing machines and mill apparatus.
Elting Bolt and Duster Company, Cincinnati, Ohio.—Bolt and duster machine.
Geo. Purrington, Jr., New York.—Carpet sweeper.
Chas. H. Hudson, New York—Clothes washer and rinser.
Schultz & Warker, New York.—Glass fountains for mineral waters.
Joseph Dixon & Co., Jersey City, N. J.—Plumbago or melting pots, stove-polish, and other articles of plumbago.
E. A. Pond, Rutland, Vt.—One-spring-power portable gas machine.
Hicks Engine Company, New York.—Steam engines of 5, 15, and 60 horse-power.
W. D. Andrews & Bro., New York.—Oscillating steam engines.
Corliss Steam-engine Company, Providence, R. I.—One Corliss steam engine.
T. R. Pickering, New York.—One stationary and one machine engine regulator.
Joseph P. Pirsson, New York.—Seamless copper and brass tubes.
L. H. Olmsted, Stamford, Ct.—Friction clutch pulley.
Geo. Dwight, Jr., & Co., Springfield, Mass.—Steam pump.
P. H. & F. M. Roots, Connorsville, Ind.—Rotary blower.
Joseph Sheldon, New Haven, Conn.—Water-pressure regulator.
Francis S. Pease, Buffalo, N. Y.—Atmospheric and hydraulic pump for mines, oil wells, and other purposes.
Joseph Firmenich, Buffalo, N. Y.—A variety of faucets made of hard rubber and wood.
Philander Shaw, Boston, Mass.—Shaw's Union double-action air engine.
James A. Robinson, New York.—Ericsson caloric pumping engine 15-inch cylinder.
Joel Bryant, Brooklyn, N. Y.—Bushing for ships' blocks; hand grinding mill.
E. & T. Fairbanks & Co., New York.—Scales or weighing machines of various patterns; also weights of all standards.
Junius Judson, Rochester, N. Y.—Graduating governor for steam engines.
Crosby, Butterfield & Haven, New York.—Hot-air engine one horse-power.
Thos. J. Jones, New York.—Spring for steam-piston packing.
Warren E. Hill, Brooklyn, N. Y.—Hill's patent grate-bars.
Dr. J. H. Beidler, Lincoln, Ill.—Beidler's hydro-caloric light or steam lamp.
Nathaniel Jenkins, Boston, Mass.—Valves and cocks.
Howe Scale Company, Brandon, Vt.—An assortment of scales.
Steam Syphon Company, New York.—Steam syphon pump; model of railroad water-station pump.
John B. Root, New York.—Root's trunk engine, five horse-power.
L. B. Tupper, New York.—Furnace grate bars.
H. C. Dart & Co., New York.—Twelve horse-power rotary steam engine steam pump.
Lyon & Isaacs, New York.—Self-feeding hand and power drill for drilling holes in metals, etc.
Hardy, Foulds, & Tappan, Boston, Mass.—Steam fire engine.
C. B. Harrison, San Francisco, Cal.—Steam pump.
James Cochrane, New York—Model of a method of lubricating.
Wm. Sellers & Co., Philadelphia, Pa.—Planing machines, lathes, drills, slotter, boring mills, bolt-cutters, stocks (dies, taps, and tap wrenches); Giffard injectors, with self-adjusting water supply; shafting, to drive above machinery; assorted lot of finished hangers, couplings, pullies, pillow-blocks and wall plates; also, assorted lot of pulley castings.
L. H. Olmsted, Stamford, Ct.—Self-feeding ratchet drill; spring-top oiler.
Webster & Co., New York.—Webster's patent ordinary wrench.
D. L. Harris & Co., Springfield, Mass.—One engine lathe, with improved cross feed, and Vanhorn's patent tool elevator, back gears and screw-cutting mechanism attached.
Bement & Dougherty, Philadelphia, Pa.—Screw, bolt thread, and nut-tapping machine; bolt and nut-threading machine.
American Tool and Machine Co., Boston, Mass.—Fox's screw-cutting lathe, with Nason's screw attachment.
J. R. Brown & Sharpe, Providence, R. I.—Revolving head-screw machine for manufacturers of fire-arms, sewing machines, and other light machine work; also, a universal milling machine.
A. H. Brainard, Agent, Boston, Mass.—Various sizes and styles of cast-iron vises.
Bates, Hyde & Co., Bridgewater, Mass.—Power cotton gin; hand cotton ging.
Southern Cotton-Gin Co., Bridgewater, Mass.—Saw cotton gin of 60 saws; roller cotton gin, 6-inch rolls.
H. L. Emery & Son, Albany, N. Y.—American universal cotton-gin, H. L. Emery's patent; condensers, with cleaner and delivery attachment; 1 one-horse endless railway horse-power, with speed-governor attachment.
Chas. A. Shaw, Biddeford, Me.—Six spindle steps, with spindles; card-grinding machine.
C. L. Goddard, New York.—One mestizo burring picker.
George Crompton, Worcester, Mass.—Loom for weaving woolen fancy cassimeres.
J. F. Palmer, Middletown, Ct.—Circular loom for weaving plain and twilled coverings for cords and other tubular fabrics; circular loom to weave a double twill, with two shuttle or weft threads for hose; machine for tentering and drying wide and thin fabrics.
Morris Opper, New York.—Power loom for weaving fabrics with gores or irregular surfaces, such as corsets.
A. B. Prouty, Worcester, Mass.—Card-setting machine for the manufacture of card clothing for cotton and woolen machinery.
Hall Manufacturing Company, Boston, Mass.—Bazon's improved twisting machine for laying up lines, cords, etc.
N. B. Hooper, Newark, N. J.—Hat-finishing machine, worked by power.
Bruen Manufacturing Company, New York.—An attachment for making the double loop stitch; an attachment for making the thin thread stitch for embroidery.
Lathrop Sewing-machine Company, New York.—Sewing machines in different styles, embracing the entirely new principle of working direct from two ordinary spools.
Wheeler & Wilson, New York.—Sewing and button-hole machines of various styles, with samples of work.
A. H. Howe, New York.—Sewing machines, with samples of work.
Weed Sewing-machine Company, New York.—Sewing machines adapted for family and manufacturing purposes.
Charles A. Shaw, Biddeford Me.—Foot and hand knitting machines of various styles and specimens of their work.
Howe Machine Company, New York.—Sewing machines; four styles.
Amos L. Wood, Boston, Mass.—Buttonhole and embroidery machines.
Eiskemeyer Hat-blocking Machine Company, New York.—Hat stretching and blocking machine.
Halligan & Shapter, New York.—Leather-sewing machines, with specimens of harness, boots, shoes, belting, etc.
Continental Manufacturing Company, New York.—Crank-motion shuttle sewing machine.
Joseph W. Bartlett, New York.—Sewing machines, double lock-stitch and single thread.
Henry H. Reed, Philadelphia, Pa.—American buttonhole, cording, and combined sewing machines.
Bartram & Fanton Manufacturing Company, Danbury, Conn.—Sewing and buttonhole machine.
Florence Sewing-machine Company, New York.—Reversible feed, lock stich sewing machine, with self-adjusting tension, making four distinct stitches.
Isaac W. Lamb, Rochester, N. Y.—Family knitting machines.
John J. Folsom, Winchendon, Mass.—Globe sewing machine.
Thos. J. McArthur, New York.—Sewing machine.
J. M. Sterling, Paris—Sewing and embroidery machines, and specimens of their work.
Elliptic Hook Sewing-machine Company, New York.—Sewing machines, two styles.
Chas. Houghton, Boston, Mass.—McKay sole-sewing machine.
Emile Nougarit, Newark, N. J.—Hat-pouncing machine.
Mumford, Foster & Co., Detroit, Mich.—Specimens of boot trees and lasts.
John B. Winslow, New York.—Double serpentine moulding machine.
Wright & Smith, Newark, N. J.—Scroll-sawing machine.
H. S. Jacobs, Portland, Oregon.—Wheel-dressing machine.
C. B. Rogers & Co., Norwich, Conn.—Molding machine for planing, matching, and sticking molding; iron-frame pencil machine for making lead pencils, also adapted for sash and moldings; medium tenoning machine with double copes; small power mortising machine; large foot mortising machine; patent self-oiling saw arbor; Broodworth planing and matching machine.
Fenn & Felber, St. Louis, Mo.—Zimmerman's mortising and slotting machine.
Baxter D. whitney, Winchenden, Mass.—Cylinder planing machine, two horse-power; gauge lathe, two horse-power; smoothing machine, one horse-power; Wardwell's patent saw bench, one fourth horse-power.
American Saw Company, New York.—Circular saw, with Emerson's patent movable teeth.
Warren P. Miller, San Francisco, Cal.—Adjustable teeth for saws.
Coon, Sherman & Co., Glens' Falls, N. Y.—One barrel machine.
Gegener & Weller, New York.—Patent liberty quarto medium job press.
John E. Sweet, Syracuse, N. Y.—Composing machine.
Patrick Welch, New York.—Compositor's type case; also, a machine for dressing printers' types.
Geo. B. Buell, New York.—Patent writing printing machine.
Dustin F. Mellen, New York.—Screw making machines, consisting of one heading, one threading, one shaving, and one nicking machine.
Chas. A. Warland, Pawtucket, R. I.—Potter's file-cutting machines.
Henry Winser, Philadelphia, Pa.—Shot and shell polishing machine.
Wickersham Nail Company, Boston, Mass.—Wickersham nail machine.
Henry Smith, Salem, Mass.—A method of equalizing the power of coiled springs.
John Prentice, New York.—Cigar machine in operation.
New York Quartz Company, New York.—Emery wheels.
Hoylen & Graffling, Dayton, Ohio.—Self-feeding tobacco cutter.
Wood Brothers, New York.—One phaeton, one buggy.
Brevet Major Gen. D. H. Rucker, Chief Quartermaster's Department of Washington, D. C.—United States Government army wagon and six sets of mule harness.
A. V. Blanchard & Co., Palmer, Mass.—Plough and shovel handles of bent wood. Photographs of machinery on which the articles were made.
John Scott, Ocalo, Fla.—One carriage wheel.
James Hall & Son, Boston, Mass.—One top buggy.
Augustus Harrington, Warsaw, N. Y.—Elastic sursingle attachment.
Chas. Stallman, Natchez, Miss.—Fine lady's saddle.
Chas. Wellman, New York.—Ladies' and gentlemen's saddles.
W. G. Creamer, New York.—Model of an English railway carriage with Creamer's safety brake attached; model or samples of automatic ventilators; samples of perforated ventilator.
B. J. La Mothe, New York.—Model of a portable house.
G. Easton, United States Consul, Bristol, England.—Model and plan of a street railway and carriage.
Andrew Foster, New York.—Graham's locomotive spring balance, designed to regulate and control the safety valves of the boilers of locomotive steam engines.
Grant's Locomotive and Machine Company, Paterson, N. J.—Passenger locomotive engine and tender complete.
Henry W. Warner, Greenfield, Mass.—Cast-iron chairs with two pieces of railroad iron.
J. L. Booth, Rochester, N. Y.—Steel-capped rail for railroads.
Star Metal Company, New York.—Star metal railway journal bearing.
Thos. S. Hall, Stamford, Ct.—Electric railroad switch alarm.
John Stephenson, New York.—First-class street railway car, constructed with top seats, adapted to the European mode.
S. E. & G. L. Morse, Harrison, N. J.—A new mode of laying and raising telegraphic cables.
A. F. Ward, Philadelphia, Pa.—A chart and pamphlet representing combinations of colors arranged in geometrical order, by which the various combinations, amounting to tens of thousands, may be readily found; designed as a universal code of signals.
Moses G. Farmer, Boston, Mass.—A thermo-electric battery.
Paul Schultze, New York.—Model of a church.
Board of Public Works, Chicago, Ill.—A drawing of the tunnel being constructed two miles under Lake Michigan.
John Johnson, Saco, Me.—Model of a steam dredging machine.
Isaac Gregg, Philadelphia, Pa.—A brick machine and specimens of brick.
Horace H. Day, New York.—Model of a new system of canals without locks, adapted for the passage of ships of any size.
Stephen Ustick, Philadelphia, Pa.—Model improved street lamp.
Broughton & Moore, New York.—Instruments and apparatus for plumbers' use.
B. S. Huntington, New York.—Lever blind fastener for windows.
Arthur Huston, Bristol, Me.—Miter box, with scale for sawing miters.
Johnson Rotary Lock Company, New York,—Locks, padlocks, door-locks, etc.
Morris, Tasker & Co., Philadelphia, Pa.—Boiler flues, tubes, valves, cocks, fire plugs, heating coils, etc.
Yale & Wirm Manufacturing Company, Shelburne Falls, Mass.—Various kinds of bank, safe-door, and other locks.
New York Quartz Company, New York.—Specimens of building stones.
Samuel Nicholson, Boston, Mass.—Model of an improvement in wooden pavement.
Wm. Webster, Rochester, N. Y.—Plans for a first-class public park; plans for the grounds of a private mansion; plans for a rural cemetery etc.
James Dana, Boston, Mass.—Faced or pressed brick.
S. T. Bacon, Boston, Mass.—Bacon's challenge lock.
S. W. Palmer, Auburn, N. Y.—An improved adjustable iron bench plane.
Gonges Ventilating Company, New York.—Atmospheric Ventilator.
Louisville Cement Co., Louisville, Ky.—Specimens of cement.
Dodds, Macneale & Urban, Cincinnati, Ohio.—Bank locks.
Henry J. Newman, Andover, Mass.—Imitation of American woods, painted in oil and distemper colors on whitewood plank.
Chapin & Wells, Chicago, Ill.—Model of a swing bridge.
R. D. J. Pratt, Washington, D. C.—Working model of propelling apparatus.
Joseph Duffy, Paterson, N. J.—Miniature sectional model of iron-clad ships.
Capt. J. M. Hudson, Brooklyn, N. Y.—Specimen of rigging for ships, having for its object the raising of the topsail yard.
J. B. Van Deusen, New York.—Model of a yacht, called Fleetwing.
Elisha P. Beckwith, New London, Ct.—Miniature fishing smack.
Fred. E. Sickles, Oak Dale, Pa.—Working model to illustrate the effect of controlling the rudders of steam vessels by power instead of by hand.
E. L. Perry, New York.—Life-saving raft for saving human life at sea.
C. L. Daboll, New London, Ct.—Daboll's fog whistle or trumpet.
Brown & Level, New York.—Life-saving tackle.
E. W. Page, New York.—Eight pairs of oars of different styles.
William Oscar Reim, M.D., Springfield, Ohio.—Hydrostatic scale for ascertaining the tonnage of freight of vessels.

EXTENSION NOTICES.

Isaac Brown, Cecilton, Md., having petitioned for the extension of a patent granted to him the 19th day of July 1853, for an improvement in Mode of Driving Saws, for seven years from the expiration of said patent, which takes place on the 19th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the first day of July next.

Enoch Hidden, New York, N. Y., having petitioned for the extension of a patent granted to him the 21st day of June, 1853, reissued Sept. 8th, 1863, and again reissued March 15th, 1864, for an improvement in Side Light for Ships, for seven years from the expiration of said patent, which takes place on the 21st day of June, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 17th day of June next.



ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 16, 1867.
Reported Officially for the Scientific American

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

On filing each Caveat	$1
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On 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)	$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.

63,779.—Mode of Uniting India Rubber with Leather.—Aaron C. Andrews, New Haven, Conn.

I claim uniting india rubber to leather or other material by forming grooves or creases in such material into which the rubber is pressed previous to vulcanizing, as and for the purpose specified.

63,780.—Saw Mill.—Asa Bee, White Oak, West Va.

First, I claim the application of the guide rollers N, or their equivalents to the stirups J, substantially as and for the purpose specified.

Second, I claim the V-shaped adjustable and reversible guide bars O, when constructed and applied substantially as and for the purposes set forth.

Third, I claim the clearers P, which constructed and applied in the manner and for the purpose explained.

Fourth, I claim the combination of the springs T T3 T5, and lever T', when constructed and operating as described to communicate motion from the saw sash to the grip iron.

Fifth, I claim the spring T3, when constructed and made ajustable in the slotted lever T1, in the manner specified for the purpose of changing the feed, as described.

Sixth, I claim a grip iron when constructed with adjustable gripping blocks V1 V2 substantially as and for the purpose specified.

Seventh, I claim the adjustment of the blocks W1 W2 by means of the arm X, and clamp Y, as and for the purpose described.

63,781.—Mold for Pipe Casting.—Henry M. Bird, Cambridgeport, Mass.

I claim the combination as well as the arrangement of two or any other suitable number of the flange finishing and core supporting flasks D, provided with masses E, of molding sand, or its equivalent with a pipe mold, A B, and its core C, the whole being substantially as and for the purpose described.

63,782.—Harness Buckle.—George S. Caldwell, Syracuse, N. Y.

I claim the combination and arrangement of the buckle as herein set forth, viz., with the toothed jaws B B, resting in the edges of the frame, and bearing upon the edges of the tug or strap by means of the pins and inclined slots i k, or equivalent as specified.

63,783.—Axle Box.—Neil Campbell, (assignor to himself and William Frazier,) Brooklyn, New York.

First, I claim the flanges a a' on the exterior of the pedestal in combination with the grooved and shouldered removable base plate C, substantially in the manner and for the purpose described.

Second, The removable base plate constructed so as to be applied as described and also with sockets to receive a tie rod and end braces D D, substantially in the manner shown and described.

Third, The combination of the brackets E', studs d d', and solid springs F, F, substantially in the manner and for the purpose described.

Fourth, The combination of the enlarged sleeves K, with a grooved face bearing block H, having flanges I I, substantially as described.

Fifth, The lugs h h, collar I, and pin j, in combination, as a means for securing a removable sleeve K, to the arm of a railroad car axle, substantially as herein described.

Sixth, The box E, with brackets E', on its sides and the pedestal with semi-cylindric chambers and with a cap A, so that solid springs F F, may be employed and confined in place by means of the removable base plate C, all substantially in the manner described.

63,784.—Machine for Making Drain Water Pipes.—Chas. Collier, Charlestown, Mass.

I claim a clay cylinder or receiver B, in combination with an hydraulic cylinder operating a piston or plunger D, for ejecting the clay from the receiver in the required form for a pipe or tile substantially as described.

I also claim connecting the head or plunger D, with the piston E, of the hydraulic apparatus by means of a screw e, so that it may be moved toward and from the clay-cylinder by hand for the purpose specified.

63,785.—Paper File.—Germond Crandell, Washington. D. C.

I claim a bill and paper file made as herein described or its substantial equivalent.

63,786.—Millstone Feed.—Michael DeCamp, South Bend, Ind.

First, I claim the separator constructed and operating substantially in the manner herein described and applied in the relation substantially as shown and described to the millstone feeder and the eye of mill stones for the purpose set forth.

Second, The construction of the mouth of the separator in the manner substantially as shown and described, so that the separator is adapted to be applied to a mill and to operate substantially as described, for the purpose set forth.

Third, The arrangement of a millstone feeder and a separator in the relation to one another substantially as shown and described and for the purpose set forth.

Fourth, The raised step e e1, arranged on an inclined support and in relation to the inclined partition b, and the passage d, substantially as and for the purpose described.

63,787.—Sash Supporter.—Herman Ehle, Utica, N. Y.

I claim the employment and use of one or more rods or bars C, attached to the sash and operated substantially as described.

I also claim in combination with said roads or bars C, and sash B, the nuts or disks D, and thumb screws E, the whole being attached and operated substantially in manner described, for the purpose mentioned.

63,788.—Treshing Machine.—George Eichenseer, Waterloo, Ill.

I claim the combination of the screw bolts, a and a', substantially as and for the purpose set forth.

Second, The combination of the shaft, e, its bearing block, e2, and sliding bar, e3, the ways, e4, with the screw bar, e5, and handle nut, e6, all acting substantially as and for the purpose set forth.

Third, The combination of the pulleys, e11 and e12, for packing the driving band, D, substantially as and for the purpose set forth.

Fourth, The cutter teeth, h9, for cleansing the crevices between the flanges, h8, and the feed plate, h4, as set forth.

Fifth, The application of the drop guide plate, k5, as set forth.

Sixth, The combination of the conduit, o3, and o4, with the door, o5, substantially as and for the purposes set forth.

Seventh, The combination of a feed plate, h4, arranged for vertical adjustments, with the thresher cylinder, h2, arranged for lateral horizontal adjustment, substantially as set forth.

Eighth, The combination of the separators, k k1 k2, with the return feed plate, k3, chaff discharge plate, k4, and guide drop plate, k5, all with the air currents adjusted and directed by the vane, p4, substantially as set forth.

63,789.—Apparatus for Refining and Distilling Petroleum, etc.—John Ellis, New York City, and Edward C. Hattell, Binghamton, N. Y.

First, we claim the using of steam and super heated steam for the purpose of separating and removing the more volatile from the less volatile portions of petroleum, kerosene, benzine, naphtha and turpentine, while these fluids are in a state of spray or drops, as specified.

Second, The oil pipes, E, and K, and condensing tubes, D and I, when constructed and arranged in relation to each other, and a retort, as and for the purpose specified.

Third, The separating tank tub, or tube, in combination with an upper and under retort, for the purpose of separating the water and earthy impurities from the oil before the latter flows into the lower retort.

Fourth, The using in a retort scraps of metal wire, wire sieves, nails, turnings, or other metallic or earthen materials, or even vegetable substances, which will either form a screen or a porous mass through which oil can trickle down so as to expose a large surface of it to the action of heat.

Fifth, The using in a retort or retorts of a series of nearly or quite horizontal plates, shallow pans or shelves, which may lie concave or with edges turned up, plain or convex, perforated with from one to numerous openings, or without any openings, over which oil can flow or drop, or run from point to point, in combination with the pipe, I, and coil, K, so as to expose a very large surface to the action of steam, and to form a very large evaporating surface.

Sixth, The using an agitator in a circular or nearly circular retort, for the purpose of throwing the oil into a spray or drops, so as to expose every drop as far as possible to the direct action of heat, and allowing the oil or fluid being distilled to flow through the retort in a steady stream, but not to accumulate in any considerable quantity in the retort, substantially as represented in the drawings.

Seventh, The condensers, A M and Q, containing internally, plates, discs, turnings, or an agitator into which the vapor of oil and cold water are allowed to flow for the purpose of condensing the vapor, substantially as represented in the drawings and described in the specification.

Eighth, The blowing the inflowing oil into a state of spray, by a current of steam, by allowing the steam to strike the stream of oil substantially as is represented by the oil pipe, u, and the dotted steam pipe, t, in the drawings of retort, L.

63,790.—BED BOTTOM.—Daniel Fitzgerald, New York City.

I claim the bar, B, provided with holes or openings, cut directly through it from side to side, when used in combination with an elastic or other band or cord passed through said openings in the manner represented for the purpose of forming a reversible bed bar which will support the slats when either side is down, substantially as herein set forth.

63,791.—CHURN.—J. C. Gaston, Cincinnati, Ohio.

First, I claim in the dasher the inverted cup-shaped hub, E, the cavity, b, being cylindrical, and two or more series of radial arms, F, secured to the exterior of the hub, E, all constructed substantially as above described, and for the purpose specified.

Second, In combination with the lid, B, which has the enlarged central perforation, a, the guard plate, c, pendants, b, and blocks, c, arranged substantially as and for the purpose above described and set forth.

63,792.—JOINT FOR CARRIAGE TOP BRACES.—G. Gregory and F. B. Morse (assignors to themselves and W. H. Cooper), New Haven, Conn.

We claim the herein described stump joint, as an improved article of manufacture, consisting of the two parts, A and B, upon the ear of one of which is formed a stud, a, and in the other a corresponding recess, so that the said stud forms the bearing or pivot for the joint, substantially as herein set forth.

63,793.—MACHINE FOR FORMING TUBES OF SHEET METAL.—William Hall, Dubuque, Iowa.

First, I claim the grooved plates, A a, hinged together and operated as and for the purpose set forth.

Second, The slotted mandrel, F, in combination with gear wheels, C C, arranged and operating as described.

Third, In combination with the grooved plates, A a, the sliding straight-edged bar, H H, with its elevated projecting flange as operated and described.

Fourth, The sliding frame, G G, with its clamping device, b b, and wheels, d d, in combination with the inclined plane, m m, operating substantially as described and for the purpose set forth.

Fifth, The combination and arrangement of the plates, A a, mandrel, F, gear wheels, C, sliking frame, G, with its parts, b b, inclined plane, m, and sliding bar, H, with projecting flange, substantially as and for the purpose set forth.

63,794.—RAILWAY SWITCH.—John A. Heyl, Boston, Mass.

I claim the arrangement of the bars, I I', the cranked shaft, G, the connecting rods, H H', the lever, E, the toggles, F F', the connection bar, D, the whole being applied to the switch, and so as to aid in operating it in manner and under circumstances substantially as hereinbefore explained.

63,795.—TABLE CUTLERY.—Walter Hubbard, Meriden, Conn.

I claim the solid handled cast metal knife herein described, the same being a new article of manufacture.

63,796.—OX BOW PIN.—Orange D. Hunter, Terrysville, Conn.

I claim securing the bolt, c, on the plate, b, by means of the prongs, c, in combination with the drop latch, h, substantially as and for the purpose described.

63,797.—UNITING STOVE PIPES, ETC.—A. B. Hurd, Watkins, N. Y.

First, I claim uniting joints of stove pipe, by means of the projections made by the indentations, a, on one piece, being shoved longitudinally in the groove, b, of the opposite piece, and then turned into the circumferential groove, c, as shown and described.

Second, Uniting joints of pipe by means of the circumferential beads, e and n, and the narrow slits, h, when arranged for joint operation as herein described.

63,798.—MACHINE FOR FELTING OR FULLING YARN, ETC.—Moses A. Johnson, Lowell, Mass.

I claim, in combination with a cork surface, aprons, cylinders and steam rolls, and the presence of heat and moisture for felting or fulling yarns, composed of wool, fur, hair, in whole or in part, substantially as described.

63,799.—SAW-MILL DOG.—Cyrus G. Jones, Orono, Me.

First, I claim the short carriage, A, constructed substantially as shown and described, for use in front or rear of the saw, and having the two independently-moving jaws, H and I, mounted thereon in such a manner as to dog the log from above and below, substantially as herein set forth.

Second, The jaw, I, mounted on the guide rods, R, and arranged to be operated by the wheel, D, and cord, U, substantially as described.

63,800.—WINDLASS FOR WELLS.—F. H. Jones, Attica, N. Y.

I claim the loose drum, C, and windlass shaft, B, in combination with the disks, J and E, springs, Z, sleeves, D, clutch, f, winch, G, and adjusting screw, n, arranged and operating substantially in the manner and for the purpose set forth.

63,801.—PORTABLE FENCE.—James Lefeber, Wayne, Ind.

I claim the double triangle, consisting of the posts, A A, bars, E E, and cross pieces, e e, and rails, 1 2 3 4 5 6 and 7, in combination with the cross pieces, c c c c and D D, all arranged and constructed substantially as and for the purposes set forth and described.

63,802.—GAS BURNER.—R. B. Locke, New Orleans, La., and Wm. B. Ulrich, Concordia Parish, La.

First, I claim providing a gas burner, with a small secondary gas taper or burner, which is so arranged as to serve as a means for lighting the gas when admitted to the principal burner, substantially as described.

Second, In combination with a gas burner, which is provided with a smaller gas burner or taper for lighting it, we claim a cock, D, which is constructed so that it shall cut off the gas from the smaller burner when gas is admitted to the main burner, substantially as described.

Third, The divisional piece, d, or its equivalent, applied to the orifice, a, of the grooved cock, D, and constructed with gas escapes, e e, in combination with a self-lighting burner, substantially as described.

Fourth, The hood or shell, G, in combination with a self-lighting gas burner which is constructed substantially as described.

63,803.—CEMENT ROOFING.—Robert O. Lowrey, Saratoga Springs, N. Y.

I claim a plastic foundation for roofs to receive, hold, and absorb more or less of the roofing cement, constructed and applied substantially as set forth.

63,804.—FARE BOX.—William H. McLellan (assignor to St. Charles street Railroad Co.), New Orleans, La.

I claim the combination of the push arm, A, tilt door and shelf, B, tilt, C, and sliding shelf, D, when these several parts are constructed and arranged for conjoint operation as described for the purpose set forth.

63,805.—MANUFACTURE OF SPEET-IRON.—Joseph Miller, Cuba, N. Y.

I claim the improved mode of manufacturing sheet-iron, as herein shown, by raising it to a welding heat just as it is about passing between the finishing rollers, substantially as and for the purpose described.

63,806.—HAY LOADER.—Joseph Morgan, West Springfield, Mass.

I claim the attachment of a wooden grooved drum, to the inside of a wheel of a hay cart or wagon revolving upon the hub, in combination with the crane and machinery by which said drum is connected to and disconnected from the wheel automatically, the whole constructed and operating substantially in the manner as herein described.

63,807.—PENDULUM LEVELS AND SIGHTS COMBINED.—Chas. Morrill, New York City.

First, I claim the combination of a swinging frame, C, with a suitable stock, A, substantially as herein specified.

Second, The combination of the swinging frame, C, stock, A, and arms, B, substantially as herein specified.

Third, The combination of the set screw, H, with one of the arms, B, and swinging frame, C, substantially as herein specified.

Fourth, The combination of the globe-sight, E G, with the stock, A, and swinging frame, C, substantially as and for the purpose herein specified.

Fifth, The bob or pendulum, D, with the graduated swinging frame, C, when such bob is pivoted at its upper end to the upper part of said swinging frame, substantially as shown and described.

Sixth, Providing the inner surface of the swinging frame, C, with a rib, d, and constructing the lower end of the bob or pendulum conformably thereto for the purpose of allowing the bob or pendulum none but the required motion.

63,808.—COMPRESS FOR COTTON, ETC.—E. L. Morse, St. Louis, Mo.

I claim the combination of the endless screws, E', on the power shaft, E, with the screw guard sectors or wheels, C, the lifting rods, C4, and platen, D, when acting substantially as and for the purpose set forth.

63,809.—VEGETABLE SLICER.—A. M. Olds, New York City.

I claim the combination of the adjustable inclined plane, B, with the grater A, slots, D, and triangular apertures, F, when constructed and arranged substantially in the manner and for the purposes set forth.

63,810.—METHOD OF SECURING HEADS IN SEAMLESS CASKS.—Dewey Phillips, Shaftesbury, Vt., and William Reid, West Arlington, Vt.

We claim the method herein described, of putting the heads or bottoms in seamless casks or other vessels, by making the heads or bottoms of a less diameter than the inner diameter of the shells at the croze, and then compressing the ends of the shell into close contact therewith preparatory to putting on the hoops, substantially as described.

63,811.—PORTABLE FURNACE FOR BOILERS.—Daniel R Prindle, East Bethany, N. Y.

First, I claim the construction of a combined furnace and support for boilers, caldrons, or steaming vessels, of an extended horizontal base, D, an outer jacket, E, and a constructed fire box, which is formed of side plates, F F and F', substantially in the manner described.

Second, In a furnace which is adapted for supporting and heating caldrons or steaming vessels, I claim the air spaces, g g g, for protecting the fire box plates formed substantially as described.

Third, The deflectory plate, G, adapted to serve as a cover for the rear air space, g, and also as a means for directing the heated products of combustion forward around the bottom of the caldron, substantially as described.

Fourth, A heating furnace which is also adapted to serve as a firm and safe support for a caldron or steamer, constructed substantially as herein described.

63,812.—HORSE HAY FORK.—Elias Rhodes, Jr., Clyde, Ohio.

First, I claim the tubular rods or links, A B C, provided with the shanks, b, and head, F, constructed and applied as and for the purpose set forth.

Second, The arrangement of the lever arm, G, provided with the lug, h, in combination with the cross head, E, tubular links, A B C, shanks, b, and jaws, D, when the several parts are constructed and arranged as and for the purpose set forth.

63,813.—METALLIC BOBBIN.—William B. Rice, Utica, N. Y., assignor to himself, John Rice, and E. S. Munson.

First, I claim the combination of a hollow metal base, C, with a tubular metal spindle, A, constructed and united substantially as and for the purpose set forth.

Second, I claim the inverted conical shoulders formed at the base of the hollow spindle, when the said spindle is attached to the hollow metallic head, substantially as and for the purpose set forth.

63,814.—APPARATUS FOR MAKING MEDICAL PLASTERS.—Albert D. Richards, Lowell, Mass.

First, I claim the bed piece, B, when made with sunk panel and raised edge, substantially as shown and described and for the purpose set forth.

Second, The pan, C, when made with the opening having chamfered edges, in combination with the bed piece, B.

63,815.—GAS-COOKING STOVE.—George O. Sanderson, Boston, Mass.

First, I claim the combination and arrangement of the pipes, G G, with the oven, L, substantially as described and for the purpose set forth.

Second, The combination of the basins, B B', with the pot holes of the cooking stoves, substantially as described and for the purpose set forth.

Third, The combination of the short cylinders, D D, with the rear pot holes and the top of the oven, substantially as described and for the purpose set forth.

63,816.—STEAM SAFETY VALVE.—John Shaffer (assignor to Samuel Baxter), St. Louis, Mo.

I claim the arrangement of the double-seated safety valve, C, with reference to the case, D and levers, E and F, substantially as and for the purpose set forth.

63,817.—LADY'S FAN.—Francis B. Scott, Lancaster, N. Y.

I claim a lady's fan having a perforated center piece, A, with or without designs printed or formed thereon, as a new article of maufacture, substantially as described.

63,818.—WINDOW SCREW.—Francis B. Scott, Lancaster, N. Y.

I claim a window screw made of perforated card board and supported in a wood or iron frame, as a new article of manufacture, substantially as described.

63,819.—MACHINE FOR CUTTING THE WIND PASSAGES IN THE ROTARY VALVES OF CORNETS.—Lewis W. Spencer (assignor to Schribner Cornet Manufacturing Co.), New York City.

I claim the combination of the mandrel with its burr cutter, the chuck capable of being turned and held in position and provided with griping jaws, substantially such as described, and the two carriages capable of being moved at right angles, the one with the other, substantially as and for the purpose described.

63,820.—HANDLE FOR SIGNAL LANTERN.—A. N. Towne, Chicago, Ill.

I claim bending a lamp handle at or near the center at a right angle, in combination with a guard handle, or its equivalent, as and for the purpose set forth.

63,821.—PROTECTING PADS FOR INTERFERING HORSES.—A. D. Westbrook (assignor to himself, R. W. Daniels, and John Humphrey), Buffalo, N. Y.

I claim retaining a pad in place on a horse's hoof by means of a hook, J which engages with the clip, c, of the shoe, substantially as set forth.

63,822.—WOOD REAMER.—Peter Meyers, Stoutsville, Ohio, administrator of the estate of Emanuel Young, deceased.

I claim as a new article of manufacture a tapering reamer constructed substantially as set forth.

63,823.—DIE FOR SWAGING CALKS FOR HORSESHOES.—John Allen (assignor to himself and Samuel Ferry), Palmer, Mass.

I claim a toe-calk die constructed of the plates, a b c, with the grooves, d e f g, arranged and constructed substantially as and for the purpose set forth.

63,824.—PERMUTATION LOCK.—George B. Atwood, Philadelphia, Pa.

First, I claim locking the spindle, D, in a position disconnected from the bolt, F, by preventing longitudinal motion without preventing rotary motion in the said spindle by means of the disks, E E1 E2, and block, K, constructed and arranged to operate together substantially in the manner described and set forth.

Second, I claim the loose measuring ring, I, in combination with the knob, C, arranged and operating together substantially as and for the purpose described.

63,825.—PORTABLE FENCE.—John Augspurger, Trenton, Ohio.

I claim the construction of a light and portable fence in lengths or panels with one short and one long post, substantially as shown and described, to be connected in a worm or zigzag shape by means of the hooks, C C', and eyes or staples, D D', in combination with the spring, E, as set forth.

63,826.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

I claim the construction of a light portable fence in lengths or panels, with one short and one long post, substantially as shown and described, to be connected and secured in a worm or zigzag form by means of the prolonged and gained rails, F F', in combination with the slide, D, as shown and set forth.

63,827.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

First, I claim the construction of a light portable fence in lengths or panels with one short and one long post, substantially as shown and described, to be connected and secured in a worm or zigzag shape by means of the prolonged and gained ends of certain of the rails, and the notched and tongued intermediate rails, as a b.

Second, I also claim in combination with the elements of the first clause, the additional block, D, attached to the end of the supporting foot of each panel, to serve as an anchor to give the fence additional firmness.

63,828.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

First, I claim the construction of a light and portable fence in lengths or panels, with one short and one long post, substantially as shown and described, to rest upon the surface of the ground in a worm or zigzag shape and to be connected and secured by means of the hooks, C, staples or eyes, D, and cleats, a b, or cleat, E, and oblique gains, F, operating as shown and set forth.

Second, In combination with the elements of the preceding clause, I claim the block, H, serving as an anchor, as set forth.

63,829.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

I claim the construction of a light portable fence in lengths or panels having one short and one long post, substantially as shown and described, and connected and secured in a worm or zigzag form by the hooks, a, and staples, b, in combinating with the gravitating button, D, and anchor block, C, the whole operating as shown and set forth.

63,830.—CULTIVATOR.—Wm. M. Ball, Morristown, Ind.

First, I claim the arm, s, provided with screw thread and nuts, t, as described, in combination with bar, e, for the purpose herein specified.

Second, The arm, s, provided with screw thread and nuts, t, the bar, e, handle, d, standards, C C C, braces, b b b, and beam, A, when the whole are combined, arranged and operating in the manner and for the purpose substantially as herein set forth.

63,831.—MATTRESS AND LIFE-PRESERVING FLOAT.—Louis Bauhoefer, Philadelphia, Pa. Antedated April 9, 1867.

I claim, First, An air bag, C, and a mattress or cushion, D, arranged within a frame substantially as and for the purpose described.

Second, The frame, A, with its buoyant cushion, B, and detachable buoyant cushion, D, and detachable air bag, C, the whole being arranged substantially as and for the purpose set forth.

Third, The frame, A, with its detachable cushion, D, in combination with the detachable cover, c, and the strips, e e, or their equivalents, for the purpose specified.

63,832.—MACHINE FOR DISINTEGRATING AND PULPING FIBROUS MATERIAL.—J. C. Beach, Bloomfield, N. J., and J. Abbey, Orange, N. J., assignor to J. C. Beach, Bloomfield.

I claim, First, The combination of the two spiral ribbed cylinders, A A, constructed and operating together in the manner and for the purpose set forth.

Second, The flat-faced bar, p, and the adjustable boxes, t, either or both of them, when used in combination with the spiral ribbed or grooved cylinders constructed and operated as shown,

63,833.—WAGON BRAKE.—W. W. Bean, Iowaville, Iowa.

I claim the application of the key block, C, fig. 3, in combination with brake operating upon the wheels by the action of tongue bar sliding in the holes, F, made in the tongue bounds, with the frame, E, and brace bars, D D, connected with the wooden rubber, as substantially described.

63,834.—CONCUSSION FUSE FOR EXPLOSIVE SHELLS.—Wm. S. Beebe, Philadelphia, Pa.

I claim, First, So attaching an inertia fuse to the interior of a hollow projectile that while it is secure against any ordinary shock, it will be broken loose by the discharge or the cannon or mortar from which it is fired, when such fuse is so constructed and arranged that, lying loosely in the powder during the flight of the projectile, it will turn its loaded end against the wall of the cavity in the projectile and explode when the flight of such projectile is suddenly arrested or checked, substantially as above described.

Second, A percussion or frictional fuse which is constructed with a loaded head, A, terminating in a feathered tail, a, and adapted for use in spherical and other tumbling shells, substantially as described.

63,835.—BLIND FASTENING.—E. B. Beecher, Westville, Conn.; Joseph G. Davis, Henry E. Frost, and Anthony G. Davis, Watertown, Conn.

We claim, First, The combination of the grooved friction wheel or pulley, H, the two semicircular clamps or brakes, I, and the slotted cap or case, G, with each other, with the shank of the knob or handle, F, and with the shaft, E, of the gear wheel, D, substantially as herein shown and described.

Second, The shaft, E, connected to the gear wheel, D, and to the knob or handle, F, in the manner herein shown and described and for the purpose set forth.

63,836.—WOOD-TURNING LATHE.—H. C. Berry, Wauseon, Ohio.

I claim a back rest for a wood-turning lathe composed of the segment, A, in combination with the spreading bars, B B, and the friction rollers, d d, constructed and operating substantially as and for the purpose herein specified.

63,837.—BUTTON FOR FASTENING CARRIAGE CURTAINS.—Salmon Bidwell, Bordentown, N. J.

I claim the construction and arrangement of the vertically swinging triangular plate, b, pivoted in the pin, A, in such a manner that its inner point may fall by its own gravity and rest against the upper edge of the shoulder upon the pin, G, its lower point fitting over and securing the plate, D, as herein shown and described for the purpose specified.

63,838.—PLOW.—Wm. Zeller, Lebanon County, and Richard Lechner, Berks, Pa., assignors to James Wallace, Lebanon Co., Pa.

We claim the jointed rod, D D', used in combination with the beam and the handle, H, as and for the purpose specified.

63,839.—SCHOOL DESK.—James E. Blair, New Haven, Conn.

I claim a school desk cover reversible in the manner substantially as described, having one of its surfaces coated or plated as herein set forth.

63,840.—HAND CULTIVATOR.—Reinard Blum, Champaign, Ill.

I claim the arrangement of the beam, A, wheel, B, shank, C, provided with point or tooth, D, with the handles, E E, and strap, F, for forming a hand cultivator, substantially as specified.

63,841.—ATTACHMENT TO MUCILAGE BOTTLES.—Douglas Bly, Macon, Ga.

First, I claim an attachment to a mucilage bottle for clearing the brush, having such a range of motion that when lowered it rests beneath the surface of the liquid, but when raised for action it rests above the surface, as set forth.

Second, An attachment to a mucilage bottle so arranged that the clearing edge for the brush is situated below the mouth of the bottle, as specified.

Third, A device for clearing the brush of a mucilage bottle, consisting of flexible jaws, between which the brush rests, as herein set forth.

Fourth, The combination of the nibs, c, and stops, d, with the attachment, B, and bottle, A, operating substantially in the manner and for the purpose specified.

Fifth, The cover, g, provided with the slits, h, for shutting over the flange of the attachment, as herein set forth.

63,842.—WOOD BORING BIT.—Charles Boernicke, Philadelphia, Pa.

I claim the combination and arrangement of the tube, A, composed of the slotted parts, e f, within which is pivoted the rod, b, provided at its lower end with the horizontal cutter, c, working through the slot near the lower end of the tube, A, its upper end bent so as to project in an inclined line through the slot in the upper part of the tube, A, its upper end bent so as to project in an inclined line through the slot in the upper part of the tube, A, and held outwardly by means of the spring, d, as herein set forth for the purpose specified.

63,843.—CAR BELL.—A. Borrowman, New York City.

I claim suspending the tongue, B, in the slotted bell, A, by means of the pin, C, passing through the upper side of the bell, and through the end, D, of the tongue, B, as herein set forth for the purpose described.

63,844.—BOOTJACK.—Henry D. Boss, Williamsburgh, N. Y.

I claim a bootjack having the inside of its jaws provided with an india-rubber bearing surface for the boot heel, inserted therein, substantially as and for the purpose specified.

63,845.—PROPELLING ATTACHMENT FOR CHILDREN'S SLEDS.—F. Philip Bourne, Williamsbridge, N. Y.

I claim the attachment of lever picks, B, to sleds, sleighs, etc., substantially as and for the purpose described.

63,846.—EXERCISING APPARATUS.—Benjamin F. Brady, New York City. Antedated April 8, 1867.

First, I claim the combination of the levers, F, with the seat, a, and with springs applied in such manner that their tension will oppose the backward movement of the said levers, substantially as herein set forth for the purpose specified.

Second, The outriggers, B, levers, F, arms, D, and springs, E, combined in relation with each other and with the box, A, and seat, a, substantially as herein set forth for the purpose specified.

63,847.—COMPOSITION FOR COATING LEATHER.—Ellison Brown, Indianapolis, Ind., assignor to himself and James B. Bell, Cincinnati, Ohio.

I claim the water-proof oil polish compounded of the ingredients named, or their chemical equivalents, in the manner and for the purpose substantially as set forth.

63,848.—ELECTRO-MAGNETIC BATTERY.—Peter Bruso, Erie, Pa., assignor to himself and Charles B. Clark, Buffalo, N. Y.

I claim the adjustable connecting arm, A, for the cups of electro-magnetic batteries consisting of the pivoted attachment, f f g, and sliding clamp for the platinum, constructed and operating substantially as set forth.

63,849.—COTTON TIE.—W. F. Buckelew, Shreveport, La.

I claim the point, A b a, in combination with the point, c, and the bend, B C, as and for the purpose set forth.

63,850.—ATTACHMENT FOR CONTROLLING DRAFT IN STOVEPIPES.—Ira S. Bullard (assignor to himself and C. H. Parker), Geneva, N. Y.

I claim the construction and arrangement upon the side of the stovepipe, A, of the circular box, B, provided upon its slotted face, C, with a semicircular graduated ring, D, and depressions, b, into which fits the pointed stud of the spring index hand, H, secured to the end of the damper spindle, G, sliding slotted plate, I, hung upon said spindle, and held in place by means of the spiral spring, b', substantially as herein shown and described for the purpose specified.

63,851.—CORN PLANTER.—John Burns, Elyria, Ohio.

I claim, First, The wheels, D, provided with the rotary cutting blades, E, in combination with conductors, O, and seed boxes, Q, when arranged and operated conjointly with the adjustable frames, A B, as and for the purpose described.

Second, The levers, J L, and links, M K, as arranged, in combination with the pole, H, and adjustable frames, A B, for the purpose and in the manner set forth.

63,852.—STRAW CUTTER.—W. W. Burson, Rockford, Ill.

I claim, First, The arrangement of the cutting knives, a a', in combination with the spiral arms, b b' of pulley, A, constructed and operating substantially as described.

Second, In a combined fuel and feed cutter, the manner of fastening the cutting knives, a a' b b', to the pulley, A, substantially as described.

Third, The arrangement of the knives, a a' b b', to the pulley, A, and the construction of the stationary cutter, c, operating substantially as and for the purpose set forth.

Fourth, The arrangement of the feed passage, I, with relation to the cutters, a c, substantially as described and operating for the purpose set forth.

Fifth, The construction of the feed rollers, d d', for the purpose of giving an intermittent feed motion, as described.

Sixth, The placing of the additional knives, b b', upon the pulley, A, and additional serrated plates, i i, upon the feed rollers, d d', substantially as described and operating for the purpose set forth.

Seventh, The combination and arrangement of the nut, F, with shaft, H, and cutter pulley, A, substantially as described and operating for the purpose set forth.

63,853.—PORTABLE FENCE.—John T. Campbell, Rockville, Ind.

I claim, First, The cross stakes, C, with the notches, b, combined with the wedge, c, and arranged for supporting the plank rails, A, in the manner herein specified

Second, A fence constructed with the plank rails, A, and posts, B, so united by bolts and nuts, a, as to permit any required degree of inclination to be given to the rails, the posts remaining vertical thus permitting its adaptation to convertable use, substantially as and for the purpose set forth.

63,854.—HAND SEEDING MACHINE.—M. D. Cone, Port Gibson, N. Y., and A. N. Douglass, Avon, N. Y.

We claim, First, Suspending the seeding apparatus from the front of a hand barrow by which they are drawn, substantially in the manner and for the purposes shown and described.

Second, The employment or use of the revolving seed cylinder, C, when it is made to contain the supply of grain, substantially as and for the purposes set forth.

Third, Enclosing the grain cylinder, C, within the casing, B, for the purpose of concentrating the seed after leaving the distributing cylinder and conveying it to the drill through the conductor.

Fourth, The adjustable perforated band, n, in combination with the revolving seed cylinder, C, substantially as and for the purposes set forth.

63,855.—LOCKING APPARATUS FOR FERRYBOAT.—James L. Canham, Newark, N. J.

I claim, First, Pivoting the blocks, D, to the frame of the boat in such a position as to take hold of the teeth of the racks, C, and hold the boat locked, substantially as herein shown and described.

Second, The combination of the springs, F, pivoted blocks, D, chains, G, shaft, H, ratchet wheel, J, and pawl, K, with each other, substantially as herein shown and described and for the purpose set forth.

Third, Attaching racks, C, to the fenders, B, substantially as herein shown and described and for the purpose set forth.

63,856.—MACHINE FOR STUFFING AND CURRYING LEATHER.—Frederic Carl, Charlestown, Mass.

I claim, First, The combination of the rotating cylinder, A, of the shaft, B D, and perforated cage, E, or its equivalent, as and for the purpose described.

Second, The combination of the cylinder, A, and coiled pipe, G, as and for the purpose set forth.

63,857.—EXCAVATOR.—Oliver S. Chapman, Canton, Mass.

First, I claim the shovels, E, provided with the doors, F" and f, arranged to operate as herein described.

Second, The combination of the latterally adjustable hub, h, provided with the inclines, e' and the rock shaft, c, for tightening the friction bands, b, substantially as and for the purpose set forth.

Third, The combination of the bands, U, rock shafts, c, provided with the arms or levers, d', and the block, W, when arranged to operate as and for the purpose set forth.

Fourth, Constructing the wheels with a notched flange as represented in fig. 1, for the purpose herein set forth,

Fifth, I claim constructing the machine with the extra wheels, T, of larger diameter than the wheels, G, for the purpose of running the same on ordinary railway tracks clear of obstructions, substantially as set forth.

Sixth, The compound gear wheel, consisting of the movable portion, F, having slots therein, and the disk, F, with projections to fit into said slots, with the rubber or other yielding material interposed the whole being arranged for joint operation, substantially as shown and described.

Seventh, The combination of the clutch wheel, I, constructed and arranged as described with the endless chain, H", and sprocket, w and w' as set forth.

63,858.—PLANTER AND CULTIVATOR COMBINED.—Isaac H. Chappell, Decatur, Ill., assignor to himself and James B. Millison.

First, I claim the combination of the adjustable lever, J, with the beams, H, substantially as herein shown and described and for the purpose set orth.

Second, The combination of the bent lever, W, and cross bar, X, with each other and with the standards, T, of the plow, S, substantially as herein shown and described and for the purpose set forth.

Third, Making the seat bar, N' adjustable substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the roller shaft, G' arms, H' I, shaft, J', and arm, K' with each other and with the valve bar, F', substantially as herein shown and described and for the purpose set forth.

63,859.—SEED PLANTER.—E. E. Chesney, Abingdon, Ill.

First, I claim the combination of the gage wheels, D, and single shaft, C, with the seed boxes, B, and frame, A, of the machine, substantially as herein shown and described.

Second, Operating the shaft, C, to drop the seed by means of a hand lever, K, substantially as herein shown and described.

Third, The combination of the tongue, I, and upright bars, J, with each other and with the frame of the machine, substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the plows, H and G, with the frame of the machine, substantially as herein shown and described.

63,860.—SHINGLE MACHINE.—Enoch Conger, Lexington, Ohio.

First, In a shingle machine I claim the two saw sashes, E and F, placed one behind the other and to one of which a lateral movement is given for the purpose of giving a taper to the shingles sawed, substantially as herein shown and described.

Second, The combination of the sliding frame, H, with the saw sash, F, carriage, J, to whose under side is secured the inclined bar, L, working in the inclined groove of the cross bar, h, of the sliding frame, H, for the purpose of giving a lateral movement to the said sash, substantially as herein shown and described.

63,861.—FARM GATE.—Samuel B. Cooper (assignor to himself and Richard Tattershall), Beloit, Wis.

First, I claim broadly the revolving slotted post, B for the purpose set forth.

Second, I claim the brace, E e, and pulley, H, for the purpose specified.

Third, I claim an improved farm gate in combination with the revolving slotted post, B, brace, E and e, pulleys, H and a, gudgeons, b, cap, C, and fence post, D, as herein set forth for the purpose specified.

63,862.—FARM GATE.—William M. Crawford, Ashland, Ohio.

I claim the lever wheel, J, tongue board, P, slide, B, in combination with board, C, and block, K, substantially as shown and described for the purpose set forth.

63,863.—CORSET CLASP.—C. O. Crosby, New Haven, Conn.

I claim the loop, B, formed in the manner described, its two ends secured to the tongue, d, substantially as set forth.

63,864.—SADDLE.—John Curry, Stanford, Ky.

I claim the saddle constructed with head piece and cantle, mounted upon and secured respectively to bent plates C E, united by metallic side plates and forming a skeleton frame for the support of the suspended seat.

63,865.—CLASP FOR SKELETON SKIRTS.—Theodore D. Day, New York City.

I claim the clasp for skirts and similar articles formed with a lining to the clasps and the teeth in the manner specified.

63,866.—CLASP FOR SKELETON SKIRTS.—Theodore D. Day, New York City.

I claim the lip or lips, 1, in combination with the clasps hinge, a b, formed of sheet metal in the manner and for the purpose set forth.

63,867.—CLASP FOR HOOP SKIRTS.—Adolph Delkescamp, Brooklyn, N. Y., assignor to Theodore D. Day, New York City.

I claim the button or clasp for skeleton skirts formed with the flange, 2, the raised head, 1, and the teeth, 3, as and for the purposes specified.

63,868.—STALK CUTTER.—William M. Dexter, Augusta, Ill., administrator of the Estate of John A. Dexter deceased, assignor to William A. Newton.

I claim the truck, H, applied to the tongues or poles, C D, of the frames, A E, in combination with the splinter bar, L, and double trees, M M, arranged substantially as and for the purpose set forth.

63,869.—APPARATUS FOR TANNING.—Constant J. Dumery, Paris, Francis assignor to Francis C. Cormier, New York City. Antedated April 10, 1867.

I claim, First, The receptacle C, applied outside of the boiler or heating vessel, A, and communicating therewith by means of the pipe, D E, substantially as herein set forth for the purpose specified.

Second, The agitating blades or arms, I, arranged within the receptacle, C, and in relation with the opening, d, and tube, e, substantially as herein set forth for the purpose specified.

Third, The serpentine partitions, F, arranged in the upper part of the receptacle, C, substantially as herein set forth for the purpose specified.

63,870.—GLASS CLEANER.—J. B. Dunlop, Meriden, Conn.

I claim as an improved article of manufacture, a cleaner made substantially as described.

63,871.—COOKING KETTLE.—Benjamin W. Dunning, Brooklyn, N. Y.

First, I claim the adjustable covers, g, for closing the vessels, to which they are secured, and being provided with strainers, substantially as herein shown and described.

Second, The combination with the rings, c and d, and plate, e, of the vessels, A B C and D, or any or more of them, substantially as and for the purpose herein shown and described.

63,872.—LOOM TEMPLE.—W. W. Dutcher and G. Draper, Milford, Mass.

We claim each toothed wheel as constructed with the frusto-conical eye, substantially as described.

We also claim the toothed wheels so made, and their arrangement directly on, and so as to bear on one common pin and in a carrier, substantially as specified.

We also claim our improved carrier as made with the cheek pieces extended from and combined with a single supporting plate as specified.

We also claim the arrangement of a series of toothed wheels between cheek pieces, or their equivalents, and on and so as to bear on one common pin or axis, and with each wheel inclined thereto, and provided with an eye which while resting on the pin, will allow the wheel to be freely revolved thereon and between the cheek pieces.

63,873.—MACHINE FOR MIXING ROOFING COMPOSITION AND OTHER MATERIAL.—Alburtis Eagle, Trenton, N. J.

I claim a machine for mixing compositions consisting of a combination of a hopper, D, which is provided with a slotted or reciprocating false bottom, m, and valves, h, of a cylinder, B, which is provided with stirrers, s, on shaft E, and stationary arms, u, and of a furnace, A, all made and operating substantially as and for the purposes herein shown and described.

63,874.—HINGE FOR COVERS FOR TEA KETTLES AND HOLLOW WARE.—James Easterly, Albany, N. Y.

First, I claim the slot, C, entering first radially from the opening of the kettle top, then turned laterally as at C' in combination with the stem, g, of the cover, provided with a continuously projecting ledger or flange, h, or its equivalent arranged and operating substantially as set forth.

Second, I also claim the nib, d, in combination with the recess, f, on the cover, arranged and operating in the manner and for the purpose shown and described.

63,875.—HYDRAULIC PRESS.—A. H. Emery, New York City.

First, I claim a plurality of rams arranged so as to operate consecutively upon the plateau of a press, substantially as set forth.

Second, Operating or moving the plateau of a press by means of two or more columns of water or other liquids whenever these columns of water or liquid are so arranged that the plateau is moved through a part of its stroke by one or more of the acting columns, but not all, and through the rest of its stroke by a part of or the whole of the columns so used.

Third, The arrangement of two or more concentric rams placed one within the other and inclosed within a fixed cylinder to operate upon the plateau of a press, substantially as shown and described.

Fourth, The arrangement of the supply pipe, H, with the fixed cylinder, C, and the two rams, D E, for the purpose of operating the smaller ram, E, while the larger one remains stationary, substantially as set forth.

Fifth, The arrangement of the supply pipe, H, sliding packing, I, and compress ram, D, substantially as and for the purpose set forth.

Sixth, The arrangement of the two sliding packings, F I, packing ring, G, and the compress ram, D, substantially as described.

Seventh, The two supply pipes, H K, arranged and combined with the fixed cylinder, C, packing and compress rams, E D, to operate substantially as shown and described.

Eighth, The shoulder or stop, e or O, on the packing ram, E, with the nut, Q, in the compress ram, arranged to operate substantially in the manner as and for the purpose set forth.

Ninth, The two supply pipes, H K, with the valve, S, arranged to operate in connection with the packing and compress rams, E D, substantially in the manner as and for the purpose specified.

Tenth, The levers, V V, sliding wedges, U U, and valve, S, arranged to operate in the manner substantially as and for the purpose set forth.

Eleventh, The lifters, X X, plateau, P, and compress ram, D, combined and arranged to operate substantially as and for the purpose specified.

Twelfth, The combination of the lifters, X X, compress ram, D, and levers Y, arranged to operate substantially as and for tee purpose set forth.

Thirteenth, The sliding wedges, V V, plateau, P, levers, W W Y Y, spring, f, and valve, S", combined and arranged to operate substantially as and for the purpose specified.

Fourteenth, The plateau, P, and lifters, X X, in combination with the levers, Y Y, and the springs, B', or their equivalents, arranged to operate substantially as and for the purpose set forth.

Fifteenth, The spring, B', arranged with the levers, Y Y, stops, w, and the cords, u, to operate substantially as and for the purpose specified.

Sixteenth, The lifters, X X, pawls, Y', at the ends of the lifters, X X, the recesses, i, in the compress ram, D, and the fixed rests, j j, all combined and arranged to operate substantially as and for the purpose specifidd.

Seventeenth, The arrangement of the clamp frame, D', wedge, E', and the clews or loops, e' e', substantially as and for the purpose set forth.

63,876.—BLACKING-BOX HOLDER.—William A. Field, Boston, Mass.

I claim the combination of devices constituting my improved blacking-box holder, viz., the box, A, its handle, a, cover, b, elastic block, c, and screw, f arranged substantially as specified.

63,877.—MODE OF HANGING AND GUIDING THE HARNESS IN LOOMS.—L. S. Fisher, Broadhead, Wis.

I claim, First, Hanging the harness in looms in the manner substantially as shown and described and for the purpose set forth.

Second, The adjustable guides, F, in combination with the harnesses, B B, constructed and operated in the manner as shown and described and for the purpose set forth.

63,878.—DUNG HOOK.—Jacob G. Good, Raps, Pa.

I claim an improved dung hook constructed substantially in the manner herein shown and described and for the purpose set forth.

63,879.—CONSTRUCTION OF STRAINERS.—R. I. P. Goodwin, M. D., Manchester, N. H.

I claim a strainer constructed with a flange formed as described and shown in "view c."

63,880.—VENTILATING APPARATUS FOR RAILROAD CARS.—Robert C. Graves, Barnesville, Ohio.

I claim the construction and arrangement of the supplementary outlets, E, E, having deflector, n, upon the pipe, c, whose ends are curved upward and pass out of the top of the car, and whose under side is provided with crescent-shaped openings, e e, having air guides, d d, inclined in opposite directions upon each side of the middle partition, b, as herein set forth for the purpose specified.

63,881.—HYDRO-CARBON BURNER.—Alva J. Griffin, Lowell, Mass.

I claim, First, Constructing the chambers, D E, with longitudinal ribs, B C, and lateral ribs, b b b b, perforated with orifices, substantially in the manner and for the purpose set forth.

Second, The gas chamber or retort, F, when combined with the chambers, D and E, substantially in the manner and for the purpose set forth.

Third, The coil pipe, J, or its equivalent, when arranged in combination with the gas retort, F, and chambers, D and E, substantially as and for the purpose set forth.

63,882.—DEVICE FOR CUTTING WASHERS.—Adam P. Gruger, Lancaster, Pa.

I claim the manner of constructing the sliding socket head, D, with its open knife slot, d, and single binding screw, F, to each, thereby making the knives doubly adjustable, in combination with a horizontal bar, C, united firmly with the vertical brace shaft, A, and center point, B, in the manner and for the purpose specified.

63,883.—DRIVING BELT.—M. J. Haines, Bristol, England, assignor to R. R. and J. H. Whitehead, Great Britain.

I claim, First, The construction and use of driving straps or bands composed of a number of longitudinal straps of leather, hide, or other suitable material of a width equal to the thickness of the intended strap and placed side by side and secured together in any convenient manner.

Second, The peculiar modes of fastening or securing together a number of longitudinal strips of leather with a view to forming an edge laid driving strap or band, substantially as hereinbefore described and illustrated by my drawings.

63,884.—MACHINE FOR GRINDING TOP CARDS AND THE WORKERS, STRIPPERS AND LICKER-IN CYLINDERS OF CARDING MACHINES.—Charles Hardy, Biddeford, Me.

I claim the combination as well as the arrangement of the rotary grinder and mechanisms for supporting, grinding and operating two or more top cards so as to cause them at one and the same time while being ground to have reciprocating motions in directions transverely of them and in planes tangential to the curved surface of the grinder, the whole substantially as specified.

I also claim the combination of the box, x', and its lateral adjusting mechanism with the carriage, z', and its longitudinal adjusting mechanism.

I also claim the combination of the plate, y', and its pivot, b2, with the box, X', and the carriage, Z', and their mechanisms for effecting their longitudinal and lateral adjustment, as set forth, such employment of the plate, y', and its pivot serving to enable the box to turn so as to readily adjust itself to the bearing of a card cylinder when placed within the box.

I also claim the adjustable cap, f2, and tye box, x', as made and applied together, as set forth.

I also claim the combination as well as the arrangement of the grinder and its operative mechanism and mechanisms for supporting and operating one or more top cards and one or more cylindrical cards on opposite sides of such grinder in manner and for the purpose of grinding such top cards and cylindrical cards at one and the same time by such grinder, substantially as described.

I also claim in combination with each set of top card carriers and their slides, mechanism for supporting such set of carriers and moving them toward the shaft of the grinder, under circumstances and in manner substantially as hereinbefore specified.

I also claim the combination of the rotary cleansing brush, its operative mechanism and the adjustable gage bar applied to the frame, A, and for the purpose as set fortn.

63,885.—FIREPLACE.—C. Harris and P. W. Zoiner, Cincinnati, Ohio.

We claim the arrangement in a shell or case, A, open in front of the interior fire pot, B, having a grated front, C, and recessed crown, E, closed rearward and laterally and open in front, substantially as set forth.

63,886.—BRIDLE.—James Harris, Kansas, Ill.

I claim the tubes F, secured to the bit E, receiving the check straps G, having holding collars I, for the purpose described, substantially as specified.

63,887.—CAR PROPELLING-APPARATUS.—Charles T. Harvey, Tarrytown, N. Y.

First, I claim the combination of the lateral rollers E E, with the large roller B, the axis of the latter being at a right angle with the axis of the former substantially as shown.

Second, I also claim the ferrule A', composed of a conical forward part O, a frame D, and a rear part N, the several parts being connected by joints which permit of lateral motion of such parts substantially as set forth.

Third, I also claim the construction and arrangement of the ferrule A, or its body or portion that contains the anti-friction rollers in sections 1 2, substantially as set forth.

Fourth. I also claim the yielding finger or ferrule guide P, substantially as set forth.

Fifth, I also claim the combination of the hook M, connected to the part D, as shown, the conical shell N, and the conical end Q', of the rope or cable A', substantially as shown.

Sixth, I also claim the combination of the link G, connected to the part D, as shown by an universal joint, with the conical forward part O, of the ferrule, substantially as shown.

63,888.—METHOD OF PROPELLING CARS.—Charles T. Harvey, Tarrytown, N. Y.

I claim the combination of a cable driving drum A, with the stationary guides B, to control and guide a propelling cable while passing around such driving drum substantially as set forth.

Second, I also claim the twisting conducting guide E, between a driving drum and railway track or any conducting pipe or guide substantially as set forth.

Third, I also claim the construction and arrangement of a driving drum for propelling cables of two or more independent stationary guides coiled in opposite directions, substantially as set forth.

Fourth, I also claim the construction and arrangement of propelling cables with heads or ferrules whose operating faces or spurs project at right angles from the heads substantially as described.

Fifth, I also claim the sliding heads or ferrules for keeping a moving cable in proper position and preventing it from turning in its guide, substantially as set forth.

Sixth, I also claim combining with the spiral guide B, anti-friction rollers for relieving the cable of friction, substantially as described.

Seventh, I also claim the hollow pipe K, constructed and arranged for conducting a propelling cable substantially as set forth.

63,889.—HOTEL REGISTER.—Charles L. Hawes, Titusville, Pa. Antedated Jan. 17, 1867.

I claim a hotel register book with the margin of its leaves occupied by advertisements substantially as described.

63,890.—HARVESTER RAKE.—John F. Hirschy and W. M. McDonald, Wooster, Ohio.

First, We claim the attachment of the raking apparatus to an adjustable wrist on an exterior clutch wheel on an outer end of the carriage axle substantially as and for the purpose described

Second, The arrangement of the pitman C, rocking arm E, connecting rod G, and clasp H, with universal joint connections the pivotal point of the rocking arm, F, being adjustable to vary the length of throw substantially as described.

Third, The combination with the rear extension prong j, of the rake head of the curved rod L, the bearings K M, latch N, and platform guide o o, substantially as described.

63,891.—SPINNING TOPS.—Robert Hoadley, Ansonia, Conn., assignor to N. C. Stiles, S. S. Wilcox, E. N. Crocker, F. O. Tucker, and W. W. Tucker, West Meriden, Conn.

I claim ballasting the thin top A B, by the addition of the extra weight D, or its equivalent distributed around the periphery at or near the zone of greatest diameter substantially as and for the purposes herein specified.

63,892.—DEVICE FOR SEAMING SHEET METAL CANS.—Robert J. Hollingsworth, Cincinnati, Ohio.

I claim the tube or form C, in combination with the solder trough F, arranged for joint operation in connection with a soldering iron H, substantially as and for the purpose specified.

63,893.—WINDOW CORNICE.—A. J. Holmes, (assignor to Wells L. Robbins) Saratoga Springs, N. J.

I claim a cornice for interior decoration or for windows, doors and similar objects constructed substantially as herein described.

63,894.—OX-BOW PIN.—B. B. Hotchkiss, New York City.

First, I claim the hollow ends of the arms, B1 B2, arranged relatively to the main body, A, and to the trunions, b, substantially in the manner and for the purposes herein set forth.

Second, The coiled spring, c, with extended ends operating on the arms, B1 B2, b1 b2, substantially in the manner and for the purposes herein set forth.

Third, The studs, A3 A4, in combination with the spring, C, and arms, B1 B2, b1 b2, and the cheeks, A1 A2, and body, A, substantially in the manner and for the purposes herein set forth.

63,895.—MACHINE FOR RAISING A NAP UPON CLOTH.—Adrien Houget, Verviers, Belgium.

I claim in machines for raising the nap on cloth, by means of two teazling drums, the arrangement substantially as herein shown of the teazling drums, conducting and stretching rollers, and suitable gear mechanism for imparting to the cloth its move to, against, and from the said teazling drums, and also to and from the receiving basin, in the manner and for the purposes set forth.

63,896.—PRINTING PAPER.—Joseph E. Hover, Philadelphia, Penn.

I claim a printing paper, the surface of which is coated with carbonate of lime, or its equivalent, for purpose specified.

63,897.—FOLDING CHAIR.—David Howarth, Portland, Me.

I claim the cross legged chair as described, when, by means of the pivot, c, pivots, d, grooves, k k, and pins, m m, it may be folded in the manner described and set forth.

63,898.—SOAP FRAME.—Mathias H. Howel., New York City. Antedated March 27, 1867.

First, I claim the frame divided vertically and diagonally, through two corners, into two parts or halves, substantially as herein set forth, for the purpose specified.

Second, The hinged locking bars, e, and lugs, n, arranged with reference to each other, and operating to lock the two parts or halves of the frame together, substantially as herein set forth.

Third, The packing, u, within the rebate around the base or bottom, A, in combination with the diagonally divided upright portions of the frame, substantially as herein set forth, for the purpose specified.

Fourth, The diagonal trusses, w, arranged with reference to the diagonal crossed braces, h h, and with the sides of the frame, substantially as herein set forth, for the purpose specified.

63,899.—BROOM HEAD.—Barnabas Hunt, Farmland, Ind.

I claim as a new article of manufacture a broom head, consisting of a series of tubes, a, made of sheet metal, and having the central longer than the others, to receive the handle, f, as herein shown and described.

63,900.—SASH SUPPORTER.—John W. Hutchings, Bridgeport, Conn.

I claim the combination of the strip, B, and eccentric or cam lever, C, as a sash supporter, substantially as and for the purpose described.

63,901.—BRIDGE.—William James, Richmond, Va.

First, I claim the construction of the towers or supports of the bridge, with passages or flues through which the suspension rods, wires, or chains are passed, in such manner as to form extended frictional bearings for said rods, wires, or chains, substantially as described.

Second, The central drum or shaft in the tower, around which the suspension wires or rods are passed substantially as described.

Third, Forming the sides of the passages or flues on which the suspension wires rest with an extended flattened bearing surface to adapt them to receive any desired number of such wires or rods arranged side by side in the same horizontal plane, substantially as described.

Fourth, Securing the ends of the wires or rods which pass through the perforated tower at a point or points at or near the base of said tower, substantially as described.

Fifth, The tight wires, rods, or chains, forming the bottom of the bridge, and passing through the perforated tower thereof, in combination with the suspension rods or chains, substantially as described.

Sixth, The manner of applying the tight wire hand rail, whereby it is made to form an additional support to the bridge as described.

Seventh, The employment of one or more suspension rod or wires, l, intermediate between the tight wire and suspension rods or wires, h and k, substantially as described.

Eighth, The arrangement of the suspension wires, rods, or chains, l k, tight hand rail and bottom wires, g h, and vertical ties or suspenders, l, in combination with the perforated towers or supports, A, in the manner and for the purpose described.

63,902.—MEDICAL COMPOUND.—John G. Jeffrey, M.D., South New Berlin, N. Y.

I claim the improved medical compound, composed of the ingredients in substantially the proportions herein specified.

63,903.—COFFEE POT.—George Jones, Saugerties, N. Y.

First, I claim in combination with the space, E, formed, constructed, and arranged substantially as specified, the tube space or passage, f, substantially as and for the purpose specified.

Second, In combination with the body, A, constructed with a space, E, cylinder, F, and spout, C, I claim the ball valve, H, the whole arranged in the manner substantially as herein set forth.

63,904.—EYELETING MACHINE.—Henri Juge (assignor to himself and Thomas H. Rockwell), New York City.

First, I claim the eyelet clinching head, having a tubular punch or cutter, f, applied to it, in combination with a perforated clinching head, having a pin, h, through it, said parts being arranged and operated so as to cut a hole through cloth or other substance, insert and clinch an eyelet at one operation, substantially as described.

Second, The clinching head, f' provided with a tubular cutting punch, f, substantially as and for the purposes set forth.

Third, In combination with eyelet punching and clinching devices, constructed substantially as described, I claim the moveable tube, i, and movable steam, h h', with their springs, k l, and cam lever, B, arranged so that they shall operate substantially as described.

Fourth, The adjustable pin, C, applied to the cam head, B', of lever, B, for moving the steam, h h', substantially as described.

Fifth, In combination with the machine constructed as herein described, I claim the adjustable gage pin, v, substantially as set forth.

Sixth, In combination with the machine constructed as herein described, I claim the adjustable gage, E, and adjustable gage pin, v, substantially as described.

63,905.—PAPER FASTENING.—James M. Keep, New York City.

I claim the plate, A, provided with a divided tube, B, when used in combination with the plate, C, provided with the conical protuberance, D, and the inner plate, E, in which is formed an opening, F, to receive the tube, B, the cone, D, serving to spread and secure the sections of the divided tube beneath the plate, E, as and for the purpose specified.

63,906.—GARMENT FASTENER.—M. H. N. Kendig, Washington, D. C.

I claim the within-described fastening device, composed of studs or plates, A and A', the latter being provided with a suitable retaining device, D, within which is adjustably secured a chain, B, or equivalent device, the whole constructed and arranged substantially as described.

63,907.—STOVE FOR COOKING.—O. G. Kennel, Ezra Smith, and G. L. Morrison, New York City.

We claim the chambers, H, in the case, A, their lower ends opening into the chamber, G, their outer sides placed a short distance from the side plates, J, their upper edges extending upward within the box, A, and provided with escape pipes, L, said case, A, resting upon the perforated plate, F, of the base, D, when all are constructed and arranged as herein set forth, for the purpose specified.

