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Improved Governor and Stop Motion.

The object of the improvement represented in the engraving is two fold. It is to aid the governor in its action and also to prevent disasters from the breaking or running off of the governor belt. It appears to be well calculated for both these contingencies.

Fig. 1 is a perspective view of the governor and its attachments complete, and Figs. 2 and 3 are sections of the main working parts. The governor is of the ordinary style, its appurtenances constituting the particular difference between this and ordinary regulators.

A lever, A, is pivoted at B and is connected at its short end with the valve. When the steam in the boiler rises above the proper point of pressure it raises a piston fitting into the pipe, C, which is connected with the steam chest and receives steam directly from the boiler. The steam of this piston, working through a gland, engages with the lever, and when the pressure is too great assists in raising the lever and thus in shutting the valve. A spring, D, on the top of the lever can, by the set screw, E, be tensioned in the required degree as may be found most efficient.

The piston in the pipe, C, will be raised as the pressure of steam increases and act as a weight, or rather as a spring in forcing the valve to its seat. Its action is direct without any intermediate machinery, so that the rise of the steam pressure in the steam chest will show itself at once by means of this piston in closing the valve. Of course a lowering of the steam pressure will be acknowledged by the piston in receding from the lever.

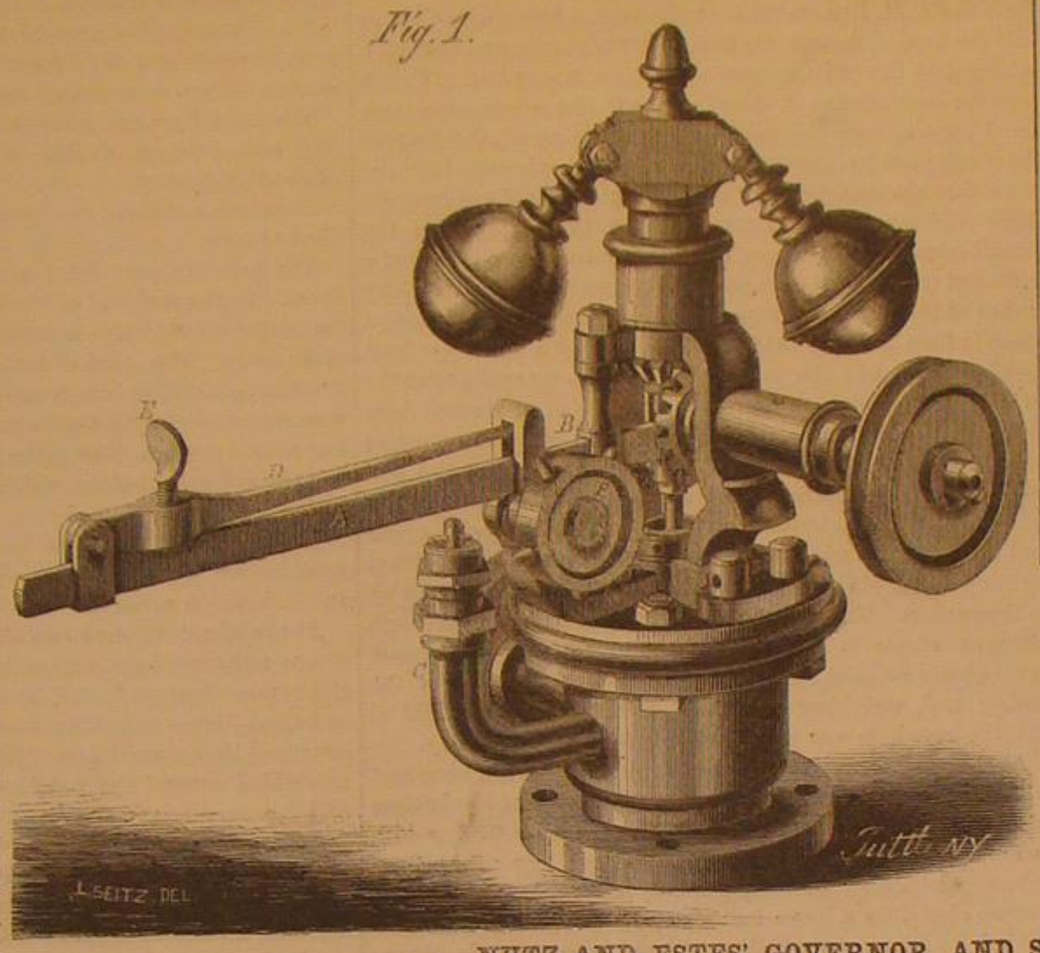
The wheel, F, is a hand-wheel with handles on its periphery Its shaft passes through a stand guide, against the top of which the spring, D, acts and on the shaft is a cam, G, Fig. 2, which by turning the hand-wheel is forced against the under side of the lever either entirely closing the valve or reducing its aperture.

There is also a device forming part of this improvement, for instantly shutting off the steam in case of the breaking or running off of the governor belt. The stand supporting the regulator balls is pivoted to an upright on one side and on the other—the pulley side—the foot rests in a recess formed in a support. This recess has a beveled offset seen in section at H, Fig. 3. So long as the belt pulls in the direction of the arrow the stand is held in position, as at H, but if the belt breaks or runs off, the stand foot drops into the recess, lowering the governor and closing the valve, instantly shutting off the steam.

The whole arragement appears to be well designed for the object intended, and calculated to work certainly and promptly.

A patent will issue next week through the Scientific American Patent Agency. For further information address Wilson Estes & Fairchild, Leavenworth, Kansas.

Fig. 1.



NUTZ AND ESTES' GOVERNOR AND STOP MOTION.

Fig. 2

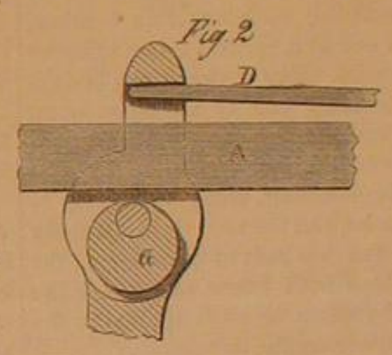


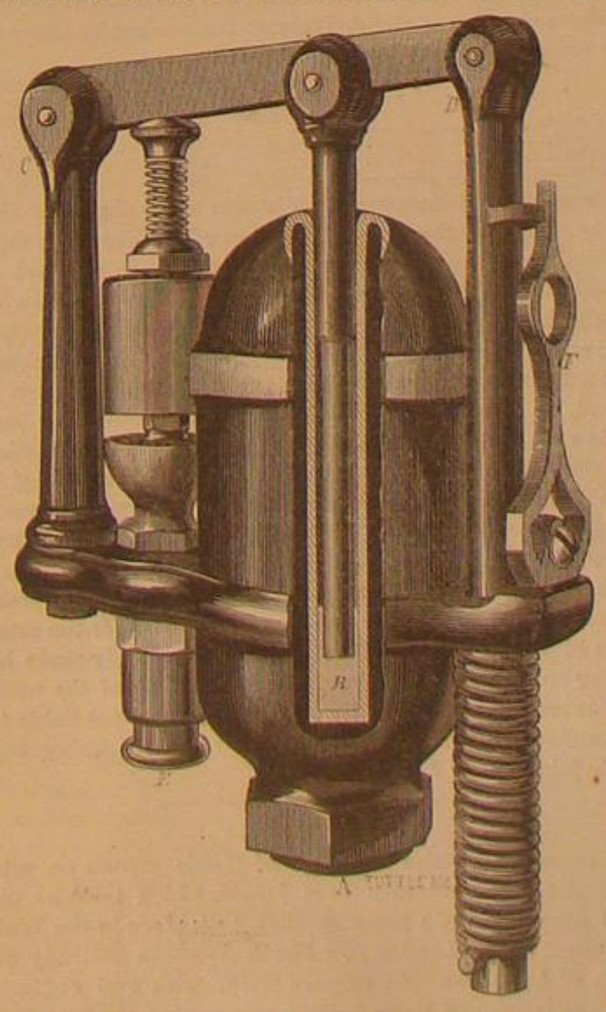
Fig. 3.