63,908.—CONCRETE PAVEMENT.—B. N. Laumpum, Rutland, Vt.

I claim the concrete pavement herein described and set forth.

63,909.—CAR BRAKE.—S. M. Lee, New London, Iowa.

First, I claim the device for disconnecting the self-acting brake, when backing the train, consisting of the rope or chain, m, bent shaft, l, chain, l, lever, h, suspended bar, d, provided with a shoulder, c, and lever, b, to which the brakes are attached, or their equivalents, substantially as described.

Second, The rod, F, with hook-shaped end to which the chain, r, is attached, for the purpose of disconnecting the self-acting brake device, and attaching the brakes to the common brake rod and wheel, in combination with the above substantially as described.

Third, The combination of the sliding bar, E, of the above described self-acting brake device, formed arm, p, and rollers, n o, with the rope or chain, m, substantially as and for the purposes described.

63,910.—SKINNING CATTLE.—Horatio S. Lewis, Communipaw, N. Y.

I claim the employment of mechanical appliances for removing hides from animals, substantially as and for the purpose described.

63,911.—SWING.—George H. Lupton, Cleveland, Ohio.

I claim the cross bars, B, heads, C, in connection with the seat and swing ropes, substantially as and for the purpose set forth.

63,912.—CORN WEEDER.—Seth March, Norfolk, Va.
I claim the frame, A, share, B, and detachable heel, C, when these parts are constructed, arranged and combined, as herein specified.

63,913.—ARRANGEMENT FOR CLEANSING WATER PIPE.—Joseph C. Marks and Lewis G. Eckels, Washington, D. C.
First, We claim the arrangement of the pipes, B F e, stop cocks, D G, and strainer, L, constructed and operating substantially as described.
Second, The combined arrangement of the box, A, pipes, B C, cock, G, rod, H, and lid, operating as described.

63,914.—DOOR SPRING.—Jabez F. Mason, Newark, N. Y., and Job Johnson, Brooklyn, N. Y.
First, We claim the bracket, g, formed with teeth, in combination with the cylindrical ratchet, b, and spring, d, substantially as and for the purposes set forth.
Second, We claim the nut, 4, in combination with the cylinder, h, spring, d, and bracket, g, substantially as and for the purposes set forth.

63,915.—MACHINE FOR MAKING CARTRIDGE SHELLS.—Wm. A. McIntire, Springfield, Mass.
First, I claim the combination of the plunger and die for drawing the shell, the slide or equivalent for delivery of the same and the trimming device for the purpose specified.
Second, In combination with the above, I claim the rotating disk, U, and heading device, arranged substantially as described.

63,916.—COTTON PRESS.—John W. McIntyre, Memphis, Tenn.
First, I claim the arrangement of the upper box, provided with slotted sides, C C, with the follower and bar, S, side doors, D D, provided with flanges, f f, and end doors, D' D', the several parts being constructed and used substantially as and for the purpose specified.
Second, The arrangement of the shaft, G, with its attachments with the cords, t t, follower, R, bar, S, and cords, q q, with weights, P P, attached for the purpose of operating the follower in both directions, substantially as specified.

63,917.—APPLICATION OF STEAM POWER TO THE CAPSTANS OF VESSELS.—John S. McMillan, Pittsburg, Pa.
I claim rotating a capstan placed on deck of a boat by means of an auxiliary engine, when said engine and capstan are placed forward of the steam boilers of said boat, substantially as hereinbefore described and for the purposes set forth.

63,918.—STUMP EXTRACTOR.—M. Mellen, Richland Station, N. Y. Antedated April 11, 1867.
First, I claim the combination of the support, D, and pin, a, with the frame, A, of the machine, and the adjustable feet, b, attached to the lower extremities of the support, substantially in the manner and for the purpose herein specified.
Second, The combination of the main shaft, F, and clutch, K, with the loose collar, h, and hook, l, operating substantially as and for the purpose herein shown and described.
Third, The application to the stump extractor of two or more drums, L and M, substantially as and for the purpose herein specified.
Fourth, The adjustable slotted bearings of the axles, H I and K, for the purpose of throwing any portions of the machine in or out of gear, substantially in the manner herein shown and described.

63,919.—RAZOR STRAP.—Charles T. Melvin, Providence, R. I.
I claim a flexible razor strap, capable of being drawn into its receiver by means of a spring.
I also claim a brush and a swivel joint in connection with a flexible razor strap, all substantially as set forth and for the purpose specified.

63,920.—VENTILATING BUNG FOR CASKS, ETC.—Jerome B. Melvin (assignor to himself and Edward B. Howe), Lowell Mass.
I claim the combination of the vent passage, e, the cavity, I, the valve, B, its seat, o o, the pressure chamber, H, and pressure passage, f, with the bung or vent plug, A A, the whole arranged substantially as herein set forth and shown for the purpose specified.

63,921.—MATTING FOR FLOOR COVERING.—John Michell, West Farms, N. Y.
I claim an improved matting formed by the combination of woollen, jute, and Manilla or Russian grass with each other, whether woven plain or twilled, substantially as herein described, as a new article of manufacture.

63,922.—ALARM LOCK FOR TILLS.—D. K. Miller, Bernville, Pa.
First, I claim the two series of bolts, H K, fitted in boxes, C J, attached respectively to the till, and to the under side of the counter or desk, and arranged in connection with a frame, I, to operate substantially in the manner as and for the purpose set forth.
Second, The two series of levers, D D', connected by rods, b, and arranged with springs, E, rods, F, and slides, G, or equivalent means to operate in connection with the bolts, H K, substantially as and for the purpose specified.
Third, The bell hammer or rod, M, provided with the springs, k k', and operated through the medium of the shaft, m, provided with the arms, l o, the projection, p, at the under side of the counter or desk, the arm, N, fitting in the notch in the rod, and the pin, r, extending from the side of frame, I, all arranged so that the bell hammer or rod will be set each time the till is shoved inward, and the hammer or rod liberated and the alarm sounded each time the till is slightly drawn outward in an unlocked state, substantially as set forth.

63,923.—STEAM GENERATOR.—Joseph A. Miller, New York City.
I claim the combination of the water base, B2, grate, A2, steam generating tubes, C2, and jacket, c2, to the fire-box roof, E2, cylinder or upper chamber, G2, return water pipes, D2, and smoke tubes, I2, the whole being arranged relatively to each other, substantially as specified.

63,924.—HOTEL REGISTER.—John L. Mitchell, Buffalo, N. Y. Antedated Dec. 5, 1866.
I claim a hotel register book with interleaves of bibulous paper with advertisements displayed thereon substantially as specified.

63,925.—APPARATUS FOR FEEDING LIQUID TO EVAPORATING PANS OR BOILERS.—S. A. Mitchell, Alstead Center, N. H.
First, I claim the invention of a self-adjusting feeder to any number of boilers required, from one faucet or feed pipe, by means of a buoy or buoys, E, acting on the flow of liquid by means of a stopper, Q, or any similar device.
Second, The immersed buoy, N, connecting rod, M, the beam, K, standard, L, the pivot, m, in standard, L, the connecting rod, J, the eye bolt, n, in cistern, A, operating on conductor, D, as herein set forth.
Third, The small buoy, H, acting by means of the beam, b, upon the valve, U, for the purpose of controlling the flow of fluid in the aperture, V, as herein described.
Fourth, The combination of the buoys, E H and N, conductors, D and O, the standards, F and L, sockets, G c and d, the beams, K and b, the connecting rods, J and M, the pivots, P m a and c, the brace, C, stopper, Q, valves, U and f, the eye bolt, n, and the perforated guard, g, arranged and operated as herein set forth, or in a manner practically the same for the purpose specified.

63,926.—COAL STOVE.—George R. Moore, Lyons, Iowa.
I claim the hinged cover, C, so arranged and operating as to smother the fire and check combustion when turned down to a horizontal position, and to form a diving flue between the combustion chamber and the smoke pipe when turned to a vertical position, substantially as described.

63,927.—BOLT AND RIVET MACHINE.—John Morgan, Jr., Wheeling, West Va.
First, I claim the combination of the die stocks, Y, lever rods, O, stirrups and cams, substantially as arranged and set forth.
Second, The arrangement of the header, V, plunger, U, cams, F and E, loose stirrups and thumbscrews, A B.

63,928.—TURNING LATHE.—H. L. Morse (assignor to S. A. Morse), New Bedford, Mass.
First, I claim the method of adjusting the movable plate, C, consisting of a combination with each other of the circular projections, d d, grooves, e e, screw, D, and nut, f, substantially as herein shown and described.
Second, The arrangement of the scale or index to the rear end of the lathe bed, in combination with the adjustable plate, C, substantially as shown and described for the purposes herein set forth.
Third, The gage, G, constructed of a right-angular bar pivoted to the foot stock, F, in combination with the adjustable plate, C, and adapted for the purpose described when the tool is set to the point of its shorter arm, as herein specified.

63,929.—CLAMP.—S. A. Morse, New Bedford, Mass.
I claim the stock, A, provided with an upright ledge or bearing surface, a, in combination with the sliding plate, B, provided with the lever, C, having the self-adjusting plate, D, attached and operated by the cam, E, or its equivalent, substantially as and for the purpose herein set forth.

63,930.—DRAFT ATTACHMENT FOR VEHICLES.—Edward Nason, Wm. Nason, and Oliver K. Nason, Orneville, Me. Antedated April 11, 1867.
We claim the arrangement of the straps, E, snap hooks, F, rods, C, in combination with the whiffletree, B, and collar, D, and operating in the manner and for the purpose herein specified.

63,931.—WAGON BOX.—Geo. W. Oviatt, Potter Center, N. Y.
First, I claim securing the sides of a wagon box to the bottom by means of the bolts, H and I, substantially as specified.
Second, I claim securing the end boards of a wagon box in their places by the use of the spring catch, D, and catches, E and E, as herein specified.

63,932.—GATE.—Calvin H. Paine (assignor to himself and Wm. D. Hilton), Providence, R. I.
I claim the combination of the gate or lazy tongs and mechanism for opening and closing it by means of a carriage, substantially as described.
I also claim the combination as well as the arrangement of the two sets of levers, D D and F F, the connection piece, h, and the series of T-pieces, I, the whole being for operating as specified the gate constructed on the principle and applied to a post, B, substantially as described.

63,933.—HAME FASTENER.—W. W. Palmer, Hudson, Mich.
I claim the metallic bar, B, with its keepers, C C, and curved spring, D, when used in combination with the bar, A, in the manner and for the purposes specified.

63,934.—CURTAIN FIXTURE.—C. C. Parker, Brooklyn, N. Y.
I claim the pulley slide formed with two arms at right angles to each other, one arm, e, receiving the pulley and the other arm, f, extending within the coils of a helical spring, c, within the slotted case, a, so that said arm, f, becomes a guide to sustain the pulley but allow its free motion, as set forth.

63,935.—WRENCH.—James A. Partridge (assignor to himself and E. D. Wright), Lowell, Mass.
First, I claim the liberating lever, A, applied to the movable jaw of a slide wrench when said lever has a segmental nut formed in the end, b, thereof, to engage with the screw, G, and a spring, g, at or near the end, d, to throw the nut into contact with the screw, and all arranged to operate substantially as and for the purpose set forth.
Second, The shoulders, e1 and e2, constructed and arranged to operate substantially as and for the purpose set forth.

63,936.—MACHINE FOR MAKING HOOP SKIRTS.—S. H. Perkins and Thomas S. Gilbert, New Haven, Conn.
We claim automatically measuring, marking, and cutting wire for skirt hoops, substantially as herein set forth.

63,937.—PUMP.—Alonzo Perry and Moses C. Hawkins, Edenboro, Pa.
We claim the construction and arrangement of the double-armed reciprocating piston, C, having valves, F, its hub, E, working air tight between the angles of the perforated partition plates, J, thereby forming the chambers, F2, in the cylinder, A, valves, I, in the chambers, G H, discharge ports, M, in the sections of the chamber, F, uniting and forming the tube, N, upon the upper half of the cylinder, A, as herein shown and described.

63,938.—SASH AND BLIND FASTENER.—L. Pollock, Fishkill Landing, N. Y.
I claim the combination of the screw bolt, E, provided with the square part, e2, and the sliding bolt, H, constructed and operating substantially as described and for the purpose set forth.

63,939.—APPARATUS FOR GUIDING CLOTH.—Elisha O. Potter, North Providence, R. I.
First, I claim in an apparatus for guiding cloth, paper, or other like material, during its delivery to other machinery, the combination of a beam capable of an endwise movement with the selvedge edge of the material as it is being unrolled, in the manner substantially as described, for the purposes specified.
Second, The combination in an apparatus for the above declared purpose of the following instrumentalities:—A beam capable of an endwise movement, a rack pinion, d e, and a double pawl and ratchet gear, E' g g, or the equivalents thereof, substantially as described.
Third, The combination in an apparatus for the above declared purpose of the following instrumentalities:—A mechanism for imparting an endwise movement to the cloth beam as above described, a disk plate, H, and vibrating bent lever, I, or the equivalents, for putting into action or suspending the operation of the mechanism of the shifting the position of the beam, substantially as described.

63,940.—CAR COUPLING.—Narcisse Reeves, Du Quoin, Ill.
I claim the combination of the sliding block, H, and weighted arm, J, with the link, D, and bumper, G, substantially as herein shown and described and for the purpose set forth.

63,941.—CORN-HUSKING SHIELD.—Almon C. Robinson, Louisiana, Mo.
I claim a corn-husking metal shield to wear upon the thumb of either hand, constructed and operating substantially as herein shown and described.

63,942.—BOTTLE STOPPER.—Robert Robinson, Brooklyn, N. Y.
I claim closing the neck of the bottle by means of the stopper, A, constructed as described, having its ends, a1 a2, of greater diameter than its center, and by placing the elastic band, B, over the upper end, a1, and after being inserted in the neck of the bottle, pressing said elastic band down upon the part, a2, of increasing diameter, as herein shown and described.

63,943.—MATCH SAFE.—John Roebuck, New York City.
I claim the match safe, A, consisting of the bottom piece, b, back piece, c, sides, a a, falling lid, d, hinged in the groove, f, and waste match receiver, e, constructed and arranged as herein shown and described.

63,944.—BIT STOCK.—Clemens B. Rose, Sunderland, Mass.
First, I claim the bit stock provided with the socket, D, the sliding jaws, b, having the inclined heads, d, and projecting or raised screw threads, c and ring, B, all constructed and arranged to operate as herein shown and described.
Second, Connecting the head, K, to the shaft by means of the grooves, i i and L, and the collar, O, melted in around them, substantially as set forth.

63,945.—LEVER SHEAR.—John J. Sandgren, Lyons, Iowa.
I claim the peculiar arrangement and combination of the levers, E and F, with the cam, J, and straps, K G and H, all for the purposes set forth.

63,946.—SKATE.—H. W. Sanford, Thomaston, Conn., assignor to himself and Horace Smith.
I claim the vibratory or lever runner, B, in combination with the sliding clamping jaws, t t' and w w', and the skate stock, the whole constructed in the manner and operating as hereinbefore described for the purpose set forth.

63,947.—BEER COOLER.—Amos W. and James Sangster, Buffalo, N. Y.
First, We claim the cone-shaped coolers connected together as described also in connection therewith of one or more partitions as shown at G, or the equivalents thereof for the purposes described and set forth.
Second, In combination with the cone or cones, we claim the tubes, D D3 D1 and D2, substantially as herein described.
Third, We claim the employment of a corrugated surface on the upper part of the cone as shown in fig. 3, for the purpose of more equally distributing the liquid to the cooled as it flows over said surface.
Fourth, We claim the plate, E, as and for the purposes described.

63,948.—BENCH PLANE.—Charles H. Sawyer, Hollis, Me.
I claim the arrangement of the screw, B, in combination with the joints or pivots by which the sheet m, is connected at its ends to the ends of the handle or stock, A, as and for the purposes herein described.

63,949.—PROCESS OF WHITENING HORN.—Augustus Scheller, New York City.
I claim the within described process of whitening horn or other similar substances by treating with acetate of lead or any other soluble salt or oxide of lead and with muriatic acid, substantially in the manner set forth.

63,950.—TWINE HOLDER.—Frederick J. Seymour, Wolcottville, Conn.
I claim a twine holder formed of a metallic case fitted so as to be suspended and provided with a brake to prevent the cord or twine running out by its own weight as specified.

63,951.—PRESS BOARD FOR AN OIL PRESS.—John Shinn, Leverington, Philadelphia, Pa., assignor to himself and G. S. Rhoades.
I claim a press board or plate formed with grooves running parallel or otherwise, in combination with a wire screw as described for the purpose set forth.

63,952.—DRAINING AND DITCHING PLOW.—Henry B. Smawley, Greensburg, Ind.
I claim the arrangement of the share, B, provided with two connected but distinct points one in advance of the other, with the cutters, C D, as constructed and connected to the beam, and the inclined plane, K, provided with a back bone or brace on its under side, the several parts being used together, substantially as and for the purpose specified.

63,953.—COAL SCUTTLE.—Gaston D. Smith, Washington, D. C.
I claim the perforated malleable cast iron bottom plates, a b, and collar, x, of a coal hod, provided with an ash box, B, attached to it by a bayonet joint, when the same is constructed and arranged as and for the purpose set forth.

63,954.—DRAFT PLATE.—George Smith, Providence, R. I.
I claim, First, The construction of the open or skeleton plate, A, with a horizontal thill supporting shelf, B, formed on its lower edge, and two or more tenons or lugs, a a, for receiving openings in the bottom of a thill, substantially as described.
Second, The longitudinally sliding head, D, fixed guide rod, f, and central spring, g, applied to the right angular draft plate, A B, substantially as described.
Third, The two slots, d' and e', when arranged on each side of the sliding head, D, of the draft plate, A B, as described and for the purposes set forth.
Fourth, The combination of the slotted bars, d and e, upright bars, c and c', and shaft, B, constructed of one piece of metal and adapted to serve the improved purposes described.

63,955.—HOISTING MACHINE.—Hiram Moore Smith, Richmond, Va.
I claim when applied to a hoisting machine, the double wheel on the cylinder, A, the two pinions combined and working on the rope wheel shaft the crank and loaded wheel for moving and holding them securely in gear, the whole constructed and operating as above described and set forth.

63,956.—FIRE CHAMBER FOR FURNACES.—Sidney Smith, Worcester, Mass.
I claim the cast iron, perforated flanged and rebated staves B, for the purpose of forming a fire chamber, substantially in the manner set forth.
A fire chamber constructed substantially in the manner described, so as to be removable entire from the frame or casing supporting it, for the purpose set forth.
In combination with the trap G, the arm H, and ratchet shaft I, substantially as and for the purpoes set forth.
In combination with the fire chamber claimed in the second claim, the rollers K, substantially as and for the purpose described.
In combination with the fire chamber claimed in the second claim the removable front J, substantially as and for the purpose set forth.

63,957.—EVAPORATOR FOR SACCHARINE JUICES.—George L. Squier, Buffalo, N. Y.
First, In a series of two or more evaporating pans, arranged and used for evaporating saccharine juices, I claim making the bottoms of such pans of different thicknesses of metal for the purposes and substantially as specified.
Second, In a series of two or more evaporating pans arranged and used for evaporating saccharine juices, I claim making such pans of different depths for the purposed and substantially as set forth.
Third, An air pipe or pipes or conductors so connected and arranged with an evaporating pan or pans for treating saccharine juices that currents of hot or cold air (either or both) may be forced through or into the juices during either part of the process for the purpose and substantially as set forth.
Fourth, Regulating and controlling the temperature of saccharine juices by means of hot or cold air forced therein in the process of evaporation substantially as set forth.
Fifth, Placing or arranging an air pipe within the furnace, so that the same fire used for heating the evaporating pans may also be used for heating the air.
Sixth, The plate K, placed in the evaporating pan for the purpose of spreading the air and for drawing the scum to the centre substantially as described.
Seventh, Dividing the furnace in the rear into two flues with a damper at each flue, in connection with evaporating pans, constructed and arranged as herein described.

63,958.—RUBBER HEEL STIFFENER.—Edgar M. Stevens, Chelsea, Mass., assignor to himself and John A. Mendum, Roxbury, Mass., assignors to A. B. Ely, Newton, Mass.
I claim a molded heel stiffening of rubber or similar elastic material having a slit or slits cut in the rear portion of the lower and under rim as and for the purposes set forth.

63,959.—DAMPER FOR STOVE PIPES.—W. X. Stevens, Worcester, Mass., and W. E. Puffer, Lexington, Mass.
First, We claim keeping two or more parts of a stovepipe damper in the desired relation to each other by means of the turning bar used as a pin in the manner and for the purposes set forth.
Second, The combination and arrangement of frame A, gate B, and bar C as specified and for the purposes set forth.

63,960.—DEVICE FOR WASHING CARRIAGE WHEELS.—Wm. T. Sweet, Fayette, N. Y.
I claim a receptacle A, provided with sockets c c, and brushes i i, operating substantially as and for the purpose herein set forth.
I also claim the folds g g, or equivalent in combination with the receptacle A, operating substantially as and for the purpose specified.

63,961.—ANIMAL TRAP.—Jesse Teed, Tompkins, N. Y.
I claim the combination of the spring trap A, (composed of one piece) and having two supporting legs B B, and the detachable brace or triggers C, arranged and operating in the manner shown and described, and for the purpose set forth.

63,962.—HINGE FOR SHUTTERS.—Lawrence Tevis, Philadelphia, Pa.
I claim a self catching hinge, provided with cam D, lug o, pin P, and catch c, the whole combined and constructed in the manner and for the purpose above described and set forth.

63,963.—APPARATUS FOR TREATING PETROLEUM.—Alexis Thirault, Williamsburg, N. Y., assignor to himself and B. S. Hilton, New York City. Antedated April 5, 1867.
First, I claim the arrangement of one or more steam jets a in combination with the condensing coil A, constructed and operating substantially as and for the purpose set forth.
Second, The steam jets d, or d,' applied in combination with tanks C or C', and with the pipes carrying the oil into said tanks substantially as and for the purpose described.
Third, The jets d* or d'* in combination with the tanks C or C', constructed and operating substantially as and for the purpose set forth.
Fourth, The combination of the coil A, tanks C C' C*, steam jets a d d* d' d** and coils k l, all constructed and operating substantially as and for the purpose described.

63,964.—SPIRIT METER.—Isaac P. Tice, New York City. Antedated April 5, 1867.
I claim, First, The diaphragm measuring can or cans constructed so as to form a chamber above and below and provided with valves to admit and discharge the liquid into and from the lower chamber of each can by the movement or action of the latter, substantially as specified.
Second, In combination with the measuring or weighing cans the valves controlling the entry and discharge of the liquid thereto or from, constructed so as to spring or yield on the cans reaching the end of their strokes to give time and space for the locking of the raised can, essentially as herein set forth.
Third, The combination of the diaphragm, measuring or weighing cans, tilting hopper, G, and floats, K K', with locking and unlocking devices under control of the floats, substantially as specified.
Fourth, The combination with a liquid meter of a device for closing the induction or passage of liquid through the meter so operated or set in motion antomatically by the liquid in the eduction passage as to prevent tampering with the meter, essentially as herein set forth.
Fifth, The combination with a vessel within the meter, of a detector arranged within said vessel and operated by the liquid rising therein to record any attempt at tampering with the meter, substantially as specified.
Sixth, The combination, in a spirit meter, of a hydrometric and therometric register with a counter or indicator of quantities for operation together by the weight or action of the liquid or other motor in passing through the meter, essentially as specified.

63,965.—MEDICAL VEGETABLE LINIMENT.—Thomas L. Upton, Farmington, West Va.
I claim the liniment consisting of the ingredients named in about the proportions specified and compounded substantially as and for the purpose set forth.

63,966.—MEDICAL VEGETABLE SALVE.—Thomas L. Upton, Farmington, West Va.
I claim the salve consisting of the ingredients named in about the proportions specified and compounded substantially as and for the purpose set forth.

63,967.—DEVICE FOR SACKING GRAIN.—Peter Von Lackum St. Charles, Minn.
I claim First, The elevator, A B E, provided with the adjustable tube, a, having hooks for attaching the bag or sack, arranged to operate substantially as shown and described.
Second, The combination of the adjustable tube, a, cords, b, lever, d, and ratchet, f, when arranged for joint operation, as set forth.

63,968.—METHOD OF OBSTRUCTING ICE IN RIVERS AND HARBORS.—Peter Voorhis, New York City.
I claim the combination of floating iron-clad obstructors with anchors, arranged to operate substantially in the manner and for the purposes hereinbefore described.

63,969.—CHURN.—Thomas A. Warren, Gettysburg, Pa.
I claim the arrangement of the horizontal churn box, provided with a curved corrugated or irregular bottom, with the shaft, C, and frame, D, provided with arms, d, revolving in different directions, and with the wheel, K, the whole being constructed and used in the manner and for the purpose specified.

63,970—APPARATUS FOR PURIFYING WASH FOR THE MANUFACTURE OF VINEGAR.—Gardner Waters, Cincinnati, Ohio.
I claim the apparatus made and operating substantially as above set forth and described.

63,971.—SEAMING TOOL—Philip Weck, Brooklyn, N. Y.
I claim a tool consisting of a frame, B, provided with a series of rollers whether more or less in number, when one or more of such rollers are arranged so as to be slid or moved in or out upon the said frame, substantially as and for the purpose described.

63,972—CATTLE PUMP.—Milo D. Wilder, Laporte, Ind.
I claim the tubular driving lever, C, in combination with a pump and a trough, which pump is operated by gearing, substantially in the manner herein shown and described.

63,973.—MOP SQUEEZER.—E. S. Wilkins and John Straw, Stowe, Vt. Antedated March 14, 1867.
We claim the treadle, R, mop squeezer, G and H, and spring lever, M, and pail, B, when arranged, combined, and operated as herein described and for the purposes set forth.

63,974.—GATE.—Horace S. Wolf, Rolling Prairie, Ind.
I claim the application of the lever herein described, by means of which to elevate the entire gate, and that too with the least possible labor.

63,975.—INKING APPARATUS.—George W. Wood, Richmond, Ind.
I claim, First, The use in an inking apparatus of one or more inking belts for conveying the ink whether applied automatically from a fountain or by hand.
Second, The combination of a fountain from which the ink is transferred to the inking belts and the distributing rollers.
Third, The combination of one or more inking belts, and the composition rollers from which the ink is transferred to the type.
Fourth, The combination of the driving roller, I, the inking belts and distributing rollers turning upon their axes, and having a longitudinal reciprocating motion.
Fifth, The arrangement of the distributing rollers and inking belts, so that the former shall have a revolution upon their axes, and at the same time an alternately reciprocating motion in opposite directions longitudinally in contact with the face of the belt.
Sixth, The combination of the adjustable fountains, the soft rollers attached to an oscillating frame, and adjustable rollers around which the inking belts are carried.

63,976.—STEAM-ENGINE GOVERNOR.—John B. Wood, Brooklyn, N. Y.
I claim the piston, i, spring, n, and connections, k l, to the throttle valve, in combination with the pump, s, and valve, q, operated by a connection, s, to the piston, i, as and for the purposes specified.

63,977.—FRICTION CLUTCH.—Sylvester C. Wright, Fitchburg, Mass.
I claim, as my invention for effecting the movements of the clutch plate, D, the combination of the auxiliary male screw, h, and its bar or nut, E, with the nut, G, and its male screw, f, having their threads pitched in opposite directions to those of the screw, h, and nut, E, the whole being applied substantially as explained to the parts or shaft, C and H, projecting from the gears, A B, and the clutch, D, as set forth.
I also claim the arrangement of the auxiliary nut, E, and its screw, h, at either end of the shaft, H, as hereinbefore set forth, when combined with plate, D, tube, c, and nut, G.
I also claim the combination as well as the arrangement of the oil passages,

k l, with the bearing, F, the shaft, C, and the clutch plate, D, applied to the shaft by means substantially as specified.

63,978.—CASTING SHUTTLE.—C. E. Billings, Hartford, Conn.

First, I claim the dies, C and D, with cavity, a, and projection b, for the purpose of forming the shuttle frame, arranged substantially as described.

Second, The dies, E and F, the cavity, c, and projection, d, for the purpose of finishing the shuttle frame, arranged substantially in the manner described.

63,979.—MACHINE FOR GRINDING AND AMALGAMATING ORES.—Philip Hinkle (assignor to himself and Charles S. Capp), San Francisco, Cal.

First, I claim the employment of the renewable side dies, G G, to form a perpendicular grinding surface on the sides of the tub or pan, substantially in the manner and for the purpose described.

Second, The employment of the perpendicular muller hangers, E E, loosely hung on the pins, C C, carrying the renewable mullers or grinding plates, F F, of the shape shown in the drawings, thrown and passed laterally by centrifugal force against the perpendicular grinding surface, G G, when the arms, B B, are revolved, with the supporting lip, l, and bearing surface, D, upon the arms, B B, by which arrangement the pressure is lightest at the feeding point and heaviest at the heel of the muller, and also the provision for loading the muller hanger to counterbalance the loss of weight by wear of the face of the muller, F, substantially in the manner and for the purpose described.

Third, The shape and arrangement of the cover of the pan, U, so as to form a flattened funnel-shaped dish, with annular grooves, S, for mercury and raised current breaking ring, W, on its upper surface, the collars or projecting flange, V, with the apertures, R R, under it, by which the escape of the pulp is permitted, and its current directed so that it is returned to the center, and a continual circulation maintained.

RE-ISSUES.

2,558.—POWER CAPSTAN.—D. N. B. Coffin, Jr., and Irah D. Spaulding, Boston, Mass., assignees of D. N. P. Coffin, Jr. Patented Nov. 21, 1865. (Div. 1).

First, We claim the conical or taper gears, h g f e, and the angular shafts, j, in combination with the barrel of a capstan, substantially as described.

Second, Connecting the fulcrum gear, e, to the bed plate automatically by furnishing each with a series of inclined faced lugs, substantially as described.

Third, Duplicating the inclined faces of the lugs, i, on the fulcrum gear and the bed plate in reverse order so as to operate both ways.

2,559.—POWER CAPSTAN.—D. N. B. Coffin, Jr., and Irah D. Spaulding, Boston, Mass., assignees of D. N. B. Coffin, Jr. Patented Nov. 21, 1865. (Div. 2).

First, We claim the inclined or wedge-shaped lifter, q, made movable separately from the parts to be locked together in combination with the sliding bolts of a capstan, substantially as described.

Second, The arrangement of one or more series of inclined or wedge-shaped lifters upon a ring or circular connection, p, so as to operate simultaneously on several bolts in the locking mechanism of a capstan, substantially as described.

Third, Casting the lower journal part of the spindle or shaft of a capstan on and as a part of the bed plate.

Fourth, Casting the lower journal part of the spindle or shaft of a capstan hollow in combination with its formation and as a part of the bed plate irrespective of the construction of the upper portion.

Fifth, Compounding the spindle or shaft of a capstan by forming the lower journal part on and as part of the bed plate and inserting the comparatively lighter wrought part to form the upper portion, substantially as described.

2,560.—HORSESHOE.—Oliver P. Macgill and T. Poultney, Brooklandville, Md., assignees of Oliver P. Macgill. Patented April 11, 1865.

We claim a false or supplemental shoe provided with ice calks and so constructed that it may be clamped to or confined upon the shoe of the horse by means of griping flanges and a clamping screw without the necessity of any screws, keys or other devices entering the stock or metal of the shoe on the horse's foot.

We also claim making the supplemental shoe in two parts hinged together in combination with the flanges, D D, or their equivalents, and the tightening screw in order that the said shoe may be clamped only to the inner edges or portions of the shoe of the horse, substantially as described.

We also claim making the ice calks, J, removable and constructed and combined with the false shoe, in the manner described for the purposes set forth.

2,561.—TOBACCO POUCH.—Winfield S. Sims, Newark, N. J. Patented Feb. 26, 1867.

First, I claim the tobacco pouch, A, formed with two openings, one for the reception of the nozzle and the other for the reception of the rod or rammer, as described.

Second, claim the combination of the pouch, A, with the nozzle, B.

Third, I claim the combination of the pouch, A, nozzle, B, rod, E, substantially as and for the purpose described.

2,562.—HOE.—Theodore R. Timby, Saratoga Springs, N. Y. Patented March 5, 1867. (Div. A).

I claim the hoe with its peculiar angular edge, as described.

2,563.—HANDLE FOR IMPLEMENTS.—Theodore R. Timby, Saratoga Springs, N. Y. Patented March 5, 1866. (Div. B).

I claim a metallic lapped thimble or ferrule for handles of agricultural implements and other useful articles.

2,564.—MACHINE FOR GRINDING SHEET METALS.—The Bridgeport Brass Company, Bridgeport, Conn., assignees of Henry Todd. Patented March 5, 1867.

First, I claim the combination of the trough, B, provided with strips or corrugations, b, and presser, B, constructed substantially in the manner described so as to grind the surface of sheet metal drawn there through.

Second, The combination of the trough, B, provided with strips or corrugations, b, and presser, C, provided with strips or circulations, c, with the mechanism constructed and arranged so as to draw the sheet between the securing surface of the trough and presser, substantially as specified.

Third, In combination with the trough, B, and presser, C, the removable sleeve, G, and reversely rotating shafts, E and F, essentially as and for the purposes herein set forth.

2,565.—WATER-PROOF SOLE.—The Water-proof Sole Company, New Haven Conn., assignees by mesne assignments of John W. Coburn. Patented June 27, 1865.

First, We claim a compound sole presenting a surface of rubber or analagous gum or its compounds over the main portion of the sole and a border of leather, the gum having been applied to the leather while soft and vulcanized thereon, substantially as and for the purposes herein specified.

Second, We claim in combination with the above, causing the vulcanized material to extend through from one face of the sole to another through a hole provided for the purpose in the leather, substantially in the manner and for the purpose herein specified.

Third, We claim in compound soles having rubber vulcanized with leather as specified, the protension of the rubber face outside of and beyond the face of the leather edging substantially as represented in fig. 4, and for the purpose herein specified.

Fourth, We claim in compound soles of rubber and leather covering the surface in the whole or in part with thin rubber cloth or analogous strong fibrous material attached so as to serve in connection with the rubber and leather substantially in the manner and for the purposes herein set forth.

2,566.—METHOD OF OPERATING RAILROAD PUMPS.—Samuel Moss, San Francisco, Cal., assignee of Gilbert Cole. Patented Dec. 16, 1862.

First, I claim conducting by means of connecting pipes, the steam generated in the locomotive boiler to a stationary engine by the road side, to operate the same as and for the purpose set forth.

Second, The combination of a stationary engine and pump, the connecting pipes, c c', and a locomotive boiler, as and for the purpose described.

2,567.—SEWING MACHINE.—Alfred B. Ely, Newton, Mass., assignee of Reuben W. Drew. Patented June 30, 1863.

I claim the application of heat by or through the flame of a lamp, gas burner or their equivalent to the metallic arm of a waxed thread sewing machine in or along which the thread may pass, for the purpose of warming the thread and making it pliable, substantially as described.

2,568.—WINDOW SASH FASTENING.—M. B. Stafford, New York City. Patented Jan. 27, 1863.

First, I claim the combination in the window fastener, of the fastening bar, B, and recessed ledge, f, substantially as herein shown and described.

Second, The combination in the window fastener of the recessed ledge, f, with a ledge, l, and fastening bar, B, substantially as herein shown and described.

Third, The employment in the window fastener of the divided fastening bar, constructed substantially as herein shown and described.

2,569.—MANUFACTURE OF CAUSTIC ALKALI.—George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. A).

I claim as a new article of manufacture, caustic alkali enclosed in an integument or casing of anti-corrosive, impervious fabric, substantially as above described.

2,570.—PROCESS OF PUTTING UP CAUSTIC ALKALI.—George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. B.)

I claim the process of putting up caustic alkali in metallic casing or integument, by pouring the molten caustic alkali into the casing, substantially as above described ann then closing up the top of the case.

2,571.—MANUFACTURE OF CAUSTIC ALKALIES.—George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. C).

I claim the caustic alkali encased or enveloped in a tight metallic integument or metallic casing, substantially as above described.

DESIGNS.

2,614.—CIGAR BOX.—Frederick Becker, Baltimore, Md.

2,615.—CASKET HANDLE.—Wm. M. Smith, West Meriden, Conn.

2,616.—CARPET PATTERN.—Alexander Beck, Philadelphia, Pa. Division A.

2,617.—CARPET PATTERN.—Alexander Beck, Philadelphia, Pa. Division B.

2,618.—PRINTERS' TYPE.—David Bruce, Newtown, N. Y.

2,619.—WASH STAND.—J. L. Mott, Mott Haven, N. Y. Division A.

2,620.—WASH STAND.—J. L. Mott, Mott Haven, N. Y. Division B.

2,621.—STOVE HANDLE.—J. S. Simmerman, Millville, N. J.

2,622.—HAT.—P. W. Vail, Newark, N. J.

2,623.—SHADE FOR A CEILING LIGHT.—Charles Wilhelm and Joseph Neumann, Philadelphia, Pa.

2,624.—LANTERN REFLECTOR.—Charles Wilhelm and Joseph Neumann, Philadelphia, Pa.

2,625.—STOVE DOOR.—Chas. J. Woolson, Cleveland, Ohio.

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PART II.—On the practice of house painting; on the materials employed in plain painting—white lead, litharge, sugar of lead, red lead, and orange lead, chromo yellow, ochres, terra-di-sena, Indian red, vermillion, lake, colcothar of vitriol, Venetian red, light red, and Spanish brown, Prussian blue, factitious ultramarine, Turkey umber, linseed oil, spirits of turpentine; on the methods of executing plain painting; on the materials employed in plain painting—Vandyke brown and ivory black, copal varnish; on imitations of woods and marbles; on the various modes decorating the ceilings and walls of dwelling houses—distemper, gilding, paper hangings, stippled flat painting and gold, imitation of gold embroidery, decorative borders, imitation damask, imitation morocco leather.

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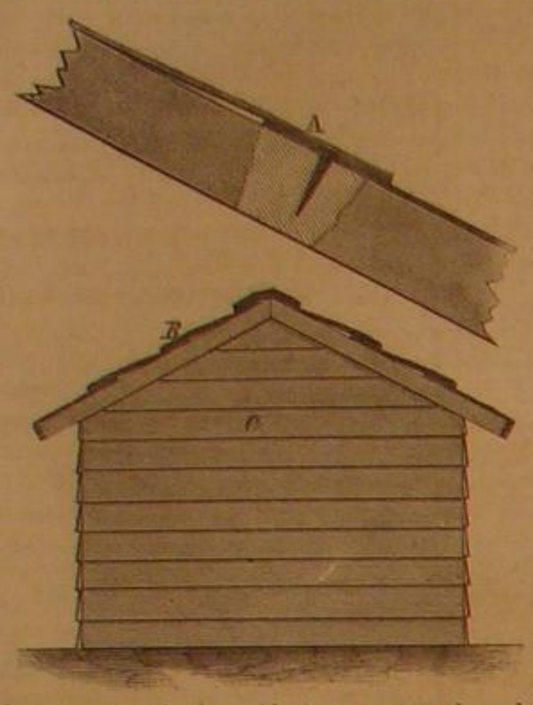
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We hear there are manufacturers infringing on some one or more of our nine patents in this machine. We caution the public from purchasing such.
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Those oldest manufacturers of paper, the Chinese, have adapted this substance to many uses for which we employ other and more costly materials. Clothing, the soles of boots, household utensils, coverings for houses, etc., are among the varied uses to which paper is adapted by this ingenious people. We have not yet equaled them in diversity of employments for paper, but the engraving herewith given shows a use for paper specially prepared for the purpose. It is a paper made of manilla, hemp, or grass according to a process which makes it perfectly air and moisture proof.



The improvement is the subject of a patent issued through the Scientific American Patent Agency to C. J. Fay, in January, 1867, and includes the method of attaching the paper to the roofs, sides, flooring and ceiling of buildings, and to the decks of vessels, to awnings and carriages. The paper is manufactured in strips of proper width for the purpose required, and creased at regular intervals for folding and marked for the insertion of the nails or tacks which secure it to the surface on which it rests. The plan protects the nails from oxidation by covering them with the impervious paper. This method may be seen at A, where the tack is driven through the paper into the board and the paper is then folded over it. It is used on the siding or roof of a house in the same manner, as seen at B and C.

It is claimed that for weather boarding, half-inch lumber is as good where this paper is used as inch stuff, where it is not used. The boards, even for the roof, need not be tongued and grooved, only matched by the saw. For floors, it is tacked down, and then painted if the floor is not to be carpeted. No moths will attack a carpet laid on this paper. For walls and ceilings it is intended to supersede laths and plaster, and it can be painted as desired, will wash clean without injury, and is said to be far superior for warmth to any plaster.

It is cheap, efficient, and easily applied, greatly reducing the cost of building. For more detailed information our readers are referred to C. J. Fay & Co., S. E. corner of Front and Vine streets, Philadelphia, Pa.

Tests of the Potter Rail.

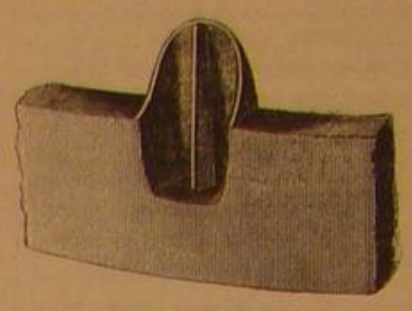
In No. 4, current volume we illustrated a rail made of Bessemer steel and iron at the Wyandotte Rolling Mills, at Wyandotte Mich. The heads are of steel and the web and bottom of iron. A few weeks ago a test of the security of the weld was made, an account of which we copy from the *Journal of the Franklin Institute*:—

"A weight of sixteen hundred pounds was allowed to fall four feet upon a piece of Doddized rail five feet long; it broke at the first blow. A piece of the steel-headed rail made at Wyandotte was then put under the drop, and subjected to four blows as follows: For the first blow the weight was raised five feet; for the second, ten feet. The rail was then turned over, and received the third blow with a fall of fifteen feet; and the fourth blow with a fall of twenty feet, bent the rail almost double. The rail was then taken to the steam hammer whose weight was eight thousand eight hundred pounds, and received ten or twelve blows."

"When the bar was nearly straightened out, it broke, but the iron and steel remained perfectly welded together. One of these pieces was then subjected to one hundred blows from the eight thousand eight hundred pound hammer on the head on the rail, as follows: Fifty blows at two feet fall, and fifty at three feet fall. This crushed the rail without breaking the weld of the iron and steel."

CUSTER'S IMPROVED TOE CALK FOR HORSES' SHOES.

This calk is formed with a ribbed projection produced by a displacement of its metal. The bar, when hot, is placed upon a die and with a blow the recess and central projection is formed. The ordinary calk is made by one end being drawn to a point and turned up at a right angle. This entails more labor and by being forced into the shoe weakens it, while the welding of the projection on this improved calk to the shoe adds to its strength. It is claimed that this calk has



advantages over both the ordinary and the two pronged calk, in greater durability of the shoe and greater economy of labor and material.

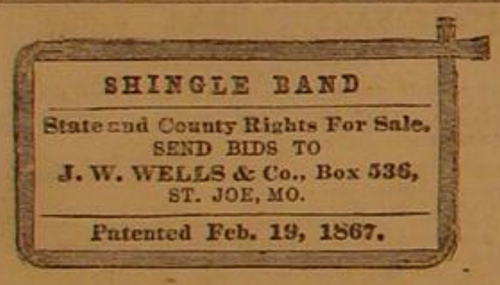
These calks can be made upon the anvil or from the bar under a drop, which for this purpose may be made very cheaply. The union between shoe and calk is very perfect, partaking of the nature of a dovetail, as the toe of the shoe is driven into the recess of the calk while the projection of the calk is welded into the shoe.

This device was patented Feb. 12, 1867, and rights of territory or manufacture may be obtained of Custer & Tull, Monroe, Mich.

Anæsthesia has been tried by two French surgeons, on the track of the tri-facial nerve, in the external ear, to produce local insensibility under the extraction of teeth. Twenty four out of thirty-two operations were painless and three doubtful. A tonsil was removed without the slightest pain.

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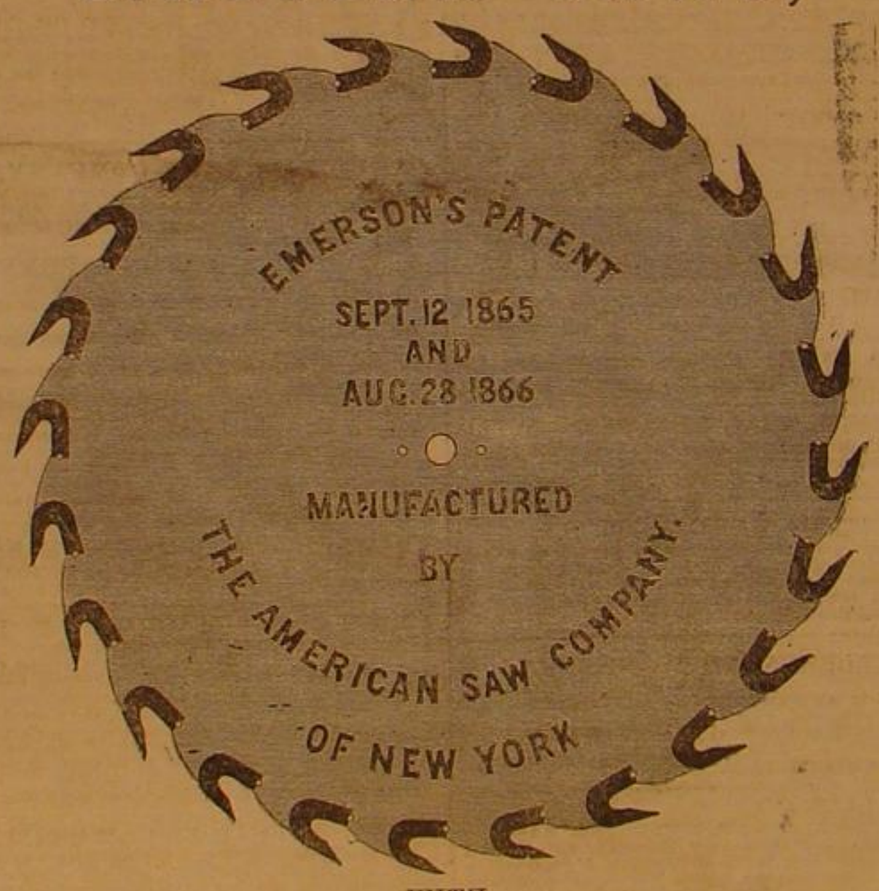
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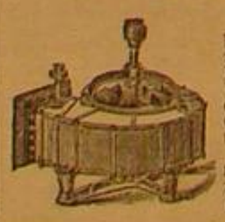
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SCIENTIFIC AMERICAN

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

Vol. XVI.—No. 19. [NEW SERIES.] NEW YORK, MAY 11, 1867. $3 per Annum. [IN ADVANCE.]

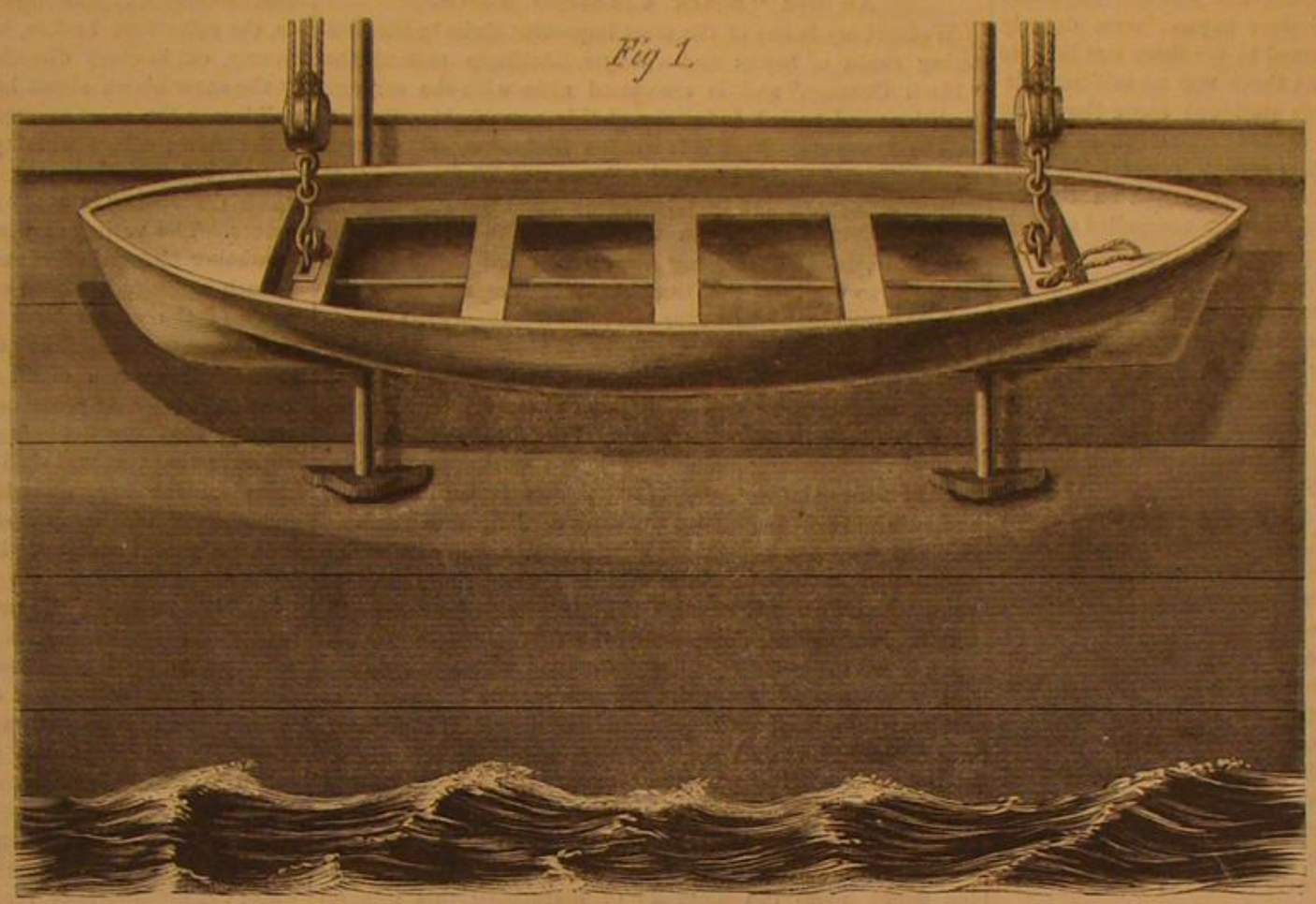
Excelsior Detaching Apparatus.

The many disasters at sea, the fatality of which is increased by the accidents attending the lowering of boats from vessels, and the law of Congress approved July 25, 1865, have greatly stimulated invention in the effort to guard against such catastrophes by improved means of safely launching boats.

The law to which we refer provides that "all sea-going vessels carrying passengers, and those navigating any of the northern and north-western lakes, shall have the life boats required by law, provided with suitable boat-disengaging apparatus, so arranged as to allow such boats to be safely launched with their complements of passengers, while such vessels are under speed or otherwise, and so as to allow such disengaging apparatus to be operated by one person disengaging both ends of the boat simultaneously from the tackles by which it may be lowered to the water."

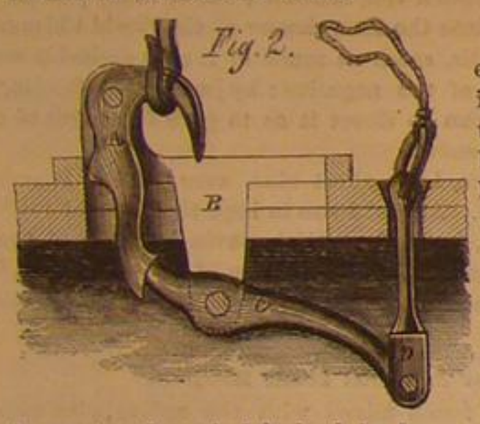
Fig. 1 shows a boat slung to the davits of a ship and having the apparatus attached. Fig. 2 shows one of the hooks, the trip, and the releasing lever. The hook, A, is of metal, pivoted to a slotted plate secured to a fixed thwart or other cross piece near the end of the boat. The slot in the plate allows the lower part of the hook to swing up through, completely reversing the position of the hook. When the boat is suspended the point of the hook projects below the upper surface of the plate, B, forming a loop so that the davit tackle cannot be accidentally unfastened, and the hook is held in place by the weight of the boat, that presses its lower end against the trip lever, C, which is pivoted to a downward projecting lug on the plate, B. The form of the end of the trip lever and its corresponding seat on the end of the hook is of such a shape that no great effort is required to detach them, as the ends are formed on the radius of a circle struck from the pivot of the trip as a center. The boat is released by a slight pull upon the releasing arm, D, pivoted to the long arm of the trip. To insure the simultaneous release of both ends of the boat, a bar runs from one to the other of the trips under the thwarts, as seen in Fig. 1. This bar forms the pivots to which the trips, C, are rigidly secured, and as the arm, D, is raised at one end of the boat, the trips at each end are released at the same time, allowing the hooks, A, to reverse instantly. The arm, D, is not necessarily used at each end of the boat; preferably it is placed only at the stern to be under the exclusive control of the officer of the boat. The hooks after being used return at once to place, so that the apparatus is again ready for use in hoisting the boat.

Fig 1.



HUNTINGTON'S BOAT-DETACHING APPARATUS.

Fig. 2.



This apparatus is the invention of Thomas Huntington, of New Rochelle, N. Y., and was patented through the Scientific American Patent Agency April 17, 1866, and January 15, 1867. For further information apply to Thomas Huntington, at T. Davids & Co., 127 and 129 William street, New York City.

Improved Cut-off Valve.

This arrangement of the cut-off and the governor valve in combination has some elements of excellence not seen in others which are intended to produce the same results. By it the governor, which denotes the speed of the engine, and the eccentric, which controls the admission of steam to the cylinder, are intimately and absolutely connected. It has neither weights, trips, springs, nor any other compensating devices liable to get out of order, but is direct acting and certain in its operation. It has been fairly tested for two years, giving excellent satisfaction.

One of its principal advantages is a screw follower, adjustable, which keeps the face of the valve steam tight against the face of the valve case or chamber. The valve is adjusted by the jam nut, A, Fig. 1. On the screw follower is a thimble-oqx, B, which carries a split sleeve, or a collar in three or four sections, which can be adjusted by means of set screws in the thimble-box to hold the valve stem in position. It will be seen that no packing is required for the valve stem, as the screw follower, jam nut, and thimble-bearing fit sufficiently close to prevent the escape of steam.

On the end of the valve stem is secured an arm, C, having a similar arm parallel to it, the two kept in their relative positions by the box, D, which is secured to the arm, E, and

Fig 1

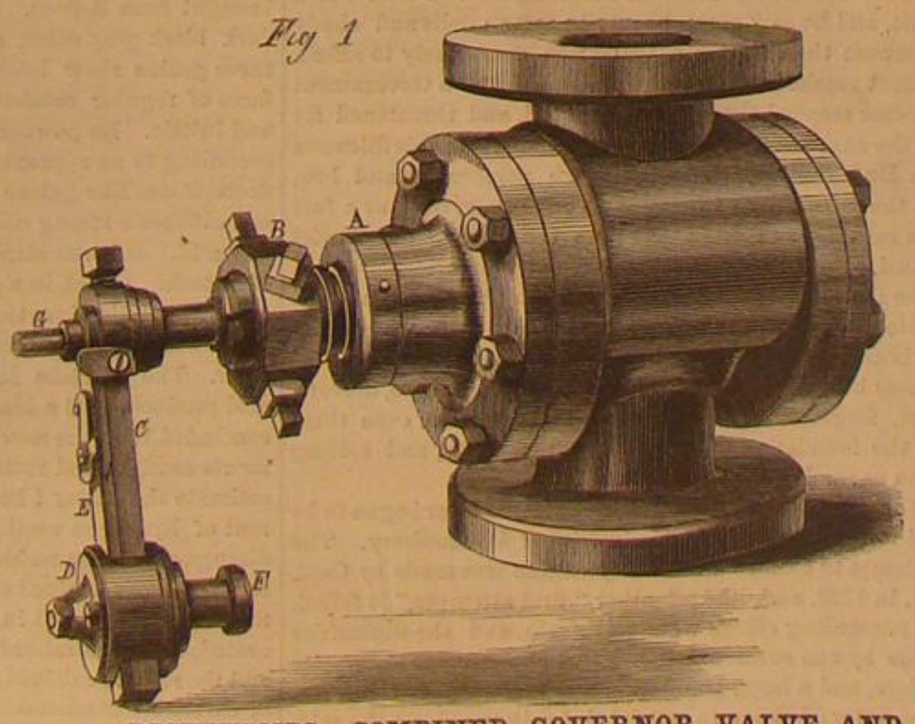
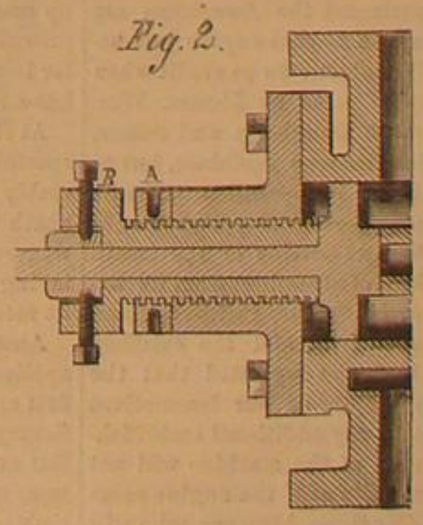


Fig. 2.



DICKINSON'S COMBINED GOVERNOR VALVE AND VARIABLE CUT-OFF.

slides on the arm, C. The wrist, F, on box, D, receives the hook of the eccentric rod, and that seen at G on the arm, E, takes the rod from the governor.

It will be seen that when by increased speed the governor balls fly out, the arm, E, and with it the box, D, slide toward the end of the bar, C, giving increased leverage and consequently diminishing the movement of the valve by the throw of the eccentric and decreasing the amount of steam admitted to the cylinder, while the contrary action takes place when the balls describe a smaller circle in a lower plane by decreased speed. The bar, E, is in two parts, connected by a V-chanelled joint and by a latch on the lower portion of E, engaging with a pin on the upper portion. On this latch is a projection that in case of the breaking or running off of the governor belt, will, by the sudden raising of E, be brought in contact with a catch or stop on the upper part of C, and thus liberate the lower part of E, together with the box, D, which will drop to the extreme end of C, and either stop the supply of steam by closing the valve or diminish the supply to a perfectly safe point, as it may have been adjusted to do.

A patent was secured for this device through the Scientific American Patent Agency Nov. 13, 1866, by J. L. Dickinson, of Dubuque, Iowa, whom address for further information.

Now.

Now, fields are being plowed, and early potatoes planted, and windows are left open in the middle of the day, and people go out in slippers to watch the gardener's progress, and coughs abound, and the doctors are busy. Now, Chaucer is read, and Milton's L'Allegro, and more poetry than ever, is sent to the magazines and newspapers. Now, the fat, saucy robins hop about over the newly turned up ground, and the blue-birds glance from tree to tree, and the wild ducks glide in a pretty procession on the river, and the crows squabble in the woods, and, walking among the cedars, you send the whirring crowds of yellow wing-tipped cedar birds flying before you at every step. Now, the bird fanciers thrive, and enthusiastic boys buy pigeons—pouters and fan tails—and the girls get canaries, and even mocking birds find credulous purchasers who fondly believe they can sing. Now, the hardware shops take in their coal scuttles, and door mats, and skates, and sleds, and put out refrigerators and bathing tubs, and rakes, and hoes. Now, strawberries grown in hot houses, with the flavor of cold potatoes, appear at the stylish restaurants, and are bought by over rich people at twenty-five cents a piece; and young women of a credulous turn of mind buy rose bushes in the city markets, full of buds, and believe they will open, and the first shad is sold for five dollars and goes to the gridiron.

Now, the dear female sex comes out as one man in little round hats with pigeon wings, and their brother's jackets, and chignons like orioles' nests, and the tidiest, prettiest short dresses, and the roses of June in their cheeks, and the violets of May in their eyes, and the gold of the sun himself in their hair. Now, Easter is coming, and the milliners are going to open, and new bonnets are to be bought, and organdies appear in the windows, and the sun will dance with joy at the beauty of the new fashions, and the inventiveness of the female mind will strike everybody for the thousandth time. Now, all the boys and girls are flying kites, excepting those who are playing marbles, and Mr. Van Tine is asked a hundred times a day, "How much for them Japanese kites?" as the kites grin like demons when the poor little shavers with ten cents are told that the kites are forty. Now, all the boys are dying for fish hooks, and cord, and sinkers, and bobbers, and the fish are uneasy in their minds, which they wouldn't be if they knew any thing about boys.

Now, plans are formed, and the winter is abused behind his back, and a good peach crop is anticipated, and the papers are full of stories of the profit people made last year off a half acre of strawberries and grapes. Now, rents are raised, and house hunters are aghast, and painters are busy, or pretend to be, and carpenters have no time for immediate calls, and servants in the city are looking out for places in the country, and hod carriers develop a preternatural and unsuspected talent for gardening and the care of horses. Now, spring has come, and winter has gone, and the heart is renewed, and life is quickened, and under the blue sky nothing seems

so fit for the day as love making, and all young things, from babies to goslings, are in season, and the faces of the sick are sadder than yesterday, and the sight of a little lame child makes the tears rush to the eyes—and that death should be here in the very bursting and fullness of life, is more than ever a dread and a mystery.—*The Nation.*

[From our Foreign Correspondent.]

THE PARIS EXPOSITION---AS IT OPENED.

PARIS, April, 2, 1867.

AN EMPEROR ON EXHIBITION.

In accordance with the original determination the formal opening of the Great Exhibition took place at P. M. The unintermitted labors of all those concerned in the matter had succeeded in bringing a fair show of order out of the chaos which previously reigned and still exists, to a considerable extent, and the event was not such a farce as many had predicted it must be. Wisely, however, the more imposing ceremony was deferred till a later date, probably the day on which the prizes will be awarded to the exhibitors; that which took place yesterday being of the simplest character. The weather was most propitious, and the thoroughfares along which the imperial party were to pass, were densely filled with people though it seemed to me there was little to reward them for their trouble, as there was no military display, except of course the guards stationed along the route (a sight too familiar in Paris to attract any attention) and as the Emperor does not at any time seclude himself from the public, it is hard to see what was the attraction on this occasion. At all events, the crowd was not compelled to wait beyond the time appointed, for promptly at the hour the Emperor and Empress with their suite entered the Grande Porte and were received by the Commissioners. The price of admission to the public was fixed at 20 francs, and many availed themselves of the opportunity to witness the ceremony. Whether they were repaid or not, each must judge for himself, but as none were allowed to walk about, but when admitted were confined to a single locality, and as the view from any one point is extremely limited, it is certain that as far as the sight of the Imperial party was concerned, the enjoyment was exceedingly brief. On entering the building, the party ascended the stairs to the raised promenade in the center of the outer or machinery gallery, and beginning at the French side made the tour of the building, and were received with cheers as they passed along. Descending from this they passed through portions of the fine arts and other galleries, and at various points were saluted by the Commissioners from the different countries, and the jurors, who were arranged in groups at different portions of the building. This was the whole of the ceremony, and at the close of it the party drove off by the same entrance at which they had arrived. The avenue from the entrance of the park to that of the building was covered over with the rich Imperial green cloth, gold flies hung from a row of masts on each side, from the top of which waved banners of many colors, presenting a very gay appearance.

Most of the machinery was in operation, steam having been got up for the first time in the English department on Sunday, and altogether the affair was a tolerable success. To day the Exhibition is open to the public at 5 francs admission which it is understood will be the price during this week, after which it will be reduced to 1 franc.

STATE OF THE AMERICAN DEPARTMENT.

Except in the machinery department, which must be nearly complete, it would seem that hardly more than half the articles are in place. The American department is particularly empty, except in the picture gallery. This latter bids fair to the most creditable portion of the Exhibition for us. There are Church's Niagara, Weir's Casting of a Parrot Gun, and Bierstadt's Rocky Mountains, besides a number of other good pictures; but of course some pieces of inferior merit detract from the excellence of the collection. As a whole, the display of paintings promises to be one of unusual interest. In the machinery department the Americans are also rather behind hand. There is a Corliss engine just beginning to be erected, which will doubtless do us credit when it is in operation, a good display of tools by Messrs. Wm. Sellers & Co., and Messrs. Bement & Dougherty and others, and a number of pumps and miscellaneous machines, but as far as I have observed nothing is yet in operation. The locomotive sent by the Grant Locomotive Works, Paterson, is placed in the United States Annex outside of the main building and attracts a great deal of attention from its extraordinary appearance, the boiler being cased with German silver instead of the usual Russia iron, and the chimney made of the same material. It is to be regretted that the makers saw fit to send it in this fashion, as our locomotives are already showy enough without any additional embellishment, and no doubt the real merits of the machine will not be as carefully studied by the majority as if the engine came in a more business-like dress. For those, however, who will examine it, there is nothing to be ashamed of in this engine, and in many points it undoubtedly excels any locomotive in the Exhibition, though I fear that will not be the general verdict. The same remark that I have made with regard to this engine applies to almost all the other American machinery exhibited. Fancy painting seems to be thought a necessary qualification for an exhibited article, while all the foreign machinery is painted in perfectly plain colors; generally lead color or some similar hue; and there can be no doubt that the effect is much more pleasing. Our best makers, however, are an exception to the rule, and show the good taste which we ought to expect from them.

In the other American departments there is as yet almost nothing. Tiffany exhibits a case of very chaste silver plate, with a model of the Vanderbilt also in silver and very neatly done. There is a good display of samples of petroleum oils by Pease, of Buffalo, and some pianos and other articles which are at present covered up; but aside from these there is only emptiness, though no doubt we shall have a better account to give of ourselves shortly. The Norwegian and Swedish department appears to be as nearly complete as any, and presents a very handsome appearance. There is, naturally enough, great difference in the taste with which the departments of the various nations are decorated, and neither ours nor the British will take the first rank in this respect.

The grounds are rapidly progressing toward completion, and now need as much as anything, a week or two of warm sunshine to make them exceedingly beautiful. The amount of work that has been accomplished is an example of the expedition with which the French can carry on such undertakings. On the 25th of Sept. 1865, the Champs de Mars, then a bare parade ground, was delivered over to the Commissioners. On the 3d of April 1866 the first column of the iron building was raised, and just one year from that date the exhibition is opened. . SLADE.

An Old "Black Country" Town.

Wednesbury is one of the most important links in the clustering chain of towns and villages, familiarly termed the "Black Country," and is associated alike with the strange traditions and varied industries of this remarkable district. In the Doomsday Book it is written *Wodensborough*, a name unquestionably derived from the Saxon god Woden, and it is reasonably conjectured that, in more remote times, it was the site of a Druid temple. In the year 916 the fair Princess Ethelfleda, daughter of King Alfred, built and fortified a castle here, to ward off the troublesome Danes, one of whose valiant "sea kings" cast ever and anon a jealous eye towards the kingdom of Mercia. Early in the twelfth century a church was erected upon the crumbling foundations of Ethelfleda's ancient castle, and henceforth the town began to acquire some degree of importance. Villaines and borderers from the surrounding plain found here a market for the produce of their carncates, and proud thanes began to discover and turn to profit the hidden treasures of their broad acres—coal and lime, and ore—those wondrous weapons with which civilization has subdued the world. There is no record to prove when the development of the minerals here commenced, but Wednesbury is, undoubtedly, the first place in the district, if not in the entire Midland coal-field, where, in Leland's quaint phraseology, "men did dig for secoles," As early as the year 1315, Bradeswall, a small hamlet near Wednesbury, was noted for its "coal pits," and appears to have been almost entirely populated by primitive miners. Leland and Camden, in the account of their "surveys," both bear testimony to the increasing development of the coal mining of Wednesbury during the sixteenth century. The latter quaintly expresses his doubt about the propriety of disturbing this mineral wealth. "Wednesbury," he writes, "hath coles digged out of the earth and mines of iron, but whether to their commodity or hindrance, I leave to the inhabitants who better under stand it." In the days of Queen Bess the smelting of iron commenced in the neighborhood, but the blast furnaces were unable to produce more than fifteen or twenty tons of iron each per week. They were erected near a stream of water, in a part of the parish known as Broadwaters, and huge water-wheels were made to work the blast bellows. The smelting was all done by means of charcoal, and the wood "two miles in length by one in breadth," referred to in Doomsday Book, was soon stripped of every "gnarled and knotted oak," to supply the requisite fuel. Then came Fuller's lament about the loss of British timber, caused by the ironworks which were spreading all over the kingdom. Fuller was a true poet, and he saw more beauty in sylvan dells and shady forest bowers than the iron trade was ever likely to afford. His lament reached the ears of Parliament, and a Government interference stopped the supplies of wood, and threatened for a time the extinction of Britain's iron trade. In this dilemma up rose Dud Dudley, who, after much persecution and loss, proved the possibility of using with advantage coal as a fuel for iron making, and from that time the trade of the district has added, year by year, to its wonderful proportions.

At the time of the rebellion Wednesbury was a town of respectable importance. Its church, thrice re-built, was considerably beautified within and without. The little town beneath was busy with industrial life. Potters, nailers, delvers, weavers, forgemen, and bend-ware makers, were, even then, laying the foundation of its modern prosperity, and setting no mean example of skill in handicraft.

Another century rolled around, and steam power began to be applied to the fast-increasing industries of Wednesbury. The first attempt to construct a colliery engine was made by Capt. Savary, in 1739, and, like all other "first attempts," it failed. But as succeeding efforts were put forth, and the difficulties were one by one surmounted, a great extension of enterprise took place, and a large population was attracted to the town. The character of these indnstrial inhabitants about the middle of the last century gave to the town an unenviable notoriety. All sorts of brutal pastimes were indulged in. Superstition was rampant among the toilers of that day, especially among the colliers, who saw in every chamber of the mine a gnome or a hobgoblin. This condition of affairs continued in a milder form until far into the present century, and the artisans of Wednesbury were not unfaithfully portrayed by Mr. Disraeli in "Sybil," about thirty years ago. About that time they commenced to throw aside the brutality and ignorance which at once uprooted their morals and fettered their skill, and every year since then has revealed a sure and steady advancement in their intelligence and ingenuity, and in the consequent prosperity and importance of the town. Modern Wednesbury contains Some 20,000 inhabitants, having nearly quadrupled its population within the past half century. The total number of artizans engaged in the skilled mechanical trades of Wednesbury exceeds 5,000.—*The Engineer.*

Cabinet Portraits Amid Snow and Ice Scenery.

We have recently noticed the admirable winter effects obtained by Mr. Notman, not only in pictorial photographic compositions, but in the backgrounds and accessories of his photographic portraits. A selection of cabinet portraits we received a day or two ago furnishes us with further variety of effect of this kind. We have here figures—ladies and gentlemen—skating in every variety of position and action belonging to this graceful exercise. Some are apparently gently gliding over the ice; others suggest the action of pulling up and arresting extreme velocity; whilst others are apparently flying along at a tremendous pace, poised on one leg, the other being raised ready to descend and give another forcible stroke. A lady, in a charming short-skirted skating costume, just raising one foot while she glides along on the other, is exceedingly graceful. In all these, the snowy background and the perfect effect of ice, secured in the studio, are most wonderful. The figures are partially reflected in the ice, the reflections broken, however, by the cracks or lines, or fissures, cut in every direction by the skates in the ice, and by the snow blown about here and there. Other figures are walking in the snow-covered scenes, their feet sinking deep in the snow; others, wearing huge snow shoes, tread lightly on the surface; others are breasting a pitiless snow storm, which, descending in heavy flakes, seems to half obscure the picture. The variety of winter costume is admirably suited to enhance pictorial effect and add interest to the photographs.

Much curiosity has been expressed as to the mode in which many of the effects have been produced with so much of nature and so little effect of contrivance. And here we find another illustration of an apothegm we never fail, when occasion serves, to press on the attention of our readers; namely, that excellence is due to the man rather than the method; that personal skill is of even more value than perfect formula. The best materials and the best processes are undoubtedly of the utmost value in securing good work; skill, judgment and taste in applying them are not less important.

Mr. Notman says; "To produce the effect of fallen snow, I have tried many ways, such as carded wool, white furs—that from the Arctic fox, for instance—but latterly salt, which I find by far the best, as you can throw it on and about stones, rocks, etc.; and it so easily takes any desired form—such as a drift. When thrown upon the figure, it adheres to the cloth; in fact, as a representative of snow, it leaves nothing to be desired.

"To represent falling snow: after the negative is dried and varnished, I take some Chinese white and mix it with water to the consistency that experience alone can dictate as best suited; put it into a vial, introduce one of those perfume blowers, and blow into the air a shower of the liquid Chinese white, and, as it falls, catch as much of it as is desirable on the varnished side of the negative: by judiciously holding the negative, you can so direct it as to give the effect of a slant to the falling snow.

"To represent ice, I use sheet zinc, over which I have polished plate glass. At first I was in hope that zinc of itself would be sufficient, but a short trial convinced me that the zinc required protection from the action of the salt, which I use to represent the snow on the banks at the side."—*Photographic News.*

A New Mineral from Borneo.