The Flow of Solids.

M. Tresca's paper read at the Paris meeting of the Institution of Mechanical Engineers, was interesting, and it was the opinion of many of those who heard it, that it foreshadowed important improvements in the working of metals. Thus far, we believe, however, no direction in which M. Tresca's researches will have a practical bearing, has been indicated, yet it does not follow that their ultimate results can at once be foreseen. That the particles of solids of which the form is altered must move upon each other, and in the direction of least resistance, is of course a physical law, long known to many. More than twenty years ago M. Remond made silver pencil cases by punching a flat plate of silver into a tube, and drawing this out; and Mr. Parkes, of Birmingham, now makes tubes in this manner. The beautiful process of stamping metallic capsules, is another interesting instance of the flow of solids. The soft metal is placed in a shallow circular recess, and a die, slightly smaller than this recess, is stamped upon the metal, which instantly runs up the die and uniformly around it, to a hight sufficient for the capsule. Cold rolling, cold tube-drawing, etc., are all examples of the flow of solids, and so indeed is all forging and working in heated but not liquified metals, since they are then solids of but moderate cohesion. With the exception of M. Tresca's experiment of forcing a pile of lead plates into concentric tubes, we have long been familiar with much of what was shown by his specimens, especially with the grain of the iron in forgings when brought out by acid. Lead pipe and bullets have long been "squirted" by hydraulic pressure, and Mr. Weems has even pretended that, in pressing an alloy of copper and zinc, he separated those constituents from each other. The most beautiful example in the arts, however, is the latest—the accurate pressing out of a thin tin tube within a lead one, from an ingot of tin placed within one of lead, described a few weeks ago in the SCIENTIFIC AMERICAN—practiced in the new lead-encased tin pipe manufacture, in this city.

PECK'S IMPROVED LOW WATER DETECTOR AND ALARM.

There have been a number of attempts to make an automatic alarm to denote the condition of the water in a steam



boiler, or to give warning of a dangerous position of the water line. Some of them have proved measurably effective, but we doubt if any one possesses more genuine merit than that shown in the engraving, the invention of Milo Peck, of New Haven, Conn., patented January 23, 1866.

As will be seen by the engraving it is not clumsy in form and may be attached to any part of the boiler. A chamber is connected by a pipe at A to the water space of the boiler at a point below which it is not desired the water shall fall. Inside this case is a pipe closed at the bottom, in which fits loosely a piston or plunger the lower end of which rests upon a plug, B, of fusible metal, calculated to fuse at a steam heat but to retain its solidity when surrounded by water. The top of the piston is pivoted to a lever, one end of which is jointed to the stand, C, and the other to the rod, D, which slides through the frame and is held firmly down by the tension of a spiral spring. Between stand, C, and the case is an ordinary steam whistle the valve stem of which rests against the under side of the lever. Steam is supplied to the whistle by an independent pipe leading from the lower part, E, to the boiler.

It will be seen that so long as the plunger rests upon the top of the fusible plug no alarm will be given by the whistle, but the instant the metal softens, so that the spring on D can depress the lever and plunger, the valve of the whistle opens and sounds the alarm. While the case surrounding the fusible metal and its containing pipe is filled with water the fusible plug remains intact, but when, by the lowering of the water in the boiler, the steam is admitted into the case, the fusible metal is melted and the lever allowed to be depressed, the whistle giving the alarm.

A very simple contrivance gives the means of again setting the apparatus without remelting the fusible metal. Pivoted to the rod, D, is a lever, F, the lower part of which is a double cam. It is represented in the engraving as resting upon the stand and the plunger is sunk into the fusible metal at B. In this position the whistle is blown. By swinging the upper end of the lever, F, down, the rod, D, lever, and plunger are raised and the metal, B, allowed to cool and resume its original form. This cooling is effected simply by bringing the water of the boiler up to its proper position, when the lever, F, is replaced into an upright position and its base will remain above the face of the stand until the melting of the metal again allows it to drop.

Further information may be obtained of the inventor and manufacturer, as above, where the apparatus may be seen in operation.

Technical Education.

Dr. Percy, of the British School of Mines, writes in the London *Times*:—Not many years ago, notwithstanding the prominent position which Great Britain then held among the iron-producing nations of the world, scarcely a chemist could be found in any ironwork in the kingdom, and such a thing as an analysis of an iron ore or of iron was hardly ever thought of. What is the fact now? Why, the absence of an expert chemist from a great iron work is the exception and not the rule. I could supply you with the names of able chemists thus scattered throughtout our ironworks. And what is true of ironwork is equally true of other branches of metallurgy. During the last few years I have had the opportunity of seeing the examination papers on metallurgy of working men, sent to the Science and Art Department at South Kingston, from various parts of the United Kingdom, and I say with confidence that at least in that branch, much progress has been made in the diffusion of 'technical education.' I am personally acquainted with many of our chief metallurgical works, and have had ample opportunities of conversing with the working men they employ, and I have been delighted to observe their desire for knowledge concerning the principles of their art, and on many occasions how much knowledge of those principles they have obtained.

BRITISH INVENTION OF TELEGRAPHY IN 1816.—The British Commission have put up in the Exposition a representation of Ronalds' telegraph, with the following inscription:—

"Telegraphy—an apparatus for transmitting through eight miles of wire signals by tension electricity invented by Mr. F. Ronalds, formerly of Hammersmith, 1815."

And in the adjoining window:—

"TELEGRAPHY—an apparatus for transmitting signals by galvanic electricity, invented by Cook and Wheatstone in 1837," subtended by an illustration of a signal-stroke bell—the bell that is now so much used for signalling on railways.

ON THE MACHINERY FOR BORING ARTESIAN WELLS.

The author commenced by stating that the artesian wells at present sunk in the Paris basin of the tertiary formation, range in size generally from about 8in. down to 2in. diameter, with a depth of about 330ft. to 350ft. The bore-hole is usually lined with copper, in order to make the wells water-tight and bring the water to the surface without loss. These works frequently present considerable difficulties in their execution, from the frequent changes in the nature of the soil passed through, and from the impediments that are so often encountered in driving the tubes through the beds of sand and clay. Borings of a much larger size are now in process of execution in Paris for the purpose of bringing to the surface a large supply of the artesian waters, whose existence has been proved by the well at Grenelle of 3¼in. diameter that was sunk in 1841, and the subsequent one of 2¼in. diameter sunk at Passy in 1861. Each of these two artesian wells required six or seven years' work for its completion. A large artesian well is now being constructed by M. Dru, at Butte aux Cailles, for the supply of the city of Paris, which is intended to be carried down through the green sand to a depth of 2600ft. or 2900ft. The boring is at present 490ft. deep and its diameter is as large as 3ft. 11in.

During the last two years and a-half the writer had also been sinking in a similar well of 1ft. 7in. diameter for supplying the sugar refinery of M. Say, in Paris; this well is now 1570ft. deep, and it is expected that the water-bearing strata will be reached at a depth of about 1800ft.

For the smaller wells hand-boring tools are in use, but these are limited to borings of inconsiderable depth and small diameter. For borings of the diameter of these large wells it is necessary to make use of special tools, worked entirely by steam power; and in some cases of sinking mine shafts, tools of as large a diameter as 14ft. 9in. have been used. The boring is effected by a rotary motion in the case of the small diameter and considerable depth percussive action alone i employed, which is effected by raising the tool and letting it fall with successive strokes.