This mineral is found mixed with the native platinum brought from Borneo. It forms small grains or globules of a dark black-gray color, and of considerable luster. Many of these grains show brilliant crystalline facets, which are the faces of regular octahedra. The new mineral is very hard and brittle. Its powder is dark gray. Its density exceeds 6, according to an approximate determination. When heated it decrepitates like galena; it does not fuse before the blowpipe, but diffuses a strong odor of sulphurous acid, and then of osmic acid. It is not attacked by aqua regia, nor by bisulphate of potash. Fused in a silver crucible with hydrate of potash and nitre, it dissolves to a green mass. After cooling, the mass is brown, and it dissolves in water with a magnificent orange color. The solution has the odor of osmic acid, and nitric acid produces in it a black precipitate. From this it may be concluded that the new mineral contains as its principal elements osmium and ruthenium. It also contains sulphur. To estimate the latter I heated the mineral to redness in a current of hydrogen until no more sulphuretted hydrogen was disengaged. The residue was exhausted many times by aqua regia; there remained metallic ruthenium. A portion of this metal was estimated in the orange solution. This was evaporated, then neutralized by ammonia and brought to dryness, and the residue calcined in a covered crucible in an atmosphere of carbonate of ammonia. There remained metallic ruthenium. The osmium which volatilized was determined by difference. From this analysis the new mineral contains—

Sulphur	31·79
Ruthenium	65·18
Osmium	3·03
	100·00

These numbers appear to show that the mineral is sulphide of ruthenium, Ru_2S_3, twelve molecules of which are associated with one molecule of sulphide of osmium, OsS_4.—*F. Wöhler, in Chemical News.*

GLYCERIN affords an excellent coating for the interior of plaster molds.

Editorial Summary.

CATCHING COLD, says Dr. Thomas Inman, is a common phrase for an attack of catarrh, but it is a very incorrect one. One year I suffered so very severely from a series of "colds" that my attention was drawn especially to them. I was then lecturer on Medicine, and nearly every night from five o'clock to six during the winter months, had to turn out from a warm room to go through all weathers, lecture for an hour in a theater heated by a stove and lighted by gas, and then return again to my snuggery at home. When I felt a fresh cold beginning, I tried in vain to account for it, until I accidentally saw in Copland's dictionary that the most fertile cause of a cold was coming from a moist, cold air to a hot and dry room. This at once explained to me the reason of my frequent suffering, for I had invariably gone into my hot room straight from the cold. I of course soon changed my habit: I dawdled in the hall while taking off my great coat, perambulated the rooms which had no fire in, went up and down stairs and the like, ere I went into my study, whose temperature was also reduced. Since then, I agree with a friend who says, "that a cold comes from catching hot;" and I am disposed to think that there is a strong analogy between a chilblain on a child's toes and a cold in a person's nose, throat, and lungs.—*Medical Mirror.*

ROCK CRUSHER.—Our miners have tried many things, but have found nothing equal to the percussion of the comparatively light and lively dropping stamp. They generally think that this principle cannot be equalled by that of pressure or of abrasion, in any shape, for breaking up ores. There are those, however, who hold a different opinion, and we have seen notices of a new pulverizer for copper rock (Mabb's) which is claimed in the north-west to crush a hundred tuns per day. The power required is not stated, and the information is therefore of little value. The machine resembles a linseed crusher on a large scale, consisting of four seven-tun wheels, with a six-inch face, traveling one after another in a channel or trough in a circle of thirty feet diameter, at the rate of 300 feet a minute. The power required for four seven-tun rollers, traveling a road of rough boulders, must be sufficient to run a great number of stamps; but we have no data for the proper comparison.

THE BROADWAY BRIDGE was opened to the public on the 15th of April for a single day, throughout which it was thronged with curious crowds, who lingered to enjoy the magnificent *coup d'œil* of architecture and swarming life, up and down the street. The top-heavy and shaky hand-rails toward Broadway have since been braced with outside brackets, and no longer threaten the crowds that press them with precipitation into the street. When the work of painting and decoration is completed, the much debated utility of the structure will be put to proof. Undoubtedly as a place to see, and perhaps to be seen, it will be popular, whether its more substantial benefits are sufficient to warrant the erection of similar structures in other quarters or not. In any event, it will remain while it is needed, a costly monument of the incapacity of our municipal institutions and their Albany stepmother together, to solve in twenty years of suffering the simple problem of a passable thoroughfare.

AMERICAN ORDNANCE.—It is much to be wished that the real power of the heavy 15-inch and 20-inch guns were understood in this country, instead of our believing so generally in their "low velocities." In the large chambers of these guns the powder gas has additional room for expansion, and, as would be the case with steam cut off at a small portion of the length of a large steam cylinder, it thus does more work. In reality, while the dynamic value of our cannon powder, for each pound weight, is but about 170,000 foot pounds, that of no better powder, fired in the large-bore American guns, is 200,000 foot pounds. Thus, the 15-inch gun, fired with 60 lbs. of powder and a 440-lb. shot, has an initial velocity of 1320 feet per second, a rate which would certainly not be considered slow by our own ordnance engineers. Our system of small bores and long shot not only strains our guns excessively, but loses us much of the useful effect of our powder.—*Engineering.*

IRON MOUNTAIN, Pilot Knob, Bogy and Shepherd Mountains, Missouri, with other iron hills of less magnitude, it is computed, would yield 1,000,000 tuns per annum of wrought iron for four hundred years. The depth and extent of the lead-bearing rocks are greater in this State than in any other portion of the globe. The same may be said of copper and iron ores. On the north and west of this great iron center are found lead, copper and zinc; on the south and east, copper, silver, argentiferous lead, nickel, cobalt, platinum and gold. The vast coal fields of Illinois are within a short distance, and will soon be brought by railroad into contact with these iron mountains, to melt them down and build from them eventually the greatest iron industry on the globe. Large manufacturing establishments have already been located prospectively in St. Louis, in view of the advantages of the Chester coal fields.

GREENLAND comes into notice once more, as the great source of the newly important metal aluminium. Cryolite, the mineral from which of all others it is most easily reduced, abounds in Greenland, and now supplies most of this metal to the arts. It is a fluoride of aluminium and soda, containing 24 per cent of the former, and is reduced by simply roasting, which deposits the metal in globules, afterwards separated from the fluoride of sodium by lixiviation. Soda is also manufactured from the cryolite at Copenhagen and other places in Europe.

PRINTS IN BITUMEN.—Mr. Swan has shown us a curiosity in carbon printing—prints produced in the following novel manner:—Paper was saturated with a solution of asphalt of such consistence that when dry no gloss appears on the paper. After exposure under a negative, an image was developed by means of turpentine, applied so that the soluble asphaltum shall find its way out of the paper from the side opposite to that exposed to light, so leaving the insoluble asphaltum to form a print with half tone. The same principle is, of course, applicable with chromo-gelatine printing; the material saturated with the chromo-gelatine being of an open texture (woven materials, for an example), and the coloring matter being of course soluble with the gelatine. Prints by Mr. Swan's processes are regularly published in Paris.—*Photographic News.*

MILITARY PROBLEMS IN ENGLAND.—The British Government are strongly urged by a late editorial in the *Mechanics' Magazine*, to take steps in emulation of the continental governments, to make an efficient defensive weapon of the torpedo. Capt. Harvey, R. N. who has devoted twenty years to the study of this subject, has recently offered to the Admiralty a plan of torpedo and torpedo vessel, the latter a sort of turretless monitor, with which he expects to be able to bring an explosion of any necessary force to bear upon the hull of a hostile ship approached in any direction. It appears that the British are behindhand also in the matter of repeating arms for cavalry, and Major Sir Henry Havelock, in a military argument just published, has endeavored to enlighten the public and the authorities, on this subject, by a detailed account of the battle of Five Forks, in which the decisive work was done by Sheridan's cavalry, armed with the Spencer repeating rifle, and acting both as cavalry and infantry.

REWARD OF HEROISM.—Mr. Parkin Jeffcock, the mining engineer who perished in a heroic attempt to discover and save those who were possibly left alive in the pit after the first of tha series of explosions in the Oaks Colliery, held a policy for £1,000 from the "Accidental Death Insurance Company." This company now refuses to pay over the money to the widow and orphans of the deceased, on the ground that he was guilty of "willful exposure," against which the policy stipulates expressly. Perhaps the defense is good: certainly public appreciation of it cannot fail to be the means of relieving them to a large amount from future risks of the kind. Other parties will show the same stone-blindness to their own interest as well as to all that is admirable in human conduct, if they neglect to make up promptly the provision refused to the family of this noble man.

WALL COLORING.—A new wash, said to be almost as durable as paint and well suited to plaster, wood, metal or brick, has been invented by Dr. Jacobsen of Hamburg. He dissolves 50 parts of glue in 150 parts hot water, with 2 parts of a solution of caustic soda, of specific gravity 1·34, and boils. After cooling, he adds 50 parts of commercial water glass solution, and then stirs in enough oxide of zinc to give a proper consistency for painting. Grind smooth in a paint mlll, if necessary. After the last coat has perfectly dried, a solution containing 10 per cent of chloride of zinc should be applied. This will give a beautiful gloss, and great durability. Earthy pigments not affected by alkalies may be used for color. The mixture must be applied quickly, as it will not keep.

IMPROVED AIR PUMP.—Mr. Regnault presented at a late meeting of the French Academy of Sciences, in the name of M. Deleuil, an excellent double-action, exhausting and condensing air pump, capable of making a remarkably perfect vacuum and of preserving it indefinitely, and of creating a pressure of 8 or 10 atmospheres. The piston is free and without packing, except a layer of air ·0008 of an inch in thickness and very long; the piston having a length equal to thrice its diameter. The heat disengaged is not appreciable, beyond that resulting from the compression of the air.

A NEUTRAL MAGNETIC CHAMBER.—Faraday has shown that if a small cubical space be enclosed by arranging square bar magnets, with their like poles in apposition, so as to form a chamber, within that space all local magnetism inferior in power to the magnets employed will be neutralized. The same effect may be obtained with electro-magnets as with permanent magnets, and it is proposed in the *Mechanics' Magazine* thus to enclose the compass of an iron ship, as a remedy for the deviation by local attraction. A battery might be constructed to be excited by the sea water flowing through it, requiring no attention as long as the zinc plates lasted.

TO BEAUTIFY THE TEETH.—Dissolve two ounces of borax in three pounds of boiling water, and before it is cold add one teaspoonful of the spirits of camphor, and bottle for use. A tablespoonful of this mixture, mixed with an equal quantity of tepid water, and applied daily with a soft brush, preserves and beautifies the teeth, extirpates all tartarous adhesion, arrests decay, induces a healthy action of the gums, and makes the teeth pearly white.—*Ex.*

THE METEORIC IRON sent by Marshal Bazaine to Paris from Mexico, has been assayed, with a specimen sent from North America, and both are reported to the Academy as remarkable for their white hue, softness and susceptibility of high polish—which is but a way of describing their chemical purity.

A LATE BOSTON NOTION is to generate steam with the aid of waste coal dust, very fine, injected by a current of compressed air into the space over the fire, where it burns with an intensely hot flame, and greatly increases the production of steam.

A HINT FOR PAPER-HANGING MAKERS.—We have a letter from a correspondent who is impressed, or as he says "stuck up," with the idea of gummed wall paper. Noticing that postage stamps as well as postmasters are gifted by their makers with the property of sticking to their places, he suggests that it would save trouble and be an economy if paper hangings had the same happy disposition beforehand. Much paper of this convenient description would be purchased and applied by small householders with their own hands, for which there is no demand with the present difficult and disagreeable way of hanging. The only objections that occur to us are the greater cost of glue or gum than of flour paste, and the inapplicability of the former to cheap unsized paper, which it fills and discolors. Possibly some inventor may devise a cheap sizing and soluble coating for common wall paper, which can be applied by machinery at trifling cost, so as to introduce a valuable new article of manufacture.

PHOTOGRAPHIC WALL PAPER AND CALICO PRINTING, seems to be the next thing coming. Mr. Dancer has been improving on the process of Mr. Mercer, the directions for which are as follows:—34 oz. of sulphate of iron is converted into peroxalate, diluted to 2 gallons, and will impregnate 200 square yards of paper. The paper having been floated on the solution until fully wet, is then exposed, and afterward steeped in some solution that acts only on the parts where the iron has been reduced from the peroxide to the protoxide. Red prussiate of potash and sulphuric acid act well, making the image blue and the ground white. Sulphocyanide of potassium and a salt of copper form another bath: the protoxide of the picture deoxidizes the copper, and the sulphocyanide of the suboxide of copper is fixed in the cambric or paper. This may be converted into the red prussiate of copper. A beautiful variety of colors may be obtained by substituting iodides, chromates, prussiates and oxides of other metals for those of iron or copper, and with these bases may also be used various dyes.

THE CUNARD STEAMSHIP "RUSSIA" is the forty-fourth screw steamer which has been built for the Cunard company; commencing with the Australian, in 1847. Of screw and paddle steamers this company has owned, from first to last, about 136, with an aggregate of 120,000 tuns and about 35,000 horse-power. The *Russia* is the largest screw steamer afloat, with the exception of the *Great Eastern*, and except the *Scotia* and *Persia*, the largest vessel in the Cunard fleet. She is 346 feet in length of keel and fore rake, 42 feet 6 inches breadth of beam, 29 feet 2 inches depth, 3,141 tuns. She has eight water-tight bulkheads, with water-tight doors which can be opened or shut from the spar deck. The engines are direct-acting inverted cylinders, of 86 feet diameter, 3 feet 9 inches stroke, and 650 horse-power nominal. She is designed for the line between New York and Liverpool, but will not be quite ready until June.

CHINA GREEN, or Lo-kao, has been produced by Mr. Charvin from the *Rhamnus Catharticus*, forming as beautiful a dye as the original of the same name. The process allows the article to be afforded for $8 90 per pound, and is as follows: Two pounds of the bark is placed in a kettle of boiling water; in a few minutes a pink scum is produced, when the whole is placed in an earthen jug well covered, until the next day. The liquid, now yellowish, is turned reddish brown by the addition of lime water, and is then distributed in glass jars, very little in each, and thus exposed to air and light, when it takes a green shade. This becomes gradually more general, and the whole is mixed together and carbonate of potash is added, producing a green precipitate, which is finally collected and dried.

IMPROVEMENT IN WEAVING.—The sewing machine is likely to have a rival in an invention recently perfected by which wearing apparel of all kinds, shirts, pantaloons, vests, skirts, ladies' mantles, jackets, coats, etc., etc., are both woven and sewed at the same time. The sewing of the seams is stronger even than hand sewing and perfectly smooth and even, and the articles are woven and sewed of any pattern, of wool, silk, cotton, or any other material.

HORSLEY'S TORPEDO POWDER is a compound of chlorate of potassa and nut galls, in the proportion of three to one by weight; ground and sifted separately to fine powder, and afterward intimately blended by passing together through a series of fine horse-hair sieves arranged one above another. If treated with care and not brought in contact with combustibles, it is not particularly dangerous, and is of nearly three times the strength of the best gunpowder.

THE SEWERS OF PARIS have an aggregate length of 294 miles. They are kept clean by means of boats—or in the smaller sewers, cars on rails—armed in front with a disk which fits the sewer like a piston; the whole being propelled through the sewer by a current of water.

A LIGHTNING CONDUCTOR, on the lighthouse at Fecamp, proved useless against a thunder-stroke, in consequence of being terminated in a cistern of water, lined with Portland cement.

M. GALLOS, director of the observatory at Breslau, has determined the identity of the orbit of one of the swarms of shooting stars of April, of which the radiant point is well defined, with that of the comet of 1861.

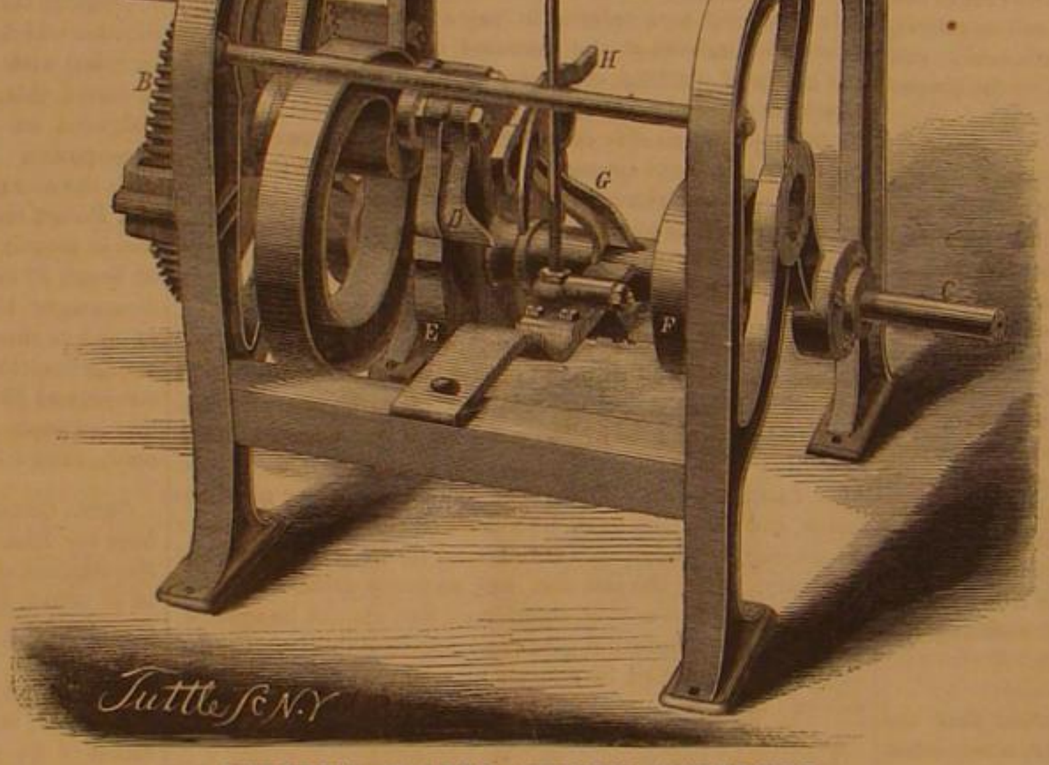
BLEACHING OF GUMS.—Mucilage, says Picciotto, may be completely decolorized by means of recently precipitated gelatinous alumina, which fixes the color on itself and leaves a clear solution.

Kelley's Water Wheel Governor.

This is a simple arrangement of a ratchet wheel and double pawls by which the gate of a pentstock can be lowered or raised to regulate the speed of the wheel. The machinery is mounted in an iron frame of appropriate form, surmounted by an ordinary ball governor, which is driven by a belt upon the pulley, A, through the medium of bevel gears. A small gear on the pulley shaft drives a larger one, B, the other end of the shaft of which carries an eccentric cam. This cam, by means of a traversing roller on the end of an arm swinging loosely on the lower shaft, C, gives a vibrating motion to two pawls, one seen at D, which are pivoted to the vibrating arm. These pawls point in opposite directions and engage with dovetail shaped teeth on the ratchet wheel, E, which is secured to the shaft, C, that in turn is connected by belt, chain, or other suitable means with the water gate; in the engraving a pulley, F being shown for this purpose. It will be seen that if one of the pawls, D, engage with the ratchet, E, the shaft, C, and pulley, F, will be turned by degrees in one direction, while the engagement of the other pawl will rotate them in the other. It is necessary therefore that when one is engaged the other shall be lifted clear of the ratchet teeth. This is secured by the movement of an arm, G, which turns loosely on the shaft, C, and carries at its upper end two weighted shoes, H, which when carried beyond a certain point elevate one or the other of the pawls, D, and thus prevent the raised one from acting on the ratchet. To a short projection of the arm, G, standing at right angles in a horizontal position, the rod, I, of the governor is attached by passing through a swivel stud, and adjusted by nuts, one above and the other below.

If the balls fly out in consequence of increased speed, the rod, I, is depressed, one of the shoes lifts one of the pawls and allows the other to engage with the ratchet, turning the shaft, C, and closing the gate. In case the balls are depressed by two slow a speed the reverse action takes place. When the water wheel runs at the speed desired and for which the nuts on rod, I, are adjusted, neither of the pawls can engage with the wheel and the gate shaft is held stationary.

This improvement was patented through the Scientific American Patent Agency, March 12, 1867 by Oliver D. Kelley. For other particulars address Lamb, Cook, & Co., Providence, R. I.



KELLEY'S WATER WHEEL GOVERNOR.

Obituary.

We have to record the death of Captain John Norton, which occurred last month at Bray, in Ireland. Captain Norton was, for many years, a contributor to the *Mechanics' Magazine* on matters of gunnery, etc. He invented many improvements in rifles and projectiles. We believe him to have been the original inventor of the bullet now used with the Enfield rifle, and known as the Minie bullet, and for which Minie received the Government premium.—*Mechanics' Magazine.*

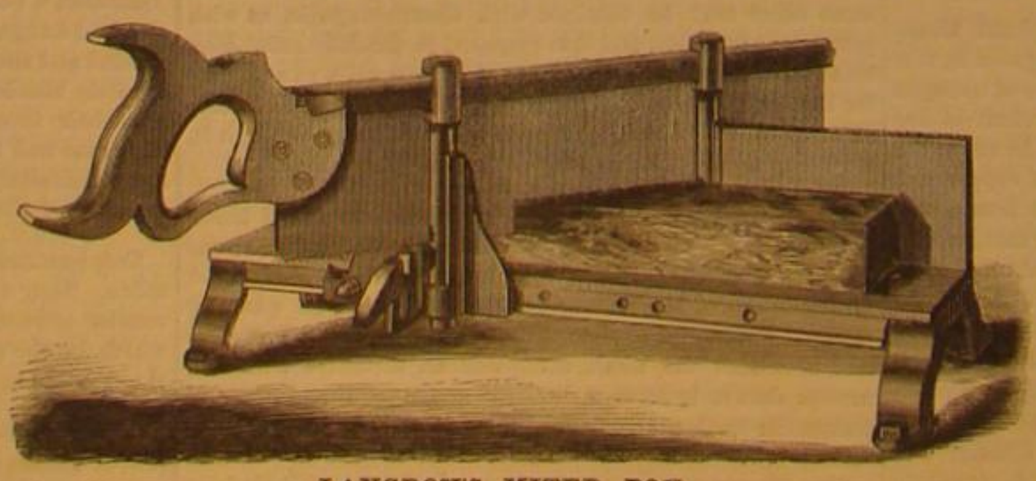
Our readers will remember Captain Norton as a frequent contributor to the columns of the Scientific American. He was one of those ingenious but luckless inventors whose golden thoughts for some reason or other are coined by others than themselves, and prove afterward hard to identify successfully and recover. It has thus become impossible to estimate accurately what unpaid and unpayable debt we must owe to the departed.—Eds. Sci. Am.

Improved Miter Box.

Workers in wood are continually annoyed by the disarrangement and unreliableness of the common and temporary miter box; the engraving shows one of more durable material than wood, one which cannot warp or wear. It is made entirely of iron, yet by a simple arrangement of the parts the saw teeth never come in contact with the metal. It will saw four, six, and eight square, and at any angle, from 45° to 90°, the work always being done with perfect accuracy, requiring no paring of joints with plane or chisel, as is so often the case with that done with the common wooden box.

The saw passes through two upright guides, that at the back capable only of being lifted to accommodate the thickness of the piece to be sawed, and also of turning to guide the saw at any angle, while the front one in addition turns in a sliding clamp which can be secured at any required point by a dowel pin and a thumb screw. The box is planed, both floor and back, so that it is perfect. The saw is sustained in the guides by its back so that under all circumstances the teeth are kept clear of the iron.

This device will recommend itself to all practical workers in wood as durable and exact. It was patented Nov. 24, 1864. For machines or information address William H. Todd, agent for the Langdon Miter Box Company, Northampton, Mass.



LANGDON'S MITER BOX.

Iron at Paris.

We glean a few notes of interest from *Engineering* relative to iron and steel manufactures in the Paris Exposition. Dietrich & Co., of Niederbronn, in Alsace, exhibit as specimens of mere iron and workmanship, a set of cast iron rings five feet in diameter, but only one twelfth of an inch thick and three eighths of an inch wide. They are cast entire, of a diameter of one ninth of an inch, and reduced by finishing on all their surfaces to the dimensions named. Messrs. Dietrich & Co. are also inventors of a peculiar solution for coating iron, which is insoluble in water and prevents oxidation. They exhibit a wrought locomotive wheel forged entire in one piece, including crank, counterweight and twenty-two spokes. Another company (the Societé Anonyme) exhibit disk wheels forged entire without a weld, out of a single bloom. Taylor Brothers, of Leeds, show a large spur wheel, four feet in diameter, cast of crucible steel, with teeth and arms all in one piece. Krupp exhibits an ingot of steel, of forty tuns weight, which is remarkable not from any known or necessary peculiarity of skill in producing it, but only as requiring bulkier apparatus than have yet been used by other manufacturers. *Engineering* reiterates the not very strange statement that Krupp's efforts in monster guns have not yet been successful: only the smaller steel guns having given fully satisfactory results. The firing of his great exhibition gun will decide more than its weight or measurement has done. He shows a mar ge shaft of steel, with double cranks, turned and finished all over, without a flaw or speck in its entire surface. Another Prussian steel worker, Berger, of Witten, is spoken of as fully equal in his line to Krupp. His reputation has been raised very high by the production of steel gun barrels for the Prussian army, their needle-gun barrels having been nearly all made by him, in solid blanks, and drilled. The remarkable uniformity of his material is shown by this, as ordinary inequalities would turn the drill out of line and ruin the weapon. Among the chilled car wheels of the Royal Works of Wurtemberg, at Königsbrunn, one is shown having a solid Bessemer steel shaft in its center, the iron having been cast around it. The steel shaft is heated and inserted in the chill like a core, and the iron, when run in, shrinks around the shaft, to which it becomes perfectly united.

Pisciculture.

The artificial propagation and rearing of fish is one of the most interesting and in many situations one of the easiest and most profitable kinds of husbandry. Experience has rendered it as simple a thing as hatching fowls, and will yet render it, wherever water is available, as common. The pursuit has spread considerably in this country, both among amateurs and economists, particularly in Massachusetts, as our readers are aware.

The improvement effected by human aid in the preservation of the eggs and multiplication of their actual product, is one of the most striking results of man's interference with animal nature. It is supposed that under natural conditions not more than one egg in five thousand of the spawn of fishes ever comes to maturity. But the *Canada Farmer* informs us that a gentleman of the "Dominion" has obtained from four female salmon, captured last fall in a small stream that empties into Lake Ontario, a progeny of no less than from 20,000 to 30,000 young salmon, which are doing finely. As to the parents, indeed, this is doing rather better than could be expected. Any kind of fish can be thus propagated, by following plain instructions with tolerable care. All that is needed is a safe receptacle or tank, or series of such, through which a pure current (filtered if necessary) is made to pass constantly, but so gently as not to disturb the eggs in the bottom. It should be protected from light by opaque sides and a perforated cover. The principal care and science are required in obtaining and impregnating the eggs, which must be done from the adult fish at the proper season and in a particular manner, described in such works as Buckland on "Fish-hatching."

A species of aquarium by far surpassing any other in curious interest may be maintained within doors by any one who can command a constant stream of pure water as large as a straw. The most satisfactory arrangement for observing the process of development in the eggs is to place them on a sort of raft of glass rods fixed in a frame of wood, fitting the interior of the tank, and just submerged beneath the surface of the water. The curious stages of transformation will richly repay daily examination with the microscope. The first development, after the egg has been maturing in the proper temperature for about thirty days, exhibits itself in two minute dots, which are the eyes of the young fish. The transparency of the structure enables the fish to be examined at a later stage, coiled up within the envelope or shell, when nearly ready to be hatched. Soon after this it may be caught in the act of emerging from the shell, and will then present to view a singular structure in which all the embryo organs can be examined by the microscope. For some time after being hatched, they have a transparent, jelly-like appearance, and the whole organization exhibits itself, in an extremely delicate and beautiful condition. The heart, blood vessels, liver and other organs, the gelatinous beginnings of gills, fins and bones, can all be distinctly traced, and although the structureis too frail to bear a touch, the motions are exceedingly swift. The most curious thing about them is a sac, resembling the air sacs or floats found inside of adult fishes, which is carried suspended beneath the body but three times its size at first, and is filled with an oily looking fluid, analogous to the yolk of an egg. This supplies the entire nourishment of the young fishfor the first six or seven weeks of its existence. In fact, it is simply pursuing in freedom the process of growth and sustenance which land embryos need to undergo in confinement and shelter. As its fish grows, by absorption of the contents of the sac (or haversack) the latter diminishes, and eventually disappears, when the young creature begins to eat for itself, and takes on in miniature the functions and habits of a fully developed fish. It should not be let out of the breeding tank until this change takes place.

Compressed Blasting Cotton is manufactured and sold in charges by an English firm. After being reduced to pulp, it is compressed by hydraulic power so that a cartridge or charge of a given length and diameter, is equal in explosive force to six times its bulk of gunpowder, with the additional advantage of concentrating the charge at the very bottom of the hole.

Science Familiarly Illustrated.

The Spheroidal State of Liquids.

When drops of water fall on a heated stove they assume the form of flattened spheres, roll about over the hot metal until dissipated by slow evaporation. This simple phenomenon was first brought to notice by Leidenfrost about a century ago, but it is to the later researches of M. Boutigny that we are mainly indebted for what knowledge of the subject we now possess. This philosopher christened this peculiar condition of liquids the "spheroidal state," and observed the following facts in relation to it: the temperature of the plate must be above the boiling point of the liquid; the temperature of the spheroid liquid—Boutigny found by immersing a delicate thermometer therein—is always lower and the temperature of the vapor is invariably higher than the boiling point of the liquid. If the experiment is tried with a heated plate of metal the liquid will continue in the spheroidal condition until the plate is cooled to a certain point, when the liquid will burst with an explosion into violent ebullition, and rapidly evaporate.

One of the most striking experiments which a knowledge of these facts led Boutigny to attempt was freezing water in a red hot crucible. He heated a platinum dish to redness, then placed in it a small quantity of sulphurous acid and a few drops of water. The former assumed immediately the spheroidal condition, and by its extremely low temperature readily solidified the water. Similarly Faraday, by using a mixutre of solid carbonic acid, succeeded in freezing mercury under like conditions.

Any liquid when in the spheroidal state is not in actual contact with the heated surface, but rests upou an interposed film of air, as on an elastic cushion. With a knowledge of this fact, the explanation is manifest, of the trick of placing the naked hand with impunity in molten metal. In this case the natural moisture of the hand assumes the spheroidal condition and acts as a shield or covering in preventing the liquid from coming in contact with the flesh. If the finger is drawn rapidly through the molten mass, the spheroids will be mechanically broken and unpleasant consequences must ensue. By first wetting the hand with ether it may likewise be safely plunged into boiling water.

An old Spanish proverb facetiously advises taking a basket to the well, or carrying water in a sieve. But these apparent absurdities have been actually accomplished, the success being due to the repulsive action of the liquid spheroids toward the heated surface. The original experiment Boutigny performed by heating to a red heat a basket formed of a net work of platinum wires. As long as this temperature of the metal was sustained water placed therein was prevented from passing through the meshes, but on gradually cooling the liquid was dissipated in vapor.

Boiler explosions may sometimes be explained by a knowledge of the facts relating to the spheroidal state of liquids, as when the supply is for any reason deficient, or as often happens on our steamboats stopping to load or unload freight or passengers, part of the flues are exposed to an undiminished fire by the careening of the boat. If cold water is now injected on to the red hot boiler it will first assume the spheroidal state, but almost immediately after will burst into a volume of vapor with a force sufficient to rend the boiler.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, April 18th, Prof. Tillman presiding.

The hygrodeik illustrated in these columns some weeks ago, was exhibited before the association by its inventor; also a water meter which seemed very complete and efficient in its workings. Previous to the introduction of the regular subject for the evening, Prof. Vander Weyde spoke a few words in defence of American inventors, referring to the unwillingness of Europeans to yield to this class the right of priority in bringing out new ideas. The immediate occasion of his remarks was the receipt a short time since, of a letter from a friend in Europe, commending to his notice the use of laughing gas as a new anæsthesia in surgical operations of short duration; he replied that the application of nitrous oxide for this purpose was an American idea, and was extensively in use in this country.

At a recent meeting of the French Academy of Science the employment of this anæsthetic was disparaged because of alleged danger attending its use. In this country but one or two fatal accidents have ever been reported though the gas is so generally used in dental operations, and in these instances death was finally traced to other causes.

MR. PAGE ON PETROLEUM.

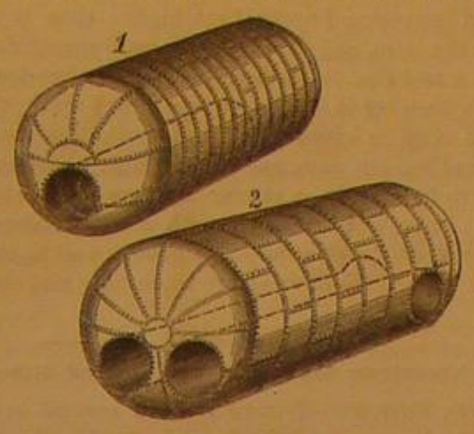
The purpose of these remarks was to show the connection existing between the lightest hydro-carbon oils and anthracite coal, proceeding in this order rather than in the ordinary way of tracing the origin of oil back to coal. The truth of his position Mr. Page sought to establish by exhibiting specimens of oil from all parts of the world, and of every grade of density. From the lightest oils he showed the different grades down to the heavy pitch of California; the gum beds of Canada, having the consistency of molasses; and finally bitumen, a substance so nearly identical with coal that some years ago in an important law suit chemists could not decide whether the coal of New Brunswick was in reality a coal, or an asphalt; a compromise being finally made and the name Albertite is now commonly given to it.

Mr. Page stated his belief that oil trickling down between the rocks, at first mixing with sand formed the coal shale, afterward the pure oil oozed in through the passage thus cleared, and by evaporation passed through successive changes, pitch, gum, bitumen, until finally it became a vein of true coal. The presence of fossils in coal, the speaker accounted for by referring to a statement made by Prof. Silliman, that if any living creature ventured into the pitch lakes of California, extrication would be an utter impossibility. Mr. Page spoke at some length and his remarks throughout were listened to by a large and attentive audience.

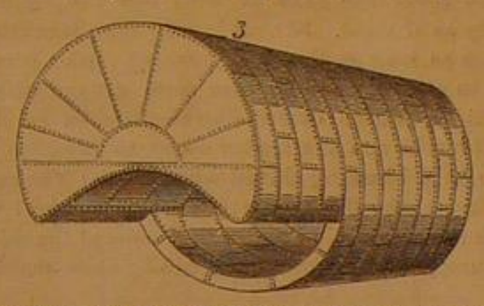
STEAM BOILERS---THEIR FORM, CONSTRUCTION, AND MATERIAL.

NUMBER THREE.

The device of internal tubes for increasing the heating surface of boilers was in use in the wagon boilers shown in the first article of this series, but it became much more common



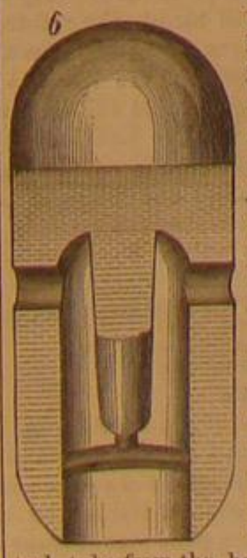
when the cylindrical boiler usurped their place. One of these is seen in No. 1 with a tube passing from the rear of the fire to the front of the boiler. No. 2 has two tubes which open at the front and at the sides near the rear end. Both these are externally fired. They are extensively used now



and are made as large as nine, ten, and even eleven feet in diameter, but these large sizes are an element of weakness. It may be questioned whether after the flame has passed nearly or quite the whole length of the boiler there can be much utility in returning the gases through



the tubes or flues, the principal advantage being in reducing the quantity of water in the boiler which is acted upon by the fire.



The wagon and cylindrical boiler were united in the Butterley boiler seen in No. 3. This is a cylindrical boiler having a wagon shaped projection over the fire, continuing as a gradually contracted flue through the boiler. It generates steam rapidly, but the part projecting over the fire has the inherent weakness of form which is the fault of the wagon boiler. So many of these boilers exploded that the fact prevented their very extensive manufacture.

Boilers of various forms for the utilization of the waste heat from puddling furnaces have been contrived, one of which, calculated for four furnaces, is shown at No. 4. This represents a boiler ten feet in diameter and twenty-eight feet high. It is an upright cylinder with hemispherical ends, having a central tube from the bottom to about half the hight, where it meets four transverse flues which open at the side. The heat from the furnaces impinges on a portion of the shell and entering the side flues passes down the center tube and off through an underground flue to the chimney. These are very strong boilers, presenting a large heating surface, and by the division of the heat all portions of the circumference of the shell are subjected to the same tension. The form of the ends insures very grest resistance to internal pressure, and the distance above the water line prevents priming.

Boilers for single furnaces called from their form, chimney boilers, have been extensively used. One is seen at No. 5, and is simply an upright cylinder with a tube running through it, the bottom and end of which is bell mouthed and the top end connected with the chimney flue. To protect the tube sheets from overheating where it passes through the steam chamber, it is lined with fire brick. No. 6 is a boiler having an internal fireplace of conical form with a suspended cone and cross pipe for increasing the heating surface. The shell is set in brick work in such a way that the heat passes through the side tubes and around the shell before passing off.

One form of the chimney boiler was called the elbow boiler and was merely a horizontal cylinder, having a downward projecting portion at right angles with the body, and in this the fire was placed, the heat of which passed through a tube conforming in direction to the angle of the boiler. The Cornish boiler is a horizontal cylinder with an internal flue of large diameter running from end to end. The fire was built in one end of this tube the products passing through the whole length of the boiler. This boiler is a great favorite from its great generating powers, economy, and durability, although there have been many instances of collapsed flues occasioned simply by weakness of construction. The Lancashire boiler contains two tubes or flues instead of one, but in other respects is similar to the Cornish boiler. An oval form, flattened from top to bottom, has been attempted for the purpose of reducingt he depth of the body of water above the flues.

In our next article we shall give some examples of explosions of the different classes of boilers already mentioned.

Correspondence.

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

The Rights of Society and of Labor.

MESSRS. EDITORS:—A remark occurs in your paper for April 27th, which will appear to many of your readers to require explanation in view of your natural position as a champion of workingmen. You say, speaking of the strike on the locomotives in England, "Society must and will exist, right or wrong, whatever else has to be crushed under its necessities." I should reply to this as the celebrated Frenchman is said to have done to the highwayman, who justified himself by saying that he must live:—"I do not in the least see the necessity." If the organization of society necessarily involves the "crushing" of anybody, the sooner a total reorganization takes place the better. The very same argument was used to justify and uphold slavery, yet that form of "society" was able to bear the upheaval, and the world "still lives."

It cannot be denied that the only redress the workingman has against the natural and unceasing inroads of capital is in concert of action; and his "necessities" are at least equal to those of "society." If the work of civilization *must* be done, let it be paid for. If it is so necessary, let the price be commensurate—at least let the workingman be considered a constituent of society, and not its slave. Thank heaven, the society alluded to is that of England, not yet of America.

Examples might be adduced, as that of the pilots on the Mississippi for instance, who ask and are able to command such compensation as seems to them a fair equivalent, and yet "society" does not go under. I will not enlarge, however, as I wish to be very brief, in order that you may be induced to print this comment and answer it fairly, as it is a practical question, and one of the deepest interest and importance, particularly if extensively misunderstood. HENRY HOBART.

Washington, D. C.

[Our remark will hardly "appear to require explanation" to those who keep awake while they read. But as some people *will* read without reflection or even attention, they must be reminded that the words quoted only say that society "*will* exist, right or wrong," but not that it ought to. We may add that, like our correspondent, we do not see the necessity for anything or anybody to exist in contravention of justice. But neither his opinion or ours will change human nature, or withstand the imperious necessities, real or supposed, of human society, and hence it is not best for parties to push their rights, real or supposed, to the point of forcible collision with those necessities, for they will certainly have to take the smash—that is all. Our correspondent is very careless again, in substituting for "society" which we said, "the present organization of society" which is quite another thing, and can be destroyed if justice or expediency require, as society itself can not.

Happily there is no possible antagonism, in the long run, between the interests of society and of any of its members. Justice to all is the only stable foundation of society Consequently, its inevitable maintenance, to which we referred, does not involve destruction to the interests of the producing classes, if they are maintained with a due regard to the rights of the whole. No community can or ought to flourish which does not recognize their just claims, with those of all others: but this question of the rights of labor and capital is one that has puzzled the wisest brains, and like all other great problems it will require time to work out the proper solution. It seems to be rapidly progressing toward the union of both parties in mutual interest, which we conceive to be the only equitable principle on which it can be adjusted. No country has a greater stake than our own in promoting the best interests of the working classes, and it is little to our credit that both Englishmen and Frenchmen are

ahead of Americans in developing the coöperative union of labor and capital.—Eds.

Can Heat be Accelerated or Retarded.?

Messrs. Editors:—In No. 13 of the present volume is an article entitled "The Sun's Spots—A Discovery," which I read with interest at the time. But I was not satisfied with the expression "the heat withdrawn by Jupiter and Venus from the side exposed toward them," etc., and have been patiently waiting to see if some inquisitive person other than myself would not call out the explanation I now desire to get.

I therefore propose and ask as follows:—Do we not understand that light and heat are forces continuously radiating from the sun as a sphere? A continuously transmitted force reacts upon itself and ultimately upon its source, against every fresh obstacle it encounters. In the way of a moving force nothing can be interposed that will accelerate the discharge of that force, though it might retard it, or in other words cause a greater amount of reactionary effect. If the foregoing premises are correct, I would ask how can a planet at any point in its orbit withdraw from the sun a greater amount of heat than was being radiated to that particular point before the planet became interposed there?

It is inconceivable to me how radiated heat can be thus accelerated in its discharge. And if it be asserted that the cold influence of a planet extends across half the diameter of its orbit through the medium there interposed, and thus by conduction cools the exposed side of the sun, several interesting queries at once spring up. Must not the planet be a perfect iceberg or even have the temperature of frozen mercury to do all this? If Jupiter be one of these cold fellows laying on his icy fingers at the immense distance of half the diameter of his orbit, why has it not been observed of him that when in conjunction with our earth he makes us see "spots" much nearer home?

Let us hope the astronomers will yet give us some satisfactory explanation of the phenomena in question, and not freeze out the general interest with such chilling suggestions.

C. A. G.

Chicago, Ill., April 18, 1867.

[The theory quoted in our paragraph is certainly contradictory to what we understand to be the nature of heat and the effect of a reflector interposed in its path. It is doubtful philosophy, however, to assume that such interposed object retards or crowds backward the series of heat impulses, as a fluid current is dammed and set back upon itself by an obstruction. It is difficult to detect any interference between opposite or cross impulses of light and heat: we may assert that practically at least there is none. Hence the rebound of one such impulse could not be said to react upon another following it; or if considered as one indivisible and constant impulse, it could not be said to react upon itself. The impulses are thrown back, or reflected, as we know, on striking a substance more or less reflective, and actually return and intensify heat upon the substance which radiated it. All grades of reflective power are exhibited by different substances and substances in different conditions, down to the gases, which have very little, and perhaps are in some cases gaseous from that very fact. Going still beyond them, and supposing a substance with a minimum of such power, or practically none, we have a medium which offers practically no resistance, obstruction or reflection to the light and heat impulses, and is consequently penetrated and rarefied to an inconceivable tenuity by the very faintest thrills of force; which answers to our present conception of the luciferous ether. This supposition makes the observed non-interference of rays not only possible but necessary, and at the same time justifies their (practically) infinite susceptibility of reflection and condensation. They must either make their way into an object, or rebound, and that with a practically unobstructed and unobstructive movement from it, and hence there can be no such thing as a retardation of rays by an obstruction in front of them.

In regard to the conjecture of a calorical influence upon the cause of the sun's spots, from the opposition of the planet Venus, it would seem that it must operate in the opposite way to that suggested: *i. e.*, by reflection rather than withdrawal of heat. But any effect of the kind from bodies so remote and relatively small, would seem again to be but infinitesimal in amount and theoretical in character. Science is confessedly but groping as yet on this subject.—Eds.

Hardening and Tempering.

Messrs. Editors:—In No. 15 I notice a communication from "B. F. S." in regard to the treatment of steel in hardening, and I think he is correct in his views as regards hammering and tempering, but I think that the steel in the bar before it is hammered at all by the smith has a great deal to do with the quality of the tool. All smiths are aware that we have different kinds of steel, designated as the "high or low steel" according to the amount of carbon contained in it, and it is well known that the more carbon steel contains the harder it is. Therefore in making tools from "high steel" the temper would have to be drawn lower to make as good a tool as would be made from "lower steel" with a higher temper. Correspondents "B. F. S." and myself are both thought to be in error by "E. M. F." in issue April 20th, and he thinks also that the color can not be depended upon to give the proper temper, nor can one tell by the color of a piece of steel whether it is hard or not, for he says a piece of steel polished and not hardened at all will assume the same colors that a piece will that has been. Now I cannot see as that proves anything, for we know that it requires the same degree of heat in an unhardened as in a hardened piece of steel to bring it to a corresponding color. There is a certain degree of heat which when given to steel and extracted very suddenly will chill the steel sufficiently so that the temper will not need drawing at all; but it is a matter of such nicety that it is preferred by smiths to harden, and then draw to the required degree of hardness, and that degree is determined by the color. At least, I do not find any trouble in determining the temper by the color after I have become acquainted with the steel in the bar.

There is another method though not any more correct than the former; that is to take a small hammer and strike the edge of the tool so as to raise a small piece higher than the surface and then strike it the other way, and if when it is nearly knocked off it does not fall off, it is considered to be of the right temper although it may vary slightly as there is more or less heat in the tool; this method cannot be used except on the larger tools. As to the degree of heat in working and tempering I never heat higher than is required to harden the steel, and then hammer until nearly cold.

Why a tool that is hardened with a higher degree of heat requires drawing to a lower temper, is, I think, that in heating, the steel is opened and made more porous, and consequently of less strength, and then it must be drawn to a lower temper to be equally as strong as finer steel with a higher temper; but a tool tempered with a higher degree of heat when hardened, will never be so good a tool to cut as one in which the particles of steel are more close and compact.

W. S. D.

American Wrought vs. Chilled Wheels.

Messrs. Editors:—I have noticed several articles upon chilled and wrought wheels and should like to give my views upon them. If the wrought wheel is made in the proper manner, it is far superior to the chilled wheel, 1st: The wrought is only half the weight of the chilled. 2d: It is flexible in the center, and therefore in turning sharp curves will not shear the rails or wear out the journal boxes as severely as if rigid. 3d: It is safer from breaking. 4th: It will live as long as the chilled wheel. 5th: It can be made larger in diameter and go over more ground with the same revolutions, besides overcoming the friction on the journals. 6th: It can be run at a higher speed, as vibration has a great deal to do in breaking chilled wheels. 7th: The rails will last much longer, for this reason: the wrought wheel will wear a smooth surface, while I notice that some of the chilled wheels wear lumpy on the face of the head; thus making ragged rails.

I am well aware of the English wheels wearing flat places on them. It is also easy to account for the Prussian steel wheels breaking, because they are never manipulated. The difference between the English wrought wheel and the American, is that the English have a tire heated and shrunk on, which leaves them soft, while the American wrought wheel is made in one piece from Bessemer steel or wrought iron, put into the machine hot and forged until cold; thus making what is called a cold-forged wheel. The tread is both hammered and rolled at the same time. As to the price of the wheels, the wrought will be the cheapest in the end: for instance the wrought wheel weighing 260 lbs. and the chilled wheel weighing 252 lbs. Again, when one is worn it has to be recast, while the other can be reforged several times over at a trifling expense, say one dollar each. I think any practical man will see at a glance that a cold forged wheel will be the safest in the world and the best.

S. Vanstone.

Providence, R. I.

[We publish with pleasure the above notice of a new wrought wheel of American invention and manufacture, and sincerely hope it may take an important place, which there certainly is for such a wheel, even without crowding out the chilled wheel. But we think our correspondent would have made his case stronger without putting weak points into it. For instance: the chilled wheel undoubtedly wears better in the tread, while the wrought wheel is less liable to fracture; and of these advantages the former proves by experience by far the greater, as to the mere life of the wheel. It is in point of safety only, that the wrought wheel naturally excels: in longevity, the chilled wheel has the advantage. Again, there is no advantage in enlarging car wheels beyond the ordinary size of the cast wheel, which would not be lost in racking and lateral friction. Further, the chilled and not the wrought wheel has the advantage in uniformity of wear; while it might have been truly said that in destructiveness it is as much the worse as it is the harder, on ordinary soft rails. Steel rails, on the contrary, will banish the soft-tread wheel, which is entirely unfit for them. Finally, a machine that will heat and reforge a wheel, and roll the tread, at an expense of only one dollar, is a wonder that railroad men would be glad to see, but don't care much to hear of.

On the whole, we believe Mr. Vanstone is on the right track. The defects of both the chilled and wrought iron wheel are too manifest to be endured if they can possibly be cured; and their respective virtues united would make a perfect wheel, the proper counterpart and companion, with its hard tread and tenacious body, to the steel-faced and iron-based rail that we have already.

Milk Sickness.

Messrs. Editors:—In No. 16 I notice an article on the cause of milk sickness. Though but little acquainted with the Western lands, I have carefully studied the causes which produce it in East Tennessee, and western North Carolina. My observation showed me that no one plant was the true exciting cause, that it occurred in the richest land, generally on spots shaded until late in the day and where the vegetation was rank; also, that it ceased to exist when the land was cleared and cultivated; and that cattle kept up until the dew was dried by the warm sun never were infected with the milk-sick poison, while those who were out all night or were turned out early did have the poison diffused through their system.

In general it is but a slow poison with the animal, yet most rapidly fatal to the eater of the flesh or drinker of the milk. There are many poisons which act similarly. My observation taught me, that there were a number of plants which were poisonous when wet with dew, but perfectly harmless when dry.

Animals generally refuse to touch plants which are known poisons. There are many plants poisonous in themselves which grow in sections where milk sickness is never known. The morning dew, especially of the mountains, has at a certain time of summer a sweetish taste which is peculiarly liked by cattle.

H. E. Colton.

Brooklyn, N. Y., April 23, 1867.

The Man with the Squeaking Boots.

Messrs. Editors:—I once read in the Scientific American that an application of hot tar to the soles of new boots would make them not only water proof, but much more durable. Acting upon this suggestion, some months since I applied a good coat of tar to a pair of new boots, and the result is the water is entirely shut out and the *squeak* most effectually shut in. Though I have worn my boots for nearly six months in all kinds of weather, yet, whether wet or dry, there is no end to their everlasting squeaking, and this evil is aggravated tenfold by our plank sidewalks. The villagers all know when I am coming, and whither I go, by the hideous noise of my boots. Even the darkness of the night does not screen me from their knowledge of my whereabouts, and my reputation, I fear, is likely to suffer by their evil suspicions and surmises. Can you suggest a remedy?

Jones.

[We feel sorry for Jones. Perhaps he will find consolation in the fact that others are miserable from similar causes. We commend to him the celebrated case of the man with the cork leg.—Eds.

Recent American and Foreign Patents.

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

Cultivator.—J. E. Tate, Columbia, Tenn.—This invention has for its object to furnish an improved cultivator designed especially for use in cultivating cotton; but equally applicable to other uses.

Brick Machine.—John W. Burns, Henry, Ill.—This invention relates to a machine for molding and pressing bricks, and it consists in a novel manner of operating the plungers by of which the ground or tempered clay is forced into the molds, and also in a novel arrangement of the plungers with the mud mill, whereby the clay may be molded and pressed into bricks very expeditiously and in a perfect manner.

Gate.—Elias Roth and George Shane, New Oxford, Pa.—This invention has for its object to furnish an improved gate of that class that are so constructed and arranged that they may be opened and closed by a person in a vehicle or on horseback; which shall be simple in construction, cheap, light, and not liable to get out of order.

Fork for Elevating Hay and Grain.—L. M. Doudna, Elmira, N. Y.—This invention relates to a hay and grain elevating fork, designed more especially for loading wagons or carts in the field from cocks or shocks. The object of the invention is to obtain a fork for the purpose specified, which will be capable of grasping and elevating at once an entire cock or shock of ordinary dimensions and admit of having the cock or shock when elevated, readily released from it.

Steamer Bottom.—W. S. Potwin, Chicago, Ill.—This invention consists in stamping the bottoms of culinary steamers from one piece of metal and at one operation with ribs or beads, projecting upward from the surface, and with a channel projecting downward forming a deep groove around its outer edge.

Illusory Decapitation.—J. C. Withington, Brookline, Mass.—This invention relates to a device by which the head of a human being would seem to have been taken off before the eyes of a public audience.

Revolving Horse Hay Rake.—Thomas N. Henderson, Jackson, Mich.—This invention has for its object to furnish an improved revolving horse hay rake, the parts of which are so constructed and arranged that they may be adjusted to hold the rake head at any desired angle while raking; and that the rake head may be at all times completely under the control of the operator.

Coffin.—Henry Smith, Jr., Summit, N. Y.—This invention consists in combining a frame prepared for the reception of a glass plate with the lid or cover of the coffin in such a way that the upper side of said frame shall be flush with the upper surface of the said lid or cover; and which shall be covered and secured in place by a small lid or cover.

Farm Gate.—J. H. Nonamaker, Middletown, Pa.—This invention consists in attaching a large wheel to the side of the forward end of the gate, and a stop and guide hook to the fence post at the rear end, and in the combination and arrangement of two grooved pulleys with the rear end of the gate and with the rails of the adjacent fence panel.

Hay Fork.—S. Harris and Daniel A. Harris, Shippensburgh, Pa.—This invention consists in the construction of the levers and bars by which the finger or harpoon is operated; the whole construction being so simple and substantial that the fork is not liable to get out of order. The same principle may be employed on a double fork, that is a fork with two harpoons or fingers, which points toward each other when brought to a horizontal position.

Lantern.—P. J. Clark and Joseph Kintz, Meriden, Conn.—This invention consists in constructing the lantern in such a manner that the upper or globe portion may be readily turned over to expose the top of the lamp so that the same be lighted and have its wick trimmed and also be filled without removing the lamp from the lantern; the invention also admitting of the globe when broken or injured being readily removed or detached and a new one adjusted in its place.

Potato Digger.—E. S. Lenox and Edward Spaulding, New York City.—This invention relates to a potato digger, the scoop of which is provided with flaring wings so that a broad wide track is made, which facilitates the separation of the potatoes from the dirt. The sides or wings extend beyond the front edge of the scoop, and the cutting edge of the latter is V-shaped, or concave, with a projecting extension in the center, so that the scoop begins to cut at its sides, whereby the bursting of the hill is avoided. To the rear edge of said scoop is hinged a grate or riddle, formed of sheet metal bars, to which a vibrating motion is imparted by suitable gearing, in such a manner that the dirt and potatoes raised by the action of the scoop are readily separated by the action of the grate, and the potatoes can then be easily collected.

Shifting Rail for Attaching Tops to Carriage Seats.—Frederick Baumgartner, Brooklyn, N. Y.—This invention has for its object to furnish a neat, simple, convenient and substantial mode of attaching the shifting rail to the stationary rail of the carriage seat so that when the top has been removed no bolts or projections will be exposed to catch upon and tear the clothes of those riding in the carriage.

COMBINED WASHING, WRINGING AND CHURNING MACHINE.—Andrew J Mapes, Independence, Mo.—This invention has for its object to furnish an improved machine by means of which clothes may be quickly and thoroughly washed and wrung, and by means of which churning may be easily, conveniently and quickly accomplished.

GLAZIER'S DIAMOND.—Philip Sinaz, Baltimore, Md.—This invention consists in pivoting the breaker to the handle and swiveling the diamond block to the breaker so that the breaker and block may be closed upon one end of the handle at the same time thus enabling the instrument to be conveniently carried in the pocket.

TICKET FASTENER.—Samuel B. Fay, Franklin, Pa.—This invention consists in the use of a loop made of wire for the purpose of holding tags or tickets to fine fabrics to supply the place of pins which have heretofore been used for that purpose which injures the fabrics to a greater or less extent by being perforated.

CULTIVATOR.—Oliver Etnier, Mount Union, Pa.—This invention relates to an improvement in cultivators and harrows and consists in attaching an adjustable guide blade or rudder to the rear end of the center beam for steering or controlling the movement of the cultivator so that it shall run straight on hillsides.

LANTERN.—William Porter, Sen., and Wm. Porter, Jr., New York City.—This invention consists in arranging an upright flange around and on top of the base of the lantern. A hook-shaped extension of one of the guard wires is passed through a hole in the flange; the opposite guard wire has an eye or ring-shaped prolongation which also passes through a hole in the upright flange. A hook or catch arranged on the underside of the covering plate of the base engages the ring or eye and thus holds the guard securely to the base and consequently also the globe and cap of the lantern; by simply detaching the catch from the eye the upper portion may be removed from the base of the lantern.

ORE WASHER.—John Wicks, Greenland, Mich. The nature of this invention consists in the combination of an ore separator with a slime pit and the form of the separator and its connection with its slime pit. It also consists in the combinaton of a walking beam and connecting rod with a hutch, and also in the combination of huddles with slime pits.

DRAW BAR FOR LOCOMOTIVES AND CARS.—Daniel C. Cannell, La Fayette, Ind.—This invention has for its object the constructing and arranging of a link and draw bar in such a manner that a sufficient degree of vertical adjustment will be allowed the link to admit of its being adapted to car platforms of different lengths thereby preventing the breaking of bumpers, a contingency of frequent occurrence with the ordinary draw bars.

COMBINED RANGE AND AIR-HEATING FURNACE.—William H. Armstrong, New Brunswick, N. J.—This invention consists in arranging an upright range in a fireplace in such a manner that the former may perform its legitimate functions of cooking, baking, etc., and at the same time made to perform the function of an air heater or furnace and also as a water heater. The object of the invention is to combine a range and air-heating furnace at a cost not materially exceeding that of the range alone, and economize in fuel by utilizing all the heat radiated from the range.

QUARTZ CRUSHER.—Robert Bailey, Idaho City, Idaho.—This invention consists in constructing a rotary battery for crushing gold and other ores for the extraction of the metals they may contain by amalgamation with quicksilver, the object of which is to combine the principle of action of the ordinary stamp battery for breaking or crushing the rock by a blow, with that of the Mexican arastra which reduces it to a fine powder by friction or rubbing.

SHOEING HORSES.—Pierre Charlier, Paris, France.—This invention relates to a new and improved method of applying the shoes to the hoofs of horses and other animals, the hoof being provided with a recess extending around its edge of such a depth and width as to allow the shoe to drop in flush with the sole of said hoof in such a manner that the animal is enabled to walk on its own sole with much more steadiness and safety than it can on the shoes as generally applied, and at the same time the shoes applied according to this new method form a perfect protection to the hoof.

OILING DEVICE FOR JOURNAL BOXES.—G. M. Morris, Cohoes, N. Y.—This invention has for its object to furnish an improved device for oiling journals which shall be simple in construction, effective in operation and easily removed and replaced when worn.

VENTILATING SMOKE STACK.—Joseph A. Miller, New York City.—This invention consists in providing the top of a smoke stack with conical channels, which form sharp corners at their inner lower edges, and expand outward in such a manner that by said channels the wind is caught from whatever quarter it may blow, and caused to create a powerful current up through the smoke stack, whereby the draught of the same is materially increased. If the smoke stack stands on low ground, or is exposed to downward currents or wind, it will be provided with a cap in addition to the conical sharp-cornered contracting channels.

STREET PAVEMENT.—Geo. W. Grader and Matthias H. Baldwin, Memphis, Tenn.—This invention consists in the use of a cast-iron framework, which is arranged so as to form a number of square or polygonal cells, in which wooden blocks are arranged; these blocks project above the iron framework, so that the latter does not come into direct contact with the hoofs and wheels, and is consequently not so easily worn. The wood when worn can be easily removed and replaced by new blocks.

BALANCE VALVE.—George H. Myers, Philadelphia, Pa.—This invention relates to a slide valve, which is provided on its back with a cavity to receive suitable springs and packing pieces, together with a top plate, which is faced off so that it works steam-tight against the inner surface of the valve chest cover, and the valve is relieved from the pressure of the steam on its back. Through the top plate of the valve, and the packing pieces extends a pin which has its bearing in a socket in the body of the valve, and which is secured to a slide, which takes the place of the valve rod and moves in suitable guides on the top of the valve chest, in such a manner that no stuffing box is required, and the valve can be operated with the least possible friction.

ROTARY ENGINE.—Spencer H. Brown, M. D., New York City.—This invention relates to a rotary engine, the piston wheel of which is composed of a thin disk, which works steam-tight between two annular rims projecting from the inner surfaces of the cylinder heads, and which is provided with one or more pistons, the ends of which are faced off to work steam-tight against the inner surfaces of the cylinder heads, while their top and bottom edges are so shaped that they work steam-tight against the inner circumference of the cylinder and against the peripheries of the annular rims, the whole being so constructed that the weight of the piston wheel is reduced as much as possible without reducing the effective area of the pistons, and furthermore, by using ground joints all packing is rendered superfluous and the friction is reduced to the lowest possible point.

RAILWAY SWITCH.—James McLaughlin, Duncannon, Pa.—This invention relates to an improvement in railway switches, and has for its object the dispensing with the frogs now used in switches, and which are the fruitful source of accidents. The invention consists in the application of a supplemental rail, whereby the switch is rendered perfectly safe and reliable. The invention also consists in an improved means for operating the switch, whereby the same is prevented from casually moving.

METALLIC BOBBIN.—Charles T. Smith, Utica, N. Y.—This invention relates to a useful improvement in the construction of metallic bobbins, patented by this inventor October 16, 1866. The present invention consists in the means employed for securing the wooden heads or flanges on the metallic tubes.

LINING FOR CARPETS.—William Fuzzard, Chelsea, Mass.—Carpets when laid upon a naked floor soon become worn and materially disfigured on account of a lack of elasticity, and to obviate this difficulty linings of various kinds have been employed. The original lining consisted simply of straw spread evenly over the floor, and old newspapers have been used for the purpose, but more recently factitious linings have been devised, the one in most general use, and now extensively manufactured, consisting of "shoddy" batting interposed between paper sheets. This lining greatly protects the carpet, preventing abrasion and wear, but it is objectionable on account of furnishing a harbor for moths, and not permitting the dust to pass through it. This invention is designed to obviate these difficulties, and at the same time retain the advantage of elasticity pertaining to the present lining in use.

PONTOON BOAT.—John Hegeman, Vischer's Ferry, N. Y.—This invention has for its object to furnish an improved pontoon boat, which can be built very light, and which will, at the same time, be very strong, and which can be folded into the smallest and most compact compass for transportation, without injury to the strength of the boat.

GAME REGISTER.—John Enright, Louisville, Ky.—This invention has for its object to furnish an improved instrument, by means of which the number of points made and the number of games played may be accurately and conveniently registered.

SHAPING SHEET METAL.—Morris Wells, Williamsburg, N. Y.—This invention relates to a machine for shaping sheet metal, in which the die, together with the bed supporting the same, are raised against the clamp and plunger, the clamp being secured to a cross plate, which bears against an adjustable spring, whereby it is rendered yielding, and the plunger being secured to a cross head, to which a rising and falling motion is imparted by a crank in the same shaft, which also carries the cams or eccentrics which serve to impart the required motion to the die and bed supporting the same. The clamp being secured to a yielding plate, is capable of accommodating itself to blanks of unequal thickness.

COMBINATION TOOL.—John Lyle, Newark, N. J.—This invention consists in a tool provided with a V-shaped jaw, which forms the bearings for the fulcrum pins of two movable jaws, which in combination with the ends of the V-shaped jaw form two tools of a different nature, such as pliers on one, and a punch on the other side, or a punch on one, and an eyelet fastener on the opposite side, and a tool is thus obtained which is cheap and of great convenience. A suitable stop which passes through holes in the V-shaped jaw and in the movable jaw, serves to throw either of said movable jaws out of work.

STEAM PUMP.—James Edward Thorp, Erie, Pa.—This invention consists in operating directly on the water by pistons or plungers with the ordinary valves.

CORN PLANTER.—John Clarridge, Pancoastburgh, Ohio.—This invention has for its object to furnish an improved corn planter, by means of which the corn may be dropped promptly and accurately, and covered properly; and which may adjust itself to the unevenness of the ground over which it passes.

SPRING SHADE ROLLER.—Stewart Hartshorn, New York City.—This invention relates to an improvement in spring shade rollers, those which have a spiral spring connected or applied to them in such a manner as to roll up the shade and thereby dispense with the cord and pulley originally used for that purpose.

MILL FOR ROLLING CLEVISES AND SHARES FOR PLOWS.—Felix Murray, Pittsburgh, Pa.—This invention relates to a rolling mill for rolling clevises and shares for plows, whereby said articles may be manufactured very expeditiously and at a moderate cost.

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 50 cents a line, under the head of "Business and Personal."

J. H. S., of Pa., asks:—"What is the best and most practicable method of hardening cast iron, steel, and wrought iron?" As our correspondent appears to be a practical man we do not think we can assist him, but the best method of hardening steel we know, is heating and plunging in water, and of cast iron to cast it in chills, or, like wrought iron, to heat and saturate with prussiate of potash and cool in water, or by the ordinary process of case hardening by packing in an iron box with ground bones and leather scraps.

B. H., of Ky., in reply to J. E. of Pa., in our issue of April 15th, says a piece of grindstone makes a good float for a steam boiler but that a cast iron float is better than either stone or copper.

J. M., of Ill.—The varnish usually employed for maps, lithographs, etc., is a solution of gum mastic in alcohol

P. J. S., of Ohio asks how he can secure the eccentric of his engine without keying. The set screws do not hold it. Probably the valve works too hard, but replace your ordinary set screws by cast steel ones, the ends of which drill slightly and turn the outside beveling until you make a concentric edge around the hole; than harden the end or point and draw to a dark straw. The bevel should not be over 45°. This annular edge will cut a ring on the shaft and seat itself firmly.

H. C. V., of Texas, desires to know how to color his meerschaum. He has smoked it eight months and only partially succeeded. We know of no better way than to "fight it out on that line." The pipe is probably not a meerschaum.

J. C. L., of Pa.—If you wish to construct an underground cistern it may be done in a hard dry soil by plastering with hydraulic cement—one-third cement and two-thirds clean sand—directly upon the earth. In this case the bottom must be much smaller than the top, so that the sloping sides will retain the plaster in place until dry. If built of bricks the cistern may take any other form. In a valuable treatise called "The House," published by G. E. and F. W. Woodward, 37 Park Row, New York city, you will find full particulars on this subject.

A. F., of Pa.—Sulphurous acid is much used for fumigation, due regard being had of the precautions, mentioned on page 187 Vol. XV. You need have no fear in using it in an empty house. All sensible traces of the gas are promptly removed by ventillation. There is no difficulty in burning sulphur. Sulphur takes fire at a low temperature and burns very persistently; it burns in an atmosphere when ordinary fire would be smothered.

J. H. W., of Wis.—A patent covers and includes all the exact equivalents of the invention. But the question whether a legal equivalence exists is often doubtful, and is only to be decided in the courts.

C. R. of Mich.—A few drops of bi-sulphide of carbon mixed in the plating solution will cause silver to be deposited bright. The process is however not much used, for a better surface is given by the ordinary burnishing.

W. B., of Ala.—The sample you send is mica, often called isinglass. It is a valuable mineral and we recommend you to secure it.

W. K., of Tenn.—The solution of chloride of gold in ether is sometimes used for gilding on steel. If you add to it just before using a small quantity of oil of cloves or cassia the gold will be deposited on glass.

D. C. H., of N. Y.—The virtue of copying ink consists in its non-drying property. This property may be given to any ordinary ink by the addition of sugar. Lately, however, glycerin has been substituted for sugar, and is decidedly to be preferred. The quantity of glycerin needed may be easily determined by trial.

J. N., of Pa.—To make soldering fluid get 1 pound of muriatic acid and put into it ½ lb. of zinc in small lumps. As soon as the bubbling ceases, the acid has dissolved all the zinc it can, and the fluid is ready for use. Some think it advantageous to add an ounce of sal-ammoniac to each pound of the fluid.

J. W. B., of Ill.—No useful solvent of vulcanized rubber is known, and there is no good cement by which broken or torn vulcanized rubber goods can be mended. These two things are much desired, and any one who finds them will be handsomely rewarded.

F. B., of Mass.—The acids used for pickling and coloring brass and other alloy castings, are sulphuric, nitric and hydro-chloric. These are used in mixture of various proportions.

W. A. Moore, of Pa.—The most durable varnish contains linseed oil, and is the only sort which will bear much handling or rubbing. One of the best spirit varnishes is four parts shellac and one part sandarach dissolved in alcohol.

V. L. C., of Miss.—"We are running an engine from a cistern and wish to know the cheapest method of condensing steam." The meaning of this question is not clear.

F. P. M., of Tenn.—The brilliancy of shellac varnish is increased by adding sandarach. The final polish of spirit varnish is often given by rubbing it with a rag which has on it a little raw linseed oil.

O. C. M., of Pa.—Plaster of Paris is used to make the molds for soft rubber which is to be vulcanized.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

W. G. Burgin, Carthage, Mo., wishes to purchase machinery for manufacturing straw paper. Manufacturers and patentees will please send circulars and address as above.

I. F. Beach, of Bastrop, Bastrop county, Texas, wishes to correspond with makers or dealers in machinery for the manufacture of tubs, buckets, and churns from red cedar.

Manufacturers and dealers in aluminum please send their address to Wm. Hoeden, Box 1,444, Philadelphia, Pa.

Manufacturers of pottery or stone ware please send their address to Dr. W. W. Smith, Montrose, Susquehanna county, Pa.

Wanted to purchase the best lathe for turning taper penhandles. Address W. A. Morse & Co., Philadelphia, Pa.

NEW PUBLICATIONS.

WEIGHTS AND MEASURES ACCORDING TO THE DECIMAL SYSTEM; with Tables of Conversion for Commercial and Scientific Uses. By B. F. Craig, M.D. New York: D. Van Nostrand, 192 Broadway, New York.

An excellent little treatise on the decimal system of weights and measures now legalized in this country by act of Congress, containing tables, simple in arrangement and easily understood, for reducing common measures to the new system. The reading matter is so plain and logical as to enable any one of ordinary capacity to understand the principles of the decimal system and familiarize himself with its details. The volume is of a convenient pocket size and will prove a valuable manual to the masses as well as to the scientific man.

WOODWARD'S RECORD OF HORTICULTURE FOR 1866, edited by Andrew S. Fuller. New York: Geo. E. and F. W. Woodward, 37 Park Row.

This is the first of a yearly series of books giving the actual state of horticulture, the additions to the list of fruits and flowers, the improved methods of cultivation, etc. It contains a list of treatises on the subject, which will be found not the least valuable portion of the volume, as it is not a mere catalogue, but a series of descriptions. Methods of propagation, cultivation, and management of our small fruits, ornamental plants, and flowers, with useful hints in gardening, laying out walks, etc., illustrated by engravings, make this a welcome treatise to all who desire to make home surroundings useful and beautiful.

EXTENSION NOTICES.

Thomas D. Burrall, Geneva, N. Y., having petitioned for a patent granted to him the 6th day of Dec. 1845, extended for seven years the 6th day of Dec. 1859, reissued the 10th day of Oct. 1865, for an improvement in Corn Shellers, for seven years from the expiration of said patent, which takes place on the 6th day of December, 1867. This second extension having been authorized by act of Congress, it is ordered that the said petition be heard at the Patent Office on Monday the 2d day of September next.

Richard Montgomery, of New York City, having petitioned for the extension of a patent granted to him the 12th day of July, 1853, for an improvement in sheet metal beams, for seven years from the expiration of said patent, which takes place on the 12th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 24th day of June next.

Simon M. Elder, administrator of the estate of John A. Elder, deceased, of Portland, Me., having petitioned for the extension of a patent granted to the said John A. Elder the 26th day of July, 1853, for an improvement in curving the backs of books for seven years from the expiration of said patent, which takes place on the 26th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 8th day of July next.

George T. Parry, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him the 2d day of August, 1853, for an improvement in anti-friction boxes, for seven years from the expiration of said patent, which takes place on the 2d day of August, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 15th day of July next.

Samuel Darling, of Bangor, Me., having petitioned for the extension of a patent granted to him the 30th day of August, 1853, for an improvement in apparatus for grinding and shaping metals, for seven years from the expiration of said patent, which takes place on the 30th day of August, it is ordered that the said petition be heard at the Patent Office on Monday the 12th day of August next.

William Butterfield, of Boston, Mass., having petitioned for the extension of a patent granted to him the 4th day of July, 1854, for an improvement in sewing machines, for seven years from the expiration of said patent, which takes place on the 24th day of November, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 2nd day of September next.

Nathaniel Gear, of Marietta, Ohio, having petitioned for the extension of a patent granted to him the 8th day of November, 1853, for an improvement in machine for turning or cutting irregular forms, for seven years from the expiration of said patent, which takes place on the 8th day of November, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 30th day of September next.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,163.—PTEROTYPE OR MACHINE FOR WRITING WITH TYPE.—John Pratt, Greenville, Ala. December, 1866.

523.—COVERING OR CUSHION FOR HORSES' FEET.—Samuel Adlam, Jr., Charlestown, Mass. Feb. 27, 1867.

549.—RAILWAYS AND MEANS OF PROPULSION USED THEREON.—Joseph A. A. Fontaine, New York City. Feb. 27, 1867.

643.—SAFETY VALVES FOR STEAM BOILERS OR GENERATORS.—George W. Richardson, Troy, N. Y. March 7, 1867.

675.—BRIDLES AND REINS CONNECTED THEREWITH.—Samuel B. Hartman, Millersville, Pa. March 9, 1867.