M. Dru illustrated the apparatus he employed in boring the large wells that have been mentione l, by diagrams drawn to a scale of one thirtieth size. The boring rod is suspended from the outer end of a working beam, which is made of timber hooped with iron, working upon a middle bearing, and is connected at the inner end to a vertical steam cylinder of 10in. diameter and 39in. stroke. The stroke of the boring-rod is reduced to 22in., by the inner end of the beam being made longer than the outer end, serving as a partial counterbalance for the weight of the boring rod.

The steam cylinder is single-acting, being used only to lift the boring-rod at each stroke, and the rod is lowered again by releasing the steam from the top side of the piston; the stroke is limited by timber stops both below and above the end of the working beam. A friction break is applied to the drum to regulate the rate of lowering the boring-rod.

M. Dru went on to say that the boring tool is the part of most importance in the apparatus, and the one that has involved most difficulty in maturing its construction. The points to be aimed at in this are—simplicity of construction and repairs, the greatest force of blow possible for each unit of striking surface, and freedom from liability to get turned aside and choked.

The tool used in small borings is a single chisel, but for the large borings it is found best to divide the tool face into separate chisels, each of convenient size and weight for forging, but keeping all the chisels in a straight line, whereby the extent of striking surface is reduced, and the tool is rendered less liable to be turned aside by meeting a hard portion of flint on a single point of the striking edge, which would diminish the effect of the blow.

If the whole length of the boring-rod were allowed to fall suddenly to the bottom of a large bore-hole at each stroke, frequent breakages would occur; and it is therefore found requisite to arrange for the tool to be detached from the boring-rod at a fixed point in each stroke, and this has led to the general adoption of free-falling tools. There have been several contrivances for effecting this object, and M. Dru described and illustrated his plan of self-acting free-falling tool. This tool consists of four principal pieces—a hook, a catch, a pawl, and a disengaging rod. The hook has the chisels fixed in its lower end, and slides between two vertical edges of a box, which is screwed to the lower end of the boring-rod, and the catch works in the same space upon a center pin fixed in a box, so that the tool is lifted by the rod when hooked on the catch. The pall at the same time being opposite the tail end of the catch, secures it from getting unhooked from the tool; but this pawl is centered in a separate sliding hoop forming the top of the disengaging rod, which slides freely up and down within a fixed distance upon the boring rod, being carried by two guides outside the box of the boring-rod, and the hoop rests upon the upper one of these guides. In lowering the boring-rod the disengaging rod reaches the bottom of the bore-hole first, and then being stopped prevents the pawl from descending any lower, and causes the inclined back of the catch to slide down past the pawl, forcing the catch out of the hook, and thus allowing the tool to fall freely and strike its blow; and this hight of fall of the tool will always be the same, being determined only by the length of the disengaging rod.

As the boring-rod continues to be lowered to the bottom of the hole the catch falls back into its original position, and engages with the hook ready for lifting the tool in the next stroke.

The boring-rods employed are of two kinds, wrought iron and wood. The wood for the rods requires to be carefully selected, and care has to be taken to choose the timber from the thick part of the tree, and not the topplags; and in France Lorraine or Vosges deals are preferred.

The boring-rods, whether of wood or iron, are screwed together either by solid sockets or with separate collars. The boring-rod is guided in the lower part of the larger diameter bore-hole by a lantern, consisting of four vertical iron bars curved in at both ends, where they are secured by movable sockets upon the boring-rod, and fixed by a nut at the top: these bars admit of being readily adjusted to any required diameter. In raising up or letting down the boring-rod two lengths of about 30ft. each, are detached or added at once, and a few shorter rods of different lengths are used to make up the exact length required. The coupling screw by which the boring-rod is connected to the working beam, serves to complete the adjustment of length; this is turned by a cross-bar, and then secured by a cross pin through the screw.

In ordinary work, breakages of the boring-rod generally take place in the iron, and more particularly at the part screwed, as that is the weakest part. In the case of breakages of the rods occurring, the tools usually employed for picking up the broken ends are in a conical screwed socket and a claw. Tools with nippers are sometimes used in large borings, as it is not advisable to subject the rods to a twist.

In boring through chalk, as in the case of the wells in the Paris basin, M. Dru stated that the hole is first made of about half the final diameter for 60ft. to 90ft. depth, and it is then enlarged to the full diameter by using a larger tool. This is done for convenience of working, for if the whole area were acted upon at once it would involve crushing all the flints in the chalk; but by putting a scoop in the advance hole the flints that are detached by the blows of the tool are received there without getting broken during the working of the second larger tool. When the boring tool has detached a sufficient quantity of material, the boring-rod is drawn up by means of the drum and rope worked by the steam engine; a scoop is then lowered into the bore-hole by a wire rope from another drum, and the scoop is then drawn up again with the excavated material. This scoop consists of a riveted iron cylinder, with a handle at the top that can either be screwed to the coring-rod or attached to the wire rope; and the bottom is closed by a large valve opening inwards. On lowering this cylinder to the bottom of the bore-hole the valve opens and the loose material enters the cylinder, where it is retained by the closing of the valve, whilst the cylinder is drawn up to the surface. The resistance experienced in boring through different strata is very various, and some rocks passed through are so hard that with 1200 blows per day of the boring tool, weighing nearly 10 cwt., with 19in. hight of fall, the bore-hole was advanced only 3in. to 4in. per day.

As the opposite case, strata of running sand have been met with so wet that a slight movement of the rod at the bottom of the hole was sufficient to make the sand rise 30ft. to 40ft. in the bore-hole. In these cases the writer has adopted the Chinese method of effecting a speedy clearance, by means of a scoop closed by a large ball clack at the bottom and suspended by a rope, to which a vertical movement is given; and each time the scoop falls upon the sand a portion of this is forced up into the scoop and retained there by the ball valve.

M. Dru concluded his interesting paper by pointing out that an artesian well is always some time in settling down to its permanent working state, and when the water first reaches the surface it undergoes considerable fluctuations, being charged from time to time with the substances at the bottom of the bore-hole. The velocity of the flow of water from the artesian wells varies considerably and the following are some examples of the delivery at the surface by those already completed in the Paris basin:—

	Diameter of bore-hole. Inches.	Gallons delivered per minute	Velocity of discharge Feet per minute.
St. Denis	3·28	29	161
Elbeuf	2·95	66	222
Stains	2·95	176	593
Grenelle	3·74	384	698

Borings of large diameter for mines or other shafts are also sunk by means of the same description of boring tools, only considerably increased in size, extending up to as much as 14ft. diameter. The well is then lined with cast iron or wrought iron tubing for the purpose of making it water-tight; and a special contrivance has been adopted for making a water-tight joint between the tubing and the bottom of the well, or with another portion of tubing previously lowered down. This in done by a stuffing-box, which contains a packing of moss. The upper portion of the tubing is drawn down to the lower portion by the tightening screws, so as to compress the moss packing when the weight is not sufficient for the purpose. A space is left between the tubing and the side of the well to admit of the passage of the stuffing-box flange, and also for running in concrete for the completion of the operation. The joint is thus simply made by pressing out the moss packing against the sides of the well; and this material, being easily compressible and not liable to decay under water, is found to make a very satisfactory and durable joint.—*The Engineer.*

Turned Rails.