838.—MACHINERY FOR MANUFACTURING FLOUR.—John Brown and Alexander Hart, Utica, N. Y., and Allen B. Ralph, James H. Cutler, and Dexter N. Knight, Providence, R. I. March 22, 1867.

740.—BOXES FOR CONTAINING, PRESERVING, AND TRANSPORTING BUTTER AND CHEESE.—Wm. B. Guernsey, Norwich, N. Y. March 14, 1867.

742.—CRAMPING AND LIFTING APPARATUS.—Henry H. Baragwanath, New York City. March 14, 1867.

751.—BALE TIE OR FASTENING.—Osborne Macdaniel, New York City. March 15, 1867.

755.—ROTARY ENGINE AND PUMP.—Dexter D. Hardy, Covington, Ky. March 15, 1867.

760.—BELT HOOK OR FASTENER FOR PIERCING DRIVING AND OTHER BELTS OR BANDS.—Frederick G. Wilson, Lowell, Mass. March 16, 1867.

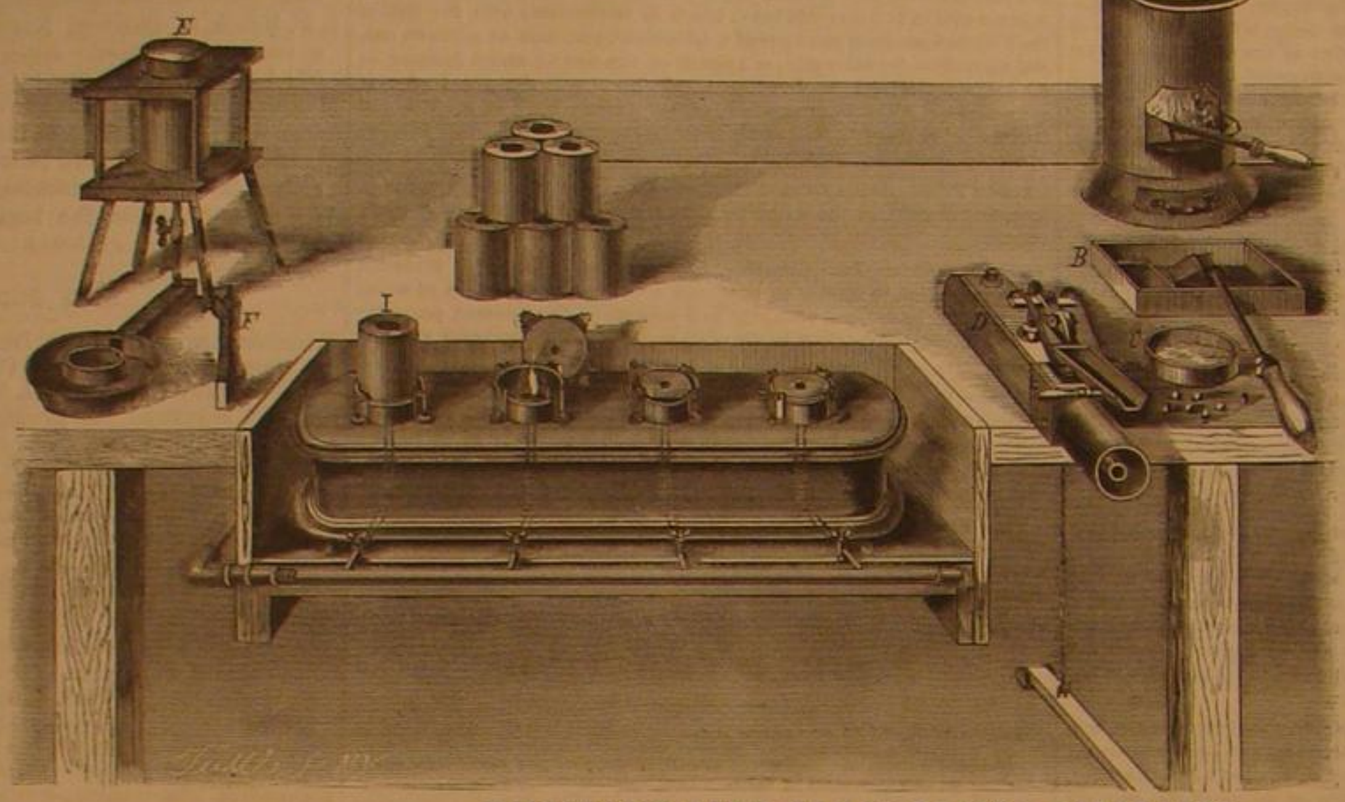
761.—BREECH-LOADING FIRE-ARM.—Benj. S. Roberts, Maj. Gen. U. S. Army. March 16, 1867.

769.—BREECH-LOADING FIRE-ARM.—Silas Crispin, New York City. March 16, 1867.

792.—SEWING MACHINE.—James S. McCurdy, Brooklyn, N. Y. March 19 1867.

Hollingsworth's Can-Soldering Apparatus.

The preservation of meats, vegetables, etc., by hermetically sealing them in tin cans has become an important business, and apart from its pecuniary benefits to those engaged in the preparations of these things for the market, the advantages on the score of health are neither few nor trifling. Any process, therefore, which will reduce the cost, by simplifying the manufacture, is of general utility. This is the object of the apparatus herewith represented. The circumferential body of the can is rolled and the longitudinal seam closed in the usual manner, and the top and bottom made. Contrivances for soldering the seam of the body are seen on the right of the large engraving. They consist of an improved bench furnace, A, bench tray, B, with hatchet irons, a resin box, C, and a seaming apparatus, D. This last is the main peculiarity in this department. It is bolted to the bench having a projecting stake for the reception of a can body. A treadle brings the double knife appendage down on the tin, when the solder and iron is applied and the seam is quickly secured. The edges of this double knife hold the seam perfectly closed until the solder has been applied. This knife can be raised or lowered by nuts on the standard to which it is attached by an arm, so that it may fit any sized can, from a pint to a gallon. One of these nuts is above and the other below the bench. The edges of this knife hold all the resin and solder on the seam, and they are so placed as to form the proper angle for the soldering iron. When not in use two springs raise it from the stake, lifting the treadle, ready for the reception of another can.



HOLLINGSWORTH'S CAN-SOLDERING APPARATUS.

The operation of securing the top and bottom to the can, called "floating", is performed without the aid of a soldering iron. A circular groove is formed around the inside edge of the top and bottom, into which the end rims of the can body fit. This groove is so formed that the outer portion of it projects a little way up around the body of the can, making a sort of lap joint and leaving a slight recess around the inside edge. The soldering is wholly from the inside of the can. At E, on the left of the large engraving, is an apparatus for delivering the liquid rosin. It is merely a gallon glass bottle inverted in a suitable frame, and having a straight pipe secured in the neck, which pipe reaches within one-third of an inch of the bottom of the conductor to the resining pan. When the faucet on the pipe is turned the resin flows into the pan to the depth of one-third of an inch and remains at that hight, ready for dipping the edges of the cans. F is a small anvil for drawing in the edges of cans of thick tin to make them fit the bottom and top.

In the center of the engraving is a furnace carrying a number of cups for "floating" the can tops and bottoms. The construction of these cups can be seen in the small engraving. G is a top view of one, showing four angles, which are furnished with grooves to receive the annular projections on the tops and bottoms. H is a vertical cross section of the cup, showing the double bottom which is filled with asbestos or some other non-conducting substance to prevent the heat from being diverted from the circumference of the can to the center. These cups rest by their arms on four standards recessed to receive them, the feet of the standards having interposed between them and the main plate of the furnace a piece of felt or other non-conductor to confine the heat to the point desired.

In the center of each four of these standards is a gas pipe the flame of which impinges on the bottom of the cup and rapidly heats those portions at the arms which are solid. Surrounding the flame is a sheet iron guard to prevent its flickering by the wind. The bottom or top of a can being fitted to the body, a strip of solder wire is placed in the annular recess and the can set on the cup, as at I. When the solder begins to flow the can should be shifted and shaken a little to distribute the solder evenly, and the work is done.

There seems to be a great advantage in forming a groove around the top and bottom plates, thus making a lap joint which will not in soldering effect the longitudinal joint. Also in soldering from the inside, thus obtaining a plumber's joint. If still greater security is desired the bottom or top can then be soldered on the outside. Unskilled labor can be employed in making cans by this process and with this apparatus. The work is rapidly performed, as must be evident by an examination of the engraving. Where gas cannot be obtained coal oil may be substituted. The inventor says his concern has a capacity of making from 6,000 to 10,000 cans per day. That the cans are perfectly air-tight is evident from samples of vegetables and fruit we have tested, which are two years old, each as perfect as when first put up.

Patents were obtained through the Scientific American Patent Agency September 12, 1865, and April 16, 1867, by Robert J. Hollingsworth, of Cincinnati, Ohio. For machines, and territorial rights address Percival, Semple, & Co., 16 Main street, Cincinnati, Ohio.

Tunneled Street Crossings.

Several correspondents have suggested tunnels under the streets for crossings as being less objectionable than bridges, particularly to ladies. One correspondent would have three or four at crowded crossings, lighted with gas if necessary, and about eight feet below the surface. To protect the entrance steps from accumulations of snow, light roofs of glass might be erected over them, the entrances to be closed at nightfall. We hardly agree with him that ladies would prefer them to bridges, unless the passages were guarded by policemen.

Eickemeyer's Improved Governor for Marine and Stationary Engines.

The governors of the valves of steam engines generally in use, either those which govern by the conical pendulum or by the motion of fans, are incapable of rapid self adjustment. They are liable to incessant oscillations and vibrations, arising mainly from their tardiness of action. They are incapable of acting at the instant when the equilibrium between the force exerted and the resistance to be overcome is disturbed, and act only after the fly wheel or other machinery of the engine has received such an impulse that the governor balls or the fans revolve with sufficient velocity to overcome the resistance of the throttle valve.

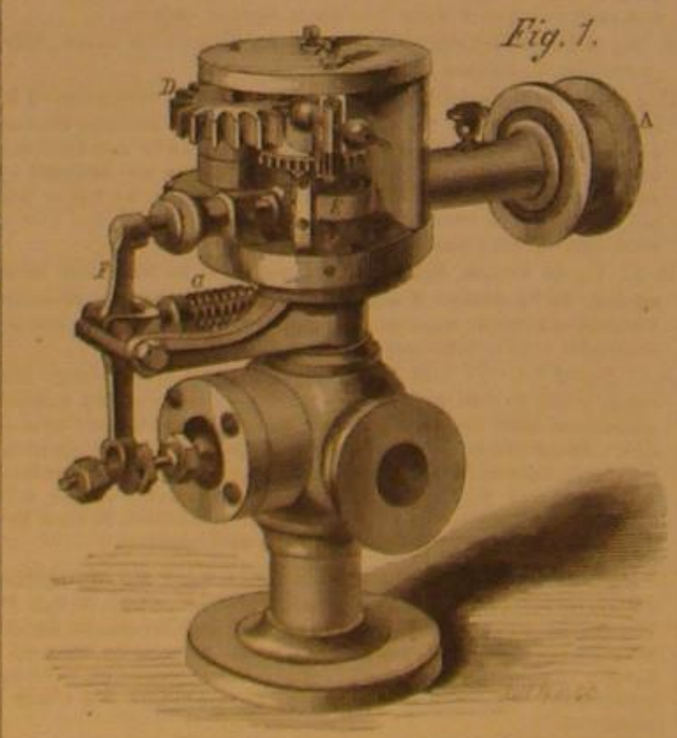


Fig. 1.

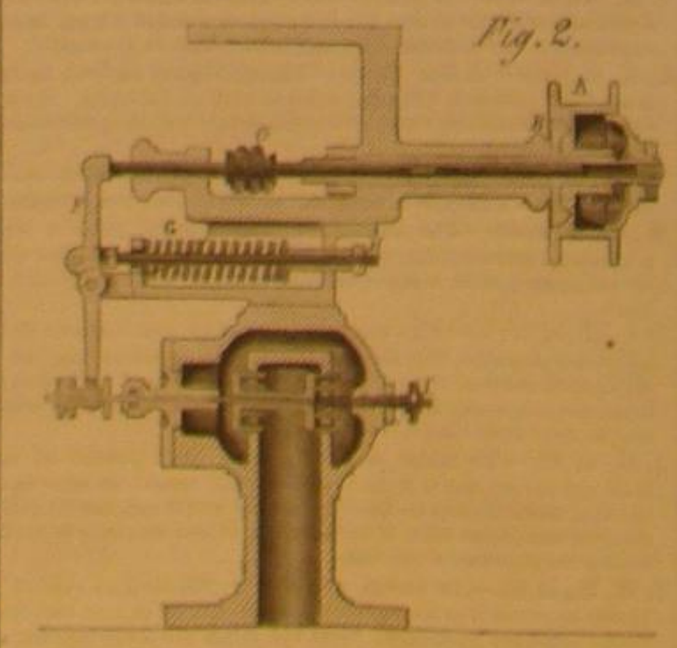


Fig. 2.

In the governor represented in the engravings the conical pendulum is entirely discarded, and the balance of the chronometer is substituted, involving the idea of combining the invariable motion of an independent balance with the varying speed of the engine, so as to make the former arrest instantly the fluctuations of the latter.



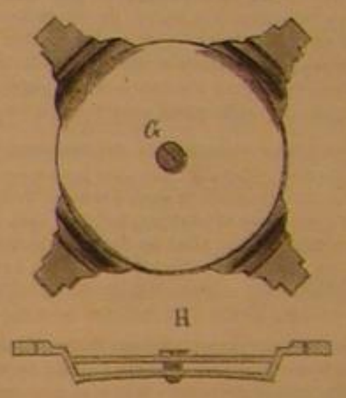


Fig. 1 is a perspective view of the governor and valve and Fig. 2 is a vertical section through the center, showing the connection between governor and valve. The power of the engine is applied to the flanged pulley, A, and the motion transmitted through the friction clutch, B, to the horizontal shaft on which the worm screw, C, is fastened, which rotates a worm gear on an upright shaft and through that communicates motion to a verge or pallet engaging with it. Attached to the upright spindle on which the verge swings is a segment of a gear that meshes with a pinion, bearing on the same shaft a coiled spring, E, and a balance wheel, or its equivalent in two horizontal swinging balls. The lever, F, is swung on an arm of the frame and is held against the horizontal lever by [a spring, G. The other end of the lever engages with the valve stem and its throw is governed and regulated by check nuts on the stem. The tension of the spring is determined by the nut, H. The are valves two disks, and a set screw and jam nut, I, are used to adjust the valve opening, so that in all cases there will be a supply of steam to start the engine. The tension of the coiled spring, E, is controlled by screws in an arm to which one end of the spring is attached.

The operation is this: motion being given to the pulley, A, the worm, C, moves the wheel, D, and consequently operates the escapement formed by the pallet, the segment spring and the revolving balls with a uniform motion. So long as this movement is only rapid enough to neutralize the action of the escapement and balance, the spring, G, will keep the worm screw in one position, and consequently by the lever, F, keep the valve open. But when, by the increased velocity of the engine, the speed of the worm screw exceeds the legitimate speed of the gear, the gear acts as a fixed nut and sliding the longitudinal shaft, S, closes the valve by the action of the lever, F. The closing of the valve will thus be exactly proportioned to the excess of the velocity of the screw or worm over that neutralized by the escapement balance. If, on the contrary, the speed of the worm shaft is less than is necessary to counteract the motion of the balance, the spring, G, will operate the lever, F, and open the valve. Whenever the two motions correspond the valve remains stationary. It will be seen that the valve is not controlled by a centrifugal acting governor, but by the irregular velocity of the engine. The friction clutch, B, is introduced to prevent undue strain on the escapement and to insure the instantaneous opening of the valve whenever the engine has come to its normal speed.

To alter the speed of the engine it is only necessary to change the position of the balance balls on their arms secured to the shaft that carries the coiled spring. The inventor claims that this governor has the following advantages: It is a positive regulator of the speed of the engine, keeping it under all circumstances at the same number of revolutions per minute; it can be altered to increase or decrease the number of revolutions from 25 to 50 per cent without altering the driving gear; in all positions in which it may be placed it will act equally well, thus adapting it for marine as well as stationary engines; it reduces the fluctuations of velocity so that they are hardly perceptible, and is compact, elegant, and unfailing in operation.

It was patented in August 1865 and has been in operation several years, never failing to give entire satisfaction. For further information apply to Osterheld & Eickemeyer, Yonkers, N. Y.

Another Crystalization of Glycerin has been noted by a manufacturer at Vienna, but under different circumstances: the article having simply stood in an iron tank for a year or more, suggesting the possibility that the solidification may have been connected with the presence of iron in solution.

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Contents:

(Illustrated articles are marked with an asterisk.)

*Excelsior Detaching Apparatus.. 293
*Improved Cut-off Valve..... 293
Now..... 293
The Paris Exposition—as it opened 294
An Old "Black Country" Town... 294
Cabinet Portraits Amid Snow and Ice Scenery..... 294
A New Mineral from Borneo..... 294
Editorial Summary..... 295
*Kelley's Water Wheel Governor. 296
Obituary..... 296
*Improved Miter Box..... 296
Iron at Paris..... 296
Pisciculture..... 296
The Spheroidal State of Liquids... 297
Gleanings from the Polytechnic Association..... 297
*Steam Boilers—Their Form, Construction, and Material..... 297
The Rights of Society and of Labor 297
Can Heat be Accelerated or Retarded?..... 298
Hardening and Tempering..... 298
American Wrought vs. Chilled Wheels..... 298
Milk Sickness..... 298
The Man with the Squeaking Boots 298
Recent American and Foreign Patents..... 298
Answers to Correspondents..... 299
New Publications..... 299
Extension Notices..... 299
Inventions Patented in England by Americans..... 299
*Hollingsworth's Can-Soldering Apparatus..... 300
Tunneled Street Crossings..... 300
*Elckemeyer's Governor for Marine and Stationary Engines... 300
The Sewing Machine Manufacture—What it has accomplished... 301
Encouragement to Manufactures—The Newest Mode..... 301
Improvement in Mechanics' Tools 301
Mutual Assistance Among Mechanics..... 301
Dogs vs. Wool..... 301
Meter and Testing Apparatus for Distilled Spirits..... 301
Estimating Guns in Horse-power. 302
Business and Manufacturing Items 302
Marine Life-Saving Inventions.... 302
New Route Across South America 302
Patent Claims.....303, 304, 305, 306
*Improved Trap-door Attachment 308
Trial of a Heavy Gun..... 308
Wheels on Pavements..... 308

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

THE SEWING-MACHINE MANUFACTURE---WHAT IT HAS ACCOMPLISHED.

To attempt any adequate notice of the benefits the invention of the sewing machine has showered upon mankind at large would require volumes. The struggles of Howe, who for years battled against poverty, prejudice, and interested opposition, and of Singer, Wilson, and others, whose inventions were coldly received for a long time, have had their rich reward, not only in pecuniary success, but also in a recognition of their merits by the whole civilized world. But this is not the object of the present article; it is mainly to refer to the benefits conferred upon mechanics and on the public by the improvement in tools and in methods of doing work, and also in awakening a more general interest in machinery.

The castings for sewing machines must be very light, very smooth, and very perfect. Some of the delicate parts will compare favorably with the fine Berlin work so much admired for ornamental purposes. These requisites have necessitated great improvement in the skill of the molder and in the accuracy of the pattern maker. In regard to the molding, many parts which formerly were molded from halved patterns are now "coped," reducing the cost and increasing the durability of patterns, which are the most costly appliances used in casting. When these castings come from the pickling tank they are of wonderful smoothness and finish, and in working seldom show blow holes. In this respect the sewing machine manufacture has been of immense benefit to this department of the arts. The demand for perfect and finished castings was imperative, and the demand was met.

In the introduction of new processes of finishing and ornamenting, the invention of the sewing machine was a great boon. Electro-plating in gold and silver was previously an art seldom employed for purposes of utility; japanning was confined mainly to a coarse process used on tin ware; inlaying was generally done on articles of a purely ornamental character, by mechanically recessing the material to be ornamented and setting the foreign substance by hand in the recess. All this is changed. The chemist's laboratory has been, in part, transferred to the manufactory. Dealing with chemical compounds and practicing chemical processes have become familiar, to a certain extent, to our mechanics. This is an advantage to them and a benefit to the public. The beautiful finish on the castings of the sewing machine, a finish which resists oxidation, abrasion, and time, and is so superior to the paint and varnish formerly employed, is that of the japanning process demanded by the requirements of that ornament to the parlor and sitting-room, the sewing machine.

The artistic ornamentation of its parts by inlaying with mother-of-pearl and other iridescent materials has added another branch to the wide range of mechanical manipulation. By cementing these beautiful substances on the iron, and filling the interstices with a varnish which hardens like iron, all the effect and the durability of the old time inlaying is assured at a fraction of the cost.

Then in the perfect finish of those parts the surfaces of which are not covered with a layer of a more precious metal, or hidden by japan or ornamental shell, the sewing machine has been a great advantage to mechanics. The perfection of the forgings required, demanding the most cultivated skill; the invention of machinery to insure accuracy and multiply products; the absolute exactness demanded where hand labor is indispensable, all show the influence of the sewing machine on the practical education of mechanics, and consequently on the advancement of mechanical art.

There is one other aspect of this subject worthy of notice. That is the introduction of the fairer sex to the beauties of machinery, making them interested in the subject. Sometimes in visiting manufactories in company with ladies we have been surprised that they evinced no interest in the machinery but only in the results of its operation. So on board one of our moving palaces, the River or Sound steamers, they were more interested in the upholstery and hangings of the cabin than in the workings of the powerful monster that propelled the floating hotel through the water. The sewing machine has changed all that. We have now female machinists, not those only who run sewing machines, but women who can direct and put together a machine; who can use screwdrivers, wrenches, and other mechanical tools, and ascertain a fault in the adjustment of the mechanism and remedy it. And, to tell the truth, they are not behind their fellow workmen of the other sex in their love for and adaptability to the work.

Here is an avenue opened to woman. She may even invade the province of the "greasy mechanic" without becoming "greasy," and, with her instinctive delicacy of touch and judgment, succeed where he would fail.

ENCOURAGEMENT TO MANUFACTURES---THE NEWEST MODE.

Public encouragement to manufactures is always eagerly conceded by those who find themselves directly interested in the increase of substantial prosperity around them— substantial or productive prosperity, as distinguished from mere activity in exchanges. To take a recent striking illustration: The city of Augusta voted a release of two years' taxes to the proposed Sprague corporation, beside aiding it with a quarter of a million of her bonds, and the citizens of Oxford, in the same state, have since voted ten years exemption to all manufacturing capital hereafter introduced in lots not less than $10,000. In like manner those really interested in the growth and wealth of any place will always gladly pay a moderate indirect tax of any kind to encourage manufacturing industry at their own doors. There is no difference of opinion among practical men, of whatever political school, in a case thus brought home to themselves,

In all countries, tribute is gladly paid by other interests to the Arts that profit all: the kind of tribute varies in different cases, and that is all the difference. In England, it happened that the tribute took an opposite form to that rendered in this country: but free trade meant practically the same thing there that protection means here, namely, encouragement to the Arts. Agriculture, after a blind and bitter struggle indeed, gave up its protective tariff, that England might become, through cheap bread, the workshop of the world. Agriculture now knows that it has gained a hundred fold for what it gave up, and would no sooner resign manufactures for the sake of a close corn market, than a man would exchange his house for the lumber or the trees it was built from.

In America, on the other hand, we gladly agree—mere traders and theoretical economists excepted—to pay or risk paying a temporary tax on foreign manufactured goods, that the all-profiting Arts may become great among us. If that is not enough, through the effect of deranged currency and heavy taxation, then local interests band together and say to manufacturers, "we will pay your taxes, if you will come hither and build us up." This method of supplementing an insufficient national encouragement to manufactures, although placing the burden of a national benefit on the shoulders of a few, is yet so manifestly profitable even to the few, that we expect to see it extensively adopted, while the present difficulties of business enterprise continue. Thus much is certain: that in one way or another mankind must and will have the Arts, and no community will content itself in bucolic simplicity, after books and newspapers have opened its eyes to the prosperity of others and its causes. The question is between resting in a comparative barbarism, with few and primitive arts, accepting like savages all improvement at the hands of others; or on the other hand, placing ourselves among the foremost in all that advances humanity, and making the rest of the world debtors and dependents instead of ourselves. For we do not achieve progress by purchasing its fruits from others. Not consumption, but production, makes a people great: and gathering corn or gold from Nature is not production but only a form of consumption. There is no national greatness in mountains of gold or cotton or corn: it is only in the genius that can feed its workshops with these crudities and transform them into utilities; and to the hands of that genius they all must flow, no matter where they come from, just as all the rivers flow to the sea.

We remarked that the general impulses of self-interest are infallible; but we must qualify that with the proviso that the case must not be too complex for self-interest to comprehend itself. Within such limits the selfishness of all communities that want prosperity works in the same way, and is so far infallible—it craves and subsidizes willingly the aid of the Arts. Could selfishness be enlightened one step beyond its mere instinct, so far as to perceive that no class of arts or interests can flourish alone, but that all are allies, and their union multiplies the powers of each by the sum of all, then we might realize a consistent, harmonious public policy, fostering with a liberal hand every art that needs encouragement, in the assurance that every other interest must be ultimately enriched by paying tribute to a dominant principle of productive progress.

ALUM AND PLASTER OF PARIS, well mixed in water and used in the liquid state, forms a hard composition and is a useful cement.

IMPROVEMENT IN MECHANICS' TOOLS.

To the observant man whose attention has been directed to the immense advances toward the perfection of machinery made during the past twenty-five years, no step in this direction will strike him more forcibly than the improvements in tools. The machinist, for instance, who could have enjoyed a Rip Van Winkle sleep for a quarter of a century, and should now awake and essay to work at his trade in a well-appointed shop, would find himself as far behind the requirements of his business as when he first entered the shop as an apprentice. He would find the file, which in his day was the favorite tool, scarcely ever out of his hands, superseded by the planer, shaper, milling machine, turning tool, and many other devices which perform the work more accurately, quicker, and with much less expenditure of labor. The center punch, bench centers, and hammer have largely given place to the centering machine; the screw cutting and tapping machine does much of the work formerly performed with the hand screw plate and hand tap; the slotting machine cuts the key ways, and more perfect bench tools, as gages, try squares, straight edges, etc., assist in the manual labor.

Any other mechanical business will show a similar progress; indeed, there are few of the old tools except those which have been superseded by more modern appliances that have not been more or less modified and improved. Although all or nearly all these improved appliances are labor saving, yet the demand for skilled labor is fully as great as ever. Skill is required in the proper management of these tools as well as in their production. An inefficient and unpractised workman will as surely ruin a job in using the best and most approved tools as though he employed improper appliances, while by the aid of superior tools the good workman can turn out superior work.

MUTUAL ASSISTANCE AMONG MECHANICS.

In No. 17 current volume we published an engraving and description of a device which will prove valuable to many mechanics all over the country and possibly to some in other countries. It was a simple tool for drawing a wood screw the head of which had broken. Given by Mr. Lewis Garrigus, of Waterbury, Conn., a mechanic, to his fellow mechanics, it affords an illustration of the oneness of labor—the generous willingness of one mechanic to assist another. There is much more of this generosity exercised than is publicly known, but it seems as though there could be no adequate reason why more of it should not be known.

The time has gone by when every advance made by an individual mechanic should be made a secret, or if conjectured or its effects seen, be held as a mystery. There are many improvements made by practical workmen which cannot be the subjects of patents, and yet would be useful to the grand fraternity of workers, and through them beneficial to the world at large. Is it not the duty of the inventors in such a case to allow their improvements to be put to extended practical use by their publication? The benefits would be increased and the discoverer gratified by the publicity given to his improvement and the credit accorded to him, while if he selfishly concealed his knowledge, in many cases he would not be pecuniarily advantaged. "Art is long but life is fleeting." This the old Latins understood when they said: "*Ars longa, vita brevis*," and the neglect of the legitimate inference is the reason we now are compelled to speak of the "lost arts." This love of the possession of a useless secret, or rather of a secret whose usefulness is contracted, is gradually giving way to a more catholic and human spirit, and it is a promising sign of future progress in the arts.

DOGS VERSUS WOOL.

The wool product of this country is seriously discouraged, and quite shut off on many farms, in consequence of the multiplication of worthless and predatory dogs. The last Agricultural Report contains the returns of the number of sheep killed by dogs in the year 1866, made by the correspondents of the statistical division of the Bureau. The amounts foot up 130,427, from reports supposed to cover at most only about one fourth of the ground; allowing as a safe estimate, 500,000 sheep worth $2,000,000, destroyed yearly by that invaluable pet, the dog. That this estimate is within the truth, may be seen from the number reported and paid for by law in Ohio, which amounted in five years to 203,824. The loss in New York has been estimated by the Secretary of the State Agricultural Society, at 50,000 in a year.

Unfortunately for the sheep, the dogs have votes, while the sheep have not. That is, the "representatives of the people" know that there are ten men who would be enraged by a dog tax and would govern their votes by no higher consideration, where there is one farmer who would allow a few dead sheep more or less to control his public duty. Of course it is only the more degenerate and mangy class of curs that enjoy the right of political citizenship, with the consequent civil right of killing their neighbors' sheep. Decent dogs pay their taxes cheerfully or change places if they cannot afford it, content themselves with such bones as they can honestly come by, and never aspire to dictate the votes of their masters and the policy of the government. But for "curs of low degree" this is a free country, where one dog's vote is as good as another's "and betther too."

METER AND TESTING APPARATUS FOR DISTILLED SPIRITS.

The losses of the Internal Revenue Department of the Treasury by fraudulent returns from distillers, and the consequent seizure of distilleries and of spirits created a demand which would not be evaded for some automatically

registering apparatus for recording and exhibiting the amount and the quality of the products of the still. The abuse of the power possessed by inspectors and the dishonesty of some manufacturers have been carried to such an extent that large amounts of whisky have been offered for sale at a less price per gallon than the government tax of two dollars. For this state of things a remedy was imperatively demanded. We think the demand has been met.

The Secretary of the Treasury appointed Professors Henry and Hillyard, of the National Academy of Science to investigate devices intended to register the quantity and quality of the spirits distilled, and they reported in favor of an invention by Mr. Isaac P. Tice, of New York city. Consequently, Mr. Tice's apparatus, several patents in which were secured through this office, has been ordered to be attached to all stills in the country. Next month (May), every distiller must give notice of his desire for one of the meters and deposit the money for the same, as a condition of his continuing his business. An order will probably soon be issued that these meters shall be attached by November next, and Mr. Tice has made arrangements for supplying the demand, however great it may be.

The points contemplated by the introduction of this device are the following:

1. An automatical registration of all the liquid, whether high or low wine, which passes from the still.
2. A similar record of the strength of the spirits from time to time as they are produced.
3. An arrangement by which the distiller may be allowed, at will, to take the necessary proofs of the spirits as they come from the still, and separate the low from the high wines, without being able to interfere with the automatic registration.
4. The inclosure of the measuring apparatus in a safe, which shall prevent interference with its interior and cannot be broken into with bearing evidence of burglary on subsequent inspection.
5. The isolation of the doubler and condenser, so that no liquid may be abstracted from them by concealed tubes or other means.
6. An arrangement by which assurance is given that all the low wines which pass from the worm are returned to the doubler.
7. Such regulations as will insure successive and independent inspections by different persons at irregular times.

The *modus operandi* of the registration process is simple, and the proposed methods of inspection are as follows:

1. The distiller must report at intervals, as provided by law, the amount and strength of the product of each day.
2. The samples taken by the meters are of two kinds, which may be designated as the long and short samples. The short sample, which indicates the strength of the liquid from day to day, and is intended to check the report of the distiller, must be drawn and inspected each day by an officer detailed for that purpose.
3. The samples to be examined three times in a month, or at irregular periods, by another officer especially detailed for that duty, and the results to be compared at the office of the Assessor, with the average results of the previous inspections, each officer reporting at the time of his inspection of the samples the indications of the dials, which automatically record the quantity and strength of the liquor produced.
4. At the time of the introduction of this system into a distillery, a minute description and drawing must be made of the relative position and size of the several parts, especially the diameter and length of the different pipes, the number of pieces of which they are composed, the indications of cracks, patches, or solderings, the materials of which the tanks are constructed, the position of knots, splices, evidences of previous repairs, and other peculiarities of importance in ascertaining in subsequent inspections whether changes have been made. This drawing and description are to be kept in the office of the Assessor, for reference, and a copy transmitted to the Commissioner of Internal Revenue.
5. If an inspector shall fail to report any changes in the arrangement or in the apparatus from its normal condition, he should be deemed guilty of contrivance with the distiller in defrauding the Government.

The simplicity and the efficiency of the apparatus seem to insure its unfailing accuracy. Having inspected the machine, or machines, (for there are two), we will endeavor to convey an idea of their operation. The first machine is simply a beam balance poised on knife pivots in the ordinary way, and having at the short end a tank of a peculiar form, which, when one compartment is filled, reverses, emptying its contents and presenting another compartment to receive the spirit from the worm pipe. The depression of the short end of the lever, when the tank is full, actuates an arm that gives motion to gearing moving an index hand that traverses over a dial plate and records the quantity passing through. This dial, or its machinery, connects with a succession of dials, decreasing the movement of the pointers by tenths in the manner of the gas meter, so that the registration of the products of months and years may be recorded.

The apparatus for registering the strength of the run is on precisely the same principle—weight of the liquid. At the short end of the balance lever is a receptacle for the spirit and at the other end the beam traverses between two inclines on steps of which rest weights, which are taken up by the beam in succession as the end of the beam rises. The movement of the beam actuates a slide having an eccentrically curved face, which moves an index pointer by the medium of a friction clutch. There are trains of gearing as in the other machine, which operate other index pointers to record higher numbers by tenths, hundreths, etc. Besides these records there is a provision for running off a minute portion of the still for examination.

The whole apparatus is confined in an iron safe, enameled so that no tampering with it can be undetected. By means of the dials, covered with thick plate glass, the distiller or the inspector can at all times know the quantity and quality of the run.

Without diagrams we cannot exhibit the construction of these simple machines, but from the above the reader will be enabled to gather some idea of the principle employed.

ESTIMATING GUNS IN HORSE-POWER.

Eight pounds of powder fired in the old thirty-two pounder is able to give a thirty-two pound ball a velocity of sixteen hundred feet per second. It will be seen that these figures have a very simple relation to each other (1 : 2 : 4 : 200) and for this reason, and because they have been confirmed by many experiments they are familiar to all artillerists. Powder, 8; ball, 32; velocity, 1600—are household words with scientific gunners, and the old 32-pounder is very properly taken as a standard with which to compare guns of other caliber and other construction.

Now what is the force represented by the mass or weight, 32, having a velocity of 1600? How great is it, and what can it do? One of the measures of force is comprised in the formula mv^2, which applied in the present case gives us $32\times1600^2=81{,}920{,}000$. But 81,920,000 of what? Certainly not pounds or feet or foot-pounds or any other quantity with which the common mind is familiar. The formula and the calculation are correct, but they do not furnish us clearly with the information we seek.

A common way of estimating the force of a ball is to fire it at a target of wood or iron, and note how many feet or inches it penetrates. This plan, however, although instructive and useful, is quite crude and inaccurate when the object is to make an exact measurement. The principle on which it is based, namely, the determining the amount of resistance it can overcome, or the amount of work it can do, is well enough, but the trouble is that we have no accurate measure or conception of this resistance. There is another sort of resistance, however, which we do understand, and that is gravity; and it is gravity which furnishes us the unit of measure the foot-pound, which is now in almost universal use. How can we express the force of a projectile in foot-pounds? The question resolves itself into determining the hight to which a projectile will rise when resisted only by gravity; the product of this hight in feet, with the pounds of weight, gives us the number of foot-pounds. For the calculation we need the velocity of the shot (v), the velocity acquired by a falling body in one second, (g=32). and we have the hight (h) by using the formula $h=\frac{v^2}{2g}$. Thus we find that our ball having a velocity of 1600 feet, if projected up vertically will rise to a hight of 40,000 feet. As the ball weighs 32 lbs., $40{,}000\times32=1{,}280{,}000$ foot-pounds, which last represents the force of the ball. A horse-power is 33,000 foot-pounds, and $1{,}280{,}000\div33{,}000=39$ horse-power. Thus we find that the 32-lb. ball, on leaving the gun at a velocity of 1600 feet per second, does the work of 39 horses during one minute.

We used 8 lbs. of powder, which gave us a force of 1,280,000 foot-pounds: $1{,}280{,}000\div8=160{,}000$ foot-pounds, a little more than five horse-power for a minute, as the force of one pound of powder. The 32-pounder weighs 7,500 lbs.; then $1{,}280{,}000\div7{,}500=170{\cdot}7$ foot-pounds for each pound of metal of the gun.

This kind of reasoning may, of course, be applied to any other velocity, shot and gun, and a table which brings together the results, shows at a glance some very curious and important relations. Such a table is appended.

In conclusion we have the pleasure to acknowledge our indebtedness to a paper entitled, "On the comparative strength of cannon of modern construction," read at a recent meeting of the American Academy of Arts and Sciences. The author of the paper is Professor Daniel Treadwell, of Cambridge, Mass., a gentleman who, for a long time has been distinguished for his valuable contributions to the science and art of gunnery.

	Old 32 Pounder.	10-inch Columbiad.	15-inch Rodman.	300-pounder Armstrong.	600-pounder Armstrong.
1	7,500	15,039	49,099	26,880	49,280
2	32	128	315	900	600
3	8	18	50	60	100
4	1,600	1,044	1,118	1,500	1,400
5	40,000	17,030	19,530	35,156	30,625
6	1,280,000	2,179,840	6,151,950	10,546,800	18,375,000
7	1·00	1·69	4·73	8·24	14·35
8	39·0	66·0	186·4	319·6	556·8
9	170·7	144·7	125·3	392·4	572·8
10	160,000	121,102	123,039	175,780	183,750

1. Weight of gun, lbs.
2. Weight of shot, lbs.
3. Weight of Powder, lbs.
4. Initial velocity of shot, feet.
5. Hight to which the shot would ascend if fired upward *in vacuo*.
6. Force in lbs. raised one foot.
7. Force compared with a 32-lb. shot under a velocity of 1,600 feet a second.
8. Force in number of horses working one minute.
9. Number of pounds of shot raised 1 ft. by each pound of metal in the gun.
10. Force of 1 lb. of powder in foot pounds.

It should be borne in mind that the increase of resistance occasioned by rifling is not taken into the account, although it makes an important item against the Armstrong guns.

BUSINESS AND MANUFACTURING ITEMS.

Cotton.—The new Tecumseh mill, Fall River, Mass., in which work was commenced a few weeks since, will contain 20,480 spindles and 480 looms, will employ 250 hands, and turn out about 18,000 yards of 64x64 printing cloth per day. Much of the machinery was made in England.——A cotton manufacturing company has been started in Claiborne Parish, Louisiana, near Homer, with a cash capital of $40,000.——It is understood that the Sprague corporation will commence operations at Augusta this season by erecting dwellings for the large number of workmen to be employed upon their extensive buildings. They are now running the existing cotton mill on their recent purchase, with about 150 hands.——All the cotton and woolen mills at Westerly and Stillmansville, R. I. are idle, the operatives having "struck" against a proposed reduction of 15 per cent on their wages; which probably does not annoy the proprietors just now.——The cotton mill at Wesson, Miss., is spinning about 1,000 pounds of cotton per day, and its looms are now ready to make homespun. The company will soon put up machinery for making woolen goods.——Augusta, Ga., cotton mills are sending sheetings to New York.——The cotton mills in Petersburg, Va., have used 1,116 bales of cotton since the first of the year.

Iron.—The International Screw Company, at Northampton, Mass., is nearly ready to begin operations.——The Boston Commercial Bulletin says that Wm. Jeffers, a fire engine builder of Pawtucket, R. I., has turned his attention to the building of steam fire engines, pronounced by competent judges fully equal to those made by the Amoskeag Co., so celebrated in this country and in Europe. Mr. Jeffers has turned his inventive faculties to the construction of a little pleasure steamboat, which will run in four inches of water.——Capitalists are talking of an iron mill in Steubenville, Penn., on grounds where the power that drives the mill can be applied to hoisting coal out of the earth to run it.——The new Arms Company at Newburyport, Mass., will soon commence operations.——The manufacture of the Low-water Reporter is soon to be commenced at Newburyport. The company owning the patent has a capital of $40,000.——The new Sewing Machine Factory of the Wheeler & Wilson Company at Bridgeport, is 370 feet long, and covers nearly three acres of ground. It will contain 998 windows, and is fire-proof.

Wines.—There are two million two hundred thousand owners of vineyards in France, one thousand varieties of wine made, five million four hundred and thirty-five thousand acres of land devoted to vineyards, and in 1864 the yield of wine was one hundred and thirty-two millions of gallons, worth one hundred millions of dollars. The land used for vineyards is to a great extent upon hills where other crops would be unprofitable.——Of American wines, California and Ohio yielded in 1866 more than a million of gallons; Kentucky, 180,000 gallons; Indiana, 88,000; New York, 61,000; North Carolina, 54,000; Illinois, 47,000; Connecticut, 46,000; Virginia, 40,000; Pennsylvania, 38,000. One western manufacturer paid last year an average of 12½ cents a pound for all the grapes offered.

Miscellaneous.—More home-made "protection," is advertised by the town of Fayetteville, Vt., which offers a bonus of $5,000 to any one who will invest as much more in a saw or grist mill in that place.——An order was lately received in San Francisco from Japan for $10,000 worth of leather, to be used for military accouterments.——It is said that Florida produces lemons weighing over a pound, and twelve inches in circumference, obtained by a cross between the common lemon and the sour orange.——A company is forming in New York, with a capital of $9,000,000, to introduce the cultivation of coffee on a large scale in South Florida. It is proposed to engage about 2,500 laborers.——Over seventy new manufacturing establishments are either just opened or will soon be opened in Michigan, Illinois and Wisconsin.——A manufactory of fertilizers is to be started at Falmouth, Mass., with a capital of $1,000,000(?).——A large paper manufactory is to be erected in Camden, Me. The town has voted to exempt it from taxation for five years.——The new paper companies at Holyoke, Mass. (the Valley and the Riverside) will soon begin operations.——A paper mill has been erected at Golden City, Colorado, which will be turning out paper by the first of June.——There are eleven breweries in Erie, Penn., with an average capacity of 200 barrels per day.——Piqua, O., is to have a flax mill, 80 feet long, 40 feet wide and three stories high.——During the past year ten porgy oil factories have been erected in Damariscotta, Me. at a cost of $5,000 each.——A large sugar refinery has just been started in Portland, and another is getting organized in Bath. The great Portland cordage factory is also making progress in subscriptions.——The works at Chatsworth, Ill., have turned out about 100,000 pounds of beet root sugar, during the past season. The machinery was made in Europe, and is very costly.——The manufacture of glass was commenced at La Salle, Ill., in 1865. The sand found in that vicinity is well adapted for glass-making, and two other glass-factories have recently been started there. The people of La Salle call it the "Pittsburg of the West."——The Coys-Hill Cheese Company have begun to build a factory in Warren, which was to commence operations the first of this month with the milk of 350 cows.——The cheese factory now going up at Essex, Vt., will be 100 by 32 feet, two stories high, and will cost about $4,000.——The Methuen (Mass.) Woolen Co., propose to erect a new mill during the coming summer.——The preponderance of manufactures in proportion to population in the chief Eastern cities of the Union apparently belongs to Philadelphia, in which city the yearly product is equal to $240 per head. Next comes Boston with $212, and New York third, with $197: although the cheaper suburbs of New York locate a vast portion of the manufacturing industry of the metropolis proper, and if counted, with their population, in the estimate, might give a different turn to the scale. Looking at the gross amounts, we find in New York a product of about 160 millions a year, in Philadelphia 136 millions, and in Boston 38 millions.——The first locomotive built in Pittsburg was turned out a few days ago. It is a magnificent piece of workmanship, and was built for the Panhandle Railroad. The works are now fully under way and will be able to average about one locomotive per week.

Marine Life-saving Inventions.

The Government Commissioners for investigating life-saving devices, are still in session in this city, holding daily meetings and actively pursuing their investigations. On the completion of their labors their official report will be given to the public; meanwhile, we shall endeavor to keep our readers posted as to the more important developments, for to make a detailed report of each day's proceedings would prove more interesting to the inventors themselves than to the general readers.

The following has been the programme for the past week: Monday was occupied by the examination of safety valves and water gages. Tuesday the Commissioners proceeded down the bay on a revenue cutter, and tested several boat-detaching apparatuses and fog signals. Wednesday was spent in listening to the reading of papers on scientific subjects. On Thursday another trip was taken down the bay, and a trial of life boats and rafts was made on the Jersey coast, off Long Branch. Friday, the sixteenth session of the Board was held, and several low-water detectors and force pumps were experimented with; afterward the Commissioners proceeded to the Novelty Works, and later in the day inspected the life-saving devices provided on the steamers *Great Republic* and *Celestial Empire*, the new boats of the Pacific Mail Steamship Company.

A New Route Across South America.

By a recent naval exploration the navigation of the tributaries of the Amazon which rise in Peru has been extended to within 70 leagues of the Pacific ocean, at the seaport of Huachio, 63 miles northwest of Callao. The completion of this short link by railroad will be effectively stimulated by the exploration, and the commerce of Peru and other Pacific countries with Europe and the United States, will soon flow through the Mediteranean of South America instead of the tedious and dangerous route by Cape Horn.



ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 23, 1867.
Reported Officially for the Scientific American

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

On filing each Caveat	$1
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$30
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
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)	$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.

63,980.—ATTACHING KNOBS TO DOOR LATCHES.—Wm. H. Andrews, New Haven, Conn.

First, I claim the combination of the plate, b, with the spindle, C, and knob, B, constructed and arranged in the manner and for the purpose substantially as set forth.

Second, The rose, E, constructed in the manner described, in combination with the plate, b, and the knob and spindle arranged so as to insert and cover the screw or pin, a, substantially as and for the purpose set forth.

63,981.—GOLD SEPARATOR.—Gideon Aughinbaugh, Portland, Oregon. Antedated April 29, 1867.

I claim the principle of constructing series of selves provided with bars or ripples and placing the selves in an inclined shaker for the purpose of separating gold from earth, and the principle of operating said shaker upon pivots and the direct application of eccentrics to the shaker.

63,982.—MACHINE FOR GRINDING THE SURFACE OF MARBLE OR STONE.—John A. Bachman, Lambertville, N. J.

I claim a metal plate with rim and openings, combined with a water vessel and handle, in the manner and for the purpose substantially as herein described and set forth.

63,983.—BROOM HEAD.—Hiram Barker, Aurora, Ind.

I claim the cylinder, B, and binding wires or cords, E, arranged substantially as described, in combination with the broom handle, A, and plug, C, with their adjuncts, the holes, b b and a, substantially as and for the purpose set forth.

63,984.—VALVE GEAR.—E. M. Bates, East Rochester, Ohio, assignor to himself, J. H. and G. W. Sanor, Hanoverton, Ohio.

First, I claim the screw, F, shaft, D, cross head, C, and stay, J, as arranged in combination with the frame, A, for the purpose and in the manner set forth.

Second, The frame, K, cross heads, L and C, when arranged and operated conjointly by the eccentric rod, O, valve rod, M, and adjusting screw, F, for the purpose and in the manner as substantially described.

63,985.—SPRING FOR BED BOTTOMS AND OTHER PURPOSES.—L. M. Bates, Newark, Ohio.

I claim the tensile spring, A, composed of elastic gum and furnished with two heads, as and for the purpose described.

63,986.—ICE PITCHER.—Geo. H. Bechtel, Philadelphia, Pa.

I claim in double, or ice pitchers, the making of the inner shell or jacket in one piece, and without a joint, so as to prevent its liability to leak, substantially as described.

I also claim in combination with double-jacketed or ice pitchers, the making of the inner area thereof greater above its central portion than below that point, when this is attained by curved or arched top, bottom, and sides, and without angular joints, as and for the purpose described.

63,987.—MODE OF PREPARING COFFEE FOR TRANSPORTATION.—Thos. H. Berry, Lynn, Mass.

I claim the above described composition of matter, substantially as and for the purpose set forth.

63,988.—WINDOW LATCH.—Albert Bingham, Newtonville, Mass.

I claim the combination of the lever, D, the slotted plate, C, the springs, S, and beveled catch, E, the whole forming an automatic window latch, applied and operating as above set forth.

63,989.—CHURN.—A. H. Brainerd, Rome, N. Y.

First, I claim the binged dasher or dashers, L M, connected to the gate, K, and to the side of the churn respectively, and operating as described.

Second, I claim the arrangement of the series of compartments, A B C, and the hinged dashers operating simultaneously by the three throw crank, substantially as described.

Third, I claim the hollow and slotted slide covering the orifice through which the churn dasher reciprocates.

63,990.—BRICK PRESS.—Rufus Brunson, Chicago, Ill.

I claim the construction and combination of the side plates, B, jointed plates, C, with the rack, V, and follower, G, as operated by the lever, T, ratchet, S, and rod, R, and forming a diamond-shaped press, as herein described and for the purposes set forth.

63,991.—TINNERS' FIRE POT.—James B. Cary, Millersburg, Iowa, assignor to Cary & Young.

I claim the soldering iron tubes, f f, as secured to case, a, with catch, o, as set forth in the specifications.

63,992.—BORING TOOL.—John C. Chapman, Cambridgeport, Mass.

I claim the combination of the tapering plug, A, arbor, B, and sliding cutter or cutters, a, with the nut, D, all arranged and operating substantially as herein set forth.

63,993.—BED BOTTOM.—Hezekiah M. Clark (assignor to himself and E. A. Kelsey), West Meriden, Conn.

I claim the combination of the frame, D, half elliptic slotted springs, B, attached to ends of transverse slats, A, as and for the purpose specified.

63,994.—BREWING ALE.—Carleton Clifford (assignor to himself, A. W. Lake, and J. P. Saunders), Adams, N. Y.

I claim, First, The close cask or tank, A, provided with the discharge tube, C, or its equivalent, and employed to contain ale or other liquor while undergoing fermentation, substantially as and for the purpose specified.

Second, The combination with the above of the elevated receiving trough or box, B, and return tube, D, arranged substantially as and for the purpose specified.

Third, The water chamber, c, in combination with the receiving trough, B, substantially as described.

Fourth, The combination of the cask, A, tubes, C D, trough, B, box, B', pipe or tube, E, and water cylinder, F, all arranged substantially as and for the purpose specified.

63,995.—LINIMENT.—Lucian B. Cram, Weathersfield, Vt.

I claim the combination of the four above named simple ingredients in the proportions of each, or substantially in the proportions of each, above stated, for the uses and purposes above mentioned, as a new and valuable preparation for the treatment and cure of diseases and injuries, as above set forth.

63,996.—CONNECTING LINKS AND HOOKS.—Robert Creuzbaur, New York City.

I claim, First, Providing links and hooks with strengthening shoulders, substantially as described.

Second, Providing for locking as well as strengthening connecting links, substantially as described.

63,997.—WOOD-BENDING MACHINE.—John A. Dann (assignor to himself and Wm. F. Dann), New Haven, Conn.

I claim, First, The arrangement of one or more cranks, D, in combination with their respective hooks, T, and links, f, operating in connection with a former, I, so as to force the wood down upon the former, substantially in the manner herein set forth.

Second, A mechanism substantially as described, which operating in combination with a former, forces the wood down upon and automatically secures it to the said former, substantially in the manner herein set forth.

Third, The adjustable cams or levers, S, operating substantially in the manner and for the purpose set forth.

63,998.—BED BOTTOM.—John Danner and Samuel Danner, Canton, Ohio.

We claim, in combination with the slats of a bed or lounge bottom and the bearers that support it, the casting, a b, made and operating substantially in the manner and for the purpose described.

63,999.—LAMP.—Joseph Davis, Jr., Templeton, Mass. Antedated Oct. 23, 1866.

I claim the application of an expansive tube or case and a mass of cotton or brous stuffing to a lamp reservoir, substantially in manner as described, such tube in course of its application and after the insertion of the cotton or filling being expanded as explained.

I also claim the lamp as constructed, with the tube-receiving recess as explained.

I also claim the improved lamp as constructed with the expansible tube and the receiving recess therefor, and as having a mass of cotton or fibrous material arranged in its reservoir and about such tube, as set forth.

64,000.—APPARATUS FOR REGISTERING GAMES OF BILLIARDS.—G. W. Earl and James H. Hawley, Kalamazoo, Mich.

We claim, First, Combining the hand, A, the arbor, B, the cam, C and the draft ratchet, D, with each other and with the indicating face of the machine, in such a manner that while the points of a game from one to one hundred can be indicated by said hand, and a reversed movement be imparted thereto at any portion of its revolution short of an entire game, yet the moment that that it passes said point a stop is interposed to prevent any backward movement of said hand, substantially as herein set forth.

Second, The combination of the hand, A, the arbor, B, the cam, C, the draft ratchet, D, the ratchet wheel, E, the tubular arbor, I, and the indicating hand, j, with each other in such a manner that the said hand, j, will indicate upon the face of the machine the number of games and half games played from a half-game to twelve games, substantially as herein set forth.

Third, The combination of the hand, A, the arbor, B, the cam, C, the draft ratchet, D, the ratchet wheel, E, the tubular arbor, I, the pinion, k, the toothed wheel, l, the pinion, m, the toothed wheel, n, and the tubular arbor, o, with each other and with the hand, p, in such a manner that the said hand, p, will indicate upon the face of the machine the number of games played from twelve to one hundred and forty-four, substantially as herein set forth.

64,001.—PLANE IRON.—Wm. H. Eckert, Syracuse, N. Y.

I claim the nut, n, in combination with the planing iron, A, the screw, s, and the cap, C, made and operated substantially as and for the purposes described.

I also claim the slot, h, in the cap, C, when made to fit upon the nut, n, and applied to planing irons substantially as described.

64,002.—GRAIN ELEVATOR AND DUMPING APPARATUS.—M. Eldridge and F. A. Reed, Alexandria, Va.

We claim, First, The platform, D, in combination with the swivels, m, which furnish pivots for the platform whereby it assumes alternate inclined and horizontal positions, substantially as described.

Second, The guide bars, n, in combination with the spring, o', and stops, O, as and for the purpose set forth.

Third, The hoisting and dumping apparatus consstructed as explained.

64,003.—HAY LOADER.—Wm. H. Elliot, New York City, assignor to John Kingdon, Washington, D. C.

I claim, First, The employment of an adjustable cord, l, between the arm of the crane and the fork, p, substantially as herein shown.

Second, The employment of pulleys, f and l, in combination with spring, k, and cord, l, for the purpose of taking up the latter after it has been drawn out, substantially as specified.

Third, Connecting together pawl, h, and bolt, e, so that any motion given to the former will move the latter, substanially as and for the purpose specified.

Fourth, So combining pawl, h, and bolt, e, with cord, l, that the latter shall operate the two former, substantially as set forth.

Fourth, Pivoting pawl, h, to movable arm, g, so that these devices may have a little motion around the center of the pulleys, substantially as herein shown.

64,004.—HAND CARD.—George J. Ells, Troy, N. Y.

I claim a hand card having a wooden stock so formed with a rib or ribs, b, as to thereby cover or protect the edge or edges, c, of the leather or other sheet-like material, D, which holds the teeth of the card, substantially as herein described.

64,005.—WINDLASS.—Richard H. Emerson, Fond Du Lac, Wis.

I claim a windlass having shaft, a, wheel, b, drum pulley, c, wheel, d, drum pulley, f, pulleys, g g', elastic, m, spring bar, i, levers, h h', arranged, combined, constructed and operating substantially as described.

64,006.—TOOL HANDLE.—Luther H. Farnsworth, Hudson, Mass.

I claim the combination and arrangement of the metallic shouldered prongs and the head constituting the stock, A, with the metallic collar, C, and the heart piece, B, the whole being made substantially as specified.

I also claim the stock, A, made with the head, the series of prongs, and the shoulders thereof, as described.

64,007.—LOW-WATER INDICATOR.—Lorenzo Fulton, Edinburg, Ind.

I claim, First, The arrangement of the pipe, D, in connection with the chamber, C, substantially as shown and described for the purpose of conveying a signal to a point at any desired distance, as set forth.

Second, The combination of the pipes, B C and D, with the disk, E, and trigger, J, substantially as and for the purpose set forth.

Third, The equalizing pipe, M, in combination with the boiler, A, and pipe, B, substantially as and for the purposes described.

64,008.—SHIFTING RAIL FOR CARRIAGE SEATS.—Frederick Baumgartner, Brooklyn, N. Y.

I claim securing the shifting rail, D, to the stationary rail, B, of the carriage seat, A, by means of hooks, F G, and screw buttons or clamps, H, substantially in the manner herein shown and described, and for the purpose set forth.

64,009.—SHEEP RACK AND SHELTER.—Dexter Gray, Upper Sandusky, Ohio.

First, I claim a portable stock shelter and feeding arrangement combining the arrangement of runners, a, troughs, K, grain boxes, I, hay racks, E, movable doors, g, plates, c, and cross timbers, d, substantially as described and for the purposes set forth.

Second, In combination with a portable stock shelter, I claim the double troughs, K K, with or without their separate chambers for each animal in combination with a grain box containing the bottom, o, slide, P, cut-off bottom, r', and lever, q, and partition, m, all constructed and operated substantially as described and for the purposes set forth.

Third, In combination with a portable stock shelter I claim the movable and transferable doors, g, for the purposes named

Fourth, In combination with a portable stock shelter I claim the movable racks, E, for the purpose set forth.

Fifth, I claim in portable stock shelters the combination and arrangement of troughs, K K K, and their grain boxes, I I I, with the racks, E E, as and for the purposes set forth.

Sixth, I claim, in combination with a portable stock shelter, elevating the hay racks and center feed troughs so as so secure all the ground room for the purposes set forth.

Seventh, I claim a grain feeding box for stock combining the sides, bottom, o, slide, P, cut-off bottom, r, lever, q, and openings, n, in each, for the purpose of feeding grain in measured quantities, as set forth.

64,010.—TOP PROP FOR CARRIAGES.—R. S. Grummon, Newark, N. J.

I claim the solid-headed screw, C, when used in combination with the socket, B, and thimble, D, constructed and operated substantially as described for the purpose specified.

64,011.—APPARATUS FOR BOILING, COOLING, AND FERMENTING MALT LIQUORS.—Thomas Haigh, Liverpool, England, and Robert Adam Robertson, Philadelphia, Pa., assignors to E. F. Prentiss, Wm. D. Philbrick and Wm. J. Parsons. Antedated April 9, 1867.

First, We claim dividing the supply cistern into several compartments and arranging a zig-zag air passage above the water communicating with the ash pit of a steam boiler, or other furnace for generating a draft of air over the surface of the water in the supply cistern, substantially and in the manner hereinbefore described and set forth or any mere modification of the same.

Second, The peculiar mode of constructing the double bottom of the wort boiling-pan, as hereinbefore described and set forth, or any mere modification of the same.

Third, Forming the refrigerator columns with small chambers at the top and bottom of the small vertical pipes, as hereinbefore described and set forth, or any mere modification of the same.

Fourth, The peculiar form and arrangement of the floating cover for the fermenting tuns, as hereinbefore described and set forth, or any mere modification of the same.

Fifth, The peculiar construction and arrangement of the various parts of the self-acting temperature regulating apparatus and the mode of counteracting the fluctuations in the pressure of the external atmosphere, as hereinbefore described, or any mere modification of the same.

Sixth, And lastly the general arrangement, combination, construction and use of the apparatus hereinbefore described and set forth, or any mere modification of the same, for the purpose of boiling, cooling and fermenting malt liquors or other useful purposes.

64,012.—BLAST FURNACE.—David U. Hendrickson, New York City.

I claim the arrangement of the boiler, A, hot-air tubes, d d, and hot-blast pipes, B1 B2 B3 B4, and stop cocks, c c, all substantially as described and shown in the accompanying drawings.

64,013.—FAN.—Lucian Hill, North Brookfield, Mass.

First, I claim a folding fan pivoted in the center, and operating as described.

Second, The combination of the fan part, A, with the branches, B B, of the handle, C, substantially as set forth.

Third, The combination with the fan part, A, and handle, C, of the loop or clasp, D, substantially as and for the purposes set forth.

Fourth, Making the handle, C, from two pieces, B B, united at both ends as described and cut or curved out to receive the fan part, A, as shown and described.

64,014.—OILER.—Gardiner L. Holt (assignor to himself and James M. Thompson), Springfield, Mass.

I claim the combination of the ring, B, and one or more bars, a b, arranged and constructed substantially as set forth.

64,015.—SHOE.—George Houghton, Hudson, Mass.

I claim the staying or fastening of sewed seams in the upper leathers of boots and shoes and other articles by means of a strip of thin metal extending on each side of the seam whether the same is folded or extends over the edge and grasps both sides of the leather or other material, or not.

64,016.—SELF-ACTING EYELET BATTEN.—Silas Land, Philadelphia, Pa.

I claim the combination of the slotted eyelets, C, with battens, B, arranged and operating in relation to signs or other boards, substantially in the manner described and for the purposes specified.

64,017.—STANCHION FOR CATTLE.—James Manley, Hope, Me.

I claim all the parts of Fig. 1 except the top and bottom pieces, A and B, of the common tie-up, that is, all the parts, C M I D E F G, which are connected together, and the said grooves, and said cut or mortise, H, and the thickened part of said top piece, B (to admit of said groove), and which make up the double swinging stanchion which swings both ways, which allows the animal fastened to turn the head either way, as before mentioned when standing or lying down and to lie on either side with ease and comfort.

64,018.—FASTENING OF WIRE OR WIRE ROPE TOGETHER.—Matthew F. Maury, Liverpool, Great Britain.

I claim the tie herein described and shown upon the drawings when the same is used to connect the ends of wire or wire rope that is employed in baling cotton or other like material, substantially in the manner set forth.

64,019.—MANUFACTURE OF AERATED WATERS.—George McCoy, New York City.

First, I claim a vessel for the manufacture of soda water or other aerated liquids, or for holding the same after being manufactured having its sides made of wood secured by iron bands or hoops and its two ends provided with metallic head plates joined together by stay rods or braces, and the whole constructed substantially as described.

Second, In the manufacture of soda water and other aerated liquids, discharging the water or other liquid into the vessel containing the gas or gases with which it is to be charged in the form of small jets or spray, or any other equivalent form, substantially as and for the purpose described.

64,020.—TOY.—John McMahel, Hamilton, Ohio.

I claim the cup, A, and ball, E, in combination with the spiral recoiling wire or spring, D, for guiding the ball to the cup, in the manner and for the purpose substantially as described.

64,021.—STEAM GENERATOR.—Truman Merriam and A. G. Allen, Waterloo, Wis. Antedated April 19, 1867.

First, We claim the combination of the cylinders, E F G, arranged in successive tiers above the furnace and connected by pipes formed in their end plates with a corresponding set of similar cylinders into which the steam is passed from the first set, and in which it is tempered by the introduction of water or oil, substantially in the manner and for the purpose set forth.

Second, The perforated or latticed metallic walls of the furnace when constructed and arranged substantially as set forth.

Third, The arrangement of the tank, C, induction pipe, H, pump, I, eduction pipes, K, and the furnace walls, substantially as set forth.

64,022.—BUTTONHOLE FOR PAPER COLLARS.—Joseph Merwin, New York City. Antedated April 8, 1867.

I claim the construction in collars of a buttonhole formed by holes of circular shape or thereabouts, at opposite ends of a connecting cut or slit, the edges of which constitute flaps or wings, substantially as specified.

63,023.—EXCAVATOR.—John Milroy, Edinburgh, Great Britain.

First, I claim the framework, 2, to the outer edges of which are hinged directly a series of spades, I, in combination with the within-described system of chains, A and B, the whole being arranged and operating substantially as and for the purpose herein set forth.

Second, The combination of the above with the hook, 7, constructed and operating in combination with the chains attached to the frame and to the spades, as described

64,024.—JOINT FOR CARRIAGE-TOP BRACES.—F. B. Morse, New Haven, Conn.

I claim the herein-described stump joint as an improved article of manufacture consisting in the combination of the two parts, A and B, when constructed and arranged together by a conical joint, substantially in the manner and for the purpose described.

64,025.—STEAM GENERATOR WATER GAGE.—George T. Parry, Philadelphia, Pa.

I claim the construction and arrangement of the plates, B C and D, whereby the water is shown in a thin sheet, substantially as set forth.

64,026.—BOILER FEEDER.—George T. Parry, Philadelpeia, Pa.

First, I claim, in combination with the generator, A, and feeder, B, the pipe, C, with its orifice, C', and the pipe, D, when arranged to operate substantially as described.

Second, In combination with the generator, A, and feeder, B, I claim the pipes, D and C F, and float, G, and valve, arranged to operate substantially as described.

64,027.—SMUT MILL.—Dan Pease, Floyd, N. Y.

I claim the spreader shown separately in Fig. 3 and as connected with the smut mill shown in Figs. 2 and 3, and fully described in the specification, the whole being constructed, adapted and arranged substantially in the manner herein set forth.

64,028.—COOLING MILK.—Watson Peck, York, Ill.

I claim the combination and application, as herein described.

64,029.—MACHINE FOR ROLLING DOUGH, CRUSHING SUGAR, ETC.—Gustavus Perkins, Burlington, Vt.

I claim the combination of the metallic rollers, h Q or R, the gages, m m, the arms, l l, as applied to the above purpose.

Also the construction of the entire machine, all as herein substantially described and for the purposes set forth.

64,030.—WHIFFLETREE HOOK.—S. M. Perkins, Morrison, Ill.

I claim the chambered cap, B, and washer, C, the said several parts being respectively constructed and the whole combined and arranged for use substantially in the manner and for the purpose set forth.

64,031.—WEATHER STRIP.—Jacob S. Peterson, Springdale, Ohio.

I claim the strip or flap, E, adapted to close against the rebate of the carpet sill by the impact of the cam, K, and roller, D, and to be retracted by means of a spring, M, substantially as set forth.

64,032.—METHOD OF REMOVING BUILDINGS.—Thomas W. Prather, Iowa City, Iowa.

I claim the combination of the truck wheels, crank, cog wheels, shaft, platform and screw, substantially as and for the purpose set forth.

64,033.—FILE-CUTTING MACHINE.—Alexander N. Redman, Charlestown, Mass.

First, I claim the combination of the guide frame, E, the pinion, C, and rotating rack gear, B, as described.

Second, I claim the sliding block or bar, H, provided with the pawl, I, the adjustable projection, h, and retracting spring, I, in combination with the rotating rack gear, B, substantially as and for the purpose specified.

Third, I claim the combination of the yoke, P, adjustable block, N, or its equivalent, and the cutter, O, operating as described substantially as and for the purpose set forth.

Fourth, I claim the combination of the springs, S S', arranged as described with the cutter head, M, as and for the purpose specified.

64,034.—FARM GATE.—John H. Reinhart, McKay, Ohio.

I claim the arrangement construction and combination of the wheel, D, movable bolt, J, and projections, E E, so that the gate operates in the slots, G and H, of the post, F, as herein described and for the purposes set forth.

64,035.—MACHINE FOR MAKING NAILS.—Samuel G. Reynolds, Bristol, R. I. Antedated April 8, 1867.

I claim making the heads of nails, bolts, rivets, etc., by a number of consecutive upsets of a long piece of metal, by liberating or uncovering from the inclosure of the die more and more of the metal as the header advances to upset the same by means of successively receding sections of which the die is in part composed, or their equivalents, substantially as described.

I also claim the sliding block substantially as described in combination with the compound griping or molding die, the springs, g1 g2, and heading lever, or their equivalents, as described, for the purpose of operating the movable sections of said die, substantially in the manner and with the effect herein set forth and described.

64,036.—CAR BRAKE.—J. W. Rice, Springfield, Mass.

First, I claim in a brake for cars the combination of the drum, I, having the spring, L, ratchet, K and J, and the sleeve, F, having the spring, L, attached to it, and the ratchet, G, with the sleeve, B, having the pawl, f, the whole arranged substantially in the manner and for the purpose set forth herein.

Second, In combination with the above arrangement the pawls, g and h, and dogs, O and P, to operate the pawls, the same constructed and operating substantially as described.

Third, In combination with the drum, I, the device for turning the same consisting of the shaft, b, cog, M, and crank, z, substantially as shown and described.

Fourth, In combination with the sleeve, B, provided with the cog wheel, C, I claim the wheel, D, and shaft forming a windlass for the brake chain.

Fifth, The equalizers for brakes herein shown, in which the chain passes around two or more pullies, 1 2 3 4, arranged in a frame, S, having slots, 7, in it, into which works a pin, 8, substantially as shown and described.

64,037.—MACHINE FOR MAKING WOODEN PINS.—George Rowe, Worcester, Mass.

I claim in combination with the removable punch or cutter, E, of the hollow stem or handle, A, slotted as described, so as to facilitate the withdrawal of the pins, and the removal of the punch, and otherwise constructed and arranged for operation as herein set forth.

64,038.—MACHINE FOR MAKING BOOK COVERS.—Marshall Rumrell and Robert H. Rumrell, Brooklyn, N. Y.

First, We claim the means herein described for taking up stiffening papers one by one, and securing the same to the insids of book covers, substantially as and for the purpose herein set forth.

Second, The means herein described for cutting the cover at all the necessary points at once, substantially and for the purpose herein set forth.

Third, The means herein described of folding over the edges of the cover and securing the same firmly to the stiffening paper, substantially as and for the purpose herein set forth.

64,039.—CHIMNEY HOLDER FOR LAMP BURNERS.—Thomas Ryder, Providence, R. I.

I claim the combined spring and clasp, in combination with the lamp burner, for the purpose all substantially as specified.

64,040.—CAR BRAKE.—James Sheward and George A. Stanbery, Dunkirk, N. Y.

We claim the application of the worm or endless screw to the axle of any

vehicle where the axle revolves in combination with a cog-wheel to produce a slow motion under a high speed, and face plate forced upon the face of the cog-wheel as described herein, for the purpose set forth.

64,041.—SIDE BOARD FOR TRESHING MACHINES.—Ballard C. Smith, Ashland, Ind.

First, I claim the jointed side board, constructed of light sheet metal or other material hinged at E E, with permanent end, D, and movable end, C, by means of which all effects of winds are avoided on the stacker, substantially as and for the purposes set forth.

Second, I claim the spring, F, and catch, G, for the purposes of keeping the sections, A and B, in line, and for displacing the said sections when operated by cords, H, substantially as and for the purpose set forth and shown when stacker is attached to machine in the usual manner, by rod, M.

64,042.—WEATHER STRIP.—George W. Smith, Strasburgh, Ohio.

I claim the hinged strip, a, in combination with spring, g, and metal strip, c, constructed as described, and the whole arranged as and for the purpose set forth.

64,043.—STEAM ENGINE PISTON.—J. Y. Smith, Pittsburgh, Penn.

First, I claim the central groove, a, provided with the apertures, n, for admitting the steam or other material to the under side of the rings, substantially as shown and described.

Second, The combination of the ring, c and e, with the flanges, A', and plate, B, or their equivalents, when arranged and operating as and for the purpose set forth.

64,044.—SEAT AND BACK.—Mortimer L. Smith (assignor to himself and J. W. Houghtelin), Detroit, Mich.

I claim the combination of the strips, C C, back, E E B, seat, A G G, and frame, H D, all arranged as and for the purpose described.

64,045.—GUN HARPOON.—Robert E. Smith, Provincetown, Mass.

I claim the head, A B, grooved to receive the pivoted barb, C, and cast in one piece with the slotted shank, D, the latter being provided with the elastic guard, g, and the wire link, E, all constructed and operating substantially as deecribed, and for the purpose set forth.

64,046.—KNOT INDICATOR FOR KNITTING MACHINE.—John F. Steward, Plano, Ill.

I claim the arm, C, with the knot grasper, B, hammer, D, and the spring, E, in combination with the bell, A, constructed and operating as herein described.

64,047.—COMPOSITION FOR PRESERVING EGGS.—P. J. Stouffer, Uniontown, Penn., assignor to himself and Henry White.

I claim the composition for preserving eggs, substantially as set forth.

64,048.—BEDSTEAD FASTENING.—George Sugg and W. Metz, Chicago, Ill.

We claim as a new article of manufacture the bed fastening, consisting of the plate, A, constructed as herein described, and used in combination with the plate, E, provided with the arms, O, with the enlarged heads, I, as herein set forth.

64,049.—MACHINE FOR FELTING HATS.—James Walber, Washington, D. C.

First, I claim the combination and arrangement in a machine for felting hat bodies of two or more pairs of rollers, having a rotatary movement, when each successive pair revolves with a diminished speed, all substantially in the manner and for the purpose as herein set forth.

Second, The combination as above of two or more pairs of rollers, whose diameters so vary that the circumference of each successive pair shall revolve with diminished speed, substantially in the manner and for the purposes herein set forth.

Third, The combination in a felting machine of a series of pairs of rollers, each pair of which has a lesser velocity than the preceding pair, with a series of pairs of rollers having an uniform velocity, as and for the purpose herein described.

Fourth, The combination in a felting machine of a series of rollers supported in a fixed frame, but each having an independently lateral play in its bearings in the line of its axis, substantially as and for the purpose herein described.

Fifth, Imparting a lateral reciprocating movement to the rollers of a machine for felting hat bodies by means of cams on the ends of said rollers, or their journals, bearing against suitable cam surfaces when each of said rollers has free play independently of the others in the line of its axis, all substantially in the manner and for the purpose herein set forth.

Sixth, The use of a series of hollow rollers in a felting machine with suitable steam pipes for introducing steam into the same when said rollers revolve successively with a diminished speed, substantially in the manner and for the purpose herein set forth.

Seventh, The combination of a reversing roller, placed centrally in front of the last pair of rollers in a felting machine, with an auxiliary roller placed over the same, to bear thereon, and operate conjointly therewith, substantially in the manner and for the purpose herein set forth.

Eighth, The combination of a single endless chain and toothed wheels, with two series of rollers in a felting machine, substantially as and for the purpose herein described.

Ninth, The combination of suitable springs, with the sliding journal boxes of the driving shaft, and with an endless chain working thereon, all substantially as and for the purpose herein set forth.

64,050.—HAY STACKER.—Samuel Jacob Wallace, Keokuk, Iowa.

I claim a portable hay stacker having the several parts thereof constructed, arranged and combined as and for the purpose set forth.

64,051.—SPOOL HOLDER FOR SEWING MACHINES.—William Wheaton (assignor to John F. Lee, Jr.), Brooklyn, N. Y.

I claim the cylinder, A A', spring, s, or its equivalent, screw, c, horizontal plates, d and e, combined and operated in the manner and for the purpose set forth, and shown in the accompanying drawings.

64,052.—STEAM ENGINE PISTON.—Jerome Wheelock, Worcester, Mass.

First, I claim the combination of stay bolts, E E E E, with a piston head, substantially in the manner herein described.

Second, A piston constructed with an oblong hole or aperture through its center, to receive the piston rod, substantially as and for the purpose described.

Third, The slot in the piston rod, B, when used for the purpose of relieving the nut in the manner substantially shown and described.

64,053.—NEEDLE WRAPPER.—John William Whitfield, New York City.

I claim a needle wrapper, composed of a sheet of fabric, combined with a series of thread loops to hold the needles to the fabric, substantially as set forth.

64,054.—SELF-OILING JOURNAL BOX.—John Whitlock, Birmingham, Conn.

I claim in combination with a shaft or journal, having a wheel, disk or ring attached to that portion that revolves in the journal box, and with distributors for carrying the oil over the shaft or journal the vertical end passages, and horizontal passages leading from said ends back to the recess or reservoir, for the purpose of making a self-oiling device, substantially as described.

64,055.—ROTARY HARROW.—Albert H. Acken, Griggstown, N. J.

I claim the frame, A", when constructed as described, in combination with the jointed teeth, B', center pin C", and draft rod D, all arranged and operating as specified.

64,056.—LAMP BURNER.—J. B. Alexander, Washington, D. C.

I claim the wick-holder, composed of the corrugated plates O and P, with their turned edges and indentations, K K K K K K K K, and the slot, G, substantially as and for the purpose set forth.

I also claim, in combination with the above described wick-holder, the device for racing and lowering the wick, substantially as and for the purpose set forth.

I also claim the device, L M, for filling the lamp fountain with oil, in combination with the burner, substantially as described, and for the purpose set forth.

64,057.—MACHINE FOR CULTIVATING COTTON.—William Altick, Dayton, Ohio.

First, I claim the arrangement of the shaft, C, with its clutch and bevel wheel, with the pinion, T, shaft, W, and wheel, N, provided with its adjustable hoes, the several parts being constructing and used as and for the purpose specified.

Second, Adjusting the arms, O O, in the wheel, N, by means of their grooves and the pins, b b, substantially as and for the purpose specified.

Third, The bar, H, upon which the plows or cultivator teeth are secured, used in connection with the grooved plates, a a, rock shaft, k, with its arms and lever, J, substantially as and for the purpose specified.

64,058.—MODE OF TREATING FLAX.—Albert F. and John H. Andrews, Avon, Conn.

First, We claim treating it by the aid of the endless double network arranged relatively to the rollers "G H", and to the tank substantially as and for the purpose herein specified.

Second, We claim, in combination with the above, subjecting it to the action of the pressure roller, J, arranged as represented.

Third, We claim the alternate application of warm and cold water, substantially in the manner and for the purpose herein described.

Fourth, We claim the treatment in the soluble protein solution obtained from ground beans or other equivalent, substantially as specified.

Fifth, We claim the treatment with the chloride of sodium, or its equivalent, after the treatment with the alkali before the bleaching, substantially as herein specified.

Sixth, We claim the employment of metallic chlorides in the bleaching bath substantially as and for the purpose herein specified.

Seventh, We claim blowing atmospheric air through the interstices, after the material to be bleached has been immersed in a solution containing chloride of lime, whether this solution is prepared in the ordinary manner, or as above described.

Eighth, We claim the use of alkaline solutions after bleaching, substantially as and for the purpose herein specified.

Ninth, We claim the treatment with urine, in connection with the treatment with soap, substantially as and for the purpose herein specified.

Tenth, We claim the treatment with cider or equivalent vegetable acid solution at the termination of the process.

Eleventh, We claim the use of atmospheric air forced through the flax, in connection with an alkaline solution, saturating the flax, as a bleaching and disintegrating agent, substantially as herein specified.

64,059.—RANGE AND AIR HEATING FURNACE.—William H. Armstrong, New Brunswick, N. J.

I claim the arrangement of the cooking range it appurtenances, A B C F G, flue, H, chambers, I M M, air passages, E E, water back, D, and auxiliary pipe, O, as herein described, and for the purpose specified.

64,060.—QUARTZ CRUSHER.—Robert Bailey, Idaho City Idaho.

First, I claim the construction of the rotary mortar bed enclosed within the case, A, made of blocks of rock, b b b, forming inclined planes of irregular dimensions on their inside surfaces combined with cast iron dies, c c c, fitted in and secured to them, arranged and applied as and for the purpose herein described.

Second, I claim the cubical stamp, d, in combination with the revolving mortar bed constructed and operated together in the manner and for the purposes herein set forth.

64,061.—CULTIVATOR.—Jacob Bergen, Canton, Ohio.

I claim, The arrangement of the crank axles, D D, with the levers, H, spring, d, and guides, I and J, substantially as and for the purpose specified.

64,062.—WINDOW SHADE.—Adoldh Binner (assignor to himself and John Leuzinger), Muscatine, Iowa.

I claim a window curtain or shade composed of round sticks of wood connected together, substantially as described.

64,063.—CLOTHES LINE.—J. W. Bliss, Hartford, Conn.

I claim a clothes line of cord, leather or wire coated with india-rubber, or gutta-percha to protect the same from the weather, all as and for the purpose specified.

64,064.—LUBRICATING JOURNAL BOX.—Samuel F. Bond, Worcester, Mass.

I claim a self-lubricating journal box constructed substantially as described with a chamber or chambers forming oil reservoirs along either side of the journal also provided with lower supply apertures and their upper inner edges made to form scrapers or cleaners for removing surplus oil and to return it to the reservoirs essentially as herein set forth.

64,065.—FRUIT DRYER.—John K. Boswell, Richmond, Ind. Antedated March 16, 1867.

I claim, First, The revolving triangular heater, D, arranged as and for the purpose set forth.

Second, The shield, b, when provided with apertures and arranged substantially in the manner and for the purposes specified.

Third, The combination of the furnace, N, when provided with tube, I, or its equivalent, the revolving triangular heater, D, when provided with tube, J, or its equivalent, and the chimney, K.

Fourth, The sliding panel, C, substantially in the manner and for the purpose described.

64,066.—CHILD'S TOY.—Lucy Broad, St. Louis, Mo.

I claim the combination of the figures, C1 C2, with the circular plate or race track, C, and with the actuating machinery as described and set forth.

I also claim the bell, B' in combination with the other parts as described and set forth.

64,067.—CARRIAGE THILL COUPLING.—J. J. Brown, Madison, Wis.

I claim, First, The bar, A, provided with the vertical arm, B, for attaching the button independent of the clip or band substantially as and for the purpose set forth.

Second, Making the socket for the reception of the packing and bolt between the front side of arm, B, and the front curved end of A, as shown and described.

64,068.—ROTARY STEAM ENGINE.—S. H. Brown, New York City.

I claim, First, The abutment or valve, E, constructed as described and pivoted so as to vibrate in either direction, substantially as and for the purpose specified.

Second, The semi-cylindrical reversible stops, I, in combination with the hinged abutment, E, annular rims, a, and piston wheels, C, with pistons, D, all constructed and operating substantially as and for the purpose set forth.

64,069.—BRICK MACHINE.—John W. Burns, Henry, Ill.

I claim operating the plungers, I I, through the medium of the shaft, F, connected by arms and links to vertical racks, G, pinions on segments, H, provided with arms, c, and the arm, E, on shaft, C, all being arranged substantially as herein shown and described.

Second, The arrangement of the mud mill, A, plungers, I I, and molds, J, substantially as herein set forth.

Third, The feeding of the empty molds to receive the clay, and the discharging of the filled molds from the press by means of the racks, N, and pinions, O, substantially as shown and described.

64,070.—STEAM SAFETY VALVE.—Thomas H. Burridge (assignor to himself and G. C. Fabiam), St. Louis, Mo.

I claim the levers, E F, constructed and arranged in relation to each other and valve substantially as and for the purpose set forth.

64,071.—DRAW BAR FOR LOCOMOTIVES.—D. C. Cannell, La Fayette, Ind.

I claim a draw bar, A, provided at one end with V-shaped recesses b, one at each side with a link, B, fitted in it and working within the recesses, substantially in the manner and for the purpose set forth.

64,072.—VALVE FOR STEAM ENGINES.—Charles E. Case, Xenia, Ohio.

I claim the valve, C, and spiral pin, H, constructed and arranged substantially upon the principle and in the manner herein set forth.

64,073.—SHOEING HORSES.—Pierre Charlier, Paris, France.

I claim the method herein described of attaching the shoe to the hoof of a horse or other animal by letting said shoe into a recess cut into the edge of the hoof, substantially in the manner and for the purpose set forth.

64,074.—WINDOW SASH FRAME.—Edwin Clark, Lancaster, Pa.

First, I claim the inclined tongue, d, and corresponding groove, c, on the pieces, b and b', respectively of a window sash, substantially as and for the purposes described.

Second, The projections, d',, on the inclined tongue, d, slots, c1, springs, d2, and eyes, c2, on the pieces, b and b' respectively, of a window sash, substantially as and for the purpose described.

Third, The eyes, g' on the strips, g, and pins, j, passing through the same and the window frame, substantially as described.

Fourth, The tongue, g2, on the strip, g, and corresponding groove in the frame, A, substantially as and for the purposes specified.

Fifth, The above described mode of removing and replacing window sashes from frames, substantially as and for the purposes specified.

64,075.—LANTERN.—P. J. Clark and Joseph Kintz (assignors to Samuel S. Clark), Meriden, Ct.

First, I claim the guards, D, any suitable number constructed each of one piece of wire bent or doubled, attached to the cap, B, and arranged so as to retain the glass globe, F, substantially as set forth.

Second, The connecting of the lower end of one of the guards, D, to the base, A, to form a hinge or joint, c, with a catch or fastening, e, secured to the base, A, to catch over the lower end of the guard which is in line with it, substantially as shown and described.

64,076.—CORN PLANTER.—John Clarridge, Pancoastburgh, Ohio.

First, I claim the steel plow, H, when constructed and attached to the shank, I, substantially as herein described and for the purpose set forth.

Second, The combination of the slide bars, M, the inclines, F' or equivalent arms or levers, D' and valves, B' with each other and with the plow frame, E, substantially as described and for the purpose set forth.

Third, The combination of the circular valve, I' with the seed reservoir, T, hopper, S, and sliding bar, M, substantially as herein described and for the purpose set forth.

Fourth The combination of the upwardly projecting pins, J' with the valves, H' or I' and with the seed reservoir, T, substantially as herein described and for the purpose set forth.

Fifth, The combination of the vertical stirring shaft, K' having horizontal arms with the seed reservoir, T, hollow shank, I, and with the sliding bar, M, substantially as described and for the purpose set forth.

Sixth, The coupling, G, when constructed substantially as herein described and for the purpose set forth.

Seventh, The combination and arrangement of the seed reservoir, T, hopper, S, arms, V, levers, W1, W2, and connecting rods, A1 A2, with each other with the sliding bar, M, and with the plow frame, E, substantially as herein described and for the purpose set forth.

Eighth, The combination of the lever, O and P, and sliding bars, M, with each other, with the plow frames, E, and with the frame, A, of the planter, substantially as described and for the purpose set forth.

Ninth, The combination of the cords, X', pulleys, B2, shaft, V' ratchet wheel, Y' pawl, Z' bevel wheel, U' and foot wheel, S', with each other, with the plow frames, E, and with the frame, A, of the planter, substantially as herein described, and for the purpose set forth.

Tenth, The combination of the lever, P' slide bar, N' and bent lever, M' or equivalents with each other with the slide bars, M, and with the frame, A, of the planter, substantially as described and for the purpose set forth.

Eleventh, The combination of the shovel plow, I, and strengthening rods, h3, with each other and with the flanged lever end of the hollow shank, I, substantially as described and for the purpose set forth.

Twelfth, Constructing the hollow shank, I, with a double convex head, I1, cast upon its upper end and a projecting flange, I2 and arms, I3, upon its lower end, substantially as described and for the purpose set forth.

Thirteenth, Placing the seed reservoir, T, directly above the hoppers, S, and cutting away the side of said hoppers, substantially as described and for the purpose set forth.

64,077.—FEEDING MECHANISM FOR CARDING MACHINES.—William Clissold, Dudbridge Works near Stroud, Eng.

First, I claim the combination with the inclined reciprocating bars, B, of the reciprocating comb bars, F, and rods or pressers, K, for the purpose of discharging the wool or other fibrous material from the feeding box.

Second, The combination with the reciprocating comb bars of pressing rolls, P, for delivering the wool or other fibrous material to the preparing machine in the form of a bat or sheet.

64,078.—ROLLS FOR YARN DRESSING MACHINES.—Benjamin R. Cotten, Lewiston, Me.

I claim a dresser roll having a metal coated surface, substantially as set forth.

64,079.—PAPER FILE.—Lewis B. Covert, Chicago, Ill.

I claim the file or binder formed of the cover, a, and slides, b, in combination with the perforated clasps, c, as and for the purpose specified.

64,080.—POTATO DRILL.—John Croco, Holmesville, Ohio.

First, I claim the disks, F F', constructed and arranged in combination with the guide or tension pulley, J, and pulley, H, for the purpose and in the manner set forth.

Second, The disks, F F' hopper, L, in combination with the tube, E, and shovel, K, as and for the purpose described.

64,081.—EXERCISING CLUB.—John L. Dibble, New York City.

I claim the metallic cylindrical shell, A A, and the central rod, D D D, as arranged and combined with the blocks, B B and C C, and adjustable weights, F F, the whole forming an exercising club, substantially as herein described and set forth.

64,082.—CARRIAGE FOR CHILDREN.—Alexander Dick, Buffalo, N. Y.

First, I claim a carriage body formed and constructed of wire, substantially as described.

Second, In combination with a carriage, a seat made adjustable, substantially as described.

Third, The arrangement in a carriage of the springs, W W, and D D, substantially as described.

64,083.—HORSE HAY FORK.—L. M. Doudua, Elmira, N. Y.

I claim the tube, A, and sleeve, E, in combination with the spring, F, tines or teeth, C, lever, G, and link, H, all arranged to operate in the manner substantially as and for the purpose specified.

64,084.—CARPET WADDING.—Thomas H. Dunham, Boston, Mass.

I claim a wadding or fabric, having an adherent border or selvedge formed of the sheets of paper that project beyond the edges of the batting, and attached to each other as herein specified without the use of gum or other adhesive substance, substantially as described.

64,085.—GAME REGISTER.—John Enright, Louisville, Ky.

I claim the construction and arrangement of the arm, G, working loosely on shaft, d' having tooth, K, upon its inner end and provided with the double pawl, H, spring, P, indicating finger, T, its lower end working through the slotted segment, R, attached to the frame, A, toothed wheel, D, toothed sector, J, bearing the indicating finger, L, springs, O O I, and indicating fingers, F, substantially as herein shown and described.

64,086.—CULTIVATOR.—Oliver Etnier, Mount Union, Pa.

I claim the combination of the guide blade or rudder, D, placed on the rear of the projecting center beam, B, and the handles, C C, attached to the cross beams, a b, arranged and operating substantially as and for the purpose herein described.

64,087.—CAR SPRING.—James W. Evans, New York City.

I claim the spiral surface grooves, c and e, for the reception of the terminal coils of the spring cast in the bottom of the box, A, and head of its cover, C, or in any other cast metal bearings provided for the spring, substantially as herein specified.

64,088.—TICKET FASTENER.—Samuel B. Fay, Franklin, Pa.

I claim the loop wires, D, twisted and crossing each other for the purpose described, as a new article of manufacture.

64,089.—NICKING SCREW HEADS.—Edward B. Fish, Glen's Falls, N. Y.

I claim a nicked screw provided with a cavity, b, in its head, substantially as specified.

64,090.—AIR HEATING APPARATUS FOR STEAM BOILER FURNACES, ETC.—Addison C. Fletcher, New York City. Antedated April 18, 1867.

I claim the air passage or passages, E, extending transversely across and through the smoke pipe, chimney flue or exhaust pipe for the whole or nearly the whole length of, and in combination with the jacket, D, surrounding the said pipe, chimney or flue, substantially as and for the purpose herein specified.

64,091.—RIDDLE FOR SAND WASHER.—D. L. Furnier, Rostraver Pa.

I claim a hollow screen or riddle, revolving on an axis, with one portion always immersed in a vessel through which a stream of water constantly flows, when said riddle receives the earthy sand into its interior at one end and discharges the coarser particles over a tail chute at the other end, as set forth and described.

In combination with a hollow revolving riddle, constructed substantially as described, and revolving in a water trough, B, the chute, M, and stirrers, N N, for the purposes set forth.

In combination with a hollow revolving riddle, constructed substantially as described, the web, P, and tail spout, L, for the purposes set forth.

In combination with a hollow revolving riddle, constructed substantially as described, the wings, O O, upon its outer side, to agitate and remove the sand from the trough, as set forth.

The combination of the hollow revolving riddle and bed frame, A, provided with the trough, B, and waste chute, C, constructed and arranged as set forth and described.

64,092.—CARPET LINING.—William Fuzzard, Chelsea, Mass.

I claim as a new article of manufacture, a carpet lining constructed of stiff paper, pasteboard, or a sized textile, or other suitable fabric, bent, corrugated, or folded, to effect the result, substantially as herein set forth.

64,093.—HAY AND COTTON PRESS.—Joel Garfield, Groton, Mass.

I claim, in combination with the follower, the grooves or ways at the ends of the press and their sliding pins, the vertical ratchets and their double set or sets of pawls and the toggle levers, when so arranged that an intermittent progressive movement is imparted to the follower by their co-operative movements, substantially as set forth.

Also, in combination with the follower, the hinged frame, d, by which the follower may be swung up to leave the press open, substantially as set forth.

64,094.—STREET PAVEMENT.—George W. Grader and Matthias H. Baldwin, Memphis, Tenn.

We claim interlocking the sections of the frame, A, by means of the protecting flanges, c, on every alternate corner of each section, fitting into a recess, b, under the corner of the opposite section, thereby preventing the pavement from settling or getting out of line, as herein shown and described.

64,095.—COMBINED FENCE AND GATE.—C. S. S. Griffing, Geneva, N. Y.

I claim the pannel, G, arranged as described, and in relation to the pannels, A A, and braces, B, when combined so as to form a gate and pannel, jointly, in the manner and relatively as specified.

64,096.—FRUIT GATHERER.—Jacob B. Haines, Millersville, Pa.

I claim the arrangement of the fingers, A, lever arms, E, in combination with the coiled springs, D, all surrounding a rigid shaft, B, centrally affixed to the top of the pipe, R, and also connected with the horizontal and vertical bows, I K, the latter connected by cross curves, L M N, operating jointly in the manner and for the purpose specified.

In combination with the specific frame work, I also claim the use of a sleeve or bag, N, elastic bands, O, buttons, P, actuating wire, F, cord, H, and handle, S, all arranged and operating in the manner and for the purpose set forth.

64,097.—POTATO DIGGER.—Manly Hall, Livonia, Mich.

I claim, First, The scoop, E, grating, f, and bars, M, as arranged in combination with the elevator, as constructed of the belts, L, and cross ties, L', armed with the teeth, a, and the rake, Q, for the purpose and in the manner substantially as set forth.

Second, The sieve, N, conductors, P P', when arranged and operated conjointly in combination with the elevator and rake, Q, and scoop, E, as and for the purpose substantially as herein described.

64,098.—VOLTAIC BRACELET.—Thomas Hall, Boston, Mass.

I claim the series of plates, of different metals, attached to each other by double hooks, formed upon one side of each plate, and entering corresponding slots cut at the opposite edge of each plate, the hooks being passed through the leather or cloth strap, and clinched upon the side opposite to the plates, substantially as herein described.

64,099.—APPARATUS FOR THE MANUFACTURE OF SOAP.—Cyrus H. Hardy, Charlestown, assignor to himself and Geo. Jaques, Boston, Mass.

I claim placing the several soap-forming ingredients in separate and independent receptacles, D E F, with or without steam jackets, and provided with pipes, e f g, for conducting the ingredients to the receptacle, G, in which they are heated, the supply of the ingredients thereto being regulated by suitable valves or stop cocks, h i j, substantially as and for the purposes specified.

I also claim, in connection with the above, the employment of agitators, I J, operating substantially as set forth.

64,100.—HORSE HAY FORKS.—Samuel and Daniel A. Harris, Shippensburgh, Pa.

We claim pivoting the lever, E, to the forked arm, F, of the bar, A, and to the lever, D, as herein described, in such a manner that the weight upon the finger, C, will cause the upper end of the lever, E, to be drawn toward said bar, A, thereby securing and retaining the finger, C, in a horizontal position, as herein shown and described.

64,101.—WINDOW SHADE ROLLER.—Stewart Hartshorn, New Tork City.

I claim the construction and arrangement of the short fixed shaft, E, above the shade roller, A, surrounded by the spiral spring, D, one end of which is secured thereto at, b, the other end attached to the loose hub, F, of the gear wheel, C, meshing into the gear wheel, B, upon the end of the shade roller, substantially as herein shown and described for the purpose specified.

64,102.—AUXILIARY AIR CHAMBER FOR STOVES.—Elizabeth Hawks, Troy, N. Y.

I claim the shield, A, with the open horizontal slot, B, near its top, constructed and used as and for the purpose set forth.

64,103.—PONTOON BOAT.—John Hegeman, Vischer's Ferry, N. Y.

I claim the combination of the hinged parts consisting of the bottom, A B, the end sections, C, central sections, F, and side end sections, H, when the sides and end sections are so constructed as to fold over on the bottom of the boat, in the manner described.

64,104.—HORSE HAY-FORKS.—Thos. N. Henderson, Jackson, Mich., assignor to Henderson & Cooley.

I claim the combination of the adjustable drop, C, rolling cross bar, C, and operating lever, E, with each other and with the handles, G', and teeth, I, of the rake, substantially as herein shown and described and for the purpose set forth.

64,105.—LUBRICATOR FOR MACHINERY.—Benj. Hilbert, Cincinnati, Ohio.

First, I claim the transparent reservoir consisting of a glass globe, A, in which the decrease of the lubricating material may be observed without detaching it from the bearing, and allowing of its insertion in an inclined position.

Second, A conducting pipe, E, with its end resting upon the journal or other moving metal, so that the surface of said metal closes the orifice when at rest and when in motion acts mechanically to draw out a sufficient quantity of oil, as herein set forth.

Third, A lubricating apparatus constructed in two portions, one permanently attached to the box or in other desired position, while the reservoir and conducting pipe are simply inserted in this outer pipe so as to be removable at pleasure.

Fourth, The arrangement of screw-threaded outer pipe, G, and pinching nut, I, to enable the adjustment of the tubes, as shown and set forth.

64,106.—STUMP EXTRACTOR.—J. Dean Huffman, Springfield, Ohio.

First, I claim the lever, A, of a stump puller, in combination with the cylindrical fulcrum, B, supporting the wheels, C, eccentrically attached thereto, substantially in the manner and for the purpose set forth.

Second, In combination with the slotted lever, A, eccentrically attached, the fixed cylindrical fulcrum, B, adjustable extension hook, D, and stirrup, E, when constructed and arranged substantially as set forth.

Third, The arrangement of the slotted lever, A, with the plate, A2, and bite, A3, adjustable extension hook, D, and chain, F, and eccentrically attached fixed cylindrical fulcrum, B, substantially as set forth.

Fourth, In combination with the lever, A, eccentrically attached fixed cylindrical fulcrum, B, and stirrup, E, I claim the hooked clevis, x, substantially as and for the purpose set forth.

64,107.—MACHINE FOR BLOCKING AND STRETCHING HAT BODIES.—Wm. Humphreys, Jr., Cold Spring, N. Y.

First, I claim a series of stretchers, O, in combination with the levers, F, for the purpose of overstretching the brim, substantially as described.

Second, Making the said stretchers adjustable vertically so as to regulate the extent of stretching, substantially as described.

Third, The combination of a series of levers, F, hinged to the base plate, D, springs, l, and levers or clamps, G, rods, H, and plate, I, constructed and operating substantially as described.

Fourth, The sleeve, J, which carries by means of its connections the wedge, M, for operating the levers, N, made adjustable in a vertical direction, substantially as set forth.

Fifth, A series of levers, N, hinged to the stationary base plate, D, in combination with the circular wedge, M, adjustable sleeve, J, and its connections, arranged and operating substantially as described.

Sixth, The combination of rods, Z Z', catches, j, springs, k, pins, r, slotted levers, Y, and shaft, W, arranged to operate the cylindrical cap piece, E, substantially as described.

Seventh, In combination therewith the lever, a rods, d and c, wheel, U, and its pin, m, for governing the operation of the same, substantially as described.

Eighth, The arrangement of the hand lever, e, with the projection, t, and stop, o, on the rod, Z', in combination with the tappet arrangement of the pin, n, on wheel, U, and the projection, q, on rod, f, constructed and operating substantially as set forth.

Ninth, The base plate, D, to which are hinged the levers, F, in combination with the cylindrical cap piece, E, carrying the brim stretchers, O, the whole arranged and operating substantially as and for the purpose set forth.

Tenth, The lever, F, having its journal arranged to operate with base plate, D, substantially as described and for the purpose set forth.

64,108.—GATE.—A. B. Hurd, Watkins, N. Y.

First, I claim the bar, B, pivoted on the cleat, n, and having its rear end engaging with the hook, b, as a support for the gate, A, substantially as shown and described.

Second, I claim mounting the gate, A, on friction rollers arranged to run on the bar, B, and having both gate and bar swing around, as set forth.

Third, The staples, d, with the friction rollers mounted thereon, and said staples arranged to embrace the bar, as shown and described.

64,109.—SASH-ROPE PLATE.—Anthony Iske, Lancaster, Pa.

I claim the specific arrangement of the plate, A, with its circular opening, B, slot, C, groove, D, and beveled convexity, E, on the back, all arranged in the manner and for the purpose specified.

64,110.—BOAT-DETACHING TACKLE.—Peter H. Jackson, New York City.

I claim the cylinder, g, feather, i, lever, k, and fork, h, in combination with the bolts, e e, having right and left handed threads, said bolts taking eyes or rings on the ropes or chains passing to the davits, as set forth and for the purpose specified.

64,111.—HAY ELEVATOR.—Jacob L. Kintner, Harrison, County, Ind.

I claim the guide bars, F F, having their lower ends connected to a curved plate, in combination with the rake, G, and bars, A A, all constructed and operating in the manner and for the purpose set forth.

64,112.—SHOWER BATH.—D. P. Lacy, Orfordville, Wis.

I claim, First, Constructing and operating the valve substantially as and for the purpose set forth.

Second, The valve arrangement constructed as specified in combination with a vessel for containing water, substantially as set forth.

64,113.—COMBINING GENERATING AND SECONDARY OR ACCUMULATING GALVANIC BATTERY.—Georges Lionel Leclauche, Paris, France.

I claim in combination the graphite plate or plates, the flask, and the porous vase, the flask and vase being charged and the whole apparatus being arranged to operate substantially as set forth.

I also claim the employment in electrical piles of peroxide of manganese moistened with a liquid containing a salt in solution which has no chemical action on the peroxide of manganese, the salt used being capable by its electrolytical decomposition or rendering soluble the oxides of manganese arising from the reduction operated by the hydrogen.

64,114.—POTATO DIGGER.—Edward S. Lenox and Edward Spaulding, New York City.

We claim, First, The potato digger, consisting of the frame, A, secured to the axle, B, caster wheel, D, suspended scoop, E, with wings, G G, curved bars, h, riddle, F, vibrated by suitable gearing, N, cutter, H, mold board, I, toothed vertical bar, i, chain, K, and lever, l, constructed and operating substantially as herein shown and described.

Second, The scoop, E, when provided with a concave cutting edge to prevent the bursting of the hill, in combination with the wings, G, as set forth.

Third, The vibrating riddle, F, consisting of bent sheet metal bars, which are so arranged that the ends of the center bars drag on the ground, and those of the outer bars are elevated above the ground, substantially as and for the purpose herein shown and described, in combination with the mold boards, H and I, substantially as herein set forth.

Fourth, The mold boards, H and I, when arranged as herein described, in combination with the wings, G, and scoop, E, all made and operating substantially as and for the purpose herein shown and described.

Fifth, Extending the sides or wings, G, beyond the bottom of the scoop, E, substantially as and for the purpose herein shown and described.

64,115.—SEAT FOR LOUNGES AND CHAIRS.—M. Le Page and F. Raymond, Woodhaven, N. Y.

We claim the strip, C, curved on its profile in the arc of an ellipse, in combination with the rebate, a, curved in the arc of a circle for clamping the ends of the spring, B, substantially as and operating in the manner set forth.

64,116.—SAD IRON.—Elliot Lewis, Lockport, N. Y.

I claim the detachable handle, E, provided with feet, g, and slide bolt, h, in combination with the way, b, cross wires, c c, and bolt socket, d, arranged and operating substantially as set forth.

64,117.—TOY.—William E. Lincoln, Providence, R. I., assignor to Milton Bradley & Co., Springfield, Mass.

First, I claim the device herein described, consisting of the revolving cylinder, A, with any number of slits, a b c d e, and having figures upon its inside surface, and arranged and constructed substantially as set forth.

Second, The plate, F, having any desired figures upon it, arranged in the manner and for the purpose described.

Third, The plate, B, upon the bottom of the cylinder, having any desired figure or figures upon it, formed substantially in the manner and for the purpose set forth.

64,118.—HAND SAW.—William H. Livingston, Johnstown, N. Y.

First, I claim connecting the metallic back of a frame saw to the handle, by passing the frame into a hole in the handle, substantially as specified.

Second, I claim attaching the metallic tightening buckle, d, to the lower edge of the wooden handle, a, in the manner set forth.

Third, I claim a metallic tightening buckle, formed with a slot for the reception of the end of the saw, a hole for the screw rod, i, and a nut to screw upon the rod, c, as set forth.

Fourth, I claim the stiffener plate, c', and the rod, c, forming the frame of the saw, as and for the purposes set forth.

64,119.—CULTIVATOR.—Michael F. Lowth and Thomas J. Howe, Owatonna, Minn.

First, We claim the combination with the quadrant, J, of the adjustable segment, M, for the purpose of changing the position of the lever, N, substantially as and for the object specified.

Second, The combination of the quadrants, J J', segments, M, shaft, K, and lever, N, with the chains or flexible connections, I, connecting bar, H, and shovel beams, D, all arranged and operating in the manner and for the purpose specified.

64,120.—WAGON-SEAT SUPPORTER.—John Lunger, Waldo, Ohio.

claim the standard, B, constructed substantially in the manner set forth, d used as and for the purpose specified.

64,121.—COMBINATION TOOL.—John Lyle, Newark, N. J.

First, I claim the U-shaped jaw, A, in combination with two movable jaws, B C, and handles, D E, constructed and operating substantially as and for the purpose described.

Second, The stop, f, in combination with the U-shaped jaw, A, and movable jaws, B C, constructed and operating substantially as and for the purpose set forth.

64,122.—WASHING MACHINE.—Andrew J. Mapes, Independence, Mo.

First, I claim the buoyant or floating rubber board, B, constructed substantially as herein shown and described and for the purpose set forth.

Second, The combination of the large wheel, C, and small wheel, E, with each other and with the rubber board, B, box, A, and frame, D, of the machine, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the long levers, I, pitmans, J, pulleys, K and L, and bands, M, with each other and with the wheels, C and E, and frame, D, of the machine, substantially as herein shown and described, and for the purpose set forth.

64,123.—VESSEL FOR STORING AND TRANSPORTING OIL.—Thomas J. McGarry, Cleveland, Ohio.

First, I claim the tank, A, with shell and lining, B, having a water chamber at the sides and ends, in combination with inlets and outlets, arranged as and for the purpose substantially as set forth.

Second, Hanging the tank upon journals or bearings, as and for the purpose set forth.

Third, The saddles, N, provided with spring bearings, in combination with the tank, substantially as and for the purpose set forth.

64,124.—RAILWAY SWITCH.—James McLaughlin, Duncannon, Pa.

I claim the movable elastic frog continuous with and forming part of the adjoining rails, C C, their conveying slotted ends joined together in the slotted chair, G, by means of the bolt, F, their elastic or disengaged portion connected together by means of the cross rod, d, in combination with the main rails, A A, branch rails, B B, and operated by means of the crank, e, and sliding bar, I, substantially as herein shown and described and for the purpose specified.

64,125.—PAINT OIL.—Samuel Melsom, Erie, Pa.

I claim the paint oil composed of linseed oil, benzine, rosin, and the paint dryer, in the proportions substantially as set forth, and prepared as described.

64,126.—PAVEMENT.—Benjamin F. Miller, New York City.

I claim a pavement formed of blocks laid at an inclination, so that one block lies partially upon the side of the next, substantially as set forth.

64,127.—LOOM.—Charles Miller, St. Louis, Mo. Antedated April 10, 1867.

First, I claim the combination of the short shaft, B2, the crank, b, and rod, b', when the whole are arranged in connection with the lay frame, in the manner and for the purpose described.

Second, I claim the combination and arrangement of the shifting bar, D, and its stops, d, and the picking sticks, C'.

Third, I claim the ratchet, E, and its star-shaped groove, e, for the purpose of giving the required motion to the shifting bar.

Fourth, I claim the combination of the ratchet, E, and the lever, E3, substantially as described and for the purpose set forth.

Fifth, I claim the combination and arrangement of the twill governor, composed of the devices, F2 F3 F4, F5 F6 f3 f4 f5 f6 and f7, substantially as described and set forth.

64,128.—CHIMNEY OR VENTILATOR.—Joseph A. Miller, New York City.

I claim the smoke stack, A, provided with annular inclined planes, B C, having different inclinations, leaving a space divided into compartments by the radiating partitions, D, constructed and operating as and for the purpose specified.

64,129.—CLOTHES DRYER.—A. J. Mills and E. M. Hewett, Scott, N. Y.

We claim the within-described dryer composed of the plate, A', with its flanges, and the pivoted slats, B B, the same being used substantially as and for the purpose specified.

64,130.—OILING DEVICE FOR JOURNAL BOXES.—George M. Morris, Cohoes, N. Y.

First, I claim forming inclined shoulders, D, and the oil chamber or reservoir, C, of the journal box, substantially as herein shown and described and for the purpose set forth.

Second, The inclined removable slotted plate, E, in combination with the inclined shoulders, D, of the journal box, and with the oiling disk, F, substantially as herein shown and described and for the purpose set forth.

64,131.—APPARATUS FOR ROLLING CLEVICES AND PLOW SHARES.—Felix Murray, Pittsburg, Pa.

I claim the rolling or forming of clevices and shares for plows by means of the rollers, B B', provided respectively with the grooves, a b c and d, and arranged with a stripping or guide roller, D, to operate substantially in the manner as and for the purpose set forth.

64,132.—STEAM-ENGINE SLIDE VALVE.—George H. Myers, Philadelphia, Pa.

First, I claim the cavity, a, in the top of the valve, in combination with springs, d, packing piece, b, and a top plate, c, constructing and operating substantially as and for the purpose described.

Second, The slide, C, working on the outside of the steam chest, and provided with a pin, f, to catch in a socket in the valve, in combination with the top plate, c, and packing piece, b, constructed and operating substantially as and for the purpose set forth.

64,133.—FARM GATE.—J. H. Nonamaker, Middletown, Pa.

I claim the combination and arrangement of the grooved pulleys D and F, with the rear end of the gate A, and with the rails E and G, of the panel of the fence adjacent to the rear end of said gate, substantially as herein shown and described.

64,134.—LAND CONVEYANCE.—R. J. Nunn, Savannah, Ga.

I claim the grooved rollers B, and ribbed band C, in combination with the curved end frame A, bearing the working parts which communicate motion to the band constructed and applied as described for the purpose specified.

64,135.—COPPER COATED IRON ROLLS FOR PRINTING AND FINISHING.—Alfred Parof, Mulhouse, France.

I claim a new manufacture marking printing or finishing rollers of cast iron and coating the same with copper, substantially in the manner and by the means herein specified.

64,136.—STOVEPIPE DAMPER.—Ephraim Parker, Marlow, N. H.

I claim a damper made of two parallel plates or disks whose edges are cut away at opposite sides and to one of which is pivoted hinged or adjusted near the side thus cut away a valve or slide, the whole device constructed so as to operate substantially as described.

64,137.—QUILTING FRAME.—Benoni F. Partridge, Syracuse, N. Y.

I claim the combination and arrangement of the axis, the rollers, the extension bars, the legs, the set screws, the guides, the stay rods, the slot in the extension bars all constructed and operating substantially as and for the purpose shown and described.

64,138.—RAILROAD SWITCH.—H. E. Passmore and G. A. Heckert, York, Pa.

First, We claim the pointed spring rails C C, moving on the slide plates E, E, and lug plates F F, in combination with rails X X.

Second, The double notched guard rails D D, in connection with the pointed spring rails C C, to guard the wheels from striking the points of the said spring rails X X.

Third, The single lipped switch rod G, which allows the pointed spring rails C C, to move back in combination with spring rails, etc.

Fourth, The combination of the pointed spring rails C C, moving on the slide plates E E, the lug plates F F, and the single lipped switch rod G, in connection with the guard rails D D, in the manner and for the purpose herein substantially set forth.

64,139.—MANUFACTURE OF STARCH SUGAR.—Narcisse Pigeon Montreal, Canada.

First, I claim the within described process of manufacturing a crystallizable syrup from fecula, free from dextrine or nearly so substantially as herein set forth.

Second, The within described process of manufacturing a hard crystalized sugar from starch syrup prepared from fecula as above described substantially as herein set forth.

64,140.—GATE LATCH.—George M. D. Pomeroy, Attica, Ind.

I claim a gate latch consisting of the parts B C and D, constructed and arranged for use as described acting in combination with the pin A, substantially in the manner and for the purpose set forth.

64,141.—LANTERN.—William Porter and William Porter, Jr., New York, N. Y.

We claim the lower guard ring c, when made of sheet metal as described, so as to permit of a prolongation of the guard wires substantially as herein shown and set forth.

64,142.—BOTTOM FOR CULINARY STEAMERS.—W. S. Potwin, (assignor to Frank Sturges & Co.,) Chicago, Ill.

I claim the bottom of the steamer provided with the deep groove B, near its outer edge projecting downward and surrounding the raised centre which is provided with the raised concentric ribs A, whereby perforated concentric channels are formed by the steam condensed within the steamer from the articles being steamed, as herein shown and described.

64,143.—CORN PLANTER.—John B. Raines, Fremont, Iowa.

I claim the cut off represented, in the drawings by the letters A A A, and the dies represented by the letter J, and the bottom of the box in which the corn is placed represented by the letters A A.

64,144.—VALVE GEAR FOR WATER METERS AND OTHER PURPOSES.—John H. Rhodes, Brooklyn, N. Y.

I claim in a valve gear substantially of the character described, the combination with the rod H, and its roller d of the lever E, linked as described to said rod by a pin f, arranged to pass through an oblong or oval slot in the lever and the latter constructed at its outlet end i, for gear with the roller d, substantially as specified.

64,145.—HAT.—Celius E. Richards, North Attleboro, Mass.

I claim a hat fabricated of paper, thread or twine substantially as described as a new manufacture.

64,146.—GAME FOR PASTIME.—Charles Richardson, Richmond, Va.

I claim the arrangement of certain devices as herein before described and shown by the accompanying drawings for forming an instructive and amusing game, or pastime, for the house or field.

64,147.—LET-OFF FOR LOOMS.—George Richardson, Lowell, Mass.

First, I claim the combination and arrangement of the whip roll d, with its finger e, the lever f, tension spring h, friction pad m, and friction pulley g, of any form or shape, substantially as and for the purpose herein set forth.

Second, I claim the cam or pawl q, combination with the adjustable stand p r, and friction brake f, as and for the purpose herein described.

Third, I claim allowing the let-off at the time of the extension of the sheds of the warp by its action on the whip roll and completely stopping the let-off at the time of beating up the woof by means independent of the whip roll substantially as herein specified.

64,148.—MUSICAL RACK OR DESK.—Francis Xavier, Rizy, Monroe, Mich.

I claim the cross bars G, in combination with the clamping bars e, the inclined plane h, thumb screw f, slots p, spurs o, enlargements n, and also in combination with the other common devices, such as the foot board d, rack c, and instrument a.

64,149.—CHURN.—C. H. L. Roberts, Morrison, Ill.

First, I claim the arrangement of the shaft G, with its plates b b, and placed within the trough E, in the manner and for the purposes specified.

Second, The box A, with lid D1, having funnels S t, and covered opening x dasher shaft D, in combination with the trough E, all arranged and operating in the manner substantially as and for the purpose set forth.

64,150.—GATE.—Elias Roth and George Shane, New Oxford, Pa.

First, We claim the combination and arrangement of the bent levers H and I, and short bars K and L, with the gate B, ropes O and N, post A, substantially as herein shown and described and for the purpose set forth.

Second, Placing a roller D under the front cross bar b3 of the gate B substantially as herein shown and described and for the purpose set forth.

Third, The catch G E, constructed and arranged substantially as herein described and for the purpose set forth.

Fourth, Forming the horrizontal bars b2 of the gate B, so that they may be oval in their cross section, and placing them with their longest diameter horizontal, substantially as herein shown and described and for the purpose set forth.

64,151.—COMPOUND FOR CURING FOOT-ROT IN SHEEP.—W. Russell and B. Carpenter, Northfield, and Joseph Drake, Boston, Ohio.

We claim the herein described compound applied as and for the purpose described.

64,152.—GANG PLOW.—E. Sexton, Munson, Mass.

First, I claim the adjustable bars, B, provided with the tubular guides or supports, F, for supporting the plows, substantially as shown.

Second, In combination with the laterally adjustable bars, B, I claim the spring rods, I, and levers, L and m, arranged to operate as set forth.

64,153.—GATE FASTENING.—Charles Seymour, La Porte, Ind.

I claim the bed plate, C, cap, A, sliding bar, B, thumb series, D D, and circular sock, E, constructed, arranged and operating substantially as herein set forth.

64,154.—MACHINE-KNITTED HOSIERY.—Benjamin F. Shaw, South Danvers, Mass.

I claim as a new article of manufacture, a machine-made stocking, hose, or sock, knit or formed in the manner set forth.

64,155.—SHOE FASTENING.—Gerard Sickels, Boston, Mass.

I claim a shoe fastening device constructed to operate substantially as set forth.

64,156.—APPARATUS FOR CARBURETTING GAS.—Warren A. Simonds, Boston, Mass.

First, I claim the arrangement within the vaporizing vessel of complete disks, f, and partial partitions, g, when combined with tubes, h, connecting the respective cells of each chamber, alternately with a cell of the chamber above and with a cell of the chamber below, substantially as and for the purpose described.

Second, I claim connecting the cells on different sides of the same disk by independent U-tubes exterior to the cylinder, adjusted, arranged, applied and operating substantially as described.

64,157.—MOUNTING GLAZIERS' DIAMONDS.—Philip Sinsz, Baltimore, Md.

I claim the within described glaziers diamond the same having the breaker, B, jointed or pivoted to the handle, A, and the diamond block swiveled to the breaker, substantially as and for the purpose set forth.

64,158.—METALLIC BOBBIN.—Charles T. Smith, Utica, N. Y.

I claim the securing of the wooden heads or flanges, b, on the non-corrosive metal tubes, a, of bobbins by drawing up a shoulder, c, on the tubes for the upper surfaces of the heads or flanges, b, to abut against and turning up the ends of the tubes, a, within a concave, d, substantially as shown and described.

64,159.—COFFIN.—Henry Smith, Jr. Summit, N. Y.

First, I claim the combination of the frame, C, prepared for the reception of a glass plate with the cover, B, of the coffin in such a manner that the upper side of said frame may be flush with the upper surface of the said cover, substantially as and for the purpose herein set forth.

64,160.—SASH FASTENER.—John R. Smith, Salem, assignor to himself and A. S. Rogers, South Borough, Mass.

First, I claim the combination with the shell, D, cast as described of the cam lever, E, and metal faced block, f, substantially as and for the purposes set forth.

Second, The combination with the shell, D, of the pivot, a, cast upon the inside of the block of shell, D, for the purpose stated.

64,161—PANTALOON GUARDS.—S. B. Smith, and E. Lindsley, Cleveland, Ohio.

We claim the metallic guard, A, constructed substantially as described in combination with the hooked buttons, C, in the manner and for the purpose set forth.

64,162.—SKID.—Seabury Sowle, New Albany, Ind.

I claim the skid herein described when composed and constructed as described, with its curved center, and connected by the hooks in the manner and for the purposes set forth.

64,163.—HORSE HAY FORK.—A. B. Sprout, Hughesville, Pa.

I claim the coniform points, f and g, provided with cutting edges, and shoulders or hooks, 6 and 7, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

64,164.—HORSE HAY FORK.—Ole O. Storle, North Cape, assignor to himself and Percy B. Smith, Milwaukee, Wis.

I claim a horse hay fork when made with prongs, A, connecting rods, B, sleeve, C, shaft, D, and lock, E, in combination substantially as and for the purpose described.

64,165.—CULTIVATOR.—J. E. Tate, Columbia, Tenn.

First, I claim the adjustable scrapers, F, constructed as herein shown and described in combination with the bars, G, and frame, A, of the cultivator, substantially as and for the purpose set forth.

Second, The cotton coverer, L, constructed as herein shown and described in combination with the bars, F, and frame, A, of the cultivator, substantially as and for the purpose set forth.

64,166.—STEAM PUMP.—James Edward Thorpe (assignor to himself and W. J. F. Liddell), Erie, Pa.

I claim the supply cylinder, D, constructed and operating substantially as described, in combination with the pumping engine and the oscillating valve F, and chamber, E.

I claim the arrangement substantially as described for moving the steam valve and the piston of the supply cylinder.

64,167.—HORSE HAY FORK.—William H. T. Tomlin, Mullica Hill, N. J.

I claim a hay elevator consisting of the two forks, C, hinged to the cross bars, c, and connected by the toggle joint lever, f g, having the loop or guide, o, working in the vertical groove, t, of the slotted standard, A, substantially as shown and described.

64,168.—EXCAVATOR.—Israel D. Vandecar, Chicago, Ill.

First, I claim the combination and arrangement of the shovels, B, provided with the shanks, B', the levers, C, arms, a, and the post, A, when arranged and operating substantially as described.

Second, In combination with the shovels, B, provided with the shanks, B', the levers, C, arms, a, and post or center piece, A, I claim the connecting chains, D, hoisting rope, E', and dumping ropes, E, when all arranged and operating substantially as and for the purposes set forth.

64,169.—DREDGING MACHINE.—Israel D. Vandecar, Chicago, Ill.

First, I claim the combination and arrangement of the scoops, C D, handles or levers, E F, connecting chains, B, rod, R, hoisting rope, H, and plate, A, when constructed and operating substantially as and for the purposes specified.

Second, In combination with said scoops, handles or levers, connecting chains, rod, hoisting rope and plate, I claim the ropes or chains, G, when operating substantially as and for the purposes set forth.

Third, I claim the combination and arrangement of the plate, A, rod, R, provided with the shoulder, r, the catch plates, a, bent lever, d f, and cord, g, when constructed and operating substantially as herein specified.

64,170.—IRONING TABLE.—B. Van Gaasbeek, Mount Vernon, N. Y.

I claim the combination of the chamber, d, of the table, the pivoted ironing board and the folding leg, f, substantially as and for the purpose herein set forth.

64,171.—Fence Gate.—W. F. Veber, Perrysburg, Ohio.
I claim the gate, A, as constructed in combination with the joists or pivoted post, G, as and for the purpose set forth.

64,172.—Corpse Preserving Case.—Joseph S. Waterman, Roxbury, Mass.
I claim providing the ice chamber, B, with a yielding top or cover for the purpose set forth.
I also claim forming a passage from the corpse chamber to an ice chamber placed above it, substantially as and for the purpose specified.

64,173.—Folding Chair.—N. Waterman, Toledo, Ohio.
I claim the combination of the seat, G, and legs, B D, whereby the back legs, D, fold on the front legs, B, and the seat, G, passing through between the side pieces, C, above the round, I, fold on the hind legs, D, of the chair, substantially as described for the purpose specified.

64,174.—Check Hook Rein Holder—David C. Watson, Manchester, N. H.
I claim the mode herein described to secure check reins in the hook, as shown by stem, C, pin, D, tube, B, tube, A, and spring, E, which may be made of wire or rubber.

64,175.—Spring Bed Bottom.—Dexter P. Webster and Hermon W. Ladd, Philadelphia, Pa.
First, We claim the detachable frame herein described, the same consisting of the side pieces, B, with dovetail brackets, C, and the cross pieces, D, with dovetail ends constructed and operating, substantially as and for the purpose specified.
Second, The plates, C, constructed as described, in combination with the cross pieces, D, substantially as and for the purpose specified.
Third, The removable sectional tubular cushions, G, applied to the coils of the springs, substantially as described for the purpose specified.
Fourth, The pendent hooks, a, constructed as described, in connection with the bed stead frame, A, supporting the slat-bearing frame, substantially as described for the purpose specified.

64,176.—Machine for Shaping Metals.—Morris Wells, Williamsburg, N. Y.
First, I claim the combination of springs, d, with the cross bar supporting the clamp, G, substantially as and for the purpose described.
Second, The link, K, fitted closely between the cross head, J, and crank, L, and operating in combination with the die, F, and punch, I, substantially as and for the purpose set forth.

64,177.—Sleighs.—Nathaniel T. Whiting, Lawrence, Mass.
First, I claim the combination of the hollow cross bar, A, the slotted slide, B, and pin, E, when constructed and arranged to operate substantially as and for the purpose set forth.
Second, The combination of the slotted shaft irons, F, the springs, C, and slotted hooks, a1, a2, when arranged to operate substantially as and for the purpose set forth.

64,178.—Ore Washer.—John Wicks, Greenland, Mich.
First, I claim the combination of the separator, B, slime pit, J, buddle, H and their connections, the sieves, c c c c, and hutch, K, all for the purposes and substantially as described.
Second, I also claim the walking beam, N, connecting rod, 3, in combination with the hutch, K, substantially as described.
Third, I claim the buddle, H, in combination with the slime pit, J, for the purposes described.
Fourth, I also claim the buddle, G, in combination with the hutch, K, substantially as described.

64,179.—Illusory Decapitation.—James C. Withington, Brookline, Mass.
I claim the effigy composed of figures 1 and 2, constructed and arranged substantially as herein shown and described for the purposes specified.

64,180.—Clothes Wringer.—John Young, Amsterdam, N. Y.
First, I claim the gear, F, when applied to the upper shaft, B, of clothes wringers in the manner herein shown and described and operating as set forth.
Second, I claim, in combination with the gear, F, the cone or center, g, and pin, d, arranged as described, when used in connection with a gear, c, as specified.

64,181.—Method of Sprinkling Liquids in Refining Sugar.—Helem Merrill, Brooklyn, N. Y.
I claim diffusing the water or other cleansing or bleaching agent in a finely divided state by means of a current of air or other elastic fluid, substantially as described.

64,182.—Discharge for Centrifugal Machines.—Helem Merrill, Brooklyn, N. Y.
I claim the stationary and removal scrapers and receptacles, by which a centrifugal machine may be discharged when in motion, substantially as described.

64,183.—Feeder for Centrifugal Machines.—Helem Merrill, Brooklyn, N. Y.
I claim a hopper constructed substantially as described for the purpose of delivering and distributing a uniform layer on the seive of a centrifugal machine, while in motion.

64,184.—Sewing Machine.—Monroe Stannard, Hartford, Conn.
First, I claim operating the feed wheel of a sewing machine by means substantially such as described, so that whilst it shall always, when in action, have the ordinary intermittent motion, it may, in addition, have, or not have, at the option of the operator, a positive rising or falling motion for each progressive action of the wheel, for the purpose set forth.
Second, The employment in a sewing machine of the adjustable vibrating lever, N, or its mechanical equivalent, with the rock shaft, P, arms, q s, connecting bar, r, cam, t, or their mechanical equivalents, for holding the feed wheel, and for giving to it an alternate rising and falling movement, substantially as described.

RE-ISSUES.

2,572.—Carriage Wheel.—John Raddin, Lynn, and George W. Chipman, Boston, Mass., assignees of John Raddin. Patented June 13, 1865.
We claim a wheel having combined directly with the spokes thereof elastic cushions or blocks of rubber so applied to or in the line of the spokes as to receive the strain exerted between the axle and the tire of the wheel, and having also means for relative adjustment of the spokes and cushions.
Also, The specific constructions described, and shown in the several spokes represented in figs. 1, 2, 3, 4, 5, and 6.

2,573.—Grate Bars.—Lorenzo B. Tupper, New York City, assignee of Daniel Lasher. Patented Sept. 11, 1860.
First, I claim a furnace grate bar having a series of parallelogram openings running crosswise of the bar, substantially as set forth.
Second, A furnace grate bar in which the cross bars are alternately connected at their ends, substantially as set forth, to strengthen said cross bars and prevent the scraper dropping in between said bars, as set forth.
Third, A furnace grate bar in which the surface of the longitudinal bar is on the same level as the top of the cross bars, as set forth, so that said longitudinal bar will aid in supporting the scraper.
Fourth, Furnace grate bars in which there are longitudinal air spaces between the bars and parallelogram air spaces transversely of the bars, substantially as set forth.

2,574.—Machine for Cutting Hoops.—Martin Reed, Rochester, N. Y., assignee of John Thompson. Patented Nov. 17, 1863.
I claim, First, The combination of the irregular-shaped knife, D, with the automatically adjusting rest, C, and adjustable gage, b, as and for the purpose set forth.
Second, The employment of the knife, D, constructed with one or more offsets in its cutting edge, as described, and for the purpose set forth.
Third, The combination of the wheel, E, the spring pawl, d, and clutch, f, or their equivalents, with the rest, C, as and for the purpose set forth.
Fourth, I claim as an improvement in manufacture of hoops, the cutting of the hoop from the edge of the plank by a cut alternately in a bevel line and in a right line to the side of the plank, or in alternate bevel lines.

2,575.—Composition for Roofing and other Purposes.—Rees B. Smith, Mount Pleasant, Ohio. Patented July 31, 1866.
I claim the composition, for roofing and other purposes, consisting of the ingredients in about the proportions described.

2,576.—Brace for Bits.—N. Spofford, Haverhill, Mass. Patented Nov. 1, 1859.
I claim, First, A bit stock constructed with a tapered socket transverse to the arm or portion of the stock in which it is formed, and said arm slitted along its center line, so as to divide said socket lengthwise into two equal parts to form an expanding socket, substantially as and for the purpose described.
Second, The slitted socket, A, constructed with the inward projections or lips, d d, at its larger end to close over the shoulders of the bit shank for the purpose of retaining said shank with the socket when clamped substantially as set forth.
Third, Arranging the socket, A, of a brace with a slot, a, as described in combination with a thumb screw, D, and slips or projections, d, or their equivalents, substantially as and for the purpose set forth.

DESIGNS.

2,626.—Clock Case.—A. C. Felton, Boston, Mass.
2,627.—Trade Mark.—Louis L. Arnold, New York City.
2,628.—Trade Mark.—Eli. W. Bailey, Philadelphia, Pa.
2,629.—Trade Mark.—John M. Batchelder, Cambridge, Mass.
2,630.—Trade Mark.—James P. Baxter, Portland, Me.
2,631.—Tobacco Box.—Charles J. Hauck, Brooklyn, N. Y.
2,632.—Fence Panel.—George Lovejoy, Deposit, N. Y.

Foreign Patents.

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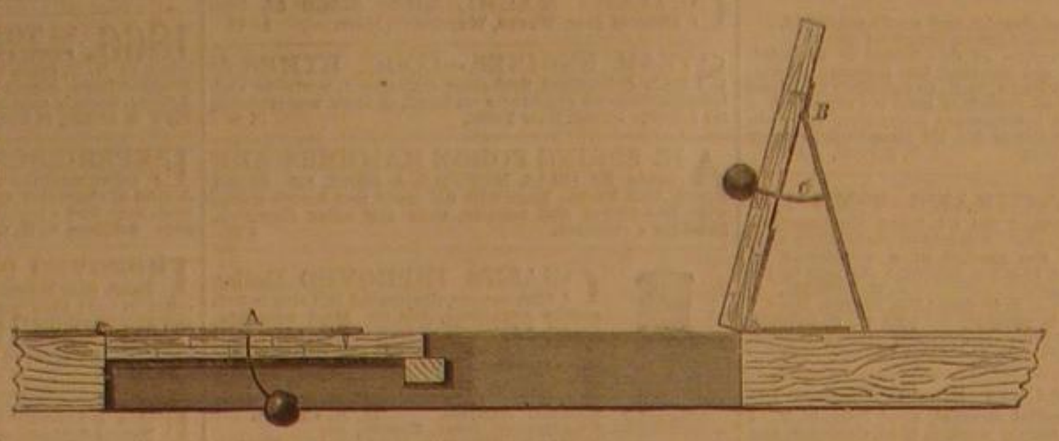
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It will be seen that this contrivance is convenient in all situations, but particularly in opening a trap, as a roof scuttle, from a ladder. It will save the breaking of hinges so common by throwing the trap door back, and its upright position will naturally attract attention and prevent accident.

It was patented through the Scientific American Patent Agency by Samuel R. Bartlett, of Detroit, Mich., March 12, 1867. For particulars apply to Albert G. Boynton, Detroit, Mich.

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At the experimental firing of the 20-inch gun at Fort Hamilton, March 15th, the charges used were, first shot, 125 lbs.: second shot, 150 lbs.: third shot, 175 lbs.: fourth shot, 200 lbs.: mammoth powder. This gun was fired at a constant angle of 25°. Gen. Rodman's pressure plug was used in getting the pressures. An examination of the record will show that from some unknown cause the amount of pressure of the third discharge exceeds that of the fourth, although 25 lbs. less powder was used. At the same time the range is 2,827 yards less. The same irregularity may be observed between the second and third shots. Future experiments may explain these variations. It would undoubtedly have been more rapidly loaded had the running gear been free from dirt and properly oiled. The dust from the parapet (recently made) will insinuate itself, and unless removed, soon form with the oil a mixture which, on the axle, seriously retards the working of the gun. The mean recoil was 5′ 10″, or less than half the length of the top carriage. Weight of shot, 1,080 lbs.

The following is the record of the firing :—

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By plotting, the Ranges are—First shot, 6,144 yards—difference, 34 yards second shot, 6,260 yards—difference, 58 yrrds; third shot, 6,828 yards—difference, 58 yards; fourth shot, 8,091 yards—difference, 49 yards.

Times of Flight.—First shot, 26 seconds; second shot, 26 seconds; third shot, 27 seconds; fourth shot, 27 seconds. Length of base line, 7,310 yards.

Pressures (Maximum).—First shot, 21,000 lbs. per square inch; second shot, 21,000 lbs. per square inch; third shot, 25,000 lbs. per square inch; fourth shot, 21,000 lbs. per square inch.

Recoils.—First shot, 8 feet (no sand); second shot, 85 inches (sanded); third shot, 10 inches from counter hurter (sanded); fourth shot, 7 feet 5½ inches (sanded).

Time of loading, running into battery, elevating, and priming, 8½ minutes. —*Army and Navy Journal.*

Wheels on Pavements.

One of our correspondents recommends for the preservation of pavements, wheels with large faces. He thinks there should be a law compelling every truck to have wheels of eight-inch face, and every stage and express wagon wheels of six-inch face. This would preserve the pavements and keep them level. He says he has three ox carts, two with wheels of six inches and one with wheels of eight inches of face, and his meadows are never cut up in ruts. One of these eight-inch wheels will outlast four of two-inch face, and the tires of three-eighths-inch iron never wear out. There should be no disk to these wide-faced wheels and no "gather." The spokes should be double.

SELF-ACTING TOOLS FOR WORKING WOOD are of a comparatively modern existence. They have been, in many important instances, originated in America and brought to this country, where they have undergone a complete reconstruction and alteration of design, their main principles and mode of action being preserved, but the framework and gearing of the machines have received a certain amount of strength and solidity which, as a rule, was not to be found in the original tools imported from America. The circumstances which are most favorable to the invention and employment of wood-working machinery are cheap wood and dear labor. The power of production of wood-working machinery, and the speed with which machine work is completed in this branch of industry, have no equal in practical mechanics. The application of this class of machines in Europe, and in this country (England) particularly, is rapidly increasing; and although the construction of wood-working machines is carried on by a very limited number of firms only, the trade is a growing and important one as a whole.—*Engineering.*

PATENT CLAIMS.—Persons desiring the claim of any invention, patented within thirty years, can obtain a copy by addressing a note to this office, giving name of patentee and date of patent, when known, and inclosing $1 as a fee for copying. We can also furnish a sketch of any patented machine to accompany the claim, at a reasonable additional cost. Address MUNN & CO. Patent Solicitors, No. 37 Park Row, New York.

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If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

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Those who have made inventions and desire to consult with us, are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us an *honest opinion.* For such consultations, opinion, and advice, *we make no charge.* A pen-and-ink sketch, and a description of the invention should be sent, together with stamps for return postage. Write plainly do not use pencil nor pale ink; be brief.

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All the documents connected with extensions require to be carefully drawn up and attended to, as any failure discrepancy, or untruth in the proceedings or papers is liable to defeat the application.

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If the device has been patented, the time and expense of constructing models, preparing documents, etc., will, in most cases, be saved by means of this search: if the invention has been in part patented, the applicant will be enabled to modify his claims and expectations accordingly.

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Where examination is wanted upon more than one invention, $5 for each must be sent, as each device requires a separate, careful search. Address MUNN & CO., 37 Park Row New York.

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ADDITIONAL TESTIMONIALS.

SHAWNEE, MONROE Co., PA., Near Delaware Water Gap, April 14, 1867.
Mr. George Tallcot, New York:

You will remember selling me a 15 inch Turbine Wheel to take the place of my Overshot in driving one and two run of stone on a fall of about 27 feet.

My stream is a very light one, and everybody told me it was useless to try a Turbine in place of an Overshot with so little water. When the wheel came they all pronounced me a fool, or insane; that so small a wheel could not turn around, much less drive a millstone.

I told them to wait and see and they would change their tune. Some fifty men had come in to see me start up, and I wish you could have been here to hear their different opinions.

First I started up with one run of stone, and off she went like a thing of life, then after a little I put on two runs; off she went again, and has run beautifully ever since. They all gave it up, and pronounced it the most wonderful wheel they ever knew. The Turbine uses no more water than the Overshot did, and gives decidedly more power.

I am surprised at the accuracy of your calculations and statements as to the performance of your Turbine. My Confidence was not misplaced.

Respectfully,
R. D. WILSON.

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WANTED—All Manufacturers of Agricultural Implements and Capitalists to send for an illustrated and descriptive circular of Drake's improved Potato Digger. Patented Dec. 11, 1866. Territorial Rights for sale. Address M. T. DRAKE, care of McCullough & Kennedy, Cincinnati, Ohio. 19 2*os

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STEAM COOKING APPARATUS,
For cooking all kinds of vegetables and meats at one time and together, without flavoring each other in the least. All offensive odors done away. Saves labor, fuel, and time. Dinner can be cooked over one stove hole. Fit any kind of stove. Several sizes: within reach of all. Soup can be made in lower receptacle, vegetables and meat cooked in center, and puddings steamed on top, at one time. Seeing is believing.
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Full description and cut appeared some months ago in Scientific American. 18 2os

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IMPORTANT TO BLOCK MAKERS.—The subscriber would like to sell his patent for a Swivel Shackel Block, patented May 29, 1866. It is very simple in construction, perfect in its operation, and the best article of its kind ever patented. Parties engaged in making blocks will be licensed on reasonable terms, or a share of the profits taken in payment. Address
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Nach dem neuen Patent-Gesetze der Vereinigten Staaten, können Deutsche, sowie Bürger aller Länder, mit einer einzigen Ausnahme, Patente zu denselben Bedingungen erlangen, wie Bürger der Ver. Staaten.

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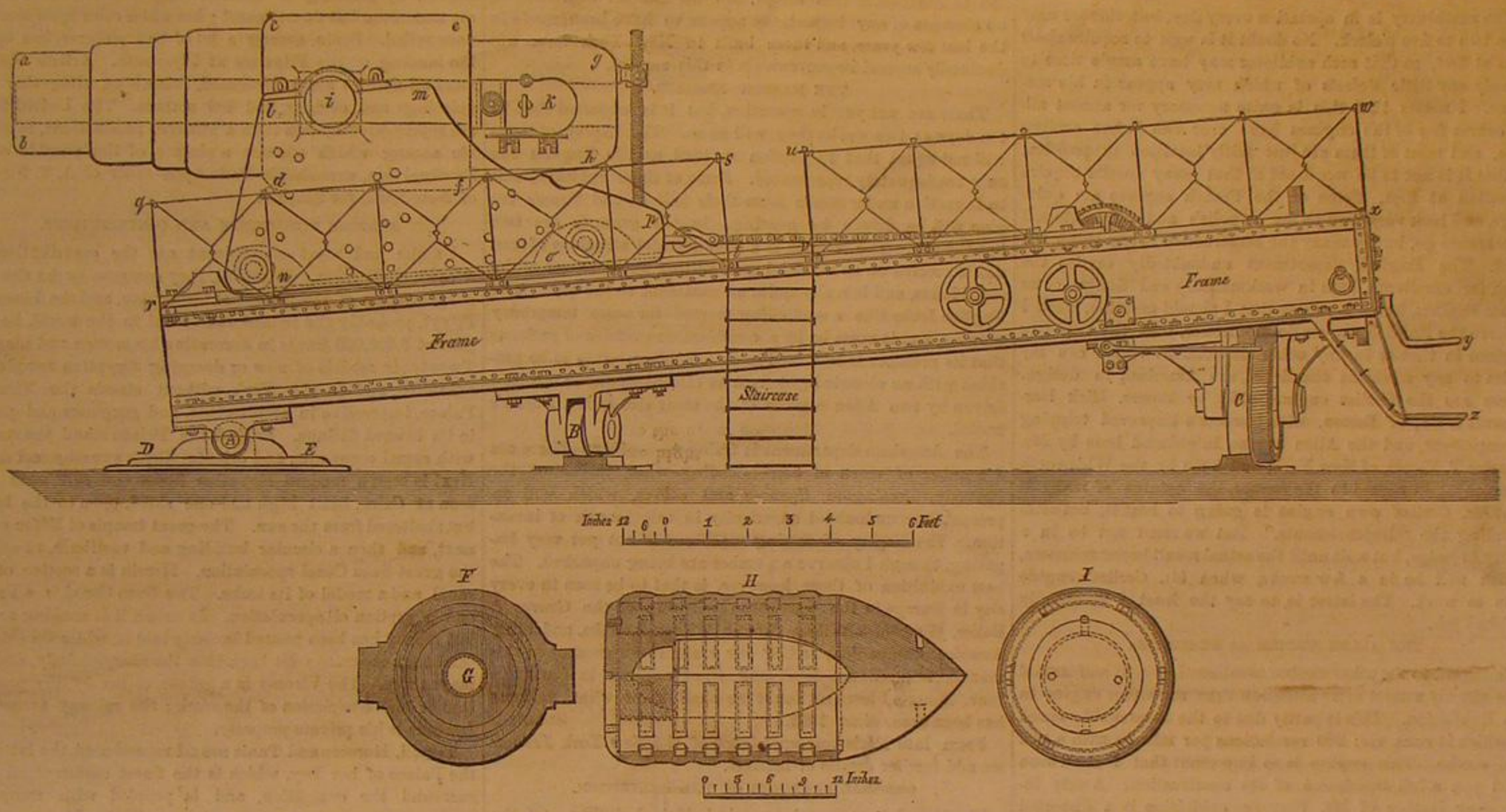
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XVI.—No. 20. [NEW SERIES.] NEW YORK, MAY 18, 1867. $3 per Annum. [IN ADVANCE.]

Krupp's New Cannon for the Paris Exhibition.

Rhineland and Westphalia are undoubtedly among the most important provinces of Prussia, and one of their most important establishments is that of Mr. Krupp, which from the character of its work must be ranked among the first manufactories on the European continent.

This establishment will be represented at the Paris Exhibition by four or five steel cannon, ranging in size from the smallest field piece to the heaviest caliber, the one represented in the accompanying engraving being without rival the most powerful cannon in existence. This immense gun



KRUPP'S BIG GUN FOR THE PARIS EXHIBITION.

is a rifled breech-loader of 14 inches bore, constructed wholly of cast steel, and weighs 1,000 cwt., and the cannon (intended for the armament of a coast fortification) consists of an inner barrel having several cast-steel rings or reinforces welded around it while hot.

The inner barrel, the most important part of the whole, weighs 400 cwt. and is wrought from a pig of 850 cwt., under a hammer of 1,000 cwt. The loss of its original weight is caused by the falling off of the head or mold end, by forging, turning and boring. The cast-steel rings weigh all together 600 cwt. The breech stopper is Krupp's own invention. A charge of gunpowder of one hundred pounds is required to project the shot, which weighs eleven hundred pounds. As our readers may imagine, the cost of such an enormous piece is somewhat high, and the gun is now valued at $100,000. Workmen have been engaged in its construction night and day for the past year, and only by the greatest exertion will it be completed in time for the exposition.

The cannon is mounted on a steel carriage forty feet long by nine feet wide, and weighing 500 cwt. The mechanism for maneuvering this enormous mass of metal is so arranged that the proper elevation, declination, etc., can be given by one or two men with the greatest facility, and with such rapidity that a passing vessel can be aimed at with accuracy.

As on the railroads no car could be found strong enough for transporting this cannon, Krupp was obliged to build an iron car for this especial purpose, which rests upon eight wheels, and which will take the monster to Paris and from thence to its final destination. The lightest cannon to be exhibited in Paris will be still heavier than the first cast steel one with which in 1849 Krupp first brought his invention of cast steel arms before the public. In order to test the various improvements constantly being introduced respecting the material as well as the construction of these guns, trials are continually made in Krupp's establishment which are witnessed by army officers of all nationalities, sent especially by their respective governments to Essen. About 30 or 40 cwt. of gunpowder are used every month for these trials.

REFERENCES TO THE ENGRAVING.—A B C, rollers; D E, pivot plate; F, cross section of barrel through trunnion, *i*; G, bore; H, longitudinal section of cast steel shot with leaden coating; I, cross section of same; *a b g h*, barrel; *c d e f*, reinforce; *i*, trunnion; *k*, breech stopper; *l m n o p*, carriage; *q r s t u v w x*, railing; *y*, crank communicating with mechanism by which the gunner moves the cannon, carriage, and frame, his position being upon the step, *z*.—*Leipzig Allgem. Illustr. Zeitung.*

A NOVEL COMBINATION.—An interesting suggestion is made in the St Louis *Republican* by Wm. H. Githens, for improving the Des Moines rapids (Mississippi river) and obtaining at the same time a railroad tunnel, a dam, and large waterpower, by one and the same structure. That is: to build a dam at the foot of the rapids, in the form of an arch, the hollow of which would form a tunnel, the hight of which would be sufficient to set back the rapids to the upper level and make smooth navigation, and the top of which would be crossed by a lock or locks for raising and lowering vessels. The water power obtained would be sufficient to found a manufacturing city.

IMPROVED ADJUSTABLE MITERING APPARATUS.

The accompanying engravings represent a mitering machine for which letters patent were granted through the Scientific American Patent Agency Aug 21, 1866. It is a semi-

Fig. 1.

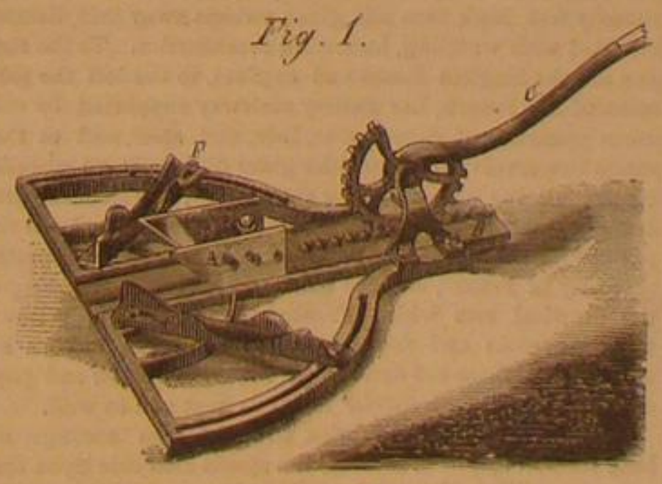
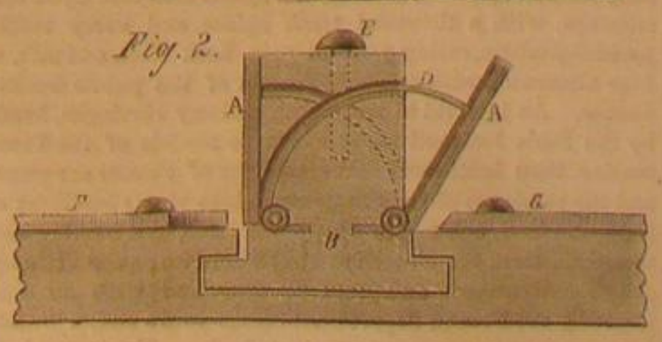


Fig. 2.



circular bed of iron, eighteen by twenty-eight inches, upon which are mounted hinged and sliding knives and movable guides, with a lever, segment, and rack. Fig. 1 is a perspective view and Fig. 2 a front, longitudinal, vertical section. A are the knives secured to wings which are hinged at the bottom to a movable carriage, B, which slides in grooves in the bed and is propelled by means of a toothed rack on its upper rear surface engaging with the toothed segment on the lever, C. The knives are brought into any position required by means of the curved guides, D, and held by the screw clamp, E. Rests for holding the strips to be mitered at any angle are seen at F. They are fastened in position by set screws traversing slots in the semi-circular frame and can be placed at any angle from 90° down to 5°.

For mitering moldings or strips edgewise the rests and knives are adjusted in the position seen at F, A, in both figures, and by adjusting the rest the end or edge can be cut to any angle desired. For mitering flatwise the position of knives and rests is as at G, A, Fig. 2, the rest being secured at an angle of 90° with the cutter head and the knife, A, being brought and secured in the desired position.

The machine will miter a molding six inches wide, the great power of the lever being directly applied. The form of the knife edge makes a drawing cut insuring perfectly smooth work. The machine appears to be well adapted to the purposes of the picture frame maker and cabinet worker and will prove useful in the joiner's shop. For further particulars address Howard, Thorndike, & Co. Belfast, Me.

THE PARIS EXPOSITION.

Our engraving (page 316) gives a view of the French Industrial Palace, situated in the Champ (field) de Mars, at Paris. This is a locality about one and a half miles from the central portion of the city, and, before the enterprise, was a large, flat, sandy, and naked plain, with its surface lower than the surrounding neighborhood, but which has now been transformed to a spacious and pleasant park. Its surface has been raised, hillocks and little valleys created, streams and rivulets, leading to little waterfalls and lakes, introduced in every direction, and the grounds diversified with buildings which are made the complete copies, in inward and outward fittings, of the structures of almost all the nations of the globe. In the grounds, also, are groups of sculpture, ornamental fountains, lawns, groves of trees, parterres of flowers and shrubbery, a garden with almost every known plant and shrub, horticultural establishments, marine and fresh-water aquaria, model cottages for the working people, infant nurseries, and almost every conceivable structure of interest.

The exhibition building is elliptical in form, and consists of a series of eight concentric halls, of oval shape upon the ground, each one outside of the other, which surround a neatly arranged garden in the centre. From this garden numerous covered streets or passages, each one bearing the name of a different nation, penetrate outward, and cross the halls in manner resembling the spokes of a wagon wheel, which radiate from the hub in every direction. Another separate building in the park, contains the surplus goods of various nations. The two structures cover about 185,000

square yards of space, and 500,000 is about the area of the whole locality. The buildings contain 800,000 articles, presented by 46,000 individuals, a list of the articles alone requiring a book of 1,300 double-column pages, while the care of the exhibition, and showing of the goods, keep within the buildings a constant population of 15,000, exclusive of outside visitors. It is stated that the government has expended two and a quarter millions of dollars upon the buildings and grounds, and it is probable that private expenditures will raise the cost to beyond three millions. The receipts from licensed stalls and exhibitors' spaces are a million of dollars.

THE GENERAL EXHIBITION, ENGINE DEPARTMENT, ETC.

These are referred to in the following letter from our Paris correspondent:—

PARIS, April 9th, 1867.

Though the progress of the Exhibition toward completion the past week has not been quite as noticeable as during the week previous to the opening, yet a great deal has been done, and it is beginning now to be thronged with visitors. The price of admission, which was five francs during last week, has now been reduced to one franc, which is certainly low enough to allow all who desire to visit it, either for amusement or instruction, to do so as often as they wish.

STEAM ENGINES—AMERICAN PATTERNS.

The machinery is in operation every day, but this for only from two to five o'clock. No doubt it is well to require short runs at first, so that each exhibitor may have ample time to remedy any little defects of which may appear in his machine. I notice that this is quite necessary for almost all. Of course few of the engines have ever run before coming here, and most of them are just fairly installed in position, so that it is not to be wondered at that many details require attention at first. Some of the French engines are quite large, and look very well as far as polish and mere external appearance go, but in many the construction is any thing but good. The English department undoubtedly carries the palm for excellence, both in workmanship and design, of its steam engines, but it is proper that I should mention, what I observe the English papers do not notice, that the only two engines in that or in any other department which can lay claim to any scientific excellence, are American in design. These are the Corliss engine, built by Messrs. Hick Hargreaves & Co., of Boston, with Spencer's improved tripping arrangement, and the Allen engine, introduced here by Mr. Charles T. Porter, of New York, and built by the Whitworth Company. In regard to the former, the opinion of many is that Mr. Corliss' own engine is going to beat it, notwithstanding the "improvements." But we must not be in a hurry to judge, but wait until the actual result becomes known, which will be in a few weeks, when Mr. Corliss' engine gets to work. The latter is, to say the least, a beautifully finished job.

THE ALLEN ENGINE AS EXHIBITED.

In regard to the other engine mentioned, it will and indeed does already attract more attention than any other engine in the Exhibition. This is partly due to the remarkable speed at which it runs, viz: 200 revolutions per minute with a two feet stroke. This engine is so important that I shall soon send you a full description of its construction. A very interesting feature of Mr. Porter's exhibition is a dissected model of his engine, to show the action of the valve gear. It consists of a perfect engine, being indeed one of a lot built for a certain purpose, in which the upper half of the cylinder is planed off so as to uncover the piston, and the steam chest, which is at the side of the cylinder, is cut in two longitudinally so as to show the exact motion of the valves. This is driven by suitable gearing from the large engine at the speed of 12 revolutions per minute, but the connection is such that it can be thrown out of gear and worked at pleasure by hand, so as to give time to observe more distinctly the amount of opening of the valves at the ends of the stroke and the points at which they close. The valve gear belongs to that class in which the cut-off is regulated by the governor, and to show the operation of this in the model he has the governor driven at the same speed as that on the main engine, so that while the piston and valves move slowly, the governor is making the same variations in the distribution that are occurring in the large engine: thus enabling one to see what is going on inside the steam chest of the latter.

PROPOSED TEST OF STEAM ENGINES.

Informal notice has been given to exhibitors that all engines will probably be required to be indicated, and the award be based on the facts so elicited. Though this has not been finally decided on as yet, it is a most rational requirement. In these days of engineering we want something more than highly polished connecting rods, or even than good workmanship *alone*. In the London Exhibition of 1862 there were many engines considered worthy to be exhibited, which when the indicator was applied to them showed a distribution of steam most defective, and it is obviously wrong that such an engine, however finely finished, should be allowed to complete with perhaps a plainer one in which the steam is freely admitted and freely released from the cylinder.

Considered as a mechanical job, there is a beautiful pair of engines exhibited by Messrs. Galloway & Sons of Manchester. The framing of these engines is as neat and substantial an arrangement as it would seem possible to design. There are two cylinders side by side, the steam chests being on the sides and between the cylinders, so that they are bolted together by these parts as in English inside cylinder locomotives; not in itself, I am sure, an arrangement to be commended. The framing consists of three straight and parallel ribs, if we may call them so, one running from the outside of each cylinder to the crank shaft pillow block, and one in the center between the two cylinders, containing in itself the center pillow block for the shaft. These ribs, which are perhaps 6 inches wide and hollow, are of such a hight as to come a little above the center line of the engine from the cylinders to the pillow block, and beyond this point they are made lower, thus enabling inclined caps to be used for the pillow blocks, which are formed in the body of the frame and therefore in the best possible position for sustaining the strains that come upon them. The framing extends far enough beyond the bearings of the shaft to allow the three main ribs to be connected by a cross member just clear of the throw of the cranks. As this appears to be all cast in one, there being no flanges or bolts to break the continuity of the lines, it presents the most agreeable appearance to the eye. A bonnet at the *end* of the steam chest between the back cylinder heads gives access to the valves, but under the difficulties which must always exist where the valve seats are so close together.

THE LENOIR GAS ENGINE.

There are several Lenoir gas engines in the French department, and one or two of them are connected with the gas pipes, so that they will probably be in operation. I shall take pains to observe the performance of these engines and communicate the results, as I know considerable interest is felt in America in this motor. In mechanical construction, no changes of any importance appear to have been made in the last few years, and those built in New York have undoubtedly several improvements in this respect.

THE MARINE ENGINES.

These are not yet in operation, but it is expected that in ten days or two weeks they will be so. The display of these will not equal that in London in 1862, as the English are only inadequately represented. Some of those exhibited will be in motion under steam from their boilers, and Penn's engine will be driven by gearing. In the grounds are two lighthouses. The French is a very tasteful structure of iron and is erected on an artificial rock jutting out into one of the small lakes, and is really quite an ornament to the park. The English looks like a scaffolding erected for some temporary purpose, and it must be by a considerable exercise of patience that its presence is tolerated in such a place. It is to be provided with an electric light from an electro-magnetic machine driven by two Allen engines of the same size as Mr. Porter's model.

The American department is filling up rapidly. There are a number of cases of breech-loading rifles, including the Peabody, Remington, Spencer and others, which will represent our undoubted superiority in this branch of invention. The display of sewing machines is not yet very imposing, though I observe a number are being unpacked. The best exhibition of these, however, is that to be seen in every city in Europe in the warehouse windows of the Grover & Baker, Wheeler & Wilson, Singer, Wilcox & Gibbs, and other American companies; so that our claim to supremacy in this manufacture will not depend on what appears in Paris this year, though I have no doubt we shall show what progress has been made since 1862. SLADE.

From late Paris correspondence of the New York *Tribune* we add further details of interest.

GENERAL FEATURES OF THE EXHIBITION.

The French part occupies nearly half the building. Of the remaining space England takes one fourth, then Belgium, followed by Prussia, Austria, and Switzerland, in the order named, and then come the United States, ranking seventh as to space, and taking up one sixteenth of the room devoted to foreign nations. The United States have a retired but pleasant position—have progressed greatly in arranging the goods, but were at first more backward than any other nation.

Entering at the Grand Avenue of the Park, the same gate that admits the visitor registers the number, and straight down the Grand Avenue, among innumerable fountains, statues, and curious edifices, under a green and golden vellum canopy you find the great arched portal of the Exhibition building broad and high before you, and its exterior circle, seventy feet high, iron and glass, sweeps away into distance, crowded with whirling, humming machineries. To the right you see the English looms and engines, to the left the panorama of the French, her gallery stairway supported by enormous pyramids of copper, zinc, iron, and steel, and at their crests two revolving lights, like giant diamonds, go wheeling crystal all the while. Along the gallery, at intervals, great engines stand, in the solid floor below, to turn the shafts that put all the machines in motion. These engines represent each city in France, and the machines they turn represent all the practical arts which France essays. A steady line of workmen, male and female, reach among the brasses and wheels, and these are dressed in the blue *blouses* and paper caps that the French *ouvrier* keeps so neat and so well.

Railway bars, copper fabrics, wrought iron cordage, and long lines of spinners, moving the spools that ride upon their railways, with a thousand teeth apiece, and every tooth a prestidigitateur, eating yarn to give back cloth and silk, are here alternated with frequent models of the public works of France. An interval of mammoth railway carriages, headed by the Paris locomotives, succeeds to models of the French marine, then indifferent coal specimens of France are passed, and the carriages of the people come into view; not light are they like ours, but full of ponderous laces, and bearing coats of arms. Here are French sewing-machines; poor little telegraph instruments compared to ours, and with an organ booming the French department comes to an end, a wonderful museum of a great nation's industry. Next stand the colonies of France, in Africa, Asia, and America, with canes of sugar and bamboo at their crushing instruments, great bales of cork, and feeble traces of cotton.

The next great nation is Belgium, whose mechanical industry is the most ardent of any Continental nation. She is the New-England of the Continent, and her engines are more massive and powerful, but less graceful, than the French. Belgium shows in her department of mechanics great power and resources, but little that is novel.

The next of the nations is Prussia, that has brought hither all sorts of guns, and swivels, and bayonets. She shows products from all her newly-conquered provinces, locomotives and saddlery, wood-carving and threshing machines, much, indeed, that is quaint, but little that is suggestive, except ordnance. Prussian, and indeed all German machinery, is slow and plain, not comparable to that of France or Belgium.

Baden, in fire engines, field and street telegraphy, and ordnance, stands well. Russia and Turkey lie together, with few machines or products, but very completely and lavishly ornamented in strange, half Byzantine architectures. Sweden, and Norway, and Italy have little machinery. Great Britain in the mechanical department appears to great advantage; yet the models of almost all her vehicles, looms, boilers, and engines are like her people, thick-set and stumpy.

The crowning glory of its great Exhibition is its art collection. One half is the work of living Frenchmen. Their school of painting is so far the superior of all others, that not even rival patriotism questions it. The Germans give up the contest by refusing to exhibit. The English oil paintings are numerous but do not excel; her water color specimens are unequalled. Spain, among a lot of bad pictures, has one of the landing of the Pilgrims at Plymouth. Artists from almost all nations are represented, furnishing altogether 6000 paintings and designs, and 400 statues. The United States are represented by less than a hundred productions, remarkable among which appears a picture of the parable of the Prodigal Son, executed in Paris upon order of A. T. Stewart, of New York, for $12,000.

AFRICAN STRUCTURES AND CONTRIBUTIONS.

Unique and most magnificent are the contributions of African civilization. Together, they compose by far the most gorgeous part of the Universal Exposition, and the Viceroy of Egypt, probably the richest individual in the world, has expended 8,000,000 francs in decorating his section and his park Twenty-six models of new or decaying Egyptian temples are exhibited, and in the Park without stands the Viceroy's Palace, impressive in architecture, and gorgeous and perfect in its inward fittings. Behind the Palace stand the stables, with camel occupants, and oriental slaves swarthy and dumb. Next is seen a modern Egyptian house and *café*, such as is seen at Cairo, built high and one sided, open to the breeze but sheltered from the sun. The great temple of Edfon comes next, and then a circular building and vestibule, to exhibit the great Suez Canal speculation. Herein is a section of the canal, and a model of its locks. The Suez Canal is a French and Egyptian oil-speculation. In result it is nothing as yet, but money has been poured lavishly into it, while the shifting sand they excavate rolls back into the channel daily, and dismays them. The Viceroy is a gainer, either by the prosecution or the completion of the work; the railway across the Isthmus is his private property.

Tripoli, Morocco and Tunis are all represented, the latter by the Palace of her Bey, which is the finest edifice of all that surround the exposition, and is peopled with troups of Arab attendants in native costume. These Moors exhibit more vitality to-day than the Spain which expelled them, and the Egypt of 1867 stands out more vital than Rome, the head of the Church.

FURTHER EUROPEAN EXHIBITORS.

The Pope and Cardinals exhibit copies of architecture 500 years old, some fruits, oils, wines, private jewelry, carriages, and imitation carpets, but no educational machineries and few tools of surgery or economy. Spain characteristically shows 38 exhibitors of church tapers, and out of 29 paper manufacturers two thirds make only cigarette paper. Italy shows much vitality, eight Italians exhibiting improved telegraph cables, and tramways, hospital trains, iron sleepers, novel railway apparatus, and military goods being presented in great variety. There are also 90 varieties of Italian marble, most of them strikingly beautiful. Greece shows steam engines and navigating balloons, with her native products, but not one agricultural, or mining, or domestic invention. Russia has been the most forward nation of all to supply and ornament her department, which shows the towers of the Kremlin, booths from the fair at Novogorod, huts of the Cossacks, the palatial arches of St. Petersburg, and rich displays of fabrics. The palace of the Grand Seignor displays the architecture of Turkey, whose department is brim-full of cunning, dextrous, and beautiful workmanships, the richest that are made, and gorgeous with silver and gold. But in machineries the Turks, like other Asiatic nations, have nothing, save one fire engine. Their cunning is only in handicraft; they entertain no notion that nature should do man's work, and steam and the magnet are to them almost undiscovered. China comes forward with her silks, matting, teas, firecrackers, and outside, with a two-story tea drinking saloon, open-air theater, and native women to supply tea and take the change. Japan has an embassy, shaved and sworded, looking about. Switzerland excels in watches, and her breeds of St. Bernard dogs attract attention. The Hollanders have in the Park a model butter and dairy farm. Norway excels in fishing apparatus; Austria in cereals; Portugal in heavy wines.

In the Park, the Emperor's present to the Exhibition is an iron lighthouse, 180 feet high, standing upon a very natural rock in an artificial lake.

THE UNITED STATES DISPLAY.

The United States Department is found upon examination to fall below the expectations of foreigners and friends. The

American Commissioner in Paris is a patriotic gentleman, without executive ability, and with little knowledge of the idiosyncrasies of his countrymen. Our goods are scattered, one half of them standing in a shed or *annexe* out of the way, while the total of them could be made to fill the sector of the main building appropriated to us. This main sector is ornamented with the shields and seals of the States. A French engine of the size we see grinding chocolate, runs our machinery; but we are now putting up a fair Corliss engine, one out of five that we show. In the American *annexe*, where you can see the French committee of awards at work every day, looking learnedly, the most characteristic of our inventions stand. Conspicuous in the midst is the beautiful Grant locomotive, *America*, the largest and finest ever seen in Europe, built at Paterson, N. J., standing high and colossal, its engine house made of the oiled woods of our country—ash, maple, walnut and oak—splendid in its brazen moldings and appointments, and its tender is painted with the arms of the Republic. This engine cost $35,000 and great interest is manifested to see it fired up and run. It is the most majestic single contribution that we have. Beside it, is a remarkable street railway car, built in New York for Calcutta, upon a new principle of carrying passengers, and bearing on its sides inscriptions in the native Hindostanee. With these is the great Daboll fog-trumpet, blown by steam, and stated by scientific men to be audible from horizon to horizon in the densest vapors. It was sounded the other day, and when the Arabs, Japanese, and Malays heard it, they fell upon their faces thinking Allah had come in the shape of a roaring lion. It roused the Faubourgs like the bell of Marat. Curled up in its huge case, as if for a snore, its Ericsson engine, like a dapper stomach, just throbbing; the whistle of the calliope is no more than a bird song to it.

The American reapers and mowers, although the most ornate and extraordinary in the Fair, are largely represented from almost every manufactory. The specimens on show are often in carved and inlaid woods, and in engraved steel. Ohio, New York and Massachusetts have each their favorite mowers, but that which most attracted and surprised has been the patent of John G. Perry, who sits upon it like a jovial Archimedes, that has put his fulcrum in Rhode Island and means to mow the universe. This machine has a curious hollow axle, that gives it the air of standing up of itself, and the simple principles on which it is built, with the few parts into which it is separated, are reasons why the Paris people do not wonder when they hear that thousands of similar cradling giants will go through the fields of America next harvest. Wood, Ridgeway, McCormick, Wallace and Seymour are the other great reapers. New England, indeed, with her restless suggestiveness, makes almost all that is shrewd, quaint or startling here. New York is represented by massive workmanships. Her power is in her forges rather than in her idiosyncrasies. Instance the State of Connecticut again, where you see Gov. Benjamin Douglas, having quitted his executive dais to show mankind his famous pumps. He has here about 40 different garden and fire engines, rams and chargers, which are, in many cases, no bigger than a wine-bottle; yet, as you see the French water-sprinkler, with a poor hand-nozzle go to and fro wetting the flowers, you know that any one of these American pumps is a very geyser, capable of drowning a man with a jet as well as making the summer rain fall gently and equally. We are making such machineries as much for foreign as for our own people now.

The collection of platform scales, represented by Howe and Fairbanks, is curious and exhaustive. The latter great firm has one large scale adjusted to the weights of each country, so that even Turkish characters may be seen upon them; and one of their railway scales is so powerful that you could almost weigh the Exhibition building upon it, and it is at the same time so true that one apple lifted out would affect the balance-rod. The Polyglot Justice is not more blind and strong.

In the heart of the American triangle the pianos are arranged; one of the largest and best collections that the country has ever exported or exhibited. Artists of eminence make perpetual music here, and the quarter is always densely crowded. The superiority of our instruments is not questioned even by the rival manufacturers of Paris, Vienna, and Leipzig. Playel, Erard and Herz have far inferior displays, and find it difficult to attract the Littholfs, Jaels, and Liszts of the continent to their plainer wares and feebler instruments. All our great firms are represented, and the contending keys, in passages which all the world warbles, mingle their winds, as if the birds of the West in choirs, had assembled here to sing. The spectators divide their enjoyment, now listening to some composer try his own latest music upon a Schomacker, Chickering, or a Knabe; but the seven superb instruments of the Steinways allure the professional people, and here the best musical talent in Europe may be seen from morning till dark—Stephen Keller, Eugene Ketterer, W. Kruger, Alfred Jaell—grouped about the bird-cages. The "overstrung" harp, as it is called, in the Steinway piano has attracted the greatest interest here from its novelty and the sweetness and power which its superior vibration gives. The best piano makers in Europe have sought the privilege of sending their workmen to examine it: and professional artists compete to play upon it. It is very odd to note how, by our mechanical genius, we have so carried away the honors in the arts, and our department has the best music in the whole Exhibition. The grand Steinway was said by Rossini to resemble a nightingale cooing in a thunder storm. We also exhibit stringed and wind instruments and accordeons. The Lehigh Navigation Company sends a single lump of coal weighing the tuns. Colorado sends likewise a lump of crude silver as big as a cooking range. Among the novel American articles are papers made of wood, straw, and hemp; pens, combining the inkstand; apparatus to cure stammering; do. to cauterize dental machineries of all sorts, including a saliva pump; barometers of all sorts, sun dials, lenses, and compasses. The surgical department of the United States Army shows its ordinary ambulances and surgical instruments, while the Hydrographic Office is rich in new marine instrumentalities. All our States show geographical maps; cradle, rocking, and folding chairs are frequent, with iron safes and water coolers, while most of the American marbles are exposed, and many glass wares. We show paper hangings from three cities, Newark cutlery, and clocks from Connecticut, Indiana, and Louisiana. Tiffany, the jeweler, shows silverware of massive and beautiful character, and Tucker, of New York, exhibits bronze iron ware, fine as the veriest bronze. Petroleum develops 17 exhibitors; we compete in meerschaum pipes with Europe; and our cloth manufacturers come from New York, Lowell, Newark, California, and Boston. We show crinoline, now antique in Europe, water-proof stuff, wooden boot heels and soles, corsets, hats, even cameos. The Quartermaster's Department of the Army has sent over teams, equipments, and clothing, as yet badly arranged. We have tiles cut by machinery, prepared peat, crocodile boots, root cutters, prairie plows, digging machines, sorgho strippers, winnowers, sack fillers, beehives, pig cutters, sheep shearers, horse forks, guano and charrue, snares, apple peelers, alarum coffee pots, clod breakers, shoe peggers, buttonhole stitchers, and sewers without number.

The American Lead Pencil Company has one of the most prominent places in the Department, and the designs drawn in its leads are by some of our pleasantest artists. There are books from the Riverside press, and from Appletons, and photographs from almost every American City. Forty exhibitors show bandages and artificial legs; 24 guns, pistols and projectiles; every Northern State and Alabama show minerals and precious ores; the latter State is ably represented by its Chief Engineer, Hiram Haines, and his collection is very hopeful in cotton, gold, iron and coal.

The furs that we exhibit are attractive, and 11 parishes in Louisiana send tobacco; nearly all our manufacturing chemists report themselves, and in machinery of all kinds the country is well exhibited. Still, an American, with a knowledge of our mechanical superiority, and used to the grand scale on which we subdue nature, will feel demeaned by what he sees in Paris. It is suggestive, strange, and indicative of a natural genius for the industrial arts; but it is not the best of America.

The Exhibition is a success. I was at London in 1862, and looked fairly at what the English now praise so invidiously, and I believe the French Exhibition to be three times vaster, more cheerful, and more wonderful than that. France shows now in Paris more than England showed on her own soil; with equal vigor and quantity in manufactures. France far exceeds her neighbor in art, and the Grand Exposition is not surrounded by a filthy city, whose atmosphere is fog and bitumen, nor by a people whose false social system recalls to you, in every man you meet, a flunkey or a snob. All who had intended to come here will not be disappointed. The face of the world never before concentrated so many attractions.

LUBRICATING PETROLEUM AS A SICCATIVE OIL.

From a correspondent in West Virginia we have received a communication on the use of the heavy petroleums—lubricating oils—as vehicles for pigments. He believes they are equal and, in some cases, superior to linseed oil for this purpose. He quotes scientific and other authorities in support of his position. A series of experiments were made with linseed oil and Pennsylvania and West Virginia heavy petroleums in a lighted room kept at 60° F. On metal the linseed oil dried in seven days, the Pennsylvania petroleum in nine days. On glass, linseed dried in ten days, Pennsylvania in one month, and West Virginia in seven days. On wood, the experiments showed in ten coatings, each applied soon as the preceding coat was dry; linseed dry in thirty-six hours, Pennsylvania petroleum in thirty-five, and West Virginia in twenty-four.

The writer says he has seen several houses, brick and wood, which have been painted a year or more with this oil as a vehicle, and thus far the petroleum paint stands as well as that mixed with linseed. The Baltimore and Ohio Railroad Company use the petroleum for painting their cars and consume more for this purpose than for lubricating. Other statements are made to show that the lubricating petroleum is well fitted to take the place of linseed oil and that it is very much cheaper.

We are not prepared to view the substitution of this hydrocarbon for the linseed oil, so sanguinely as our correspondent. One of the facts stated by him is that the petroleum oil absorbs one sixtieth the amount of oxygen that raw linseed oil does and one fifteenth that of boiled linseed. This may be an advantage, but we do not so understand it. In drying, the linseed oil does not evaporate, but, combining with oxygen, is transformed to an elastic gum which holds the particles of paint in one mass. Petroleums hold in suspension rather than in chemical combination a certain amount of asphaltum and paraffine. When the oil is evaporated there will be left this asphaltum or paraffine, a brittle substance incapable of holding the paint powder in cohesion. It may be, however, that used with litharge, japan, and a portion of linseed oil these heavy petroleums may be adapted to some kinds of work and answer as well the purpose as pure linseed oil.

GLYCERIN PASTE for office use may be prepared by dissolving one oz. of gum arabic and two drachms of glycerin in three ounces of boiling water.

PROGRESS OF THE COMMISSION OF LIFE-SAVING INVENTIONS.

The eighteenth meeting of the Board of Commissioners was held on Saturday April 27th. Several models of life boats and rafts were examined after which the Board adjourned to a foundery in West street and witnessed some interesting and satisfactory tests of the strength of corrugated iron. A short session was held on Monday, and at its conclusion the Commission on invitation visited the steamer *Scotia* of the Cunard line, inspecting her boilers, engines, and life saving contrivances. Tuesday, was devoted to the examination of patent anchors, and witnessing some experiments with non-inflammable paint, and a trial of the portable fire-extinguisher described in these columns several weeks since. On opening the twenty-first days, proceedings, a motion was passed appointing Friday the 3d inst. as the last day on which models or drawings would be received. This step was necessarily taken as the vast collection of these devices already accumulated has been daily receiving new accessions thus indefinitely protracting the labors of the Commission. The subject of locked safety valves was taken up, and several papers from interested parties read and disposed of. The examination of inventions classed under the first division, was then declared as completed. Models of patent steering apparatus, water expelling-pumps, water detectors, and life-preserving berths were examined, and passed upon at the meeting on Thursday; afterward the Commission proceeded to the laboratory of the New York College where Prof. Doremus delivered a lecture on the employment of certain gases on board of vessels, as fire extinguishers, illustrating his views with numerous experiments.

Prof. Doremus was also present at the regular meeting on Friday, explaining at length a plan for carrying liquified carbonic acid gas in suitable reservoirs connected with stationary pipes or hose by which a fire in any part of the ship could be extinguished. Several models of life boats were submitted, also a life spar, a life preserving mattress, and anti-incrustators. The American Magnesium Company exhibited an apparatus for signaling at sea. After listening to a paper on steam boilers, their construction and causes of explosion by Mr. McDougall, the Commission adjourned.

Prof. Wheatstone's Cryptograph.

The importance of a secure cipher for commercial, military and other telegrams of a confidential nature, grows with every step in the extension of telegraphic correspondence, and has brought forth a most ingeniously simple and effective invention for the purpose mentioned, which has been adopted by the British War Office. The parties to a confidential correspondence by telegraph are each furnished with a little instrument consisting of a dial having the letters of the alphabet printed in regular order in a circle near the circumference, with one blank space, making 27 intervals. In a circle within this runs a flanged groove having room for just 26 letters, and in which the letters, printed on separate bits of card of the exact size, are arranged in any arbitrary order understood between the parties. A secure and convenient way to fix this arbitrary order in the mind without risking it on paper, is to agree upon any word easily remembered, and when a despatch is to be sent or deciphered, write down the letters of this word, and under them write the remaining letters of the alphabet in their proper order from right to left, one letter under each letter of the word, then beginning another line under this in the same way, and so on until the entire alphabet is arranged in both lines and columns, which are to be read vertically, and the letters in the inner circle of the dial are to be arranged in that order. After the despatch is sent or deciphered, as the case may be, remove the letters, and the instrument is again uncommunicative.

But the mode of communication remains to be described. The center of the dial is penetrated, exactly like a clock, by a shaft or arbor passing through a hollow arbor, the former bearing a long and the latter a short index hand. Each of these arbors has also fixed on it a spur wheel, gearing on a loose pinion common to both, so that turning the one turns the other. But the spur wheel of the short hand has twenty-six teeth and that of the long hand twenty-seven, answering respectively to the divisions of the inner and outer circles, so that at every revolution of the long hand, the short hand completes the circuit of the alphabet and one letter further, thus gaining one every time. Consequently, a message spelled out with the long hand, and written out in the letters simultaneously indicated by the short hand, would be in a constantly changing cipher, in which no letter would be represented twice by the same substitute, and no possible clue could be obtained without first obtaining the magic word upon which the inner circle of letters was arranged. The receiver of the message, having properly arranged the arbitrary alphabet in the instrument, has only to turn the short hand to the letters of the dispatch as received, in succession, and write off those indicated by the long hand. The instrument is, of course, only to be turned forward, or from left to right.

THE CITY OF AUSTIN, Nevada, is six thousand feet above sea level, where the air is so thin that the least physical labor causes great shortness of breath, and the atmospheric pressure is so light that those of its four-thousand inhabitants who find it necessary to wear artificial teeth experience extreme difficulty in keeping their sets in position.

THE ATLANTIC CABLE, according to the London *Daily News*, is now transmitting more messages than ever. The daily number is constantly increasing, and the receipts now average $5,750 in gold a day.

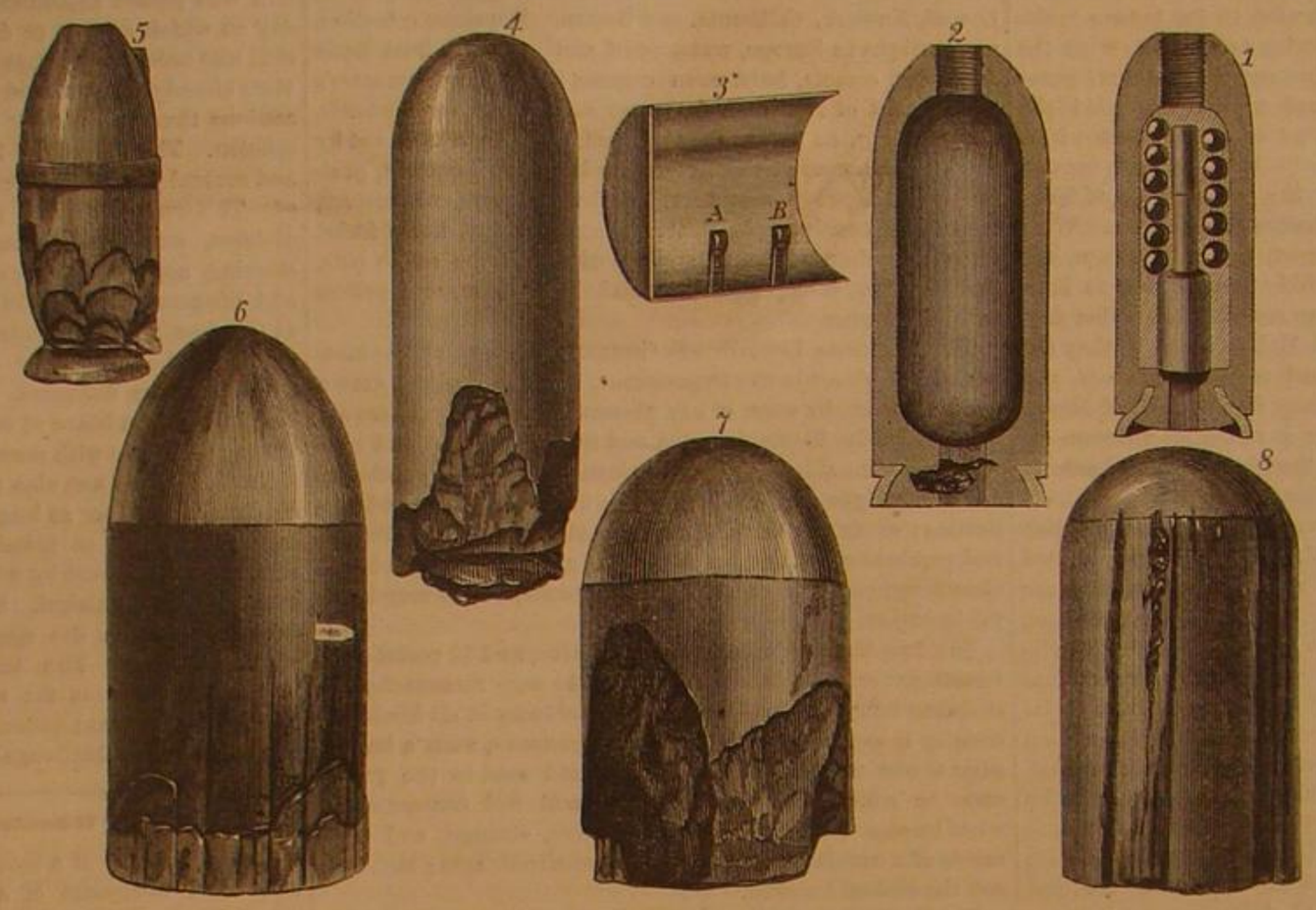
The Bursting of Guns.

We have received a communication on this subject from a gentleman who has had excellent opportunities to investigate the matter, and has made many experiments to elucidate it. During the late war a large number of the projectiles used by the respective armies were ill adapted for service. Many of them broke in the gun on the shock of discharge, others burst outside the gun prematurely, while many did not burst as intended.

Cast iron is the metal usually employed for projectiles for guns. It is highly crystalline, and the size and character of the crystals depend upon the process of extraction of the iron from the ore, and on the amount and nature of foreign materials held in chemical or mechanical combination with the metal. Repeated meltings will change the size of the crystals; it is therefore necessary that the character of the metal should be well understood. Very soft material for projectiles upsets on the shock of concussion, and very hard metal is apt to fracture.

The mode of applying sabots, and the material of which they are made are important. A hard sabot will transmit the shock of concussion to the shot itself, and tend to break off wedge-shaped portions or upset the base. Our correspondent speaks highly of the Thomas brand of iron which has a tensile strength of 18,000 lbs. per square inch, and the Hopkins' brand of cold blast, charcoal iron having a tensile strength of 24,000 lbs. to the square inch. He has never found any difficulty with either in practice.

Even sabots of papier maché, soft lead, or rubber, may, under certain conditions, cause the bursting of a gun by premature fracture, as when the gun has a gain twist if too fast, or the projectile is too heavy for the gun and the charge. Papier maché sabots, as usually manufactured in this country, contain potash combined with rosin as a binding material. The alkali absorbs and retains moisture, swelling the sabot.



GUN PROJECTILES AND SABOTS.

If a gun be loaded, the projectile having a papier maché sabot, and not fired until several weeks have elapsed, the sabot would have time to absorb moisture and swell, thus tending to burst the walls of the gun when acted on by the explosive force of the powder. A soft lead sabot has also a straining effect, especially when the gun is foul; it has no lubricating quality, but on the contrary retains grit, and is employed by the lapidary for this quality. Probably the bursting of rifled guns is often due to the wedging of the sabot in the projectile.

Fig. 1 is a sectional view of a 3-inch Parrott case shot. It will be seen that the sabot enters the base of the shot as a wedge. This is known as the Reed sabot. It is found in practice that this sabot has a tendency to break off pieces from the base of a projectile, which act as wedges, so that the projectile, itself, will take the grooves in the gun. Fig. 2 is a sectional view of a Parrott 20-pounder shell. It will be seen that the sabot does not enter the base as a wedge. But even this form does not save the shell.

Some believe that the unequal distribution of heat caused by the combustion of powder tends to the bursting of a gun. In Fig. 3 our correspondent shows a simple device for testing this question. He styles it a "gun pyrometer." The engraving is a sectional view of a metallic cartridge capable of holding one pound of powder. A and B are slips of common tinned iron; on A is soldered a composition of tin and lead which melts at 312°, and on B is a metal which fuses at 450°. The case, being charged with gunpowder, is placed in the piece and fired. On the removal of the cartridge case the metal fusible at 212° has melted and run down slightly, while that which melts at 450° has not changed. This has been repeatedly tried and in no case were the slips of tinned iron warped or injured by the heat, or the metal on B injured. It would seem that the repeated experiments which have been made by our correspondent with this pyrometer tend to show that a very small amount of heat is communicated to the gun at each discharge by the combustion of the powder. No doubt considerable heat is generated in rifled ordnance by the friction of the sabot and projectile, particularly in rifled guns, and in some cases the friction is so severe that the edges of the lands crumble, and the projectile will consequently jam in the gun, straining it more or less; still, the wedging or upsetting of the bases of projectiles may prove more destructive or injurious to the gun than the premature bursting of a shell while in the gun.

Fig. 4 represents a shot which was fired with one of the wedge-shaped Reed sabots seen in Fig. 1. It is a 30-pounder projectile and shows how the sabot broke off wedge shaped fragments. Fig. 5 is another illustration. In this case the base is preserved, but there is the same wedge-like fractures. Fig. 6 is an 8-inch Parrott shell. It will be observed that the wedges are formed, but held in position. Fig. 7 is an 8-inch solid shot, the sabot of which was of hard gun metal. The wedges extend up nearly the whole length of the cylindrical portion of the shot. Some of these hard metal sabots were removed and others of soft metal, composed of tin, lead, and copper, were substituted, and in no case were wedges formed. Fig. 8 represents a solid shot for an 8-inch Rodman. It has grooves to fit those in the gun. This shot requires no sabot. It will be seen that the condition of the grooves prove that they left the lands of the gun. On the fiftieth round the gun was burst.

The tendency of every shot in a rifled gun is to go straight forward; *i. e.*, leave the lands of the gun. Rotation of a shot is a forced motion, unnatural to the projectile, and it will be seen that with a high initial velocity the tendency of shot in such guns is to strain the walls. Then there is the strain from the upsetting or expansion of the base of shot, particularly of those using a sabot which acts as a wedge. Where the shot and gun, both, are of iron the friction on the lands of the rifling must be very great, and the action of the liberated gases and the direct line of the shot would tend to burst the gun; but the wedging of the fragments disengaged from the base of the shot must have an injurious effect on the gun. It seems as though the form and material of the sabot is a very important matter, and as it is easily seen that they affect the durability of the piece, greater attention to this matter should be given than that which it has heretofore received.

The Galibert Respiring Apparatus.

The portable atmosphere which we described lately, appears to be making its way into this country, as an aid to firemen—and why not to divers?—as well as to miners. The apparatus was subjected, the other day, in Chicago, to a public test in the presence of the Fire and Police Commissioners, representatives of the insurance interest, and others.

One of the cells of the central police station was made air-tight, and in it was kindled a fire with straw and sulphur, which filled the place with smoke very dense and excessively irritating. Mr. T. Galibert, a brother of the inventor who lives in Chicago, pulled out the apparatus from the case in half a minute, inflated it in another minute and a half, equipped himself in forty seconds, and rushed into the cell. The door was closed on him and he was left to his fate, the stench coming through the door, which was open only an instant, being so intolerable that the watchers were glad to escape to the open air. Five minutes elapsed, and the watchers began to grow uneasy—ten minutes, and they could brook the suspense no longer. They called out to the man in the dungeon, to know if he were all right. He answered with a cheerful whistle, and was allowed to stay. At the end of about sixteen minutes he came out. Save that his eyes were a trifle red from a little of the fumes which had passed under the goggles, he was just the same man as when he entered. His pulse was 130.

John Kern, a member of the Hook and Ladder corps, then assumed the apparatus and entered the cell. He staid in it nine and a half minutes, saying on coming out that it seemed as if he could have kept on breathing half an hour, but that the fumes penetrated under the goggles and made his eyes ache. We may remark that this would not be the case in the smoke from an ordinary fire.

It was noticed that the operator had both hands free to work or carry out valuables, the bag at his back being a very slight incumbrance, being scarcely the size of the human body, and offering no obstruction to the passage of the wearer. The price asked for the apparatus is $150 each set, or nine for $1,000.

"WIRBEL-BEWEGUNG."

What is wirbel-bewegung? Who knows anything about wirbel-bewegung? The secret has just been extracted that the round world and they that dwell therein, the big whales and little fishes, gorillas and anthropologists, the sun, the moon, the stars—nay, the foundations of the wide universe itself, are all wirbel-bewegung. The readers of *The Engineer*, the editor, the paper, the printing-ink, and the printer's devil, are wirbel bewegung root and branch. Historical personages, Henry VIII., the Holy Maid of Kent, Mr. Disraeli, the Cock-lane Ghost, Mr. Gladstone, the Thirsty Woman of Tutbury, the Vicar of Haverfordwest, the great Mogul, the reform league, Landseer's lions, and Balaam's ass, are all nothing more nor less than wirbel-bewegung. Who made the discovery? Professor Sir William Thomson, of the Atlantic cable, who first announced it a few days ago, to an assemblage of learned philosophers, with Sir David Brewster at their head, at a crowded meeting of the members of the Royal Society of Scotland. The first publication of such an announcement in England is of itself a mighty task, but now that the first burst is over and the secret out, breathing time may be allowed, and the details calmly considered in fresh paragraphs. We are now as exhausted as the hero of old, who took a run of three miles to jump over a hill, but having reached the bottom of it sat down to rest, and then walked over at his leisure.

A lump of any solid simple substance is reasonably assumed to be built up of a number of atoms of that substance, but such particles have never been seen, being infinitely beyond the ken of the most powerful microscope, so on this point there is fine scope for the exercise of the imagination. Let a poker made of the simple substance iron be made red hot in the fire, and it will grow longer than it was when cold; hence its constituent particles have the power of motion. In fact, heat in a body can be proved to be nothing but motion, and as absolute absence of heat represents a degree of cold that has never been attained upon earth, the atoms of all bodies are known to be in a state of motion. What that motion is, or what the atoms are like, nobody knows, so it has been assumed by many philosophers that the particles are incompressibly hard and infinitely rigid. "But," it has been argued, "it is impossible to imagine an atom so small that it cannot be cut in two; therefore, matter may be infinitely divisible." In this case it would not be matter at all, but a series of forces emanating from points, so that the universe may be built up of laws rather than of material substances. As it is, therefore, quite as impossible to prove as to disprove the existence of solid matter, the dilemma forms a very pretty puzzle, and the leading votaries of physical science at the present day are divided, without much dogmatism on either side, into two classes, the materialists and the immaterialists, and the ranks of the latter seem day by day to be gaining ground.

Professor Thomson based his communication upon the admirable discovery of Helmoltz of the law of vortex motion in a perfect liquid, that is to say, in a probable fluid destitute of viscosity or fluid friction. Helmoltz has proved mathematically an absolute unchangeability in the motion of any portion of a perfect liquid, in which the peculiar motion he calls "wirbel-bewegung" has once been created. Professor Thomson, therefore, boldly throws down the gauntlet, by condemning "the monstrous assumption of infinitely strong and infinitely rigid pieces of matter," and suggests that Helmoltz's rings are the only true atoms. Further, he managed, in the presence of the audience, to make some large vortex rings in the imperfectly elastic fluid, air, and to render them visible to the audience in the following curious way:—He took a large wooden box filled with smoke—any smoke will do, such as that obtained by burning magnesium, or by placing two jars in a box, one filled with ammoniacal gas and the other with hydrochloric acid gas. At one end of the box there was a round hole, and at the opposite end another and larger opening. Every time a cloth or piece of wood was flapped against the larger opening, of course a sharp puff of air laden with smoke in suspension shot out through the opposite round hole. These puffs instantly took the form of smoke rings and floated about the room, and were frequently seen to bound obliquely from one another, shaking violently from the effects of the shock. They rebounded from each other and trembled in much the same way that two india-rubber belts would do under the same circumstances. Had these rings been formed of a perfect fluid they would, as Helmoltz has demonstrated, have kept up the wirbel-bewegung motion to all eternity.

"A full mathematical investigation," said Professor Thomson, "of the mutual action between two vortex rings of any given magnitudes and velocities, passing one another in any two lines, so directed that they never come nearer to one another than a large multiple of the diameter of either, is a perfectly solvable mathematical problem, and the novelty of the circumstances contemplated presents difficulties of an exciting character. Its solution will become the foundation of a proposed new kinetic theory of gases." He proved that if two such vortex atoms were interlinked, nothing could ever separate them, for one line of vortex motion could never pass through another line. Thus such a double atom might much vary in shape yet remain essentially the same.

Here, then, is a new basis for all physical science with a vengeance. Since the time when a perfectly elastic fluid was acertained with tolerable certainty to permeate the universe, and to convey the vibrations of light from the sun to the earth, philosophers seem to have rapidly grown more etherial in their ideas respecting the construction of solid bodies. The discovery also of the grand law of the conservation of energy, of the total indestructibility of force, has brought the minds of men of science into a state which prepares them to listen with considerable attention to novel ideas like that of vortex atoms, which bases the existence of solid bodies upon an all pervading energy rather than upon crude lumps of matter which have never been seen. Those who have had much to do experimentally with the imponderable forces, especially electricity and magnetism, the latter of which now presents phenomena shrouded in the densest mystery, are inclined to think the theory of solid atoms of hard matter far too crude to meet in any degree the observed facts. What is the reason that this mysterious force deflects magnetic needles in the observatories at Kew and Lisbon at the same instant of time? Does the force come from the sun? Does it traverse the hypothetical ether in vibrations like those of light? Mr. Varley, who probably knows as much about electricity and magnetism as any man living, has no faith in the idea of the existence of hard rigid lumps as ultimate atoms, and has in his researches, discovered that these imponderable forces have some properties which are commonly ascribed only to solid matter.

So wirbel-bewegung is vortex motion. In all ages mysterious powers have been ascribed to the circle. A serpent with its tail in its mouth has long been considered the fittest emblem of eternity. Dancing dervishes, devotees of wirbel-bewegung, for centuries have achieved a meritorious amount of devotion by spinning around upon one leg. The lamas of Thibet pray by machinery, their petition being printed upon small windmills, which rotate right merrily in every passing breeze. Sometimes, it is true, the wind chances to fail, but a band over the smoke-jack in the chimney furnishes the necessary mechanical power, to grind the prayers. The world is circular, and travels round the sun in a circle, the moon twists round the earth in a circle, the sun dances round his axis in a circle, and is supposed himself to travel in a circle, round the star Alcyone, the center of another circle, so there is plenty of precedent for Professor Thomson's idea that atoms whirl in circles, and that the heads of philosophers spin round in an endless wirbel-bewegung. Astrologers and other clever men found this out long ago, so made their bodies spin round when performing their incantations. Dr. Aldrovando, first physician to Prester John, leech to the Grand Lama, and hakim in ordinary to Mustapha Muley Bey, is recorded by one of the fathers of the Church, to have thus, by unholy rites, obtained power over the spirits of the nether world.

"On one side was an article bearing a strong resemblance to a coffin; on the other was a large oval mirror in an ebony frame, and in the midst of the floor was described in red chalk a double circle, about six feet in diameter, its inner verge inscribed with sundry hieroglyphics, agreeably relieved at intervals with an alternation of skulls and cross-bones. In the center was deposited one skull of such surpassing size and thickness as would have filled the soul of a Spurzheim or De Ville with astonishment. A large book, a naked sword, an hour glass, a chafing dish, and a black cat, completed the list of movables. The doctor seated himself in the center of the circle upon the large skull, elevating his legs at an angle of 45 degrees. In this position he spun round with a velocity to be equaled only by that of a tee-totum, the red roses on his instep seeming to describe a circle of fire. The best buckskins that ever mounted at Melton soon yielded to such rotary friction—but he spun on—the cat mewed, bats and obscene birds fluttered overhead."

Now here is a clear case of wirbel-bewegung, known to a scientific man of the days of old. Now-a-days, whenever a discovery is made, some good-natured friend of the promulgator always rises to say it is not new; as was the case with Mr. Wilde's new magneto-electric machine, so here is a clear case against Professor Thomson. Probably he made his discovery by going through the ceremonial incantations laid down by the illustrious Dr. Aldrovando, but this is one of those grave secrets which his tailor only can unravel. The scientific world now travels onward at a rapid rate, and who knows whether before long the canny folks in Glasgow may not see their learned townsman building himself a house of solid matter, made by banging smoke-rings out of a wooden box with a damp towel?—*The Engineer*.

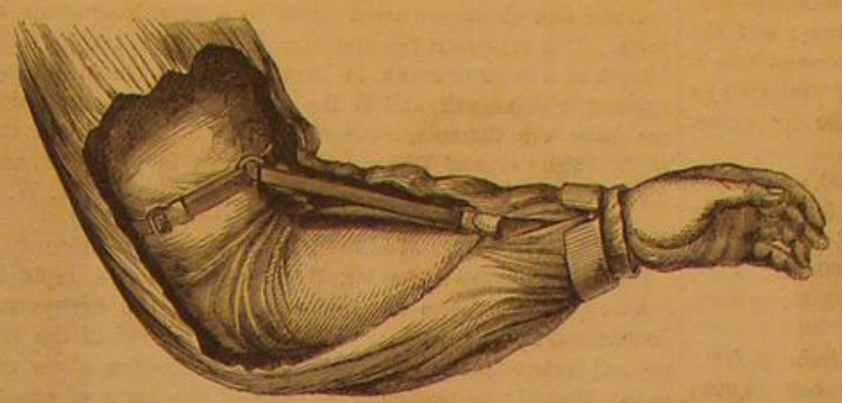
THE PALM OF THE INDIAN ARCHIPELAGO, according to M. Maxime du Camp in the *Revue des Deux Mondes*, furnishes from the envelope of its trunk and stalks a peculiarly valuable fiber for covering telegraph cables. An anchor fished up after 60 years submersion, had a piece of native cable from this substance attached, which was as strong as when new. A sugar manufacturer in Java has used a mattress of the same material in the river which supplies water to his establishment, as a filter, for the last twenty-five years, submerged during four months and hung up in the torrid sun the rest of the year; yet the mattress is as sound and strong as ever. The application proposed is about to be tested, as the submarine cable between Batavia and Singapore has been covered with a tissue of *aren*, as it is called by the natives, and in a few years will afford some evidence in regard to its value.

A RODMAN GUN FOR THE BRITISH GOVERNMENT.—One of these guns of 15 inches calibre has been cast for the British Government for experimental purposes, and will shortly arrive in England.

POWELL'S SLEEVE SUPPORTER.

In the labors of the household, the store, shop, and laboratory the annoyance of long or drooping sleeves is one which all more or less feel. The plan of slipping an elastic over the arm is not half efficient, and the rolling up or tucking of the shirt or dress sleeve is apt to deface the smoothness of the fabric.

The engraving shows a simple device for keeping the sleeve in a proper position when at work, that appears to answer the requirements without the annoyances of the temporary contrivances generally employed. It is merely a strip of flat silk elastic, one end of which is attached to a slide of sheet metal and the other to a hook. The hook end passes



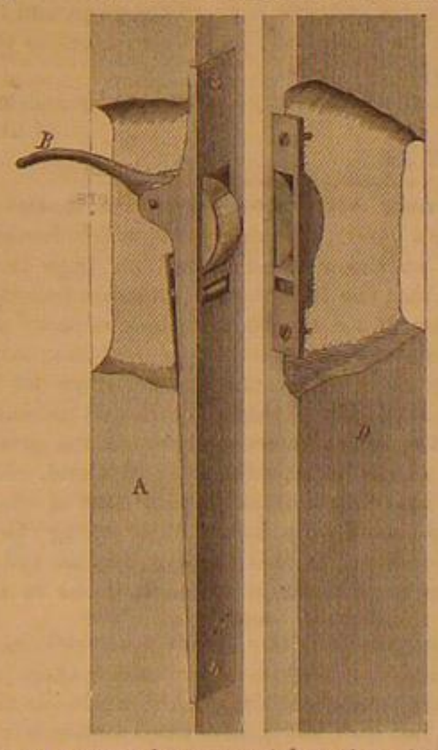
through a ring engaging with the loop formed by the slide and the elastic itself. The loop formed by the slide and ring is slipped over the arm above the elbow and the hook drawn through and attached to the opening above the wristband.

It will be seen that the movement of the hand controls the elasticity of the band and also that the tension can be regulated by the slide. It seems to be just what is needed by hundreds, as it can be used under all circumstances. It was patented through the Scientific American Patent Agency March 19, 1867, by Thomas Powell, Milroy, Rush Co., Ind., whom address for other facts relating to the device.

BUTTERWORTH'S IMPROVED WINDOW SPRING.

The breaking of window weight cords, the difficulty of putting in new cords, and the annoyance of rattling window sashes have stimulated many inventors to provide a substitute for the sash weight and at the same time to produce a lock for the sash to hold it in position. The engraving shows one which was patented March 24, 1863, by J. C. Butterworth Jr., of Providence, R. I. It is simple and always direct acting.

On the sash frame, A, is a plate of metal mortised into it, and carrying a spring lever, B, having at its outer end a segment of a circle the face of which is of elastic rubber intended to have a bearing against the window frame in which the sash slides and to hold the sash firmly against the other side of the window frame. This segment is held in place by a flat spring of steel, riveted to the plate at C, and bearing at



the other end against the segmental portion of the lever. Riveted to this spring is a projection of metal that passes through a corresponding aperture in the plate on the window frame, D, to lock the window when closed. By placing these plates at desirable distances on the window frame, the window can be locked at any point desired. The plate on D, has a semicircular recess to receive the segment of the lever, B, at any point to prevent unnecessary strain upon the spring.

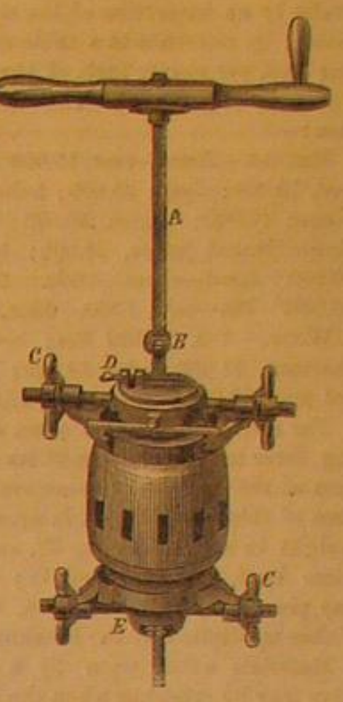
By raising the end of the lever, B, the segment is receded and the sash left free, so that the sash can be readily raised; by releasing the lever the spring forces the rubber surface against the window frame or engages the projecting snug with the mortise in the plate on the window frame. The lifting instead of the depression of the lever assists the contrivance in raising the window, being in this respect superior to those window latches which operate in a reversed manner.

J. C. Butterworth Jr., Providence, R. I., will furnish the springs or give any information desired relative to the price, action, etc., of this device.

THE ATLANTIC AND PACIFIC TELEGRAPH COMPANY has been organized to build a new line through from New York to the Pacific. The division from New York to Buffalo is to be completed by the first of next September.

HUB-BORING MACHINE.

This contrivance is intended for wheelwrights and carriage makers who do not have stationary machinery or power to assist them in their business. It is a hub-boring machine worked by hand. The usual way to bore hubs by hand is to use first an auger which bores a straight hole and then to ream out the hub thus made with a conical pod auger or semicircular conical reamer. To do this two tools are necessary but with this machine only one. The cutters are carried on the shank, A, on which is a stop, B, to regulate the depth of the shoulder. The lever nuts, C, clamp the hub, and their screws are secured to a disk in which traverses an eccentric that, by a set screw, D, and a plate seen in front determines the taper of the hole to be bored. E is an open nut by which the cutters can be drawn back to the butt of the hub without turning the handle or shank.



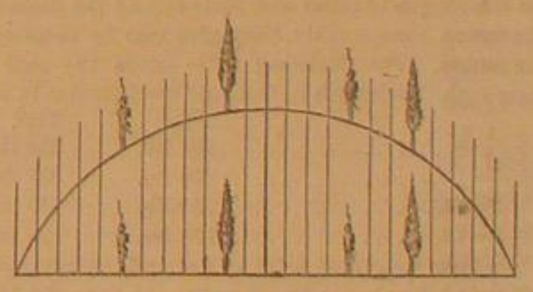
To bore a box, set the machine on the hub, then measure the distance from the eccentric plate to the nut, E. Make a drawing of the iron box which is to be seated in the hub, giving an outline with center and side lines extending down to the face of the open nut, E, giving the small end of the hole intended a continuation to the top of the diagram. Set the cutters one half the diameter of the small end of the hole gaged from center of the shaft and bore through the hub. Then move the eccentric plate by the set screw, D, to half the taper required and bore through again. The result will be a taper to fit the box.

The work can be done quickly and with certainty of satisfactory results. When accustomed to the machine, the workman will not require a drawing, but will be able to judge by the eye how to set the cutters.

For further information address Ira B. Gage, of Constantine, Mich.

UPRIGHTS ON A PLANE AND ON A CURVE.

A correspondent from New Hampshire writes as follows: "I would ask your opinion of the picket fence question discussed lately in the columns of the New York *Ledger*. Mr. Bonner cannot be convinced that it would not require a greater number of pickets of a given width, placed a given distance apart, to build a fence over a hill than if they were placed on a level plane running from the same points on either side of the hill. I say it will take the same number for each, and would like your opinion."



We have not read the discussion referred to, but we think our correspondent is correct. By reference to the above diagram in which the curve represents the hill, or reversed, a valley, it will be seen that the same number of upright objects, either fence pales, men, or trees can be placed on a level as on a curve; that it requires no more to occupy the same horizontal distance on the convex or concave curve than on the plane. That the surface distance is greater on the curve than on the plane is apparent, but in the case of upright or vertical objects the horizontal distance is the same in both cases. No more trees can be planted on a hill side than on a level representing the same horizontal distance. The diagram appears to be a perfect demonstration of the matter.

MORE UNPLEASANT COMPARISONS.—Among the many tokens, small and great, of the arousing of a German giant to take the place of England in commercial, political and perhaps maritime supremacy, are mentioned the twin significant facts, that while business is languishing in England, the Berlin Railway Plant Company and a Stettin shipbuilding concern, the "Vulkan," have both made enormous dividends in the last year, being respectively ten and eleven per cent.

GOOD WORKMANSHIP.—A locomotive constructed in the workshops of the Orleans Railway company, has run 93,150 miles, in three years, without submitting to any repairs. The engine is to be exhibited at the Exposition, and is worthy of it.

Correspondence.

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

[For the Scientific American.]

STRENGTH OF MATERIALS.

In the construction of machinery, mill-work, bridges, etc., the builder is called upon to calculate the dimensions which must be given to each part of the machine or structure in order that it may safely sustain the strain or load which is to act upon it. Before these calculations can be made, it is necessary to determine the nature of the strain acting on each part; that is, whether it is subject to a *pulling, thrusting, bending, shearing,* or *wrenching force,* and also the amount of resistance which the material, used in the construction of the parts, offers to these forces. The first can be determined generally by an inspection of the machine or structure; and the second by reference to a table containing the average breaking load, per square inch, of the most important materials as found by experiment. The following is a table for extension:—

METALS.—Brass—cast, 15,000 lbs.; wire, 40,000. Copper—cast, 16,000; sheet, 30,000; bolts, 35,000; wire, 50,000. Iron—cast, 17,000; plates, 50,000; double-riveted joints, 85,000; single-riveted joints, 28,000; bars and bolts, 60,000; wire, 70,000. Lead—sheet, 3,000. Steel—bars, 100,000; plates, 80,000. Tin—cast, 4,500. Zinc, 7,000.

WOOD.—Ash, 17,000 lbs.; beech, 11,000; birch, 15,000; chestnut, 11,000; elm, 14.000; locust, 16,000; oak, 10,000; red pine, 13,000; white pine, 10,000.

The resistance which a piece of any material offers to pulling force in the direction of its fibers is proportional to the area of the smallest cross-section. Hence, if we represent the area of this cross-section in square inches by A, the breaking weight in above table by W, and the strength of the whole piece by S, we have S=A W; or in words, the strength of any piece, subject to extension, is equal to its area in square inches multiplied by the breaking weight found in the table.

Materials acted upon by a thrusting force or pressure give way by crushing when the hight or length is small compared with the least diameter or thickness. Articles of cast iron in which the length is not more than five times the diameter, and of wrought iron in which the length is not more than ten times the diameter, come under this head. The resistance which materials offer to compression is proportional to the smallest cross-section, hence the calculation for resistance to compression is the same as that for extension, with the exception of the value of W, which is to be taken from the following table, which gives the ultimate resistance to crushing per square inch:—

NATURAL AND ARTIFICIAL STONES.—Brick, 1,000 lbs.; granite, 6,000; marble, 4 000; sandstone, 3,000.

METALS.—Brass, cast, 10,000 lbs.; iron, cast, 110,000; iron, wrought, 3,500.

WOOD.—Ash, 9,000 lbs.; beech, 9,000; birch, 6,000; elm, 10,000; ebony, 18,000; pine, 5,000; lignum vitæ, 9,000; mahogany, 8,000; oak, 6,000; teak, 12,000.

The value of W, or the breaking weight per square inch in the above tables is the ultimate. In practice it is usual to take one sixth of this for metal and one tenth for wood and stone as the *safe* strain for materials. The safe strain or fraction of the breaking strain to be taken will vary with the nature of the structure and the cautiousness of the constructor. In machinery, railroad bridges, etc., which are liable to sudden strains, the fraction of the breaking weight to be taken must be smaller than that which is taken in the construction of roof trusses, etc., which are comparatively free from sudden strains.

When the length of pillar and posts exceed the diameter or least dimension considerably, they give way by bending and breaking across. The following table gives the safe strain per square inch. L=length in feet, and d=diameter in inches.

	Pine.	*Oak.*
$L \div d = 8$	500 lbs.	350 lbs.
$L \div d = 12$	250 lbs.	200 lbs.
$L \div d = 24$	150 lbs.	125 lbs.
$L \div d = 48$	100 lbs.	75 lbs.

The breaking weight of solid cylindrical columns of cast iron, the ends being incapable of motion, in tuns of 2,240 lbs., is $44 \times d\ 3{\cdot}6 \div L\ 1{\cdot}7$, in which d represents diameter in inches and L length in feet of the column. Pillars and posts with movable ends break with one third of the above load. A piece of machinery is often subject to alternate extension and compression, and when this is the case it must be of the proper dimensions to sustain the strain to which the material composing it offers the least resistance. The piston and connecting rods of engines are examples, and must be proportioned to resist compression, because wrought iron of a given cross section offers less resistance to a thrust than to a pull.

Materials which are acted upon by a force perpendicular to their length, such as beams, give way by bending, the material on the concave side being compressed and on the convex side extended. If we represent the length of a beam in feet by L, the depth in inches by h, the breadth in inches by b, the resistance of the material to bending by W, and strength of the beam by S, we have the following formula for the strength of a beam fixed at one end and loaded at the other: $S = \frac{W b h^2}{L}$. If the beam is fixed at one end and the load is uniformly distributed over it, the strength will be, $S = 2\frac{W b h^2}{L}$. If supported at both ends and loaded in the middle the strength will be, $S = 4\frac{W b h^2}{L}$. If supported at both ends and the load uniformly distributed over it, the strength will be, $S = 8\frac{W b h^2}{L}$.

The value of W to be used in the above formula is given in the following table:—Iron, wrought, 750 lbs.; iron, cast, 600 lbs., oak, 150 lbs.; pine, 110 lbs.; spruce, 90 lbs.

Keys, pins, bolts, rivets, screws, etc., are acted upon by a shearing force. It is of great importance to have these small parts properly proportioned. The strength of a chain is only equal to that of its weakest link, and it may be said that the strength of a machine is only that of its weakest bolt, key or rivet. It is also a matter of economy to have these parts of the proper size, since the material of the principal parts is wasted if the bolts, etc., are too weak, and weakened by the necessary boring and cuts if too strong.

The following table gives the ultimate resistance to shearing, in pounds per square inch:—Iron, cast, 30,000 lbs.; wrought, 50,000 lbs.; pine, 500 lbs.; oak, 1,600 lbs.

Axles and shafts are acted upon by a wrenching strain or force. If d represent the diameter of a shaft in inches, l the length of a lever or crank in inches, F the force in pounds applied to this crank, and W the safe load for the material, we have the formula, $d = \sqrt[3]{5{\cdot}1\ Fl \div W}$ = diameter of the shaft. The value of W for wrought iron is 9,000 lbs., and for cast iron 5,000 lbs.

C. K. W.

"The Measure of Force."

MESSRS. EDITORS:—As Mr. Henry F. Walling's reply to "A Subscriber," (page 266 present Vol. of the SCIENTIFIC AMERICAN) may mislead your readers as to some of the important facts stated in my previous communication, allow me to say, that if "no particular change in the logic of events relative to the effects of force upon matter has occurred since the days of Newton," then, it is impossible that "discoveries in modern physical science, seem to indicate that new and important developements are near at hand," for it is only newly discovered effects of force upon matter that can possibly indicate the anticipated developments. Recent discoveries relating to the dynamical theory of heat, and the correlation of forces, are events sufficiently logical to show that all forces however derived, acting on a unit of weight, with the same intensity, and through the same space, necessarily have the same measure; and that like measures of the same intensity, contain like measures of the force which actuates it. Hence, the demonstration in my former communication, that the absolute quantity of dynamic force, is as the weight of matter and square of its velocity.

A SUBSCRIBER.

Tenafly, N. J. April 22, 1867.

Rule for Tank Staves.

MESSRS. EDITORS:—On page 217, present volume, your correspondent, C. Goodwin, gives a rule for getting the width and taper of the staves for a tank, which is the rule used by all workmen engaged in that business, and the only correct one yet discovered, but he only gives half the rule as practically applied.

The straight edge which he nails to one of the outside radial lines is the try square or bevel for jointing the staves, and will make a perfect fit. The outside of the staves should be rounded to the concave edge of the gage, and to make a very nice job the inside may be hollowed out to the convex edge, but that is not usual.

I deem the above necessary to complete his article.

M. H. SCOTT.

Newark, N. J.

Molecular Attraction in Steam Boilers.

A. S., of New Jersey, referring to the article headed "Hints to Inventors on Steam Condensers" on page 282 current volume, says that the fact of water in steam boilers contains but a modicum of air, and that explosions occur under circumstances most favorable to this condition, has led to an invention patented in this country and Europe for detecting the danger. It consists of thermometric and pressure devices operated by the slight variations between the pressure and temperature of the water, and giving an alarm. It seems to us, however, that this tell-tale is only part of the requirement. There should be a means of returning the water to its natural condition, so that the temperature and pressure should be kept at all times in proper ratio one to the other

Gleanings of the Paris Exposition.

There are 42,247 exhibitors.—The English space in the machinery gallery—about one sixth of the whole—is already occupied to the last inch, and most of the machines have already been in motion.——Pocket compasses are sold in great numbers, to assist the wanderers through the vast labyrinth. These compasses have their dials inscribed with a plan of the national divisions of the building, and thus the visitor perceives by his compass the exact direction from his position of any part he may wish to reach.——Artificial stone of several excellent varieties is exhibited. Ransome's patent concrete stone (English) is spoken of as very beautiful, exhibiting entire freedom from contraction in setting, and a hard and sharp perfection in the finest angles. The Kufstein cement is illustrated in the Austrian department by a large Gothic church window produced in one casting. This material is produced by calcining a natural stone found in the vicinity of Kufstein, in the Tyrol, which has some of the qualities of Portland cement. The mosaic cement of Vicat & Co. consists of a large-grained conglomerate of mixed fragments, united by cement, and when polished has the appearance of mosaic. The *beton agglomeré,* which has found extended application in France, is exhibited mostly in the form of sculptures, for which its dull brownish gray is not happily suited.——The Haswell patent press-forgings, made in Vienna, are exhibited in the Austrian department, including a wrought iron locomotive cross-head squeezed out of a solid block, even the opening for the connecting rod being pressed in. A locomotive crank, pressed complete at one operation, is also shown.——A very large complete forging by Marrel Frères, is a 30-tun marine shaft with three cranks, all forged solid in their positions, instead of being forged in one plane and then twisted, as is usual. Sixty tuns of iron were used in forging this shaft, one half the metal being wasted in the process. The piling was done in layers crossing each other at right angles or diagonally.——Twenty-two steel railway wheels, cast in one piece, on a steel shaft, with their bosses or hubs connected, and with a single runner 6x3 inches connecting their circumferences, but otherwise standing clear of each other and about one foot apart, are exhibited in the Prussian department, from Bochum. It is a disputed question whether they were cast on end in a deep pit or in a horizontal row from a number of runners. Bochum also exhibits the largest steel bell in the world.——Much interest is manifested by the foreign press in an American machine for making molds for stereotype plates by the compositor, who sits at a keyboard like that of a type-setting machine, and instead of setting up his types in a stick or case, impresses their faces upon *papier mache',* and forms a matrix or mold from which the stereotype is cast. Whether the compositor is expected to be infallible, or means ingenious enough for correcting erroneous impressions are provided, we are not told.

An English View of the Dunderberg.

While we have been discussing the possibility of handling heavy ordnance in broadside, and experimenting with various mechanical devices for working 9-inch guns, suggested by naval commanders, amateur engineers, and artillery officers, the Americans have left the solution of the problem to an experienced engineer. Consequently they have got the start of us, and already mounted their ponderous 15-inch guns in broadside, as our readers will see by the engraving in our present number, copied from an admirable drawing of the battery of the U. S. ironclad ram Dunderberg, forwarded to us by Captain Ericsson.

Although it is our intention, on the present occasion, only to describe the means adopted for working the 15-inch gun in broadside, we cannot omit to call our readers' attention to the vast proportions of the battery of the huge Dunderberg; nor can we omit to direct their attention to the form of this unequaled battery. It resembles a citadel with the guns pointing in all directions. There are twelve broadside guns and five guns at each end of the ship, pointing not only fore and aft, but diagonally, as will be seen by the distant ports represented on the transverse section of the battery. Our readers cannot fail to notice that, owing to the extraordinary capacity of the battery, the gundeck being nearly 70 feet wide, the enormous guns—12½ feet round the breech—appear to be but little above the ordinary size.

The simplicity and strength of the slide merit special attention. Unlike our slides, which are composed of a number of plates and angle irons, it is formed with two single bars of wrought iron 4 inches thick and 10 inches deep, provided with solid lugs near the ends slotted out to receive the conical friction rollers. These bars are held together by cross pieces, the forward one being provided with a nose-piece, through which the fighting-bolt passes. Some idea may be formed of the strength and proportions of the mechanism employed for working the 15 inch gun, when we state that the fighting-bolt is six inches in diameter, made of wrought iron, with a thin coating of composition metal, to prevent corrosion. It will be observed that the rear ends of the bars are bent upwards in order to afford support for cushions, against which the carriage may strike in case of neglect or accident to the friction gear. Naval engineers will not fail to notice this expedient, the only adequate one we have seen, for stopping a 20-tun gun which chances to recoil unchecked under a 70lb. charge. The main feature, however, of the arrangement is the rotary compressor by which the recoil is regulated and checked. Our naval authorities will do well to study this singular device for saving labor and time, which at the same time, renders it not only possible but easy to work guns of any weight during the heaviest rolling, since the mere dropping of the check-handle absolutely locks the carriage on the slide. The training of a 20-tun gun with steadiness and security while the ship rolls some 15 or 20 degrees may be regarded as a task nearly as difficult, more particularly if the condition be coupled with it of dispensing with men at the rear of the slides. The means adopted by Ericsson for effecting this object and complying with the stated condition on board of the Dunderberg require but a brief description. A winch with handles in opposite directions, is placed half-way between the ports. By means of two sets of cog-wheels and a rack connected by a joint to the slides, the turning of the winch enables the gunners to point the piece with great accuracy and steadiness, and to hold it in any position. The advantage of placing the training gear and the men between the ports out of danger from missiles entering through the port commends itself. Also the advantage of removing the training crew from the rear of the slides, as it enables the gunner more freely to sight and direct the training.—*Engineering.*

DR. T. ANDERSON has reported to Government that great success has attended the introduction of the mahogany tree into the Calcutta Botanical Gardens. Dr. Anderson believes that the mahogany tree might as easily be spread over all parts of Bengal as the larch has been in Britain.

IN THE RHINE DISTRICT grape vines are kept low and as near the soil as possible, so that the heat of the sun may be reflected back upon them from the ground, and the ripening is thus carried on through the night by the heat radiated from the earth.

How to Make French Calf Skins.

The standing of "French calf" in our market and among wearers of leather everywhere, of itself justifies the assertion in the *Shoe and Leather Reporter* of one who has personally investigated the leather manufactories of France and Germany, that the tanning as well as the finishing of calf and upper leather in those countries are so distinct from the processes carried on in England and the United States, that they can hardly be said to be the same in any particular: indeed in many respects they are the opposite of each other. Premising the obvious remark that the best system must still depend for the superiority of its product upon a mechanical excellence in the worker to which no careless or hasty apprenticeship can ever lead; we give for the benefit of our leather manufacturing readers the observations of this American manufacturer on the process of tanning in France.

The proper classification of the stock before the manufacture is commenced, is made a point of great importance. The size and particularly the substance and condition of the pelts in the same pack must be similar. The liming and indeed all the after processes, require uniformity of substance and condition, under an adapted treatment.

Next in importance is the proper softening of the hide, which is not merely softened, but the nerve is broken with great care. That is, the fine nervous tissue, which lies interlaced so closely on the flesh, as to almost present to the naked eye a compact surface, is so distended as to overcome its elasticity and break it up. The effect on the pelt is to make it pulpy. The result is more difficult and the appearance more deceptive, evidently, in a green than in a dry skin, and consequently nearly all calf skins tanned in France and Germany are dried before they are soaked. By the extreme labor required to break the nerve thoroughly—and here, how indispensable is the most thorough skill and fidelity in the workman—all the flesh is worked off without using the sharp edge of the tool. The liming is then done very much as among us, but from the very careful preparation they have already had, the skins take the lime more readily than with us. Again, the bating of the skin is performed with much more labor and more frequent workings than with us. They get the lime out of the skin, and reduce it low. The coloring is done in a tub eight or ten feet in diameter, and two feet deep, or in "England's wheels," by creating a current of liquor which revolves the skins.

When the skins are thoroughly colored, and fairly begin to plump, they are laid away in round tubs or tanks, carefully sized, and laid grain to grain, no bark being allowed between the grain surfaces. The object is to prevent "pitting" and overtanning of the grain. The tanning proceeds inward from the flesh side, and the grain thus obtains, (or retains) the peculiar toughness, with uniformity of color, which is one of the standard virtues of French calf. Thus mated, the skins go through in pairs. They are laid away in dry bark, and water or weak ooze is pumped on when the tanks are full. The bark is used several times, and the new bark never touches the skin until nearly tanned. The acid of the oak bark thus preserved tends to destroy the lime that may have been left, and to bleach the color, and make the grain fair and uniform.

A WIDE SPREAD organization has been completed in France, by which delegates from every part of the empire, skilled in their trade or occupation, will be enabled to study the Exhibition for the benefit of their fellow workmen.

Recent American and Foreign Patents.

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

BUCKLE.—Joseph Barrow, Mobile, Ala.—This invention consists in a construction of a buckle whereby it can be readily fastened to or unfastened from the article upon which it is to be used.

SAFETY ATTACHMENT FOR KEYS OF DOORS.—D. E. Campbell, Boston, Mass.—This invention relates to a safety attachment for keys of locks the object of which is to enable the key to be so fastened in the key hole of the lock that it can be neither turned around or pushed out.

WELL TUBE.—Hiram Knapp and Warren H. Pease, Goshen, Ind.—The principal object of this invention is to prevent quicksand or gravel from entering the well tubes when driven into the ground.

HAND SPRING FOR MACHINERY.—Parley Howe, Staffordville, Conn.—This hand spring is intended more especially for the starting and stopping of looms.

CARBURETING GAS AND REGULATING ITS FLOW.—George W. Porter, Boston, Mass.—This invention consists in passing the gas through a series of walls or partitions composed of capillary substances and also in regulating the flow of the gas through such partitions by increasing the density or altering the condition of the walls or partitions through which it passes.

PICKER MOTION.—Wm. Nugent, North Providence, R. I.—The object of this invention is the improvement of picker motions for looms and it consists in a peculiar device for preventing the rocker from jumping out of its place on the rail, and in constructing the picker so that when it strikes the shuttle it will not cause the latter to jump up or tilt so as to bring its nose up against the warp, but will cause it to be impelled along the race without rising or tilting, the picker staff being allowed to rise from its rail by reason of a slot in the block which carries the staff and for the purposes of adjustment to be moved in a horizontal direction by reason of a slot in the rail.

SKATE.—Charles Gooch, Cincinnati, Ohio.—This invention relates to clamps for securing skates to the soles of boots and shoes which clamps are of such construction that they can be readily applied and adapted to any of the ordinary wooden frame skates.

CARRIAGE JACK.—T. L. Goble, Bradford, N. Y.—This invention consists in an arrangement for raising the wheels of a carriage or other vehicle from the ground by operating a nearly horizontal rail by a lever which is hung or pivoted eccentrically to a standard.

BRIDGE TRUSS.—Gervaise B. Manley, Cogan's station, Pa.—This improvement relates to the construction of trusses for railroad and other bridges of wrought iron and consists in the manner of connecting and interlocking the strings and braces or suspension bars whereby are combined great strength and security, simplicity, economy and durability.

HOOP MACHINE.—John J. Alvord, Tecumseh, Mich.—This invention has for its object to furnish an improved machine by means of which the hoop may be cut at one stroke of the knife, and the table tipped automatically to give the proper bevel to the hoop.

WATER METER.—Thomas Green, Brooklyn, N. Y.—The object of this invention is to furnish a cheap, durable and reliable meter to be attached to service pipes in cities for registering accurately the passage and consumption of water. A device of this kind is much needed to regulate the consumption of water supplied by public water works, especially in large cities where the reckless waste and improper use of water often occasions serious public inconvenience.

FENCE.—Walter Reed, Wayne, N. Y.—This invention has for its object to furnish an improved fence, simple and cheap in construction, easily and quickly put up and taken down for storage or transportation.

BOAT-BUILDERS' PLATFORM.—James Granger, Zanesville, Ohio.—This invention has for its object to furnish an improved platform by means of which flatboats and other vessels may be conveniently built bottom upwards, and from which they may be easily launched.

WASHING MACHINE.—Joseph W. Bradley, Rockport, Mo.—This invention consists in constructing a cylinder of peculiar shape which cylinder is revolved in a suitable box and into which the clothes are placed to be washed.

STOVE.—William W. Carpenter, Middletown, N. Y.—This invention consists in arranging pipes or tubes within the furnace of the stove, which pipes have communication with the air outside of the stove and through which a current of air constantly passes from the lower to the upper portion, and is discharged in a highly heated state.

COUPLING FOR HOSE AND PUMPS.—J. W. Douglas, Middletown, Conn.—This invention consists in constructing in a simple, cheap and novel manner, a coupling which may be used for coupling hose or pumps to their base or to pipes or tubes. It more particularly consists in a peculiar and novel lock which holds the coupling; the sections of which may be quickly adjusted and secured in their position by means of an eccentric nut which renders it light, strong and not liable to wear and get out of order.

DERRICK.—James S. Lester and Lyman G. Jennings, La Fayette, Ind.—This invention has for its object to furnish an improved derrick for raising, brick, mortar, and other building materials to the place where they are to be used.

CARPET STRETCHER.—Willis Weaver, Salem, Ohio.—This invention has for its object to furnish a simple and convenient instrument for stretching carpets upon the floor so that they may be conveniently secured in place.

CARRIAGE.—T. A. Fisher and A. F. Fisher, Beardstown, Ill.—This invention has for its object to so improve the manner of connecting the forward axle to the body of the carriage that the weight of said parts may be diminished at the same time that the strength and safety of the connection is increased.

SELF-OPENING GATE.—Sylvester J. Wright, Ellsworth, N. Y.—This invention has for its object to furnish an improved gate so constructed and arranged as to be opened by the weight of the advancing man, horse or team, and to close itself as soon as the cause of its opening has passed through.

GRAVEL WAGON.—Adam Neer, Bellefontaine, Ohio.—This invention consists in so constructing the box and frame of a wagon that the box can be run back to dump the load and again drawn farward by ropes operated by cranks and reels.

HAY AND MANURE FORKS.—Jabez K. Babcock, Shortsville, N. Y.—This invention consists in having a ferrule provided with a solid head which has holes drilled in it to receive the tines, the latter being secured in the head of the ferrule by means of keys and pins, whereby a tine in case of breakage may be readily detached and a new one inserted in its place.

CULTIVATOR.—George Sprague, Spring Hill, Kansas.—This invention relates to a new and improved construction and arrangement of a cultivator for working corn between the rows on both sides of the hill at once.

ATTACHMENT FOR ARTIFICIAL TEETH.—John C. K. Crookes, Birmingham, Mich.—This invention relates to an improvement in the construction and arrangement of an attachment for artificial teeth, whereby they are secured to the rubber base in general use, and consists in an eye attachment having flat double shanks inserted in the tooth instead of the old method with straight and headed pins.

GRIND STONE.—G. B. Markham, Wayne county, Mich.—This invention relates to an improvement in the construction of portable grind stones for family use, and consists in hanging a small stone either natural or artificial in a light metal frame to be attached with a set screw to a table or shelf and provided with a crank for turning the stone.

HORSE HAY RAKE.—J. G. Kimberlin, Dryden, N. Y.—This invention relates to new and useful improvements in steel wire toothed hay rakes, and consists in the arrangement of a lever in connection with the rake head and the draft for unloading and otherwise facilitating the working of the rake, and also in a novel mode of attaching the teeth to the rake head to secure them firmly in place without lateral movement, while they preserve their independent action vertically.

STEAM GENERATOR.—R. J. Nunn, Savannah, Ga.—This invention consists in constructing a steam boiler entirely of tubes, which are connected together in such a manner that any section of them may be removed (should a tube fail), without interfering with the operation of the boiler or the generation of steam, and also in the provision which is made for the circulation of the water by interior vertical circulation tubes.

TOOL HOLDER FOR IRON-WORKING MACHINES.—T. L. Webster, Brooklyn, N. Y.—This invention relates to a new and improved tool holder designed for slotting machines, planing machines, and all other iron or metal-working machines, the tools of which have a reciprocating movement. The invention consists in constructing the tool holder of two parts connected by a joint, and having a spring applied, all being arranged in such a manner that the tool, during its return or backward movement, will be enabled to relieve itself and pass over the surface of the work with but little friction.

MUSICAL DIAL.—N. Paterson, Columbus, Miss.—This invention relates to a dial which exhibits all musical sounds or tones, as regards their names and distances from one to the other in a circle, the various kinds of scales being distinguished by different colors. A movable dial combined with the stationary dial allows of setting the device for different key-notes.

CIRCLE PLATE OR FIFTH WHEEL FOR VEHICLES.—J. B. Stuart, Bunker Hill, Ill.—This invention relates to a new and improved circle plate or fifth wheel for vehicles, and has for its object the turning or cramping of the front axle in such a manner that the vehicle to which the invention is applied, may be turned within a smaller compass than usual.

THILL COUPLING.—Silas Rogers, Stamfordville, N. Y.—This invention relates to a new and improved means for attaching thills to axles, and has for its object the ready attaching of the thills to the axle as well as their ready detachment therefrom, and at the same time not admit of the thills becoming casually detached.

MEAT HAMMER.—A. H. Brown, Springfield, Vt.—This invention relates to a new and improved hammer for pounding meat in order to render the same tender, and it consists in having the face or faces of the hammer provided with one or more annular sharp or V-shaped edges, whereby the meat will not only be made tender, but the juices of the meat also retained in it.

CLOTHES-WASHING MACHINE.—George W. Benton, Dansville, N. Y.—This invention relates to a new and improved clothes-washing machine of that class in which a cylindrical rubber of rollers is employed in connection with a concave of rollers. The object of the invention is to obtain a washing machine of the class specified, which operate upon the clothes without wearing them or breaking the buttons, and by which the clothes are thoroughly cleansed.

SULKY RAKE.—S. A. and L. M. Kays, Independence, Iowa.—The object of this invention is to provide a rake by which the operator may ride and perform his work of raking hay. It consists in constructing two wheels which run on an axletree, to which two draw bars are attached which extend back, at the rear end of which are pendant standards, which connect with the head by means of straps.

FRYING PAN AND STEAMER.—Robert Broome, Central Falls, R. I.—The object of this invention is to prevent the flying and spattering of the fat or gravy in the process of frying meat while at the same time the steam and gases are allowed to escape, and also in combining the frying pan portion with a steamer for cooking vegetables in such a manner that the same cover which allows the gases to escape from the frying pan shall be a tight cover for the steamer.

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 50 cents a line, under the head of "Business and Personal."

G. W. A., of Me.—We have never used any of the patent water-proof compositions for leather and cannot testify to their merits. We have used a mixture of resin, 1 ounce; beeswax, 6 ounces; tallow, 12 ounces; with a small quantity of neatsfoot oil melted together and applied hot, with good results.

H. C., of Ark.—You cannot expect a round belt to do the work of a flat one. A one-inch flat belt is better for driving a shaft than a round belt half an inch in diameter because it will present a larger surface to the pulley than the round belt, whatever the form of the score in which it runs.

L. F. P., of N. Y., asks how he can remove the "fuzz" from woolen yarn which is to be woven in a smooth fabric; when spun it presents a bristly appearance. The method is exceedingly simple. Pass the yarn through a flame. If done properly there is no weakening of the yarn by scorching. It is largely practiced by manufacturers of smooth worsted goods, and the machine is exceedingly simple in construction and easily kept in operation.

P. C. W., of N. J.—Your plan of interposing an elastic wad between the charge and the ball in a rifle, is not original. Do you think the expansive force of the gas is partially wasted because the inertia of the ball has to be overcome before it moves? Certainly your elastic cushion will not reduce the inertia of the bullet. Your device may lessen the "kicking" or recoil, but will not add to the propelling force of the powder.

G. C. B., of Conn.—We do not think that fulminating powder will be exploded, if the pressure however great, be applied so gradually that the heat of condensation escapes as fast as it is produced.

O. G. G., of N. Y.—The Mississippi river at its mouth is further from the center of the earth than at its sources. This apparent running up hill is due to the centrifugal force of the revolution of the earth. The water tends to fly off as it does from a grind stone when in motion. . . .

The magnet and armature of the telegraphic register are soft iron. . . . The wire of the helix would not answer so well if it were large.

N. J. L., of Pa., after washing his lamp chimneys sets them up on their flanged ends to drain and dry. While they are resting thus undisturbed, they are liable to crack and he says it is a frequent occurrence that the flange part separates in a complete ring. Lamp chimneys appear to be made of poor material and to be insufficiently annealed Moreover a lamp chimney of necessity undergoes rough usage for glass. Every uneven heating and cooling is probably injurious to it.

H. D. W., of Mass.—The freezing apparatus in which ammonia is used, is quite simple in construction and operation, and is said to be successful. It is a French invention and we are not aware that it has been used in the United States.

S. H. B., of N. Y.—Mr. Ransome has employed a considerable variety in the mixture for artificial stone. The following formula will give you an idea of the nature of his process: Sand 10 parts, powdered flint 1 part, clay 1 part, alcaline solution of flint 1 part. This mixture is thoroughly kneaded in a pug mill and becomes of the consistency of putty, when it is rammed into the plaster of Paris molds. The blocks must be dried with great care. The solution of flint or liquid quartz is of the consistency of sirup and of a specific gravity of 1·6. It is made by boiling powdered flints in a strong solution of caustic soda under pressure.

J. V., of C. W.—We have not yet seen the published report of the judges at the Auburn trial of mowers and reapers.

R. C., of N. Y.—The formula for determining the elements of the hydraulic press is $P = \frac{TC}{\frac{1}{4}D + T}$

in which P is pressure in tons per inch; T, thickness of cylinder in inches; D, diameter of bore; C constant for strength of metal. In your case C is 7, the constant for cast iron; D, 6; T, 2. Your press should therefore be able to stand a pressure (P) of 2 4-5 tuns per square inch.

A. W. G., of Iowa.—Lithographic stone is a peculiar close grain limestone, which is imported from Germany. Zinc may be substituted for it in the lithographic process and for making experiments answer pretty well. The acids you need are acetic and nitric; in use they are diluted with water.

L. C., of Mass.—Nitrogen is much more useful than you suppose. In the air, it is mainly a dilutant and has no very interesting properties when in the uncombined state. But it as an essential element in ammonia, nitric acid, gelatine albumen fibrine, etc. In vital chemistry, nitrogen plays a very important part.

C. G. P., of Iowa.—The surface indications of petroleum are inflammable gas which has a petroleum smell, oil floating on the surface of water, and tar or asphaltum. One or more of these signs have been noticed in all districts which have been productive of oil. Yet they are not always decisive, for they exist in districts where no oil has been found.

D. J., of N. J.—If you mix two pints of hydrogen with one pint of oxygen and set fire to the mixture, the gases combine with an explosion and the product is two pints of steam, the bulk of steam being estimated for the temperature of the mixture just before the explosion. The mixed gases on combining chemically are reduced in volume one-third. But the collapsing of the gases is slow and is therefore not the cause of the explosion. At the instant of combination the gases are expanded to several times their volume, by reason of the heat of the combustion and it is this sudden expansion which is the true explanation of the explosion.

J. W., of Wis.—The mineral you send is part of a hardened deposit of fine sand. It may be used for brightening metals as a substitute for rotten stone or tripoli. A similar substance is largely used as a polishing powder.

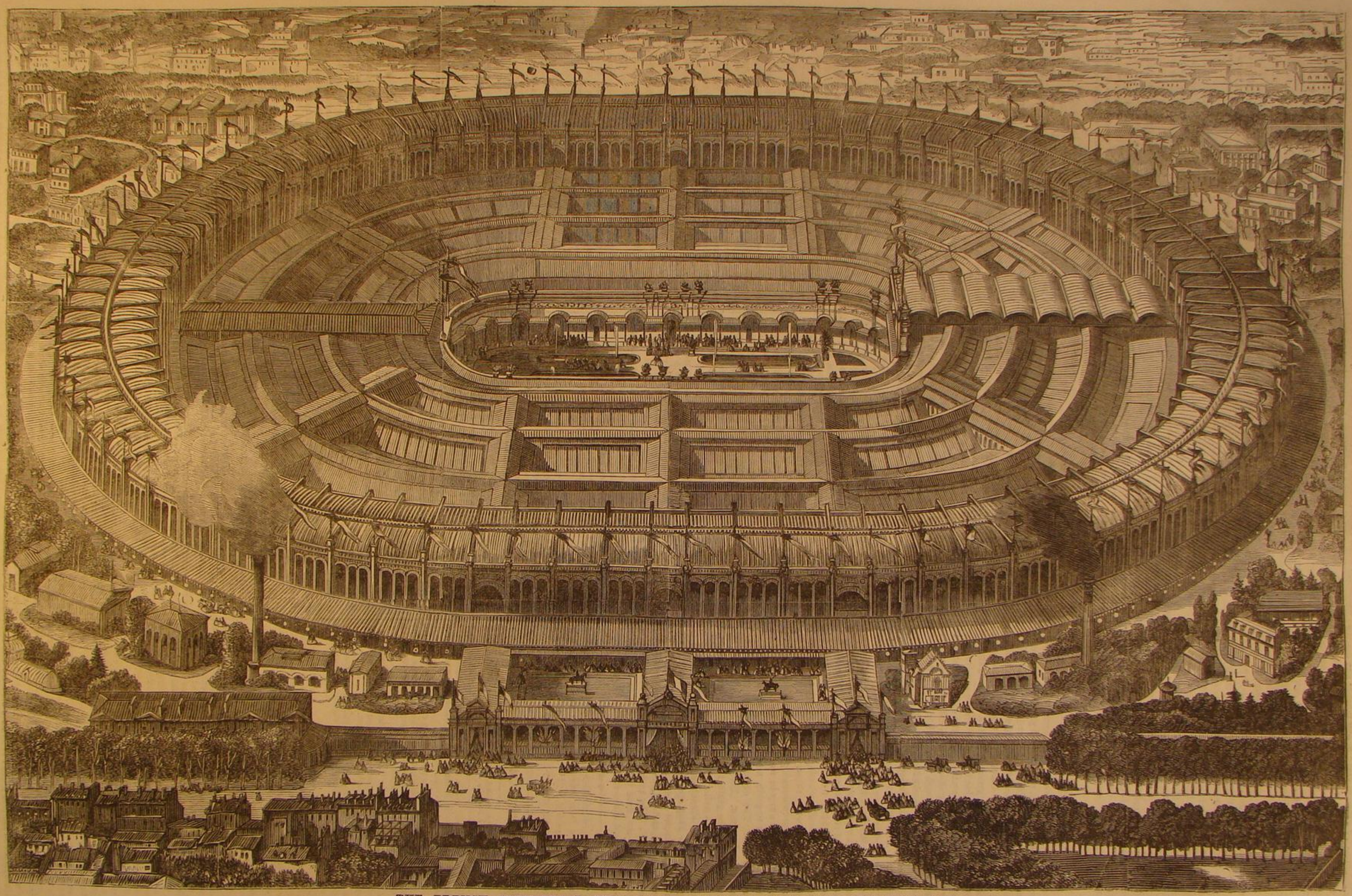
NEW PUBLICATIONS.

MINERALOGY SIMPLIFIED. A Short Method of Determining and Classifying Minerals by means of simple chemical experiments in the dry and wet way. Translated from the last German edition of F. Von Kobell: with an Introduction to Blowpipe Analysis and other additions, by Dr. Henri Erni, Chief Chemist, Department of Agriculture. 8vo, pp. 206. Philadelphia: Henry Carey Baird, 406 Walnut street.

This book is especially valuable to mine prospectors and to amateur mineralogists; it is also a convenient reference book for skilled chemists and mineralogists. It is supplied with a copious index, which seems to comprise the names of all the important minerals found in the United States.

THE INTERIOR DECORATOR. Being the Laws of Harmonious Coloring adapted to Interior Decorations, with Observations on the Practice of House Painting. By D. H. Hay, House Painter and Decorator to the Queen, Edinburgh. From the Sixth London Editon. 8vo, pp. 207. Philadelphia: Henry Carey Baird, 406 Waluut street.

This book has more of a practical character than its title indicates; there is a great deal of useful information in it which is not to be found in any book of receipts.



THE FRENCH INDUSTRIAL EXHIBITION BUILDING AT PARIS. [SEE PAGE 309.]

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VOL. XVI., No. 20....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MAY 18, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

*Krupp's New Cannon for the Paris Exhibition 309
*Improved Adjustable Mitering Apparatus 309
*The Paris Exposition 309, 316
Lubricating Petroleum as a Siccative Oil 311
Progress of the Commission of Life-saving Inventions 311
Prof. Wheatstone's Cryptograph.. 311
*The Bursting of Guns 312
The Galibert Respiring Apparatus 312
"Wirbel-Bewegung" 312
*Powell's Sleeve Supporter 313
*Butterworth's Improved Window Spring 313
*Hub-boring Machine 313
*Uprights on a Plane and on a Curve 313
Strength of Materials 314
"The Measure of Force" 314
Rule for Tank Staves 314
Gleanings of the Paris Exposition 314
Molecular Attraction in Steam Boilers 314
An English View of the Dunderberg 314
How to Make French Calf Skins.. 315
Recent American and Foreign Patents 315
Answers to Correspondents 315
New Publications 315
Lightning Conductors 317
The Public Railway System 317
Naphthalizing Gas 317
The Broadway Bridge 317
Great Inventors—Their Suffering and Success 317
Off to Europe 317
The Pacific Railroad—Its Several Grand Divisions 318
What is Gold Thread? 318
Patent Claims.....318, 319, 320, 321, 322
*Improved Flour Bolt Knocker... 324
A Raft Voyage to Europe 324

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

LIGHTNING CONDUCTORS.

A lightning conductor is always made of metal, and of the metals which are available the choice lies between iron and copper. Iron has the advantage of less cost per pound; in all other respects copper is better. Copper is the better conductor, is easier wrought into form, and is less liable to rust. The conducting power lies in the surface; a tube is as efficient as a solid rod of the same diameter, and a strip or ribbon which presents the same amount of surface is equal in power.

The ribbon form of conductor is evidently the most economical in the amount of metal and it has beside other evident advantages. It is more compact for transportation, joints are more easily and perfectly made in it, it can be put up with less labor and more securely than a solid rod, and when erected it is less in the way and so less liable to injury. As so little metal is required in the form of a ribbon we can afford to use copper. For these reasons we prefer a copper ribbon conductor to anything else which is in use.

As to insulating the conductor from the building, the question is of little importance. Good insulation, if it were desirable, is wholly impracticable. Those who make a great ado about glass insulators, ought to try a few experiments with an ordinary electrical machine, and better understand the nature of lightning. A lightning conductor if properly constructed and put up, will furnish the most direct road for all the electricity which can get into it at its pointed end.

The most important point to be attended to in setting up a conductor is its connection with the ground. Unless a proper connection is made, the conductor is worse than useless. There are many cases on record where there was insufficient provision for the escape of the lightning and it struck the houses, doing great damage. In cities the conductor should terminate on the gas and water pipes, care being taken that the joint has as much surface as the conductor. Where there are no water or gas pipes the next best thing is to lead the conductor to a stream of water or to a well which is supplied by a spring. Ordinary cisterns are not sufficient, as the wood or cement of which they are made might not allow the electricity to pass through them fast enough. When there is no body of water near at hand the lower end of the conductor may be attached to a plate of metal of several square feet of surface or to rods or strips a few feet long, laid horizontally in the nearest moist earth.

The conductor should present the same amount of surface at all parts of its length; if any part of it be narrower, which often happens with old-fashioned rods at the joints, it is but little better than if it were at every other part of the contracted size.

If a building be in length two or three times its width it should have at least two conductors, for reasons which are sufficiently obvious. There are cases on record of churches which have been struck at the rear end while the spire was provided with an efficient conductor.

THE PUBLIC RAILWAY SYSTEM.

Evidences multiply daily, that the principle of public property in all highways and parts of highways, as advocated in and widely quoted from the SCIENTIFIC AMERICAN, commends itself to the general sentiment of the public and is to prove one of the practical and governing ideas of the age. Among others, the latest we have observed is the southern movement for a public railroad system from the coast of North Carolina, to the Mississippi river, from Atlanta to Savannah, and from the Ohio to Mobile. These three will make six schemes of the kind now pending (when formally presented) by bill, before Congress. Each of these recognises, in the manner of turnpike roads and canals, the right of every one who chooses to run his vehicle on the proposed highway, for a proper payment of tolls. This principle established as the ruling principle in the construction of future railroads will tend gradually to bring all the old roads under its operation. The same principle will ultimately prove to have been to railroads what it has been to turnpikes, the entering wedge to separate them from private ownership and make them at last free to the public, and the property of the public, on the same terms with common highways.

Another principle embodied in the North Carolina scheme, is that proposed in a memorial to Congress by Mr. Lorenzo Sherwood, establishing a uniform and moderate speed for trains, and thus enabling them to follow each other in constant and regular succession, up to the whole capacity of the line, around the circuit formed by the two tracks. There is no doubt in the minds of practical men, we believe, that the freight end of the business is the right end to begin at, postponing rapid travel to the greater question of cheap transportation, rather than, as hitherto, the reverse. Eventually, no rail will be used alternately for freight and express trains, but each description of traffic will have a track of its own, with great advantage and economy to both. The devotion of a double track to steady freight traffic, is the one thing needful to render railroad freighting as cheap and universal as it is expeditious.

NAPHTHALIZING GAS.

Illuminating gas gives the greatest quantity of light when it is just on the point of smoking, and still burns clear. Such gas is said to be rich, and the richness of gas or other hydrocarbon increases with the carbon it contains. The gas which the companies supply is very seldom of an excellent quality: if it had as much carbon as it ought to contain, it would generally give about twice as much light.

There is a very simple way of introducing more carbon into gas. Coal tar naphtha is a substance which has a very large excess of carbon; so that it cannot be burned alone without giving out an intolerable smoke. Gas has the property of taking up or dissolving a large quantity of this naphtha, and the mixture becomes thorough and is permanent at ordinary temperatures. It will be seen that the excess of carbon of the naphtha can be made to nicely balance the deficiency of the gas. Naphtha is cheap, and the amount of it needed to naphthalize a thousand feet of gas is very little. Moreover the practical difficulties in carrying on the process are by no means formidable. It is only necessary to make the gas pass over the surface of naphtha or to cause it to bubble through the naphtha, always taking care that the naphtha be so handled that it shall not set the house on fire.

The process of naphthalizing gas was first used by a Mr. Lowe in England twenty or thirty years ago. Since that time it has constantly been in use. Gas companies and insurance companies however throw cold water on it, and it has consequently never been so popular as it deserved. About six years ago a company was organized in London to carry on the process on a large scale, and succeeded in getting their naphthalizers or carburetors attached to the public lights. After a year or two, however, the company came into great disfavor and the carburetors were abandoned. What part the inefficiency of the naphthalizing company or the hostility of the gas companies had in the failure is not very clear. At all events the process must still be regarded as meritorious and practicable.

THE BROADWAY BRIDGE.

It may be hardly safe to speak of the bridge over Broadway, at the corner of Fulton street, as nearly completed, yet from appearances it is nearly so. It is partially painted, and the structure itself is not only *in situ* but built. When it will be opened for the use of the thronging crowds of pedestrians we cannot tell. The addition of the paint of light shades, so far as applied, greatly improves its appearance, but, after all, there is an appearance of heaviness, not to say clumsiness, about the structure anything but gratifying to the eye and wholly unsuited to its position and object. Public opinion is somewhat divided as to its utility and beauty; but the prevailing opinion in regard to the latter quality is that the bridge *appears* unnecessarily heavy. We must confess that we share in this opinion.

In regard to its utility there can be no dispute between those who have been compelled, several times a day, to pass down and cross Broadway during the past winter. Repeatedly, to reach Cortlandt street from the east side of Broadway, coming from Park Row, we have been obliged to walk down below Trinity Church before we could cross, and then crossed at the peril of limb if not of life. To the business portion of our people, citizens and strangers, it will be a boon, especially in the winter months. The trash published in some of our papers and made a subject of illustration in comic periodicals in regard to the reluctance of women to ascend the stairs that serve as approaches on account of the exposure to which it will subject them, is nonsensical when one considers the fashion of dress, women deliberately adopted and wore for many months, and which is not yet entirely discarded. The bridge stairs are no more provocative of other stares than tilting hoops.

The appearance of the bridge is massive rather than elegant, and yet it is not so heavy as it appears. The immense moldings of hollow castings suggest heaviness altogether out of proportion to the supports at either end. The engraving which we gave in No. 9, current volume, taken from the drawings of Messrs. Ritch & Griffiths, the designers, is of a much lighter and more elegant construction. The departure from this design is hardly creditable to those who directed and authorized it.

In such a structure as a single-span elevated foot-bridge, apparent lightness combined with the requisite strength should be the rule, and not, as in this case, adequate strength with apparent heaviness. No doubt, however, this bridge will serve its utilitarian purpose, but it can never be considered a model of beauty.

GREAT INVENTORS---THEIR SUFFERING AND SUCCESS

Once or twice in a generation it happens that a great patent, like the sewing machine, meets with a success and yields a return prompt enough to enrich the inventor himself. More usually it happens that the inventor perishes in if not of the poverty to which his self-devotion consigns him, leaving to lucky rather than worthy purchasers the lucrative product of his genius and of his sufferings. Posthumous gratitude and honor may then be his reward; but if fortunate enough on the other hand to enjoy a small percentage of the pecuniary benefit he has conferred upon his own generation alone, men too commonly think him greatly overpaid without any acknowledgement as a public benefactor, and rather make it a point to embitter his too good fortune with envy, detraction, and plenty of litigation for his rights.

In this grudge that some men feel, they wholly forget the life cost of great invention. There are a few lottery prizes in life; but most men have to pay for all they get, and inventors are not exceptions to the rule. The life of Charles Goodyear is one of the most pathetic histories under the sun, and now that the reality and wisdom of his work have redeemed it from the contempt that was long its bitterest ingredient, appears one of the most heroic and admirable.

Great power is required for great work, in men just as rigorously as in steam engines; and Charles Goodyear and Elias Howe, judged by their histories and works, have the same title to our admiration as great men, and by the same rule, as General Grant.

The last-named inventor (Howe) has a history somewhat resembling that of Goodyear, in its desperate (though less protracted) struggle, but happily contrasted with it in its sequel and reward. It is well to look back upon the price of his fortune while looking at its amount. The story is well told in the last *Atlantic Monthly* by that lively biographer, Mr. Parton, and is worth recalling in its main features here.

Elias Howe was born in 1819, the son of a Massachusetts farmer and miller, whom he assisted in both capacities from a very small beginning until the age of 16, when he went to Lowell and began life on his own account in a machine shop. At the age of 20, then a journeyman machinist in Boston, the conception of the sewing machine first presented itself to his mind, and three or four years later he applied himself in earnest to realize in a machine the plan which had been gradually wrought out in his imagination.

Here the rare faculty by which he had been ordained an inventor exhibited itself triumphantly. It is a faculty possessed by the fewest of men, where the visual image in the brain is so true to reality as to require only an embodiment to work successfully in the very form foreshown. Within five months, commencing in December, 1844, the sewing machine was an accomplished fact, made two suits of clothes, sewing at the rate of 250 stitches a minute, and was patented. That first machine is still preserved in the Howe Company's Office on Broadway, and doubtless will be preserved to all time as one of the most interesting mementos connected with material progress. It is said to have recently proved its capacity, making 300 stitches a minute, and making them as well as any of its successors; a fact among the most remarkable, even if a little exaggerated, in the annals of invention.

Singularly indeed, the trials of the inventor were but commenced with the completion of his machine. Nine long and distressful years were consumed in unavailing efforts to start the manufacture and sale, before the business began to yield a modest support to his family. At the end of the first two years not a machine had been sold. Two years more were spent in extreme poverty and trial in England, during which time his straits sometimes bordered on starvation. Against the opposition and through the difficulties which he encountered, few men would ever have persevered, or persevering would have succeeded. The present generation owes as much to the invincible determination of the patentee as to the ingenuity of the inventor. Great as his success has at last been, it is one of those prizes which are only for the wise and valiant who "endure unto the end."

OFF TO EUROPE.

On Saturday, May 4th, Mr. S. H. WALES, one of the proprietors and editors of the SCIENTIFIC AMERICAN, with his family, sailed on the steamer *Pereire* for France. A large number of his friends were on the wharf to take their last farewells, and wish him and his family a pleasant voyage and safe return. Mr. Wales intends to visit all the principal points of interest on the continent and in Great Britain. He will spend considerable time in Paris during the holding of the Exposition, and our readers may hear from him occasionally through the columns of this paper.

A SCIENTIFIC party from New Haven, Conn., under the command of Clarence King, a graduate of the Yale Scientific School, has just set out on an exploring tour of the 40th parallel of this continent.

THE PACIFIC RAILROAD----ITS SEVERAL GRAND DIVISIONS.

THE CENTRAL PACIFIC RAILROAD OF CALIFORNIA.—The Pacific Railroad is to owe its anticipated early completion (1870) to three causes: the unequaled material intensity of California life and enterprise; the opportune interposition of the cheap Chinese labor; and the judicious subsidy of the national government, which allows each company—that building from the west and that building from the east—all the road it can build, with the loan of national bonds to the amount of $16,000 a mile for the same. The Californians (Central Pacific Railroad Company of California) have shown their mettle in this competition, and have driven their end of the road forward with an energy that has accomplished wonders. The whole mountain ascent and descent is now nearly graded, and most of the heaviest portion completed and running. The chief difficulties of the undertaking had to be encountered on that part of the line. The dreaded barrier of the Sierras, of impassable altitude and obstructed with impassable snows in their season, was met in the first one hundred miles. Before bold determination and able engineering these difficulties have dwindled so that, considering relative prices of all things, the road has not proved after all so much "steeper" in cost or grade than some others built long before, and the expected impassable snows have proved sufficient to make only three days interruption of trains in a whole winter as severe as the last. The estimated cost of the ninety-four miles in operation since last fall, with the remaining eleven miles to the summit, was above that of any road heretofore built, having been fixed at $88,400 per mile, against about $80,000 for the Hudson River and New York and Erie, and $81,273 for the Boston and Providence. Nearly $15,000,000 have been expended on the above 94 miles with about one third of the work on the next 25 miles and a liberal equipment of rolling stock. When 150 miles are completed, which is expected in July next, the costly work will be done, and the total construction cost will be, it is now supposed, about $15,000,000, or $100,000 per mile. There will then remain 575 miles to Salt Lake City, which it is supposed will be built for $60,000 per mile, and in one fourth the proportional time of building the mountain section. One hundred miles of this are promised us by the end of 1867, making 250 in all.

The average ascent on the California side is 75 feet to the mile: the heaviest grades completed being 105 feet. Of the grades of the 11 miles remaining we have no particulars. The time now occupied by trains is six hours: thus running nearly sixteen miles an hour. Fourteen tunnels have been made or are making, to secure the easiest possible grades, the longest of which, piercing the crest of the summit, is 1,658 feet in length, and lacks 500 feet of being completed, but is going forward with a large force of hands, working night and day. Protection from snow slides has to be provided in some places by sheds adapted to shoot the snow slides across and clear of the track. Two miles of these sheds will be required. The highest elevation is 7,042 feet above the sea level, or three times as high as railroads have ever before been constructed on this continent. Large working parties have been employed at the summit all winter: which reads singularly when we think of the exploring party under Fremont, that perished almost entirely in the attempt to pass the snows of the Sierras a few years ago. The earnings of the road are already nearly $10,000 a mile per annum, in its fragmentary condition; and even without natural growth and the addition of through traffic, would yield at the same rate a handsome profit for the whole capital to be invested.

THE UNION PACIFIC RAILROAD COMPANY is not disparaged by comparison with its western rival. It agreed to finish 250 miles the current year. It has already so far made good the promise that its fulfillment is morally certain, and we may look, therefore, by the end of 1867, for 600 miles of railroad in operation from St. Louis toward the Rocky Mountains. This will reach the border of Colorado, leaving but 750 miles between the two lines, which will be finished under the spur of competition and urgent demand, in less, if anything, than the two years appropriated to the task. When this is done, the year will be one of the most memorable turning points in the material progress of mankind, and a more remarkable starting point than any before it in the advancement of the United States in population and resources, which will then pour into our territory in redoubled ratio from all parts of the world, to be again redoubled every year by the development of the virgin treasures of the continent.

THE SOUTHERN LINE.—The "South-west Pacific," from St. Louis to the state line in the south-west (capital $8,000,000), and the "Atlantic and Pacific," from the latter point to the Pacific Ocean via Albuquerque (capital $100,000,000), are said to be virtually united in one mammoth corporation, possessing grants amounting to 56,036,000 acres of public lands, and 126 miles of the former road, reaching from St. Louis to Gasconade River, completed. Their line is represented to be shorter and easier than the Central, and offers to the public the advantages of crossing the projected North and South road from Leavenworth to Galveston, the Little Rock and Memphis road, and the Arkansas and Colorado Rivers at the head of navigation in each. The Southwest Pacific was forfeited to the State of Missouri after 113 miles had been built from St. Louis to Rolla, and sold by the State last year to General Fremont, who has conveyed it to the present company. The Southwest Pacific company has pushed on its work with energy, having already completed 13 miles and contracted 54 more, of which at least twenty will be opened by August next. This embraces the most difficult part of the work. The distance to the state line, constituting what is to be the Missouri Division of the Atlantic and Pacific, is 317 miles. The line then passes due west, through the Indian Territory, New Mexico and Arizona to California. Work can be can be commenced in both directions at two points on the line—using the navigation of the Colorado and Arkansas Rivers—as well as at each extremity, making six leading points of departure reached by existing routes of steam carriage. A San Diego letter states that ground will soon be broken at that port, as the Pacific terminus of the road. This makes a short and direct line across the southern end of California, and will make a second Pacific metropolis of San Diego.

Science Familiarly Illustrated.

What is Gold Thread?

Gold in the minutest particles is used for ornamental purposes in the form of plating, leaf, wash, etc., but one of its most delicate applications is that of a fine thread either woven into a fabric of silk, used for embroideries, twisted into fringe or netted into lace. In none of these forms, however is the thread a filament or wire of solid gold; the thread is gilded and consists of two metals and a core of silk. Wire for gold thread is of silver with a coating of gold so infinitessimally thin as to be beyond our comprehension. A rod of silver is coated with gold to a thickness of about one-hundredth part of that of the silver, and then this silver gilt wire is drawn down to a wire much finer than the finest human hair, and yet it will be then perfectly coated with the gold, still maintaining its relative thickness of one hundredth part, one-tenth the thickness of fine gold leaf.

This gilded wire is then passed between highly polished and hardened steel rollers and flattened, preparatory to being spun upon the silk thread. In this form of a film-like ribbon it is so light that a handful of it tossed into the air will float in the atmosphere of a room like gossamer. This flattened wire—if its diminutiveness deserves the name—is spun around a thread of silk, covering it in a spiral coil, so closely laid that it appears like a solid gold thread, while in fact the gold is as nothing compared to the other material. This thread is so delicate, although of triple composition, that it can be easily threaded in a fine needle and used for embroidering purposes. It can be woven into silk or into gold lace, or spun and twisted into cord, bullion, and fringe. The lace that decorates the uniforms of our soldiers, the bullion fringe of their epaulettes, which has such a massively rich appearance, is but this fine hair-like thread of silk, silver, and gold.

But the larger part of our gold lace and other ornamental gilt material is base, having not a particle of gold in its composition. That which represents gold is merely one of the compositions having copper for a base, ductile and tenacious, and worked in the same manner as in the true gold thread. This wire, however, has no silver core, nor is it usually spun upon silk but on orange colored cotton. This is largely manufactured in this country, and when just from the workman's hand is very rich in appearance, but soon tarnishes, and, if exposed to moisture, turns green from oxidation, which quickly rots the cotton core.

Gold thread and its manufactures are costly, not so much for the material employed as for the skill and care necessary in its production. It is wonderfully strong when properly made, and if protected from moisture the lace and embroidery will retain their luster for years.

NOVEL PLAN FOR A BRIDGE.—A French engineer named Boutet proposes to bridge the English Channel (20½ miles) with a structure on the suspension plan aided by the buoyant power of water. His foundation would be in effect a submerged wire suspension bridge, a fabric of sixty 7-inch wire cables, crossed and laced together by smaller cables, all carefully galvanized, and the whole thickly coated with gutta-percha and supported at intervals by immense iron buoys. Upon this foundation would rise 65 iron structures of great breadth of base and 600 to 900 feet high, as supports at proper intervals for the bridge road, formed of a network of great wire cables, like the foundation. It would be a double suspension bridge on a monstrous scale, with the sixty-five cable towers acting as trusses between the upper and lower stringers, and with the peculiarity of resting the lower portion in the depths of the channel on buoyant supports. The cost is estimated at some $75,000,000.

THE NAVAL RAM.—According to the opinion of some engineers, the best naval gun, and the one destined in future to do the most terrible execution and decide the fate of combats, is a steam ship: the best shot for naval purposes is ditto: the best gunpowder is coal, or perhaps petroleum or some other giant progeny of carbon and hydrogen, acting through the expansion of water or directly through its own, to hurl the sharp-beaked and enormous weapon into the ribs of the foe. Nothing less than mountains of iron—thunder mountains or *Dunderbergs*—are to be considered fit ammunition for modern Titans to launch at each other across the oceans that divide them.

THE LONDON UNDERGROUND RAILWAY.—During the four years since the opening of this line 58,214,075 passengers have been carried, and the amount of fares received exceeded $2,850,000. The largest number of passengers ever carried was during Whitsun week of last year, when 505,524 persons were transported in safety over the road. Strange to say there has never been a single fatal, and but one minor accident on the road since it was opened to the public.

IT IS STATED that although more than three months have elapsed since the explosion of the Oaks Colliery in England, little progress has as yet been made in extinguishing the body of fire raging at the bottom. All the shafts have been sealed up.



ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 30, 1867.
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	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On 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)	$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.

64,185.—RAILROAD SWITCH.—Joseph B. Alexander (assignor to himself and Wm. H. Frear), Washington, D. C.

I claim the construction and arrangement of the switch rails, C G and C' G', with the arms or the wings of a plate of iron or wood turning on a central fulcrum in such a manner as to oscillate and open one track while it closes the other, as described and for the purpose set forth.

I also claim the anchor-shaped cam, K, with the wings, L and L', and the friction roller, M, as described and for the purpose set forth.

I also claim, in combination with the above, depressing rails E and E', so constructed and arranged as to be operated upon by the shifting roller or wheel, c, attached to the locomotive engine, as described and for the purpose set forth.

64,186.—CARRIAGE CURTAIN FIXTURE.—A. C. Babcock and John Duffy, New Haven, Conn.

First, We claim the plate, E, in combination with a spring, F, when constructed and arranged so that the said spring bears upon the surface of the plate, E, as and for the purpose specified.

Second, The spring, F, attached to the stud, D, and so as to form the handle, G, substantially as and for the purpose specified.

Third, In combination with D, plate, and spring, F, we claim the stop, d, in the manner specified.

64,187.—MACHINE FOR MAKING WATER, GAS, AND OTHER PIPES.—Geo. H. Bailey, Jersey City, N. J.

First, I claim the employment, in the manufacture of pipes composed in whole or in part of cement or plastic material, of a plunger either movable or stationary, which is shaped substantially as set forth, either with or without spiral cutters, and which, by the application of power or by its own weight and momentum, displaces the cement in front of it, causing the latter to adhere to the pipe, and rendering it solid and compact, substantially as described.

Second, The combination with the plunger, D, of the top and bottom collars, C C', with vent holes for the admission and escape of air, substantially as described.

Third, The application of lifting rods, g g, to the collar, C, for lifting this collar when the plunger is raised, substantially as described.

Fourth, I claim a plunger working within a metallic pipe or mold having one or both ends closed, so as to more perfectly and forcibly compact the cement or plastic material within it, substantially as described.

64,188.—MODE OF LIGHTING GAS.—Arthur Barbarin, New Orleans, La.

First, I claim the direct use and application of spongy or finely divided platinum (without extra pipe for conveying the hydrogen gas upon the same) to an ordinary gas burner in any manner that shall cause the platinum to be directly in the path of hydrogen or hydro-carbon gas, when issuing through such ordinary burner, whether these gases be separate from each other or mixed together, whether the burners have additional jets or not, and whether the platinum be used and applied permanently or temporarily to said burners, for the purpose set forth.

Second, The lighting of hydrogen or hydro-carbon gas, whether separate or mixed, by means of spongy or finely divided platinum placed on a gas burner as herein specified, whether the said platinum be temporarily or permanently attached to the burner, or whether it be temporarily applied in any other way to hydrogen or hydro-carbon gases, either separate or in a mixed state, when issuing from a burner.

Third, The use of the same pipes and branches, as herein described, for the purpose of conveying the gases, whether they are mixed or separate, to the burners, for the purpose set forth.

Fourth, Conveying the gases, in a separate or mixed state, or one before the other, through the same pipe and branches as described, for the purpose set forth.

64,189.—COMPOUND FOR CLEANSING THE HUMAN BODY FROM OFFENSIVE ODORS.—Henry D. Bird, Petersburg, Va.

I claim a compound for cleaning the surface of the human body, substantially as herein set forth.

64,190.—GATE.—Daniel Bordner, Canton, Ohio.

I claim the peculiar arrangement of the levers, K and L, in shaft, S, acting on the bar N, through the iron, M, the said bar, N, having the cord, I, attached to it and to the end, W, of the upper bar, A, of the gate, the several parts operating in the manner and for the purpose specified.

64,191.—GRATE BAR.—Henry L. Budd, New York City.

I claim a furnace grate bar formed of a series of sections, b, attached to the longitudinal bar, a, said sections interlocking, and being constructed substantially as specified.

64,192.—WELL PIPE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination and arrangement of tubes, f o, the flanged collar, n, and flanged point, a, the whole substantially as and for the purpose set forth.

64,193.—GATE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination of the double action lever, a, with the levers, b double action levers, d d, horizontal bar, c, strips, e e e e and f f, guiding boards, i and h, also posts, m m, with arms, r r, the whole operating substantially in the manner described and for the purpose set forth.

64,194.—GAS CONDENSER, SCRUBBER, AND WASHER.—Thos. B. Burtis, Chicago, Ill.

First, I claim the lengthy and narrow boxes, D, the water vessels, D2, above the same, and the water spaces, E, between the same, substantially as and for the purposes set forth.

Second, The method of applying the water to condense, scrub, and wash the gas, substantially as set forth.

Third, The combination of the vessels, D2, the overflow pipes, k, water pipe, K, service pipes, l, and water chambers, M, as and for the purposes set forth.

Fourth, The application of the jet chamber, M, as and for the purposes set forth.

Fifth, The application of obstruction pieces extending from top to bottom of the boxes, D, substantially as and for the purposes set forth.

Sixth, The arrangement and combination of the pipes, F and G, f and g, with their stop cocks, valves and the boxes, d d1 d3 and d7, as and for the purposes set forth.

64,195.—BRUSH BLOCK.—Wm. B. Burtnett, New York City.

I claim a whitewash brush block which is constructed with a strip of wood which is harder than the wood of which the block is made, inserted into a kerf in its lower edge, so that the grain of the strip shall run at right angles to the grain of the block, as herein described and shown, thereby producing a new and improved article of manufacture.

64,196.—MANUFACTURE OF PORCELAIN.—Waldron J. Cheyney, Wallingford, Pa. Antedated March 29, 1867.

First, I claim the use of the minerals known as cryolite and chiolite, or their equivalents, in combination with silica, for the purpose of producing a vitreous porcelain, substantially as described.

Second, The fusing of either of the before-named minerals or fluellite or their equivalents with silica, in combination with soda, potash, lime, or other alkali or oxide, substantially as described.

Third, A new article of manufacture made by fusing silica with the above-named minerals or their equivalents, which I call "Hot-cast Porcelain."

64,197.—MACHINE FOR PUNCHING PAPER.—Spencer M. Clark, Washington, D. C., assignor to John Q. Laman.

First, I claim the combination with the punches and surrounding clamps and the springs of the screw bolts and rods, for adjusting the tension of said springs, and for effecting the combined movement of the clamp and punches, substantially in the manner herein specified.

Second, The combination with the clamp and connecting screw rods or bolts of the sliding cross head, punches, and surrounding springs, under the arrangement and for operation as herein set forth and described.

64,198.—STOP COCK.—Z. Erastus Coffin, Boston, Mass.

I claim the taper valve operated by connected screws and moving on continuous guides, arranged within the shell or body of a stop cock, substantially as described.

64,199.—VALVE FOR STOP COCKS.—Z. Erastus Coffin, Boston, Mass.

First, I claim the valve made in two parts, each bearing a face and so jointed with reference to each other and to the mover as to render them self-adjusting to the angles of the seats, sub tantially as described.

Second, Giving the mover a movement independent of the movement of the va vc, so as to relieve the pressure, by means substantially as described.

64,200.—TYPE-SETTING MACHINE.—A. Corey and J. M. Harper, Philadelphia, Pa.

First, We claim the loose wheel, d, or its eqivalent, so arranged as to bear on the type as it is being pushed from beneath the reservoir.

Second, The reciprocating bar, I, so constructed at the end and so combined with the arresting and guiding plate, J, as to turn the type in the ma ner described.

Third, The combination of the said guiding plate, J, the pushing bar and the shoulder, j, on the latter.

Fourth, The combination with the pushing bar of a plate, j2, with a straight edge, x, so arranged and operating as to adjust the row of type in line.

Fifth, The setting of a vertical row of type by introducing type after type to the said row, substantially in the manner described.

Sixth, Beneath the vertical row of type a block or plate, T, or its equivalent, so rounded or otherwise formed that on pushing a type to its place beneath the row it will be the means of elevating the same, as described.

Seventh, the plate, g, arranged as shown, so that the row of set type will not be disturbed by the introduction of a new type to the row.

Eighth, The pressure plate, w, arranged in respect to the plate, g, for the steadying of the vertical row of the type, substantially as described.

Ninth, The combination substantially as described of the plates, N and g, and rods, S and S', for confining and guiding the vertical row of type.

Tenth, The bar, g, so connected to the machine and to a suitable operating device that it can be moved at pleasure away from the front edge of the row of the type when the same has to be inspected.

Eleventh, The combination of the plate, N, the rods, S and S', and the mechanism herein described, or the equivalent to the same, whereby the rods are caused to recede from each other and make way for the row of type prior to the same being pushed back by the said plate, N.

Twelfth, The box or case, M, in combination with the detachable type receiver, 5.

Thirteenth, The mechanism described or its equivalent, for causing the block, Y', to recede prior to a new row being pushed toward a previously formed one.

Fourteenth, The combination of the pressure plate, Z, with the type-receiving c se, and sliding block, Y'.

Fifteenth, The spring plate, F, fig. 2, arranged and operating for controlling the whole of the keys, substantially in the manner described.

64,201.—WHEELWRIGHTS' MACHINE.—C. W. Corr, Cartinville, Ill.

First, I claim the adjustable frames, O and B, and the shaft, M, with the hinged support, E, when the said several parts are arranged to operate as and for the purposes set forth.

Second, the hammer, D, arranged to be operated by the spring, f, and lever, I, together with the means of regulating the force of its blow at will, as shown and described.

Third, The combined sawing and tenoning tool constructed substantially as described.

Fourth, The frames, J and K, arranged to move in the arc of a circle, the center of which shall be coincident with the center of the shaft supporting the hub, for the purpose of adjusting the sawing and tenoning tool, to work on a wheel having any number of spokes, as herein described.

Fifth, I claim so mounting the tool, o', that it shall have a lateral movement for sawing off the end of the spoke, and also a longitudinal movement for forming the tenon on the spoke, substantially as set forth.

Sixth, The tool, P, for supporting and holding the spoke while being driven as described.

64,202.—RIVET MACHINE.—J. E. Crisp, Charlestown, Mass.

First, I claim the combination of the intermittently revolving die disk, G, with the plungers, J and K, arranged and operating as described.

Second, In combination with the subject matter of the first claim, I claim the plunger, P.

Third, In combination with the plungers, J and K, I claim the series of cams on the face of the wheel, L, and the hammer, m.

Fourth, In combination with the intermittent revolving die disk, G, I claim the plungers, J and K and P, and the stubs on the periphery of the wheel, L.

64,203.—CALIPERS.—James Henry Culver, San Francisco, Cal., assignor to himself and Cornelius Leonard.

I claim a pair of calipers either for inside or outside measuring, constructed with the joint, C, and shoulder, b and c, substantially as and for the purpose set forth.

64,204.—MECHANICAL TELEGRAPH.—Jonathan Dearborn, Seabrook, N. H.

I claim the combination and arrangement of the six bell cranks, and the three connecting rods with the two shafts, and also with the two telegraphic endless chains and their sprocket wheels, applied together and constructed substantially in manner and so as to operate as specified.

I also claim the combination and arrangement of the two serrated racks, H I, connected by a chain going around a pulley as described, with the sprocket wheel, K, the connecting rods, o o, and bell cranks, m n, applied to a rotary shaft, as set forth.

64,205.—SHOES.—William A. Deitz, Albany, N. Y.

I claim the method of constructing boots by making the opening for the introduction of the foot in the back, and covering the opening with a tongue on the inside, with a flap extending around the side of the boot, secured to the same in the manner and for the purposes set forth.

64,206.—MACHINE FOR HUSKING CORN.—D. A. Dickinson, Baltimore, Md.

I claim the arrangement of the shafts, having pulleys placed eccentrically, and belts, substantially as and for the purpose herein recited.

And in combination with the pulleys, or their equivalents, I claim the teeth, g, for the purpose herein set forth.

64,207.—CLOG FOR PREVENTING COWS FROM FRISKING THE TAIL WHILE BEING MILKED.—Noah Dutton, Janesville, Wis.

I claim the application of a weight, or an instrument of specific gravity, to a cow's tail while milking her, substantially as described and for the purpose specified.

Also, the wing, b, in combination with the said instrument or weight, substantially as described and for the purpose specified.

64,208.—CLOTH-FOLDING MACHINE.—J. D. Elliot, Grafton, Mass.

What I claim, is dividing the table and hinging the parts at or near the center, so as to operate substantially as and for the purpose specified.

64,209.—LET-OFF AND TENSION FOR YARN, THREAD, etc.—Alfred B. Ely, Newton, Mass.

First, I claim the bar D, lever, D G H or D I H, and spring, J, combined and operating substantially as described.

Second, Regulating the giving-off of the yarn by means of lever, N O, and spring, Q, operating against the lugs of a revolving wheel, substantially in the manner described.

Third, The combination of the spring, x, with the end of the presser foot, H, on the arm, N, to receive the blow of the lug, substantially as and for the purpose described.

Fourth, Applying and regulating the tension upon the yarn by means of the adjustable elastic pressure roll, operating substantially as described.

64,210.—CHURN.—George W. Emerson, Peru, Ill.

First, I claim the churn body, constructed as described, in combination with the shaft, T, shown in figs. 1 and 2, with the frame, fig. 1, and the rack, A B, fig. 3, substantially as specified.

Second, The flutter wheels, A' B' C' and D', fig. 2, one or more, to be used in a churn, substantially as described.

Third, The combination of the blocks or bars, H I' J K, fig. 2, one or more, with the flutter wheels, one or more, to be used in a churn, substantially as described.

Fourth, The movable frame, fig. 2, composed of the strips of metal, L M' N' O P Q R, connecting bars or rods, H I' J K, or equivalent, to be used in a churn, substantially as described.

64,211.—PESSARY.—David Ewing, Indianapolis, Ind.

First, I claim the curving arms, c c c c, when constructed and combined with the rim, substantially as set forth.

Second, The hollow stem, e e, when the same is combined with the adjustable springs, g g, in manner and form as aforesaid.

Third, The adjustable springs, g g, when the same are constructed and adjusted, substantially as set forth, and combined with the said hollow stem, e e.

Fourth, The improved pessary described herein, when the same is considered as a whole device, and constructed in its several parts, as aforesaid, and used in the manner and for the purpose hereinbefore described.

64,212.—FIRE LADDER.—George Kale Foster, San Francisco, Cal.

First, I claim the segmental racks, F G, and pinions, T T, operated by the gear, h g, and hand wheel, c, substantially as described and for the purpose set forth.

Second, I also claim, in combination with the ladder, the swivel-joint rings, r r r, on the ends of the fulcrum rods, to support and carry up the hose when the ladder is raised for use.

64,213.—PLOW.—George Gibbs, Canton, Ohio.

I claim the lever, a, rod, b, joint, c, and slot, d, constructed, arranged, and operating in the manner and for the purpose set forth.

64,214.—HARNESS SADDLE.—Algernon Gilliam (assignor to himself and F. and H. Diehl), Cincinnati, Ohio.

I claim the arrangement of recurved and overlapping metallic cantle, H, and lug, C, or devices substantially equivalent, enabling the fastening the rear portions of the seat, seat cover, and tree securely together by the agency of a single screw, as and for the purposes set forth.

64,215.—HARNESS PAD.—Algernon Gilliam (assignor to himself and F. and H. Diehl), Cincinnati, Ohio.

First, I claim a harness-pad plate or tree, of malleable iron or other metal, with an upper flange, B, and lower plane or flat surface, with holes, C, as and for the purpose stated.

Second, I claim as a new article of manufacture a harness pad with a tree, consisting of the elements, A B C, in combination with the pieces, D E F, substantially as described.

64,216.—MEANS FOR OPERATING THE TREADLES AND HARNESS SHAFTS OF LOOMS.—Oliver W. Gorgon, Mount Pleasant, Iowa.

First, I claim the combination of the harness frames C, and their supporting ends, with the hinged treadles a, the tappet shaft B, and adjustable tappets B', the whole constructed and arranged to operate substantially as and for the purpose set forth.

Second, The combination of the hinged treadles A, actuated positively both in ascending and decending by the adjustable tappets B,' projecting from the tappet shaft B, with the harness frame C, and the end guides E, substantially as described.

64,217.—SEED SOWER.—Silas Grenell, Mokena, Ill.

First, I claim the combination of trough D, spreading board O O, shaft I, having arms S, and cups J, and hopper P, when arranged to operate substantially as described.

Second, The ends E, having the loops H, in combination with the arms G, and rod I, as described and for the purpose set forth.

64,218.—POTATO DIGGER.—D. B. Hart, Mentor, Ohio.

First, I claim the digger ploughshare E, provided with open spaces or perforations, as and for the purpose set forth.

Second, The screen mold board M, provided with adjustable screen rods, as and for the purpose specified.

Third, The auxiliary screen P, in combination with the digger ploughshare E, and screen mold board M, supported and vibrated by means of the combined arrangement of parts specified, viz: the graduated bell-crank lever S, standard S, link T, standard R, connecting rod T', crank pinion wheel T2, spur wheel T3, adjustable driver wheel U, slotted strap U', swing rods, R and Q, pivoted hanging Q, beam A, and landside D, all operating as and for the purpose specified.

Fourth, The rotary stalk cutter H, and standard H', slot I, and set screw J, in combination with the clearing rods K, and K', and beam A, as and for the purpose set forth.

Fifth, The use of the chain W, in combination with the truck, as represented, and the employment of the guide wheel V, both operating as and for the purpose specified.

64,219.—ATTACHING THILLS TO CARRIAGES.—William H. Hartman and A. K. M. Pickert, Fostoria, Ohio.

First, I claim the rubber block E, provided with the guard F, and secured by means of through bolt or screw G, to the detached or separate clip bar H, in combination with the slotted stay D, secured to clip I, in the manner shown and described.

Second, The head B, pivots C, and slotted stay D, in combination with the clip I, guard F, screw G, and rubber E, when the several parts are constructed and arranged in relation to each other, in the manner and for the purpose described.

64,220.—KILNS FOR DRYING AND CURING HOPS.—William Macey Haynie, Sacramento, Cal.

I claim a hop kiln constructed with boxes, having the slides F F, or their equivalents substantially as and for the purpose described.

64,221.—QUARTZ MILLS.—James Hitchens, Nevada City, Cal.

I claim an ore pulverizer, consisting of the containing cylinder A, and the supporting plate B, constructed and operating substantially as and for the purpose herein described.

64,222.—HARNESS HAMES.—John Holt and Simon G. Cheever, Chelsea, Boston, Mass.

We claim the projecting angular arrangement of the hold back strap attachment, substantially as described.

Also the combination in one integral piece of the breast strap and trace attachment for harness hames, substantially as described.

64,223.—DIE FOR BRICK AND TILE MACHINES.—James Hotchkiss and Ezra Buss, Springfield, Ohio.

We claim the employment of friction rollers either adjustable or not, applied to the dies of brick and tile machines, for the purposes herein specified.

We also claim the contraction of the die to the mouth thereof, in combination with friction rollers on the die substantially as and for the purpose herein set forth.

We also claim the mitred or beveled edges of the rollers, for the purposes herein specified.

We also claim the convexly curved or bulging form of the rollers for the purpose herein set forth.

We also claim scrapers I I, in combination with the rollers, substantially as and for the purpose herein specified.

64,224.—CAR STARTING APPARATUS.—Jarvis W. Houghtelin, Detroit, Mich.

I claim the double levers B B, pivoted on the axle near the wheels connected by the bar M, provided with the bent rod H, and pawls F F, operated from the draw bar D, all as described and for the purpose set forth.

Second, In combination with the above, I claim the lifting lever C, foot piece K, and connections as described and for the purpose specified.

64,225.—WAGON BRAKE.—Samuel E. Hyndman, Middletown, Ohio.

I claim the brake levers f f, rods e e, in combination with the slide braces d d, bounds c c, and tongue i, sliding bolt h, and lock bolt s, when the parts are constructed, arranged and operated in the manner and for the purpose specified.

64,226.—THILL COUPLING.—James W. Innis, Salem, Ind.

I claim the thill coupling consisting of the clip A, and pin receiving projection a', cast therewith through the side of which passes the tightening screw F, pressing into the cavity in the pin D, and operating substantially as described for the purposes specified.

64,227.—CUTTER GUIDE FOR MOLDING MACHINE.—Dedrick Jordan, Charlestown, Mass.

I claim the combination of the cutter guide a, constructed with the flange b, the cylinder c, and the adjustable and retaining nuts c d, as and for the purpose specified.

64,228.—CUTTING OUT LEATHER.—Arza B, Keith, North Bridgewater, Mass., and T. K. Reed, East Bridgewater, Mass.

We claim the described process of press cutting with handle dies substantially as described.

Also the combination with a treadle lever, of a stop lever and a friction coupling, arranged to operate substantially as described.

64,229.—CHIMNEY JACK.—John Kingsborough, Cleveland, Ohio.

I claim the slides B, adjustable hinge deflectors C, and guards D, in combination with the channel or chamber I, and case J, arranged in the manner and for the purpose set forth.

64,230.—CURTAIN TASSEL.—W. Irving Laighton, Portsmouth, N. H.

I claim the combination of the cap or cover a a, with slide b, to be attached to the barrel of the tassel, for the securing of the cord, c, after putting it through the tassel as described, for the purpose aforesaid.

64,231.—SKIRT HOOP.—John B. Lattin, (assignor to himself E. Wooster & Company, and F. Hull & Company,) Birmingham, Conn.

I claim the bottom hoop for hoop skirts formed by combining two or more springs in a single cover, the upper edge of which is formed as described, so as to be stitched to the tape of a skirt, as and for the purpose set forth.

64,232.—BURNING FLUID.—James T. Leete, New York, N. Y.

I claim a new compound for a burning fluid having as its base benzine or naptha, fully charged with carbonic acid, so as to neutralize and partially destroy its inflammability and the admixture thereafter of the several ingredients in the proportions named as substantially set forth.

64,233.—PREPARING FUEL FROM COAL DUST AND FRESH WATER PEAT.—Heman S. Lucas, Chester, Mass.

I claim the application of common salt either dry or in natural or artificial solutions in the preparation of fuel from fresh water peat and fine coal, in the manner and for the purposes set forth.

64,234.—EXPANDING MANDREL.—James B. Mallalieu, Chicago, Ill.

I claim the combination of the mandrel A, with the movable bush or jacket B, without a collar as and for the purposes set forth.

64,235.—LET-OFF AND TAKE-UP MECHANISM FOR LOOMS.—Jeremiah A. Marden, Newburyport, Mass., assignor by mesne assignments to A. B. Ely, Newton Mass.

First, I claim the combination of the rock shaft C, with its arm E, and the spring rod F, provided with the adjustable nut f, when constructed and arranged as and for the purpose described.

Second, I claim the combination of the adjustable spring rod F, and the dog G, with the pawl H, and escapement wheel I, substantially as and for the purpose specified.

Third, I claim a let-off motion in looms effected by the tension of the yarn upon a rocker shaft C, provided with an arm E, in combination with a spring rod F, a pawl H, escapement wheel I, and the yarn beam B, with its intermediate connections as set forth.

Fourth, In combination with the above described devices for effecting the let-off motion, I claim a take-up motion effected by means of a pawl O, attached to the lay in combination with the toothed wheel P, attached to the cloth beam, and one or more pawls attached to the frame, substantially as and for the purpose specified.

Fifth, The relieving pawl H, operated by the tension of the yarn upon the rock shaft through the medium of the adjustable spring rod F, substantially as described.

Sixth, I claim the spring rod F, when made with a screw thread, in combination with the nut f, rock shaft C E, and relieving pawl H, substantially as set forth.

64,236.—DOOR FOR RAILWAY CARS.—B. Martin, Prairie du Chien, Wis.

I claim as an improvement in railroad cars for carrying grain in bulk, the combination of the trapeze shaped door C, inclined cleats B, checks D, cleats H, recesses I, pins E, notched shoes F, and bolts G, all constructed and arranged to operate as and for the purposes specified.

64,237.—TUCKING AND PLAITING ATTACHMENT FOR SEWING MACHINES.—Charles Z. Mattison, Buffalo, N. Y.

First, I claim the spring bar A, attached to the rocker of a sewing machine and operating as and for the purposes and substantially as described.

Second, The adjustable sliding rule D, in combination with the spring bar A, attached to the rocker the same lapping over said spring bar the width of the desired hem, fold or tuck, and operating in the manner and substantially as set forth.

64,238.—CHURN DASHER.—Shannon McGuffin, Rising Sun, Ind.

I claim the combined inverted funnels and butter gatherer heretofore referred to.

64,239.—GATE.—E. R. McKinney, Lacon, Ill.

I claim the arrangement and combination of the cross bar B, near the top of hinge post with its pendants C C, and r r connecting with the lever L, on the top bar of the gate, also device of lever L, with rods t t, connecting with latch as hereing described.

64,240.—DIVIDERS AND CALIPERS.—G. L. McKnight, Worcester, Mass.

First, I claim the combination with the arms of calipers or dividers of the screw C, slotted nut D, and tightening nut F.

Second, The combination with the curved ends E E, and arms A, of the slotted nut D, and tightening nut F, substantially as and for the purpose set forth.

Third, The combination with arms A, having shoulders 1, 1, of spring g, substantially as and for the purposes set forth.

Fourth, The combination of nut D, with the curved ends E E, of arms A A, for the purpose of adjusting the arms substantially as set forth.

64,241.—KNITTING MACHINES.—William H. McNary, Brooklyn, N. Y.

First, I claim the combination with the needle ring the presser having the compound motions substantially as and for the purpose described.

Second, Operating the stitch hooks by cranks upon separate shafts carrying gear wheels engaging corresponding wheels on the main shaft, substantially as and for the purpose described, and

Third, Connecting the wheels of the switch wheel directly with the needle ring, substantially as and for the purpose set forth.

64,242.—LAND ROLLER.—Moses Miller, East Gains, N. Y.

I claim the roller B, having an independent frame M, and the cross reaches N N, in combination with the rollers A A, and the frame C, operating in the manner and for the purpose shown and described.

64,243.—WASHING MACHINE.—Clark Moorhead and Isaac Grier, Lewistown, Ill.

We claim the beaters h, hinged to the inner ends or sides of the revolving drum for the uses and purposes above named, substantially as above set forth.

64,244.—GLASS ANNEALING APPARATUS.—George F. Neale and Louis Amede, South Boston, Mass.

We claim the combination of the railway and the system of carriage boxes with the flattening furnace, such railway being so arranged as to enable the said annealing carriages or boxes to be run into and out of the said furnace, and to rest while on that part of the railway which is without it, substantially as specified.

We also claim, for the purpose described, the combination and arrangement of the interior track, i i, the turn table, k, or its equivalent, the two exterior tracks, r r and t t, and the transferring carriage, B, provided with the track, u u, as specified.

We also claim the combination and arrangement of the sunken space, h, with the furnace and railway, constructed and arranged substantially as described.

64,245.—BOX FOR PROPAGATING PLANTS.—A. B. Newman, Jr., Watkins, N. Y.

I claim a box or trough for propagating or growing plants, vines, vegetables, small fruits, shrubs, seedlings, and stocks, as herein described.

64,246.—APPARATUS FOR MANUFACTURING LAP-WELDED TUBES.—James Nicholson, Philadelphia, Pa.

I claim in combination a furnace with one or more openings in its front, which will admit of the simultaneous discharge of two or more heated plates or skelps, with a set of rolls having two or more welding grooves, and two or more trains of carrying rollers, all substantially as herein described.

64,247.—COMBINED STOVE COVER, LIFTER, HAMMER, ETC.—Joseph B. Oky (assignor to himself and W. A. Schofield), Indianapolis, Ind.

I claim the utensil herein described, consisting of hoop, B, lips, D D and C, hammer, F, hook, G, and handle, A, provided with a bifurcated end, H, arranged and combined as set forth.

64,248.—POCKET KNIFE.—Charles H. Palmer, Newark, N. J.

First, I claim the spurs, b, formed on the back, B, and combined and arranged with the cheeks, C, and scales, D, substantially in the manner and for the purpose herein specified.

Second, I claim the employment in pocket knives of the spring, E e, mounted separate from the back, and pressed backwards against the same by the opening and shutting of the blade, substantially in the manner and for the purpose herein specified.

Third, I claim the housing or fitting of the spring, E e, within the shoulder or recess formed by the part, B', on the outward or forward extremity of the back, B, the several parts being combined and arranged, substantially as and for the purpose specified.

64,249.—CARRIAGE SHACKLE.—George T. Pearsall, Apalachin, N. Y.

I claim the pintle, B, spur, C, recess, E, spring, D, and socket, F, substantially as described, forming a new and useful improvement in attaching thills or poles to carriages or other vehicles.

64,250.—MANUFACTURE OF SOAP.—Henry Pemberton, Allegheny, Pa.

I claim the preparation of soap from cryolite, substantially in the manner hereinbefore described.

64,251.—BOXES, CANS, OR VESSELS FOR PUTTING UP CAUSTIC ALKALIES, ETC.—Henry Pemberton, Alleghany, Pa., and B. Heineman, Natrona, Pa.

We claim protecting the surface external or internal or both, of barrels, cans, or cases made of paper, muslin, wood, or other vegetable substance or either, or either or both surfaces of paper, muslin, or other vegetable fabric for putting up caustic alkalies and other solid or liquid substances which require protection from air or moisture, or which are liable to penetrate their covering, by means of a coating of silicate of soda or potassa, in combination with powdered gypsum, lime or other substance capable of combining therewith, substantially as and for the purposes hereinbefore described.

64,252.—STENCIL PLATE.—George R. Powere, Kingston, Mass.

First, I claim the stencil plate, A, in combination with the shell, B, and handle, D, substantially as specified.

Second, I claim the cylinder, C, provided with notches or grooves in combination with the spring, E, or its equivalent, constructed and operating substantially as and for the purpose specified.

Third, I claim the combination of the cylinder, C, spring, S, and handle, D, as set forth.

64,253.—PROCESS FOR THE MANUFACTURE OF IRON WITH STEEL SURFACE.—Jacob Reese, Pittsburg, Pa.

I claim giving a hard and highly polished surface or a hard surface, susceptible of high polish, to sheet iron and other articles of rolled, forged, or swaged iron by exposing the bar bloom pile or slab, from which such articles are to be rolled, forged, or swaged to partial cementation, so that the iron may be carbureted on the outside to a sufficient depth to give the required steel coating to the article manufactured therefrom, while the interior portion of the mass of iron retains the nature and characteristics of malleable or wrought iron, substantially as hereinbefore described.

Also converting into steel by cementation the exterior of piles, slabs, blooms, or bars of iron, designed to be rolled, forged, or swaged, while the interior or body of the piles, slabs, blooms, or bars remain unconnected and retain the ductility and softness of malleable iron, substantially as and for the purposes hereinbefore described.

64,254.—MACHINE FOR MAKING HORSE SHOES.—Daniel T. Robinson, Boston, Mass.

I claim the shears or cutting mechanism, consisting of the adjustable cutter block, C, and the lever, I, operated by the finger, d, and spring, p3, all constructed and arranged in the manner and for the purpose as before described.

I also claim the mechanism for dipping the punches into water consisting of the arm or carrier, F, friction roller, j', carriage, P, guides, Q Q, and furcated lever, R, the said lever being operated by the lever, J, in the manner as before described.

I also claim the watertank combined with this machine in the manner described.

I also claim the peculiar construction as well as the application of the shaping and reducing dies, j j, as before described.

I also claim combining with the carriage, P, the spring hook, m', and abutment, s2, essentially in manner and for the purpose as before explained.

I also claim the mechanism for operating the sliding carriage, D, the same consisting of the lever, J, bar, M, connecting rod, O, and wiper, K, constructed and combined substantially in manner and to operate as before set forth.

I also claim the combination of the hammer bar of the tripper, n2, and stud, g3, of wiper, K, under the arrangement and for operation as set forth.

I also claim the hook, m2, in combination with the hammer and with the lip, b3, on arm, F, for the purpose of starting the punches from the shoe, substantially as described.

I also claim the peculiar construction and application of the forming die for shaping the snow shoes essentially as described.

I also claim the combination and arrangement as herein described of all the several devices constituting this machine.

64,255.—COTTON-BALE TIE.—Seymour Rogers (assignor to Luman Rogers), Pittsburg, Pa.

First, I claim the loop, c, with the rigid arm, c', when constructed substantially as and for the purposes above set forth.

Second, The loop, c, either with or without the rigid, c', in combination with the corrugated or rigid strap end, a, of a metallic hoop, constructed substantially as and for the purposes above set forth.

Third, The rigid arm, c', of a loop, c, in combination with the slot, e, and the folded end, d, of a metallic hoop, constructed substantially as and for the purposes set forth.

64,256.—PROCESS FOR PRESERVING EGGS.—Henry Scheffer, St. Louis, Mo.

I claim the process of forming a silicious coating by the application of a

silicate and any simple or double alkaline salt, acting substantially as described in process numbered there.

64,257.—BEDSTEAD FASTENING.—Adolph Schlingman, West Alexandria, Ohio.

I claim securing a bedstead rail by a tongue, D, which being screwed or otherwise firmly secured to the post, is traversed by a key, C, which, as it is driven downward, bears against the rear side of the cleat, and acts to close and perfectly secure the joint in the manner set forth.

64,258.—AMALGAMATOR.—A. J. Senatz and G. W. Knowlton, Sacramento, Cal.

We claim the copper-bottomed pans, with the iron rods or bars and slots in the end, fastened to the sides of the pans with pins, and by means of which rods or bars the pans are flattened together, and an undulating motion is secured for the water and earth which are dashed upward against the stationary riffles, whereby the earth or sand is prevented from becoming solid.

We also claim, as a part of the same machine, the turned up ends of these pans, and the stationary riffle beds connected with the pans, all of said parts being the machine in combination which produce the intended effect.

64,259.—PLOW.—James B. Skinner, Rockford, Ill.

First, I claim the brace, d, welded or fastened to the lower part of the standard and the landside, as and for the purpose described.

Second, The arrangement as described of the plow beam, mold board, landside, and handles, with the curved standard and diagonal brace, C, for the purposes of reducing the weight and increasing the strength of the plow as set forth.

Third, The standard constructed and connected with the landside and inner handle, for the purpose of avoiding friction or clogging, as set forth.

Fourth, The arrangement as described of the overlapping lips, 11', on the inner front corners of the mold board and share, for the purposes set forth.

64,260.—APPARATUS FOR BURNING PETROLEUM ETC., IN CONJUNCTION WITH STEAM OR HEATED AIR OR BOTH.—Gideon O. Spencer, Titusville, Pa.

First, I claim providing within the fire box or furnace, for the purposes herein set forth, a solid substance or its equivalent, capable of receiving and retaining the required degree of heat for resolving petroleum or other fluid hydrocarbons into gases, when brought in contact with the same.

Second, The within-described method of supplying the fuel and oxygen, by discharging petroleum or other fluid hydrocarbons through one or more pipes, having their orifices within blow pipes or their equivalent, when applied and operated in combination with a heater, substantially as described and for the purposes herein set forth.

Third, The use of one or more blow pipes, or their equivalent, for the purpose of supplying oxygen and concentrating the heat, when applied and operated in combination with the heater, for the purposes herein set forth.

Fourth, The within-described method of revolving and consolving crude petroleum and other fluid hydrocarbons, by impinging one or more currents or jets of the same upon or against a solid heated substance, or its equivalent, within the fire box or furnace, capable of receiving and retaining such a degree of heat as shall resolve said crude petroleum or other fluid hydrocarbons into gases, for the purposes herein set forth.

Fifth, An apparatus for burning crude petroleum and other fluid hydrocarbons, consisting substantially of a heater, one or more pipes for supplying the fluid hydrocarbon, and one or more blow pipes, combined and applied for the purposes herein set forth.

64,261.—SHUTTLE GUARD FOR LOOMS.—E. M. Stevens, Boston, Mass., assignor to Alfred B. Ely, Trustee, Newton, Mass.

I claim the hinged guard, in combination with a positive self-locking device, which shall hold the same in position when down against any blow of the shuttle, while it may be readily unlocked and thrown up by the operative when desired, substantially in the manner and for the purpose set forth.

64,262.—CULTIVATOR.—John P. Tarnutzer, Fond du Lac, Wis.

I claim the shaft, D, with pinion, p, and pinion rack, r, and cap stand head, C, and movable frame, B.

Also the rollers, F F, and sheave, S, upon which a chain passes.

Also the hinges, h h, upon which the frame, E, is hung.

Also the wings, w w.

Also the movable frame, B.

64,263.—BRAND FOR MARKING ANIMALS.—Headley Thompson, Hector, N. Y.

I claim the movable type, A, constructed with stems, A', thereto attached, in combination with the stock, B, constructed with sockets, B', and the thumb screws, C, and arranged for use substantially as and for the purpose set forth.

64,264.—FASTENING FOR WINDOW BLINDS.—L. M. Townsley, Sedalia, Mo.

I claim the combination and arrangement of the catch, D, the springs, d, and the levers, D2 and D3, substantially as described and set forth.

64,265.—WASHING MACHINE.—Adelia Waldron, San Jose, Cal., assignor to herself and J. H. Atkinson, San Francisco, Cal.

I claim the double wash boards, O and K, the eccentric buttons, B, the sash frame, N, with clamp, C, the lever handle, G, the spring, J, in combination and exactly as set forth, and for the purposes specified.

64,266.—WINDOW BRUSH.—John S. White, Boston, Mass.

I claim the improved window brush as made with the flexible backing and the inflexible cap plate connected by a center pin, as and for the purpose set forth.

I also claim the arrangement and combination of the stiffening plate, c, with the cap plate and the inflexible backing and its bristles, as explained.

64,267.—COOKING STOVE.—Charles Williams, Manchester, N. H.

I claim the arrangement of the hearth, U, the ash sifter, G, and box, H, their chambers, D E, and the fire place, A.

I also claim the combination and arrangement of the two ovens, B C, the ash sifter and box chambers, D E, the fire place, A, the flues, I K L M N O P R S and T, and dampers, h l l, as set forth.

64,268.—WASHING MACHINE.—Daniel Williams, Rock, Wis.

First, I claim the tilting washboard, composed of parts, S and S, and slats, c, in combination with part, T, and bearings, e, when both are constructed and used substantially as and for the purposes described.

Second, The roller, R, operated by means of of the framework composed of parts, I K L M N and O, substantially as described in combination with the tilting washboard composed of parts, S and S', and slats, c, when the whole are constructed, connected together and operated substantially as and for the purpose described.

64,269.—PRINTERS' TYPE CASE.—Charles L. Alexander, Washington, D. C.

I claim a type case having the lower or front sides of the boxes inclined toward the upper or rear part of the case, substantially as described.

64,270.—HOOP MACHINE.—John J, Alvord (assignor to himself and Samuel C. Blinn), Tecumseh, Mich.

I claim the arrangement of the arms, O P, pivoted together upon the shaft, M, and having the pawls, R S, secured thereto, ratchet wheel, T, vibrating frame, L, bearing the said shaft, M, the sliding table, K, to which is secured the rack, K,, meshing into the gear wheels, N, and cams, J, upon the shaft, I, substantially as herein set forth for the purpose specified.

64,271.—MODE OF CLEANING WATCHES, JEWELRY, ETC.—James Annin, Le Roy, N. Y.

I claim the process of cleaning watches, jewelry, silver and plated ware, etc., by the ingredients and in the manner substantially as represented and described.

64,272.—HAY AND MANURE FORK.—Jabez H. Babcock, Shortsville, N. Y.

I claim the ferrule, A, and head, B, cast in one piece with holes drilled longitudinally in the head to receive the tines, and holes drilled transversely through the heads for the keys or pins, D, substantially as and for the purpose herein set forth.

64,273.—BUCKLE.—Joseph Barrow, Mobile, Ala.

I claim the buckle constructed of a continuous rigid frame, A, with bars, C, on which are hung the tongues, D, having independent motions and the clasp, F, for holding the ends of the strap, as herein represented and described.

64,274.—GRAIN DRILL.—P. D. Beckwith, Dowagiac, Mich.

I claim the mode herein described of securing or attaching the chain to the ball, A, by means of the rod or hook, d, whereby a simple and permanent attachment without weakening the ball is obtained, substantially as specified.

64,275.—WASHING MACHINE.—G. W. Benton, Dansville, N. Y.

I claim the within-described arrangement and combination of the springs, B, frame, C, concave series of rollers, D, cylinder, a, rubbers, c, springs, E, and adjusting screw rods, F, all operating in the manner and for the purpose specified.

64,276.—WASHING MACHINE.—Joseph W. Bradley, Rocheport, Mo.

I claim the cylinder, G, consisting of the T-shaped slats placed a short distance apart around its periphery, projecting ribs, a, upon the inside of the perforated cylinder heads, grooved or corrugated partition, J, and door, k as herein set forth for the purpose specified.

64,277.—SLIPPER.—Charles R. Broadbent, Boston, Mass.

I claim as a new article of manufacture a slipper or shoe made of paper, substantially as described.

64,278.—COOKING VESSEL FOR FRYING, STEAMING, ETC.—Robert Broome, Central Falls, R. I.

I claim the culinary vessel or utensil herein described composed of parts, A B C and D, when constructed, combined and arranged substantially as set forth.

64,279.—MEAT HAMMER.—A. H. Brown, Springfield, Vt.

I claim a meat hammer having its face or faces provided with one or more annular edges, substantially as and for the purpose herein set forth.

64,280.—ROW LOCK.—George W. Browne, New York City.

I claim the arrangement and combination of the annular plate, C, centrally pivoted thole, D, and piste, B, secured to the gunwale of the boat, as herein set forth.

64,281.—ATTACHMENT FOR DOOR KEYS.—D. E. Campbell, Boston, Mass.

I claim a safety attachment for the keys of doors, consisting of a bar, D, having spring arms or jaws, D D, and a spring sliding catch, G, when arranged and combined together and so as to be used and to operate substantially in the manner described.

64,282.—HEATING STOVE.—W. W. Carpenter, Middletown, N. Y.

I claim the horizontal pipe, E, resting upon the grate, its ends passing through the sides of the stove and supporting the vertical pipe, D, centrally in the furnace, said pipes, D, provided with the adjustable ring, L, and connected to the stovepipe, H, where all are constructed and arranged as herein set forth for the purpose specified.

64,283.—BAG FOR PRESERVING ICE.—William B. Coates (assignor to Thomas Reece and Arthur Clarke), Philadelphia, Pa.

First, I claim the application of woolen bags of one or more thicknesses, for the purpose of preserving ice.

Second, The outside water-proof bag of oil cloth, cotton, duck, rubber cloth, or equivalents, and chamber for drippings, K, the discharge openings at H H, and at G G and N, strap and buckle, D, and cord, E.

Third, The bags, A and B B in combination, the whole being made and constructed as herein described.

64,284.—FIREPLACE HEATER OR FURNACE.—Owen Collins, New York City.

First, I claim the arrangement of the tubular grate bars with relation to the rear and side chambers, K L, of the base communicating there through with the space or spaces within the jacket, M, substantially as specified.

Second, The smoke decomposing chamber, G, made to encompass the fire chamber and communicating therewith by smoke passages, b, also provided with suitable air inlets and outlets, as herein set forth.

The combination of the side and bottom air inlets, h l, to the chamber, L, of the base and controlled by dampers or valves, J, to vary the ingress, essentially as specified.

Fourth, The draft tubes, J, arranged to descend into the fire and controlled by dampers, d, substantially as shown and described.

Fifth, The reversely conical or concave radiating reflectors, N O, and deflector, Q, arranged for operation essentially as represented and described.

64,285.—CLAMP FOR CLOSING RUPTURES IN FIRE HOSE.—P. H. Collins (assignor to Harry Bitter and A. Merritt Asay), Philadelphia, Pa.

I claim the recessed clamps, constructed substantially as described.

64,286.—TICKET CUTTER.—L. O. Crocker, Braintree, Mass., and G. F. Field, Weymouth, Mass.

We claim the arrangement of the stripper, k, with its outer end supported against and operated by a spiral spring or springs, l, and its inner end jointed or connected with and so as to be operated by the counter die jaw, b, substantially as set forth.

We also claim combining with the wire, f, the spring, g, operating as and for the purpose substantially as set forth.

We also claim, in combination with the stripper plate, k (moved from the die before the action of the counter die jaw), the inclination of the cutting face of the die, both laterally and longitudinally, substantially as described.

64,287.—ATTACHMENT FOR ARTIFICIAL TEETH.—John C. K. Crooks, Birmingham, Mich.

I claim the loop or eye, a, provided with the double shank, b, the two ends of which are flattened in line with each other in such a manner that their outer extremities shall be widened to a greater degree than their points of connection with the eye thereby being slightly wedge shaped, said shank being inserted in the tooth, A, with the said flattened ends in the longitudinal line of the tooth while the eye itself is at right angles to said line, substantially as herein shown and described.

64,288.—WINDOW SASH.—George Dewey, Blooming Valley, Pa.

First, I claim securing panes of glass in sashes or frames by means of triangular india-rubber strips or pieces, H, substantially as described.

Second, The flat india-rubber strips, d, on the inner faces of window sashes substantially as described.

64,289.—GATE.—Allen O. Divine, Cambria Mills, Mich.

I claim a gate constructed of the hinged parts, A B, as described in combination with the way, m, friction rollers, h and i, and catch, s, so arranged as to form at once a swinging, sliding and folding gate, substantially as set forth.

64,290.—WHIFFLETREE.—E. M. Dodge, Plainview, Minn.

I claim the arrangement of the rods, B B, the bars, C C, and the connecting rod, D, constructed and used as and for the purpose herein specified.

64,291.—POTATO DIGGER.—E. O. Doud and W. F. Beardsley, Penfield, N. Y.

First, We claim, in combination with the shovel, S, the reciprocating hook, H, arranged and operating substantially as shown and described.

Second, Raising the head of hook, H, upon the ways, I, by means of the pivoted lever, y, which is operated by the pin or tappet, t, substantially as and for the purpose set forth.

Third, Attaching the pitman, P', to the shank, O, as shown for the purpose of producing a gentle pressure or force through the pitman, P', upon the head of the hook, H, substantially as and for the purpose set forth.

Fourth, In combination with the longitudinally reciprocating raddle or separator, R, the reciprocating cleaner, K, constructed, arranged and operating substantially as and for the purposes set forth.

Fifth, The heads, E, constructed as shown and described in combination with the pitman, r, depressions, r', and pins, c, all operating conjointly as shown and described for the purpose of rotating the cleaner, K.

Sixth, The sinuous slot, T', and rack, q, in combination with the shaft, S', and pinions, F', for the purpose of raising and lowering the machine and at the same time retaining the pinions, G and G', in gear with the spur wheels of the ground wheels after the machine is lowered sufficiently to put them into gear, as set forth.

Seventh, The sinuous slot, T', in the stock or yokes, J, as shown and for the purposes set forth.

Eighth, The arrangement of the hand wheel, K, shaft, M, ratchet and pawl, w' and y', step box, N, pinion, P, and bevel wheel, B', for the purpose of revolving the ground wheel shaft, S, and retaining the desired elevation or gage of the machine.

Ninth, The relative arrangement of the ground rollers, D, as shown in combination with the shovel, S, and jointed or adjustable tongue, I, in potato diggers, for the purposes set forth.

64,292.—HOSE COUPLING.—J. W. Douglas (assignor to W. and B. Douglas), Middletown, Conn.

First, I claim the inclined lugs, B B', provided with corresponding groove and tongue, for the purposes and substantially as described.

Second, I claim the inclined concave grooved nut, C, in combination with the lugs, B B', substantially as described.

64,293.—HEATING DRUM ATTACHMENT FOR FURNACES.—W. Duryea, Glen Cove, N. Y., and W. Ennis, Hudson, N. J.

We claim the apparatus constructed substantially as described of tubular radiating smoke boxes, D D', within a chamber, A, partitions, G G', and smoke and air inlets and outlets arranged relatively to each other to establish a circulation through the apparatus, substantially as specified.

64,294.—FURNACE FOR BURNING SAWDUST, ETC.—W. Duryea, Glen Cove, N. Y., and W. Ennis, Hudson, N. J.

First, We claim the combination of the perforated conical fire pot or chamber, B, with its dome-shaped roof, a, and shaking grate, D, fuel-feeding tubes or passages, c, communicating with a drying chamber or receptacle above and regulating plate or valve, C, substantially as specified.

Second, The combination with the fire chamber, B, and fuel supply passages, c, of the air inlets, f, arranged relatively to the passages, d, and dome, a, essentially as herein set forth.

64,295.—PADDLE WHEEL.—Nathaniel T. Edson, New Orleans, La.

First, I claim a combination of the float arms with their lugs, f', the swivel blocks, H, and wheels, A B and F, when wheel, F, is constructed with arms firmly attached to its inner rim and the float arms placed at right angles with the floats.

Second, I claim a combination of the cog wheels, b' and c', when acting and being acted upon by cog wheels, d', and used with wheels, A B and F, substantially as set forth and described.

64,296.—HORSE COLLAR.—E. P. Edstrom, Somerville, Mass.

I claim a horse collar in which the roll is formed upon a core piece, substantially as described.

I also claim in the construction of a horse collar stitching the body part, a, and the face piece, d, of the roll together at the front of the roll when said body part is drawn over the inner side of the roll and the frame without a seam under the roll, substantially as shown and described.

64,297.—RAILROAD RAIL.—R. M. Esterle, San Francisco, Cal.

I claim the railroad rail provided with alternate inclines, A and B, substantially as and for the purposes herein set forth.

64,298.—STRING TAG.—Samuel B. Fay, Franklin, Pa.

I claim the metallic tip, c, formed with a point at one end and oval at the rear whereby the same may be inserted or withdrawn from the goods when used in combination with the string and tag, in the manner and for the purposes set forth.

64,299.—CARRIAGE.—T. A. and A. F. Fisher, Beardstown, Ill.

First, We claim the jointed king bolt H, in combination with the fifth wheel and forward axle, and with the spring, K, attached to the carriage body, D, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the jointed coupling rod, L, with the fifth wheel, G, to which its forward end is attached and with the brace or arm, M, to the lower end of which its rear end is swivelled, substantially as herein shown and described and for the purpose set forth.

64,300.—BUTTONHOLE CUTTER.—Walter Fitzgerald, Boston, Mass.

I claim the arrangement of the stationary bed and movable cutter by which increased lengths of cuts are obtained by movements towards instead of away from the fulcrum of the levers, carrying the cutters and bed, substantially as described.

Also the combination with the cutter and its slotted carrier of the adjusting screws by which the edge of the knife is saligned so as to come into contact with the surface of the bed.

64,301.—PARLOR SKATE.—George Flint, Lowell, Mass.

I claim the middle wheel or runner, c, in combination with the wheels, b and d, arranged substantially as herein described and for the purpose fully set forth.

64,302.—CARRIAGE JACK.—T. L. Goble, Orange, N. Y.

First, I claim the notched rail, E, pivoted at one end to the eccentric lever, D, and at the other end to the pivoted adjustable stand, F, substantially as described for the purpose specified.

Second, The adjustable stand, F, pivoted to the notched rail, E, which is operated by the eccentric lever, D, substantially as described for the purpose specified.

64,303.—GATE.—J. and W. B. Goff, Hornellsville, N. Y.

I claim the arrangement of the metal eyes, x x, pin, I, and loop, J, with gate, A, in the manner and for the purposes set forth.

64,304.—SKATES.—Charles Gooch, Cincinnati, Ohio.

I claim the clamp D, fitting in the holes B, of the foot rest A, consisting of the plates F, with inclined inner edges, and having pronged upright arms G, and adjusted by means of the bolt I and thumb nut J, as herein set forth for the purpose specified.

64,305.—STEAM ENGINE SLIDE VALVE.—H. W. Goodrich and William B. Mason, Boston, Mass.

We claim the combination of the slide valve, a cylinder, a piston and a carriage arranged to operate together substantially as described.

64,306.—STEAM GENERATOR.—Carlos. H. Gould, Cincinnati, Ohio.

First, I claim the annular water space F', communicating in the manner described with a drum or steam box J, and enclosing the fire chamber when combined with the enclosing non-metallic wall P', and bed P, having the bottom central vent age U, substantially as set forth.

Second, In the described combination with the elements of the preceeding clause, I claim the enclosing air-jacket Z, for the purpose set forth.

Third, In combination with the elements of clause first, I claim the annular descending and centrally discharging flue V, as set forth.

Fourth, The tubular damper S, in the described arrangement with the flue V, and the bottom of the boiler, as explained.

Fifth, The ash spout k, arranged and adapted as and for the purpose represented.

Sixth, In the described combination with the elements of clause first, I claim the feed water pipe f, passing up through the centre of the escape flue, and of the boiler bottom as and for the purpose described.

64,307.—HYDRANT.—D. R. Gould, Chestertown, N. Y.

First, I claim the valve F, constructed as described and provided with the groove a, and arranged in connection with the case B, and the discharge pipe D, substantially as and for the purpose specified.

Second, The arrangement of the plate b, supported upon the spring d, and used in combination with the opening in the bottom of the case B, and the stem E, substantially as and for the purpose specified.

64,308.—TENONING CUTTER HEAD.—James S. Graham, (assignor to himself and C. R. Tompkins), Rochester, N. Y.

I claim the arrangement of the knives or cutters k, constructed substantially as shown and described upon the longitudinally curved bed a, of the head H, of tenoning machines, for the purpose herein set forth.

64,309.—BOAT BUILDER'S PLATFORM.—J. Granger, Zanesville, Ohio.

First, I claim pivoted the tilting platform to the post a, so that when the platform is tilted the entire weight of the platform and the boat will rest upon the ground, substantially as described, for the purpose specified.

Second, The post, A, with its inclined shoulders, to which the platform, B, is pivoted at a distance nearer to its inner end than at the outer, so that when the platform is lowered, the weight is upon the ground on the foundation in the manner as and for the purpose specified.

64,310.—WATER METER.—Thomas Green, Brooklyn, N. Y.

First, I claim a water meter constructed substantially as and for the purposes herein specified.

Second, I claim the water gate, B, the valve box, C, and the slide rod, m, in combination with the cylinder, A, constructed and operating substantially in the manner and for the purposes herein described.

64,311.—SUPPORTER.—P. S. Greenamyer, Smithville, Ohio.

I claim the belt, A, carrying the uterine supporter, C, with its straps and arms when used in combination with the shoulder straps, D D, and their respective connecting straps all arranged in the manner and for the purpose specified.

64,312.—GLASS WARE MOLDS.—Robert E. Haines, Cambridge, Mass., assignor to Boston Silver Glass Company, Boston, Mass.

I claim the employment of hinged clasping bands constructed and arranged to operate substantially as described to hold the upper section when made whole of a glass ware mold to lower sections thereof, when made in parts.

64,313.—MACHINE FOR PRESSING TWEERS.—L. M. Hart (assignor to himself and Charles S. Hinchman), Philadelphia, Pa.,

I claim in combination with a traversing core mold a traversing carriage carrying two or more molds for making tweers or other articles of clay or other plastic substances.

64,314.—SKATE.—John Hartman, Jr. Philadelphia, Pa. Antedated Oct. 30, 1866.

First, I claim tightening the skate by means of a supplementary plate, D, operated by a screw, E, substantially in the manner above described.

Second, The combination and arrangement of the swivel clamping plates, F and F', with the sole, B, by means of the adjustable fulcrum pin, G, substantially in the manner and for the purpose above set forth.

64,315.—TELEGRAPH INSULATOR.—Stephen C. Hendrickson, New York City. Antedated April 24, 1867.

First, I claim a drip insulator arranged in connection with the gutta-percha coverings of telegraph wires, substantially as described and for the purpose set forth.

Second, The trunk piece, G, the bell, M, the inverted bell, O, the trunk piece, P, and the gutta percha connections at J and Q, constructed substantially as and for the purpose described.

64,316.—GUIDE FOR AXLE BOXES.—Robert Hitchcock (assignor to John Mulligan and John H. Hare), Springfield, Mass.

The detachable metallic guide plates, B B, provided with flanges, d d, upon their inner edges and having the wedged shaped projections, b, fitting into the wedged shaped grooves in the jaws, A, when all are constructed and arranged as herein set forth for the purpose specified.

64,317.—GATE.—Windsor Holdredge, Oxford, N. Y.

I claim connecting the expansible and contractable gate, p q, with the hinged platforms, J J, by means of the descending arms, K K, the horizontal levers, l l, the horizontal shaft, m, the vertical arm, n, and the crooked lever, y, in such a manner that the depression and elevation of either of said platforms will operate said gate, substantially in the manner herein set forth.

64,318.—HAND SPRING FOR MACHINERY.—Parley Howe, Staffordville, Conn.

I claim the hand spring constructed, arranged and applied substantially as and for the purpose described.

64,319.—DEVICE FOR SUSPENDING LAMPS.—David T. Hubbell, Bethel, Conn.

First, I claim the arrangement and combination of the mechanism consisting of the drum, B, spring, D, roller, T, claws, H, and chains, C, with frame, N, as and for the purpose set forth.

Second, I claim the pendant, A, with its central opening and slot, I, in combination with the above operating mechanism as and for the purpose set forth.

64,320.—HAND STAMP.—Thomas S. Hudson, East Cambridge, Mass.

First, I claim operating both of the type wheels, G H, by their spindle, I in the manner and for the purpose set forth.

Second, I also claim the type wheels, G H, provided with notches, e, in combination with the spindle, I, with its projection, f, and spring, g, operating substantially as and for the purpose set forth.

Third, I also claim the type wheels, G H, with the characters marked on their sides, substantially as described in combination with a casing, E, provided with its holes, c d, substantially as and for the purpose set forth.

Fourth, I also claim the key, L, or its equivalent for locking the type block, E, in place, substantially as described.

64,321.—PROCESS OF CONCENTRATING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim the method of process hereinbefore described of treating the extracts of bark for concentrating it by a continuous operation, in a vacuum worm or evaporating tables, substantially as set forth.

64,322.—MACHINERY FOR OBTAINING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim, First, The combination and arrangement of the rollers, E and D', and D2, with the trough, F, substantially as hereinbefore described and for the purposes set forth.

Second, The combination of the pipes, G2 and G3, with the water trough, F, for the purposes hereinbefore set forth.

Third, The combination and arrangement of the rollers, E and D' and D1' with the water box, F, and collecting trough, J, for the purposes hereinbefore set forth.

Fourth, In combination with the rollers, E D', and D2, the endless apron P, and water box, V, for the purposes hereinbefore set forth.

Fifth, In combination with the endless apron, P, and water box, V, the pressure rollers, U and U2, for the purposes hereinbefore set forth.

Sixth, The combination of the rollers, E and V, with the steam pipe, N2, for the purposes hereinbefore set forth.

64,323.—PROCESS FOR OBTAINING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim the method of treating bark for obtaining the extract thereof for

tanning and other purposes by the process, substantially as hereinbefore described.

64,324.—APPARATUS FOR CONCENTRATING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim, First, The use of a flat worm made of corrugated sheets or plates of metal, substantially as hereinbefore set forth, and for the purposes described.

Second, In combination with a flat worm made substantially as hereinbefore described, a steam chamber or box for the purposes set forth.

Third, The use of one or more tanks, H, and I, in combination with connecting pipes, G', and J, and exhausting pipe, L, arranged and operating substantially as hereinbefore set forth.

Fourth, The combination of the flat worm made as hereinbefore described with one or more tanks, H and I, by means of the pipes, F and K, for the purposes hereinbefore set forth.

64,325.—APPARATUS FOR CONCENTRATING EXTRACTS FROM BARK FOR TANNERY.—Benjamin Irving, New York City.

I claim the combination of the worms, or of coils of cylindrical pipes made as hereinbefore described with the steam chamber for the purpose of concentrating extracts from barks for tanning purposes.

64,326.—STEAM GENERATOR.—C. W. Isbell, New York City, and P. W. Mackenzie, Jersey City, N. J. Antedated April 22, 1867.

First, We claim the steam generating rings or sections, F, constructed with radial finger-shaped tubes, H, of tapering or diminishing form from their outer and open ends toward their inner and closed extremities, substantially as specified.

Second, In combination with a series of said rings or sections, F, a cylindrical shell or casing inclosing an annular water space, B, forming a steam generator with flue spaces, b, between and around the pockets, H, substantially as herein set forth.

64,327. — SELF-ADJUSTING NECK YOKE. — John Jacobs, Oneida, Ill.

I claim the swivel loop, C and plate, B, or their equivalents constructed substantially as specified and used with a neck yoke as and for the purpose herein set forth.

64,328.—STRIKING ATTACHMENT TO CLOCKS.—Abijah Johnson, West Newton, Ind.

I claim the ring, B, placed and figured as shown and perforated for the insertion of pins to operate the striking machinery of a clock, and in combination therewith the movable pins, C, substantially as and for the purpose set forth.

64,329.—HORSE RAKE.—S. A. and L. M. Kays, Independence, Iowa.

First, We claim the lever, I, and curved bar, K, in combination with the rake head, F, and pendant lever, J, for the purposes and substantially as shown and described.

Second, We also claim the spiral spring, b, in combination with the bar, K, and lever, I, substantially as shown and described and for the purposes set forth.

64,330.—REFRIGERATOR.—Moses W. Kidder and Moses W. Shorey, Lowell, Mass.

We claim, First, The arrangement of the induction tube, B, within the eduction tube or passage, I, in the manner and for the purpose set forth.

Second, The use and application of valves, b and f, to the back or either side of each or any of the compartments, said valves being operated by opening and closing the inner doors, substantially as and for the purpose explained.

Third, The combination of the tubes, pipes or passages arranged for ventilation as set forth the valves, b and f, and rods, e, with the refrigerator, the whole arranged to operate, substantially as and for the purpose set forth.

64,331.—HORSE HAY RAKE.—John G. Kimberlin, Dryden, N. Y.

I claim the continuous chain, g, provided with an intermediate spring, h, in combination with the lever, C, and rake head, C, substantially as described for the purpose specified.

64,332.—WELL TUBE.—Hiram Knapp and Warren H. Pease, Goshen, Ind.

We claim the combination of the slotted tube, A, plug, F, spiral wire, C, screen, D, encasing cylinder, E, substantially as described for the purpose specified.

64,333.—QUARTZ CRUSHER.—A. Komp, New York City.

I claim the oscillating crushing and grinding jaw, E E' in combination with the revolving jaw, C C', constructed substantially as and for the purpose described.

64,334.—BEE HIVE.—William Kraiss (assignor to himself Jacob Beckman and Myron Silverthorn), Fair View, Pa.

I claim the arrangement of one or more hives provided with chambers, P, frames, F, lining box, H, drawer, J, and external slides, K, as described, in combination with an external bee house or casing in such manner as to leave the spaces, A B N, between the sides flooring and roof of the hive and the external casing thereof filled with ashes or other poor conductor of heat, substantially as and for the purposes set forth.

64,335.—PORTABLE FENCE.—Israel L. Landis, Lancaster, Pa.

I claim the construction of the notched brace, E, with its pins, G, or rod, G, when combined or used with a rail or pole fence, fastened together with pins, B, as herein described and for the purpose set forth.

64,336.— DERRICK.—James S. Lester and Lyman G. Jennings, Lafayette, Ind.

First, What we claim is the combination of the revolving or swinging adjustable frame, D E F, with the vertical post or cylinder, A, substantially as herein shown and described.

Second, The combination of the revolving pulley bore, G, with the vertical post or cylinder, A, substantially as herein shown and described.

Third, An improved derrick formed by the combination of the pulley box or frame, G, the adjustable frame, D E F, the vertical post or cylinder, A, and the adjustable braces, B, with each other, substantially as herein shown and described.

Fourth, Connecting the ropes, J K, and pulleys, H I, with each other with pulley box or frame, G, and with the swinging frame, D E F, in such a way that one of the platforms attached to said ropes may be raised at the same time and by the same operation by which the other is lowered, substantially as herein shown and described.

64,337.—PUMPS.—Thomas Ling, New York City.

I claim the bar, G, brakes, K K', one or more, and bar, E arranged and applied to a rising and falling pump body, substantially as and for the purpose herein set forth.

64,338.—COMPOUND FOR IMPROVING THE QUALITY OF IRON. —T. Jones and W. Morgan, Pittsburg, Pa.

We claim the use and application of the above described compound, for the purpose set forth.

64,339.—MILL FOR CRUSHING ORE.—Simon F. Mackie, New York City.

First, I claim the combination of the cylinder stamp heads, a, covers, c, pistons, f, piston rods, g, cross heads, y, connecting rods, r, crank shaft, x, and guides, u, with the bed, k, and screen l, substantially as herein described, and for the purposes herein set forth.

Second, The plate, z, in combination with the flanged stamp head as described.

64,340.—LATTICE AND TRUSS BRIDGE.—G. B. Manley, Cogans, Station, Pa., assignor to himself and Timothy O. Vanalen, Danville, Pa.

First, I claim the method and arrangement of interlocking the wrought iron strings and braces of a lattice work truss for bridges in the manner herein described.

Second, The brace block, D, in combination with the grooved and ribbed beams of strings, A and C, fitted and secured between them as and for the purpose herein described.

64,341.—PLANE IRON.—S. Markee (assignor to himself and John M. Easterley), Auburn, N.Y.

I claim the plane iron consisting of the slotted iron, A, curved cap, C, flanged sliding nut, D, and screw, B, arranged and operating substantially as described for the purpose specified.

64,342.—KNIFE SHARPENER.— George B. Markham, Plymouth, Mich.

I claim the adjustable guide rest, e, attached to the frame branch, b, by an arm, d, when constructed as described and arranged in relation to the beveled grindstone, A, and its metal supporting frame as herein set forth for the purpose specified.

64,343.—MANUFACTURE OF FUEL FROM ANTHRACITE COAL DUST.—Edward G. Markley, Borough Sunbury, Pa., and George H. Bardwell, Philadelphia, Pa.

We claim the improved anthracite block as above described and set out, made of the materials combined in substantially the proportions above set forth.

64,344.—HANGER AND JOURNAL BOX FOR SHAFTING.—Isaac D. Mathews, Worcester, Mass.

First, I claim the combination of the main part, A, having a slot, g, projections, b F, screw bolts, D G, and e, with the bearing piece, E, and box, C said parts being constructed and arranged for joint operation, substantially as and for the purposes set forth.

Second, The combination of screw, t, and cap, d, with the journal box, C, and projection, b, of the hanger part, A, substantially as and for the purpose set forth.

Third, The combination with the concaved bearing part, E, and cap, d, having projections, n e, as shown of the journal box, C, having slots or recesses, ff, for the purposes set forth.

Fourth, The combination of nut, h, and screw, G, with the projection, F, and oil or drip-pan, H, substantially as set forth.

64,345.—HARVESTER RAKE.—Andrew J. Martin, Rockford, Ill.

First, I claim driving an automatic rake by a series of concave elliptic bevel gears, substantially in the manner and for the purpose described.

Second, The combination of a slotted rake arm moving horizontally over the platform, with two crank arms, arranged one behind the other and driven by elliptic gearing, substantially in the manner and for the purpose described.

Third The combination of the recessed pinion, E, with the loop, e, when arranged and operating as described to throwthe rake into and out of gear.

Fourth, The combination of the rigid rake head, T, with the yielding teeth, when arranged and operating as described.

64,346.—DRAY.—C. S. Martin, Milwaukie, Wis.

I claim a dray constructed with springs of india-rubber, D, placed between the guide plates, E, attached to the axle, C, and vertically sliding jaws, B, attached below the body, A, and strengthened by braces, G, said parts being combined and arranged substantially as described.

64,347.—MODE OF USING STEAM FOR HEATING AND EVAPORATING.—Helem Merrill, Philadelphia, Pa.

I claim the retaining of the water in the receiving and discharging cylinders until at required hight it exerts a power sufficient to perform the operations substantially as described and set forth.

Second, The independent float as connected and combined with the stop cocks making the whole apparatus self-acting for the purposes, substantially as set forth and described.

Third, I claim the method of returning the water of condensation to the boiler, substantially as described.

64,348.—CHURN.—J. W. Myers, Lyons, Iowa.

First, I claim the stationary, breaker, H.

Second, The revolving perforated cylinder, L R J K.

Third, The combination and arrangement of these parts in connection with the other parts when constructed and operating substantially as and for the purpose set forth.

64,349.—HAY RACK.—William Nash, Corning, N. Y.

First, I claim the drawers, F F, placed so as to be drawn out at the ends from under the longitudinal slats d d d d, which form the support for the hay in the rack, the drawers, F F, being so arranged as to receive and save the grass seed after it is liberated from the hay in feeding, substantially in the manner and for the purposes herein described.

Second, I claim the combination for the side troughs, E E, hay rack B, and drawers, F F, constructed and operating substantially as and for the purposes herein set forth.

64,350.—GRAVEL WAGON.—Adam Neer, Bellefontanie, Ohio.

First, I claim the combination of the rope L, pulleys M, and O, reel or drum, I, and crank, R; with each other and with the box, I, and frame, F, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the rope, S, pulley, T, reel or drum, U, and crank, V, with each other and with the box, I, and frame, F, substantially as herein shown and described and for the purpose set forth.

64,351.—MACHINE FOR BENDING TIRES.—J. A. Niman and B. Fidler, Mansfield, Ohio.

We claim the right and left hand screw, I, provided with a collar, H, working in a recess in the bed of the machine combined with the sliding or traversing roller carriages, E, which carry the rollers, B, which said screw is tapped or screwed into and through the said roller carriages, F, and by means of which said combination we are enabled to set the rollers, B, equidistant nearer to or further from the central roller, A, for the purpose required and retain them in place all of which is substantially set forth, described and shown in the accompanying drawings and in this specification.

64,352.—MANUFACTURE OF FIRE BRICK.—George Nimmo, Jersey City, N. J.

I claim the employment of the residuum of the combustion of coal as the base or principal component in the manufacture of fire bricks retorts, furnace linings, pots and similar articles as and for the purposes specified.

64,353.—MANUFACTURING METALS, GLASS AND POTTERY.— E. W. Nohe, Ripon, Wis.

I claim the manufacture of metals from the ore without the usual mixture with the latter of coal or other solid face by the means of the combustion of gas generated for the purpose and brought directly into the furnace and burned in combination with a blast of air substantially in the manner and for the purposes set forth.

64,354.—PICKER MOTION FOR LOOMS.—William Nugent, North Providence, R. I.

First, I claim the rail, A, provided with cavity, I, in which plays the pin of the arm, I, of the slotted block, G, which carries the staff, C, and rocker, E, and having horizontal slot, L, through which slot and the vertical block of the slot G, plays the bolt, F, encircled by the sleeve, a, and operating in the manner herein represented and described.

Second, I also claim the cavity, I, in the side of the rail, A, in combination with the block, G, whose arm, J, has a pin that works in said cavity, substantially as shown.

64,355.—STEAM GENERATOR.—R. J. Nunn, Savannah, Ga.

First, Steam generator or boiler constructed entirely of tubes or pipes when such tubes or pipes are arranged and connected together, and protected from the direct action of the fire substantially in the manner herein described.

Second, I claim the interior circulation tubes herein described when the said tubes are perforated in the manner and secured in their position in the manner substantially as described when used in the vertical tube of a boiler, as and for the purposes set forth.

64,356.—AUTOMATIC BOILER FEEDERS.—Saml. J. Parker, Williamsport, Pa.

First, I claim the within described arrangement of the vessel, C, with the tube, D, and fixed pipe, M, in combination with suitable packing, e and a, boiler and a water tank substantially in the manner and for the purposes herein set forth.

Second, I claim in combination with the above the arrangement of the passages, d, relatively to the movable part, C, adapted to discharge steam from beneath the packings, e, substantially in the manner and for the purpose herein set forth.

64,357.—DRILLING MACHINE.—Wm. F. Parker, Andover, Mass.

I claim the combination of the pawl, N, with the ratchel wheel K, the cam, M, and the slide, P, for the purposes herein set forth and described.

In combination with the subject matter of the foregoing clause and with the supporting frame, I, claim the top piece a, arranged as described.

64,358.—GANG PLOW.—Horace L. Perry, Aurora, N. Y.

First, I claim the cast-steel plows, D, when constructed and used in combination with the hinged plow frame, C, main frame, A, and wheels, B, B, for the purposes and substantially as herein described.

Second, The combination and arrangement of the pinions, E E, crank shaft, F, hinged racks, G G, ratchel wheel, H, and stop lever, H,' for the purposes and substantially as herein set forth.

64,359.—SHEEP SHEARING TABLE.—Oliver Perry, W. N. Welles and Clark Perry, Ortonville, Mich.

We claim the combination and arrangement of the table, A, swinging frames, B B,' rope g, and treadle C, all constructed and operating in the manner substantially as and for the purposes herein specified.

64,360.—MUSICAL DIAL.—Nicolai Peterson, Columbus, Miss.

First, I claim a musical dial substantially as and for the purpose described.

Second, The combination of the movable dial, B, with the stationary main dial, A, as and for the purpose set forth.

64,361.—APPARATUS FOR CARBURETING GAS, and AIR.— George W. Porter, Boston, Mass.

First, I claim the construction and arrangement of the hooks in the side of the box, A, their inner ends pointing in opposite directions retained by means of the spiral springs, J, and capable of being adjusted whereby a breach is made in the capillary substance as and for the purpose specified.

Second, The construction and arrangement within the box, A, of the perforated plates adjusted by means of the thumb-screw a, whereby the capillary substance is compressed or released as herein set forth for the purpose specified.

64,362.—FLEXIBLE TUBING, OR HOSE.—Thomas L. Reed, (assignor to Atlantic Tubing Co.,) Providence, R. I.

I claim the flexible impervious tubing formed by combining the non-collapsable tube with a sheath or tube of India rubber, or other vulcanizable gums or compounds by the means and substantially as described for the purpose specified.

64,363.—FENCE.—Walter Reed, Wayne, N. Y.

I claim an improved fence formed by the combination of the stakes, C, and D, and lock-bar, E, with each other and with the panel or panels of the fence substantially in the manner herein shown and described and for the purpose set forth.

64,364 —APPARATUS FOR HEADING WRENCH-BARS.—T. C. Rice, (assignor to Thomas H. Dodge and T. W. Wellington), Worcester, Mass.

First, I claim the combination of the sliding table, C, perforated in the manner described, with the horizontal rolls, H, H, for reducing the head of the wrench to the proper thickness substantially as set forth.

Second, the combination of the grooved table or bed, C, perforated in the manner described with the vertical friction roll, K, for reducing the head of the wrench to the proper depth while the sides are prevented from lateral expansion substantially as set forth.

Third, the combination of the friction roll, K, with the grooved table or bed, C, provided with the inclined hole, h, for reducing one part only of the head and giving it the proper inclination substantially as set forth.

Fourth, The combination with the friction roll, K, of the grooved table C, when provided with the inclined hole or perforation, h, notch, z, and pit, u, for receiving the surplus metal as set forth.

Fifth, The combination in the sliding table, C, of the hole, g, with the sides o, o, and projection p, substantially as and for the purposes set forth.

Sixth, The combination of the perforated table, C, for holding the wrench head in different positions with the friction rolls and the rack and gear or other actuating mechanism the whole being arranged and operated to reduce and shape the wrench head substantially in the manner herein specified.

64,365.—WHIP RACK.—Edward Richmond, Brooklyn, N. Y.

First, the wedge shaped opening formed in a rack as described of a hook or guide of metal or other suitable material secured in the said rack under such an arrangement that the portion of the said hook which guides and maintains the whip lash or tip in its proper relation to the opening, shall be parallel or nearly so with the face of the rack, and transverse to the length of the opening over which it is placed substantially as shown and set forth.

Second, The combination with a wedge or V-shaped slot formed on the edge of whip rack of adjustable guide or hook, corrugated or bent at the point where it traverses the slot above which is is placed and pivoted to the top of the rack so that it may be moved to lessen the width of the said slot substantially as and for the purposes shown and described.

64,366.—TICKET SAFE AND ALARM BELL.—Edward Richmond and Joseph G. Moody, of New York, N. Y.

First, We claim ticket safe or receptacle the same consisting of a box slotted to admit of the insertion of the tickets and provided with a door in which openings are formed and an inside leaf or plate held against the door by means of spring, the said door and spring leaf being held to the box in such manner as that the tickets when inserted through the said slot may be securely held between them as herein shown and set forth.

Second, The combination with slotted box or safe of the hinged door and inside spring leaf or plate having formed on their upper ends flanges or lips which overlap each other so as to prevent the withdrawal of the tickets placed within the said box substantially as herein shown and described.

Third, The combination with the herein described ticket safe of an alarm bell attached to said safe substantially in the manner and for the purpose herein shown and specified.

64,367.—CHURN.—John L. Riter and R. C. Swann, (assignors to themselves and T. J. West and R. B. Perry), Brownsville, Ind.

We claim the arrangement of the shaft and fly-wheel, E, with plate, G, having a pin, Z, near its periphery which works into a slotted plate, d, upon the side of the churn, C, for operating said churn box, upon its bearings as herein set forth.

64,368.—THILL COUPLING.—Silas Rogers, Stamfordville, N. Y.

I claim a thill coupling composed of the plate, C, attached to the lip, A, and having a curved front end, and the thill iron, D, provided with a slot, e, and connected to the plate, C, by means of a groove and pin arranged as shown and described, or in an equivalent way.

64,369.—PAINT BRUSH.—H. Rosenthal, New York City.

I claim the combination of the ferrule, C, socket plate or disk, E, handle, B, and bristles A, when the latter are secured together, substantially as set forth.

64,370.—CULTIVATOR.—Anson P. Routt, Liberty Mills, Va.

I claim the changeable, reversible and adjustable share secured by loops, G, and keys or wedges, g, upon the curved sheaths or shanks C', whose points enter the holes or notches in the shovel or plough to secure and steady it in any posititon which it may be adjusted, substantially as set forth.

64,371.—PIANO FORTE.—T. J. V. Roz, Paris, France.

First, I claim the construction of the back or bottom of the piano of round or oval columns, F, in combination with an iron frame, a a', and bars, A, and the bar, b, as and for the purposes specified.

Second, I claim the piano action composed of the levers, O', lifter, o, and lever, O*, applied in the manner specified so that the same shall be separate from the key board, in order that one key board may be moved away and another brought into place as set forth.

Third, I claim the anti-friction supports, J L', winch, 9, cord, 16, and tightening screw, l', in combination with the transposing key board, 1, and rack, 17, for moving said key board with facility and retaining it in place, as set forth.

Fourth, I claim the small or elementary key boards, fitted so as to be movable, and applied in the manner specified, to act upon the same notes as the main key board, as and for the purposes specified.

Fifth, I claim the cards connected with the respective notes and raised by the depression of the note so as to exhibit the name and sound of the particular note to aid in the instruction of elementary music, as set forth.

Sixth, I claim a series of levers composing the action between the keys and hammers, said action connecting on one line with the keys and lengthened downwards at the bass end, and projected upwards at the treble end, the intermediate connections being graduated so as to reach the hammer above the notes at the treble end, and below the notes at the bass end, as specified.

64,372.—DOOR SPRING.—Cyrus W. Saladee, Newark, Ohio.

I claim the box or cylinder, A, secured rigidly to the door or gate in comolnation with the arm, B, and standard, D, in the manner and for the purpose substantially as shown and dscribed.

Second, I claim the arm, B, constructed and operating in the manner and for the purpose, substantially as shown and described.

Third, I claim the standard, D, or its equivalent, when provided with a series of bearings or holes, 1, 2, 3, fig. 3, in combination with the arm, B, substantially as and for the purpose specified.

Fourth, I claim, in combination with the arm, B, the indentation, x, substantially as and for the purpose described.

Fifth, I also claim the combination of the adjustable arm, B, standard, D, follower, E, spring, C, and the box or cylinder, A, or their equivalents, arranged and operating in the manner and for the purpose substantially as shown and described.

64,373.—METHOD OF STARTING AND STOPPING STREET CARS. —Edwin M. Scott, Auburn, N. Y.

First, I claim the fixed pinion, c, in combination with gear, d, and slotted racks, e f, as and for the purpose specified.

Second, In combination with the above I claim spring, E, elbows, h h, and levers, I I, all arranged as and for the purpose set forth and described.

64,374. — PHOTOGRAPHIC PRINTING FRAME. — Jonathan T. Shoemaker, Van Wert Co., Ohio.

I claim the folding-back photographic printing frame, substantially as herein described.

64,375.— MACHINE FOR PRINTING NUMBERS. — C. Latham Sholes, Milwaukee, Wis.

First, I claim the disks, E, provided with the dogs, r, and projections, e', in combination with the plate, d, when arranged to operate as and for the purpose set forth.

Second, I claim operating the disks, E, by means of the projecting pins, t, and the cam, c, arranged to operate as shown and described.

Third, I claim aligning the disks, E, by means of the V-shaped notches and the locking bar, x, operating substantially as set forth.

Fourth, I claim the sliding bar, x, with its spring, m, and the oscillating cam or guide, a, when said parts are arranged for joint action, substantially as herein set forth.

64,376.—CORN CULTIVATOR.—George Sprague, Spring Hill, Kansas.

I claim the combination of the root cutters, F F, the shovels, d d, and the plough beams, E E, arranged and connected for adjustment and operation, substantially as and for the purposes herein described.

64,377.—LANTERN.—W. G. and C. Sterling, New York City.

We claim the guards, A A, attached to the circular part, B, in combination with the catch, D, or lugs, G G, or their equivalent.

We claim the eyelet clamps, fig. 3, when used for the purpose above described.

64,378.—CAR TRUCK.—S. G. Steves, Jamestown, N. Y.

I claim the car truck frame, A, in combination with the braces, J J', chord, H, and tension rod, K, and so constructed that the sides of said truck form a truss by which it is suspended below the axles, in the manner and for the purpose substantially as set forth.

64,379.—FENCE.—H. M. Stoker, Watson, Ill.

I claim the two-fold adjustability of the ports of the panels, L and H, in combination with bars, E, connecting pins, t, and binders, C, and pointed posts, A, the whole constructed, arranged, and operating in the manner and for the purpose substantially as herein set forth.

64,380.—FIFTH WHEEL FOR WAGONS.—James B. Stuart, Bunker Hill, Ill.

I claim a circle plate or fifth wheel for vehicles composed of the frame, A, and plate, B, connected by a bolt, d, and attached respectively to the front axle and bolster, substantially in the manner as and for the purpose herein set forth.

64,381.—SHANK AND SOCKET FOR HAND HAY FORKS.—F. F. Terry, Fort Gibson, N. Y.

I claim, First, Locking the several tines, t, to the shank or head, S, by a single key, substantially in the manner herein shown and described and for the purpose set forth.

Second, Providing the head or shank, S, with round holes to receive the wire tines, t, as and for the purposes shown and described.

Third, The arrangement of the handle socket or ferrule, C, in connection with the receiving shank, S, as and for the purpose herein set forth.

64,382.—GAS GENERATOR AND CARBURETOR.—Wm. Thompson (assignor to the Cleveland Gas Machine Company), Cleveland, Ohio.

I claim, First, The corrugated cylinder, C, annular chamber, e, as arranged in combination with the chains, f, and buckets, g, for the purpose and in the manner as described.

Second, The heater, S, burner, Y, pipe, Q, in combination with the carburetor, W, case, P, and gasometer, Y, for the purpose and in the manner as set forth.

Third, The cylinder, C, diaphragm, F, valves, I and K, in combination with the generator, B, for the purpose and in the manner substantially as described.

Fourth, The pipe, j, sleeve, h, in combination with the corrugated cylinder, C, for the purpose and in the manner specified.

64,383.—WEATHER STRIP.—E. P. and E. S. Terry, New York City.

We claim, First, a weather strip formed of a single piece of molding as herein described and shown in Fig. 5, with a strip of india rubber or other suitable material, applied therein, as specified, for covering joints on level surfaces, substantially as above specified.

Second, We also claim the weather strip shown in Fig. 6, for guarding joints in angles, constructed as and for the purpose herein set forth.

64,384.—STUMP EXTRACTOR.—George W. Townsend, Galesburg, Mich.

I claim the pulleys, a and a', arranged substantially as herein shown and described, in combination with the draught bar, C, and pitmans, E.

I also claim the double crank shaft, D, the gear wheel, F, and the pinion, H, in combination with the draft bar, C, and pitmans, E, substantially as herein specified.

64,385.—PROCESS IN THE MANUFACTURE OF BICARBONATE OF SODA.—Alois Pohr von Pohrnhoff, Brooklyn, N. Y.

I claim a process of manufacturing bicarbonate of soda without admixture of crystal of sal-soda from hydrate of soda, and as such alone without submitting the latter to a previous procedure and through the simultaneous influx of carbonic gas and water, steam created by said gas, for the purpose and in a manner substantially as described above.

64,386.—WASHING MACHINE.—Edward L. Walker, Jenner's Cross Roads, Pa.

I claim, First, The removable cover or its equivalent, against which the compression of the clothes if effected substantially as described.

Second, The compressor operated from beneath against the stationary or adjustable cover or its equivalent, substantially as described.

Third, The box or tube provided with a series of sockets or their equivalents, for graduating or adjusting the height of the removable top or cover, substantially as described.

Fourth, The arrangement of means for operating the lifting compressor, consisting of uprights attached to said compressor, pivoted fulcrum standards, and the lever frame, or their equivalents, substantially as described.

Fifth, A compressing cover provided with a rubber board on its under surface, and arranged to turn on pivots over against the side of the frame, in the manner and for the purpose described.

64,387.—CARPET STRETCHER.—Willis Weaver, Salem, Ohio.

I claim, First, An improved carpet stretcher, formed by the combination of the pivoted tooth plate, B, pivoted wire loop, C, or equivalent and the lever, A, with each other, substantially as herein shown and described.

Second, The combination of the spring, E, with the pivoted toothed plate, B, and lever, A, substantially as herein shown and described, and for the purpose set forth.

64,388.—HOLDER FOR SLOTTED TOOLS.—T. L. Webster, Brooklyn, N. Y.

I claim the tool holder for slotting machines, constructed as described, consisting of the parts, a b, fitted together and connecting by the pin, c, to form a joint which will admit of the slotted part, b, moving only in one direction, spring, B, fitted in the recess, c, of the part, a, substantially as herein shown and described.

64,389.—MANUFACTURE OF FIRE BRICK.—Samuel R. Wellman, Nashua, N. H.

I claim the use of a diamond rock in the manufacture of fire bricks, furnace linings, and similar articles, substantially as described.

64,390.—CORN PLANTER.—John D. Wells, Franklin County, Ohio.

I claim the combination and arrangement of the operating devices, consisting of the driving wheel with a crank attached for operating the valves, together with the arrangement and particular combination of the several parts named as above described, or substantially the same as would answer the intended purpose.

64,391.—DIVIDERS.—Horatio Whiting, New York City.

I claim the construction and arrangement of the annular-flanged screw nut, F, provided with a screw thread upon its inside, and hung in the slot, E, in the leg, B, upon the arm, D, the latter provided with teeth upon its upper side and passing through the slot in the leg, B, at right angles with the slot, E, the said screw nut being held in place by means of the spring, G, in the slot, E, substantially as described for the purpose specified.

64,392.—PROPELLING BOATS.—Elijah Williams, Marianna, Fla.

I claim First, The combination of the pawls, O, O, with the springs, P, P, and the driving wheels, F, the pinion wheel, E, the ratchet wheel, D, and the paddle wheels, B, B, all constructed and operated substantially in the manner and for the purposes herein before set forth.

Second, I claim in combination with the above, the method of elevating and depressing the paddle wheels by means of a platform operated by adjustable screws and blocks, substantially in the manner and for the purposes above set forth.

64,393.—CHURN.—George L. Witsil, assignor to Eliza Libbet and John Crompton.

I claim, First The dasher handle, E, when constructed with a spiral spring entirely through the same in combination with the pin, B, for giving an alternately rotary motion to the dasher, with the vertical reciprocating action of the handle substantially as described.

Second, The combination of the concavo-convex dasher, C, with triangular openings and radial flanges, D, having angular notches in their ends, with a device for giving a reciprocating vertical and alternating rotary motion to the dasher, substantially as and for the purpose set forth.

Third, The combination of the dasher handle, E, constructed as described, and the cross piece, G, when arranged to operate substantially as set forth.

64,394.—AUTOMATIC GATE.—Sylvester J. Wright, Ellsworth, N. Y.

I claim, First, The combination of the rollers, C, flexible straps, D and I, spring or springs, J, lever arm, E, and rope or chain, F, with each other, with the stationary box or frame, A, movable frame or platform, B, and gate, H, substantially as herein shown and described and for the purposes set forth.

Second, The combination of the coiled wire spring, L, or equivalent, with the gate, H, substantially as and for the purpose herein set forth.

64,395.—WATER WHEEL.—Thomas G. Hall (assignor to himself, Lewis Strayer, and Peter S. Boose), York, Pa.

First, I claim the vertical projection, g, on the buckets, K, substantially as described.

Second, The combination of the bent plates, F, forming converging inlets with the wheel having the parts, E & G, constructed as described, and with gates, I, having projections, i, all arranged substantially as herein represented and described.

64,396.—MACHINE FOR CUTTING FILES.—Elisha O. Potter (assignor to C. A. Warland and J. M. Ryder), Pawtucket, R. I.

First, I claim combining the chisel holder or device which holds the chisel with the chisel slide or other device by which the chisel is raised and lowered to and from the file blank by means of a circular bearing or socket, the center or axis of which is at or near the center of the edge of the chisel and the plane of its oscillation is transverse to the file, substantially as described.

Second, The manner in which I have combined or arranged the former or shaper which controls the inclination of the chisel to the bed, with reference to the bed and to a cutter frame made to oscillate in a vertical plane parallel to the length of the file to vary said inclination, by attaching the former or shaper to the bed and below the cutter frame, and causing the cutter frame to rest directly upon it for support, substantially as described.

REISSUES.

2,577.—GRINDING MILL.—Edwin P. Baugh, Philadelphia, Pa. Patented March 7, 1865.

First, I claim constructing the shell, A, of a number of tapering cast iron sections, b, and an exterior cast iron casing, the said sections being adapted to the casing and held in place, substantially in the manner described.

Second, Constructing the burr of a number of tapering cast iron sections, b, held in place, substantially in the manner described.

Third, The ring, L, made separate and distinct from the shell but serving to support both the outer casing of the same and the sections, b, of the shell as set forth.

2,581.—BREECH-LOADING FIRE-ARMS.—Cornelius Callghan, Boston, Mass., assignee of Wm. R. Landfear. Patented Sept. 6, 1864, Antedated Aug. 19, 1863.

I claim in combination with a breech-loading arm, a mechanism by which simultaneously a cartridge is driven into the barrel the breech block and hammer is securely locked against the barrel and the piece is discharged, all by drawing the trigger, substantially as set forth.

Also the lever, o s, applied to the breech and in combination with the opening, d d, in the frame, B, substantially as and for the purpose specified.

2,582.—HARVESTER.—Cyrenus Wheeler, Jr. Poplar Ridge, N. Y., assignee by mesne assignments of A. C. Brownlich. Patented Jan. 4, 1859. (Div. A.)

First, I claim in a two wheel machine, a frame carrying the cutting apparatus arranged to vibrate about a center coincident with the center of rotation of a bevel wheel which is mounted on an axis parallel with, but independent of the main drive wheel axle.

Second, The combination in a two wheel machine of a vibrating frame carrying the crank shaft and pinion with a frame carrying the bevel wheel mounted on an axis independent of the main drive wheel axle in such manner that the axis of rotation of said bevel wheel and the axis of oscillation of the vibrating frame shall coincide.

Third, So connecting a vibrating frame carrying a crank shaft and pinion with the frame carrying the bevel wheel mounted on an axle independent of the main gear wheel as that the axis of oscillation of said vibrating frame shall coincide with the axis of rotation of the two supporting wheels, the main gear wheel and the bevel wheel, substantially as described.

2,583.—HARVESTER.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignments of A. C. Brownlick. Patented Jan 4, 1859. (Div. B.)

First, I claim a vibrating frame carrying the cutting apparatus arranged to vibrate around a center coincident with the axis of rotation of a bevel wheel which is mounted on an axis independent of the main drive wheel axle, in combination with a means for locking or setting said vibrating frame at any desired angle of inclination to the ground.

Second, In a two wheel machine, a gear block or frame for supporting the gearing, provided with a recess for the draft pole constructed in one piece, substantially as described.

2,584.—PACKING FOR STUFFING STEAM AND OTHER ENGINES.—Richard Burr, Philadelphia, Pa., and The Silver Lake Manufacturing Co., Newton, Mass., assignees by mesne assignments of Morris Batticher. Patented Oct. 4, 1864.

I claim a packing for stuffing boxes expansion joints, etc., composed of dry powdered substances combined with fibrous material, substantially as set forth.

2,585.—HANDLE FOR TEA AND COFFEE POTS.—G. B. Halsted, New York City. Ratented June 6, 1865.

I claim a handle for metal tea and coffee pots constructed of two longitudinal parts swaged and struck up, in any desired form, out of tinned plate and connected together by solder or otherwise, substantially as herein set forth.

2,586.—BRIDGE.—David Hammond, Canton, Ohio. Patented July 3, 1866.

I claim, First, The arch, B, composed of two double T-irons, b b, combined and arranged with clamping and securing pieces and covering pieces, in the manner and for the purpose herein specified.

Second, The clamping piece, D, constructed and arranged as hereinbefore specified.

Third, The clamping piece, P, constructed and arranged as hereinbefore specified.

Fourth, The securing piece, J, constructed and arranged as hereinbefore specified.

2,587.—FABRIC FOR HATS, BONNETS, ETC.—Modena Hat Company, New York City, assignees by mesne assignments of Henry Loewenberg. Patented Feb. 28, 1865.

I claim the new compound fabric hereinbefore described, having substantially a foundation of interlaced threads and a surface composed of fibrous material stiffened by gelatinous matter and consolidated by pressure.

2,588.—DEVICE FOR STOPPING AND CHANGING MOTION.—George L. Lincoln & Co., Hartford, Conn., assignees by mesne assignments of Francis A. Pratt. Patented Sept. 4, 1860.

We claim the combination of the levers or clamps, c, disk or collar, j, substantially as and for the purpose described.

We claim the application of a sliding or wedge collar, e, or its mechanical equivalent, for the purpose of operating the said levers or clamps, c, substantially as described.

We claim the clamps, c, or their mechanical equivalents, in combination with the set screws, c', or their mechanical equivalents, with proper actuating device, substantially as and for the purpose described.

DESIGNS.

2,633 and 2,634.—FLOOR OIL CLOTH OR CARPET PATTERN.—Robert Hoskins, Brooklyn, N. Y., assignor to Edward C. Sampson, New York City. Antedated April 6, 1867. Two Cases.

2,635 to 2,640.—FLOOR OIL CLOTH OR CARPET PATTERN.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York City. Antedated April 3, 1867. Six Cases.

2,641.—KNIFE OR FORK HANDLE, ETC.—Egbert W. Sperry, Wolcottville. Conn.

2,642 and 2,643.—KNIFE, FORK OR SPOON HANDLE.—Egbert W. Sperry, Wolcottville, Conn. Two Cases.

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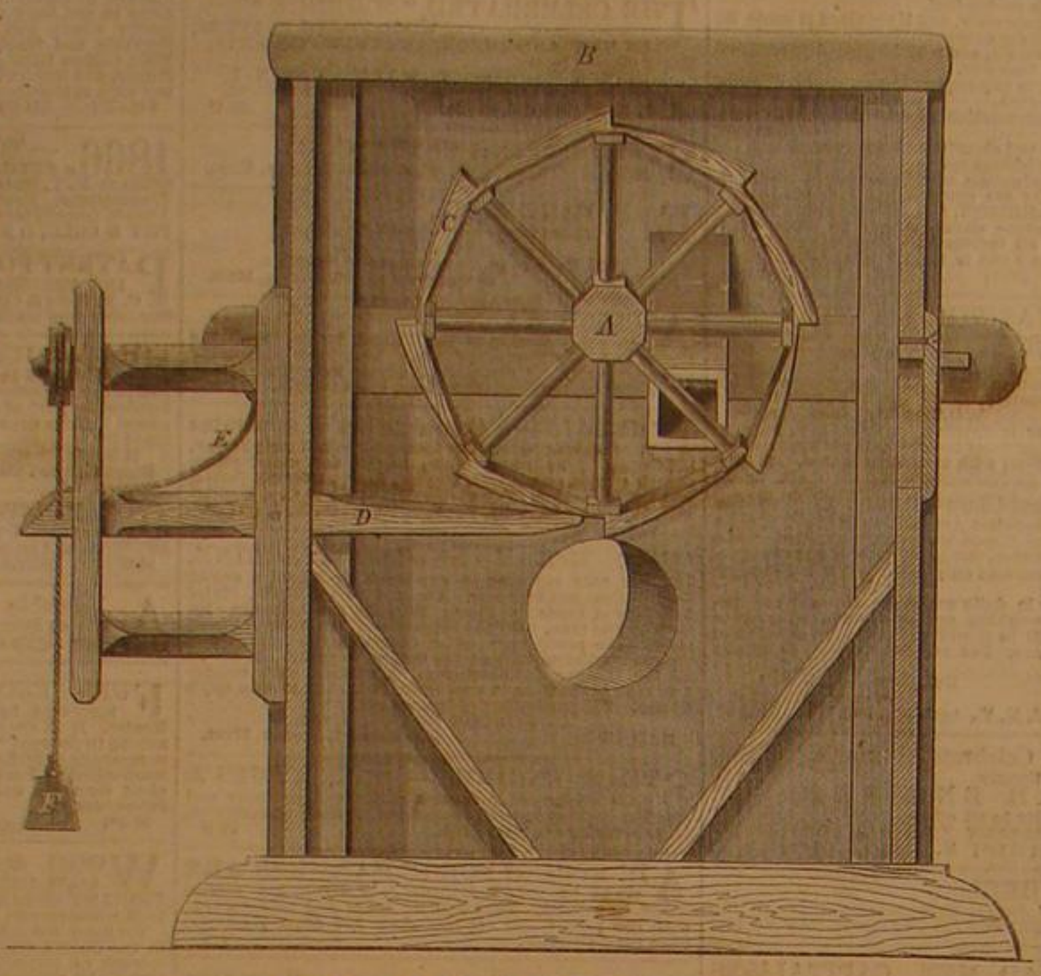
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It was patented through the Scientific American Patent Agency, Nov. 27, 1866, by A. R. Smith of Delaware, Ohio, who may be addressed for rights and nfachines.

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The successful voyage across the Atlantic by the *Red, White and Blue*, and the yachts in the ocean race, has induced another adventurer to attempt the transit. The journey is to be undertaken on one of Perry's monitor rafts, now on exhibition in this city. This raft is constructed of three air-tight cylinders incased in heavy Russia duck cloth, each twenty-five feet in length by twelve and one half wide. When blown up these bags are connected by a light framework which also forms the deck. The raft is schooner-rigged with a lug sail forward, main sail aft, and jib. Cabin there is none, the only protection for the passengers being a small water-proof tent rigged amidships. Captain Mikes with two companions constitute the complement of men, and the expedition is to start about the middle of the present month, bound for Paris and the Exposition. The raft draws but seven inches of water, and with a fair wind the inventor states that her speed will be from twenty to thirty knots per hour.

As a surf boat the claims of this raft were well tested before the Commissioners of Life-saving Inventions, at Long Branch. Its buoyant capacity is estimated at 14,000 pounds, or it will float 585 people on deck and clinging to its sides. The raft is compact and can be stored, wrapped in a tarpaulin, in a space thirteen feet by twenty inches, and can be inflated, and launched ready for use in six minutes.

CANCER AND CONSUMPTION.—Prof. Andrews, of the Chicago Medical College, has deduced some suggestive generalizations from examination of the census statistics of mortality, relative to these two dreaded, and as it seems in some way related, inheritances. They appear to coincide remarkably in their favorite haunts; following very nearly alike the two conditions of latitude and proximity to the seaboard, especially the Atlantic. New Mexico has least, of both diseases. Vermont takes the lead in cancer (1 in 40 deaths) and in consumption is second only to New Hampshire and Maine, which are respectively second and third in the former disease. The New England States stand foremost in both classes, followed closely by the middle states and Ohio. The western states come next in consumption, quite regularly. As nearly all these states are to a great extent colonies from New England, and the diseases are both hereditary, the true coincidence is perhaps rather congenital than climatic. The cold eastern seaboard, which so obviously generates consumption, is probably the parent also of the more mysterious cancer. Dr. T. W. Cooke, of London, remarks, in his work upon cancer, that a certain class of tumors which are liable to become cancerous usually occur in persons predisposed to consumption, and that by diligent inquiry he has found that most cancerous patients, not hereditarily such, are of more or less consumptive families, and are liable to transmit consumption to their offspring.

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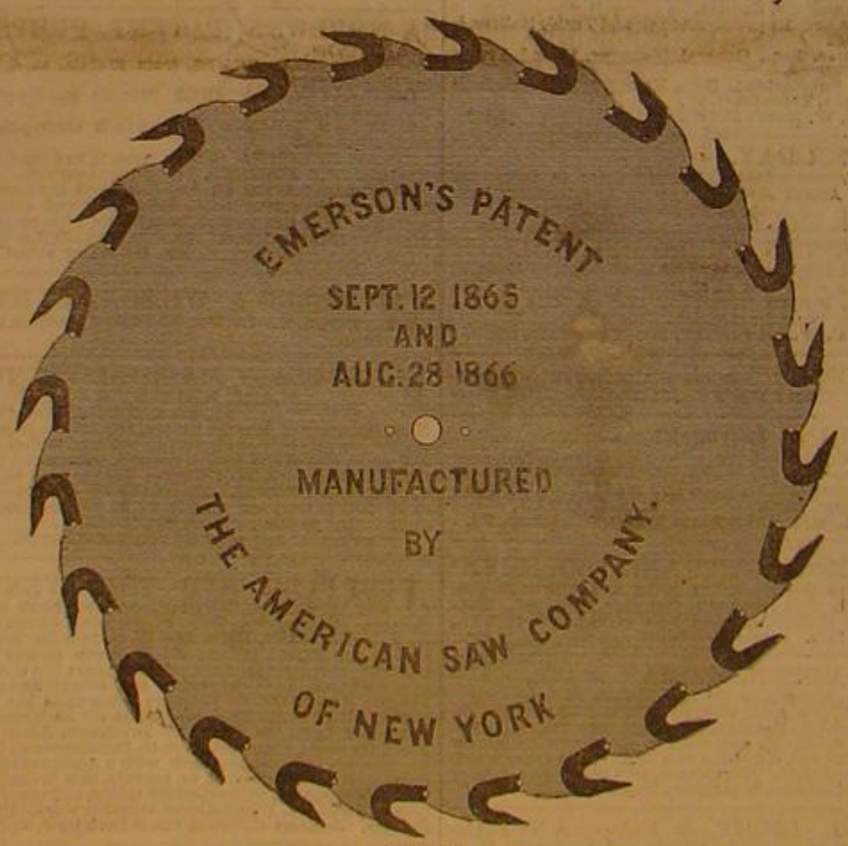
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