The second of a series of Board of Trade reports on railway accidents has recently been issued, which includes the official description of a casualty that took place in the Watford tunnel of the London and North Western Railway on the 6th of April last. An express train, with two engines, fifteen carriages, and three brakes, was passing through this tunnel at the usual speed of about 40 miles an hour, when the eleven aftermost vehicles suddenly jerked off the rails. The train was pulled up, and it was eventually found that a broken rail was the cause of this accident, and this rail was a turned rail. The rails of this permanent way, when new, are said to be very good and substantial, and usually weigh 84 lb., being fixed in cast iron chairs, each weighing 35 lb., by means of wooden keys. It is generally admitted that the turning of a rail will cause it to break sooner than it would otherwise do if retained in its original position. Colonel Yolland, R. E., who was appointed by the Board of Trade to investigate the particulars of this accident, considers that the practice of turning rails which is followed on the London and North Western, as well as many other lines, is very objectionable, and very liable to increase the casualties that are due to trains getting off the rails.

PARIS EXPOSITION---AWARD OF PREMIUMS.

The formal presentation of the chief honors awarded by the juries to the exhibitors in the Great Exposition, was made by the Emperor in person on the 1st inst., and was an imposing ceremony. In advance of our own correspondence by mail, we give the few particulars received by Atlantic cable, with the Emperor's speech.

Seventeen thousand persons, including the representatives of every nation on earth, each dressed in their national costume, were present.

The north side of the Emperor's throne was hung with crimson velvet. In front were the members of the diplomatic corps, dressed in uniform.

The French Ministers of State were present in uniform, with Senators and Deputies of the legislative chambers of the empire. They were seated near the throne.

The Lord Mayor of London with several Aldermen of that city, were present, clothed in the red robes of the great English municipality.

Napoleon's throne was guarded by a detachment of the Cent Guards.

The galleries were filled with ladies and gentlemen in full dress. In the east end of the building was placed the orchestra, made up of twelve hundred musicians, an organ and musical bells. The roof of the building was decorated with streamers, showing every color in the rainbow. The nave was surrounded with ample parterre of natural flowers growing as in a garden. The galleries were hung with flags showing the different nations which had contributed to the Exhibition.

In the center, placed on pedestals, were shown the best specimens of each of the ten groups into which all articles in the Exhibition are divided.

At ten minutes before two o'clock in the afternoon a roll of drums announced the approach of the Emperor. The imperial cortege was preceded by squadrons of dragoons, lancers and Cent Gards and trumpeters. The imperial party were conveyed in six carriages. There were thousands of people assembled around the exhibition building at this moment, and the approach of the royal party was loudly cheered by them.

The Sultan of Turkey was present. The cortege of his imperial Majesty was heralded by three carriages containing Turkish officials of distinction, who came before the Sultan's carriage. The vehicle was drawn by eight horses, each horse being led by a servant clothed in rich livery. All these carriages were literally covered with gold, having been brought in from the Palace at Versailles—where they have lain since the time of Louis the Fourteenth—for the special use of the ruler of Turkey. On the Sultan's right hand sat his nephew, the heir to the throne of Turkey, and in front of his Majesty were his son and a second nephew. The imperial foreigners received a warm welcome from the crowd. The sultan saluted the people by passing his hand from his mouth to his fez.

The officers of Napoleon's household, dressed in full uniform, entered the building, and took their places beside the throne.

Next came Napoleon the Third, having the Sultan of Turkey on his right and next to him.

The Empress Eugenie came next.

Her Majesty was followed by his Royal Highness the Prince of Wales, the Prince Imperial of France, the Princess Royal of Prussia, Prince Humbert of Italy, the Princess Mathilde, his Imperial Highness, Prince Napoleon Bonaparte, the Princess Clotilde, the Duchess D'Oste, the brother of the Tycoon of Japan, Prince Von Teck, and his Royal Highness the Duke of Cambridge, Field Marshal and Commander-in-Chief of the British army.

Napoleon took his seat on the throne in the center of the group, having the Sultan on his right and the Empress Eugenie on his left hand.

As the imperial cortege entered the Exhibition building, the orchestra, with a full chorus, gave the Rossini Hymn to the Emperor. The accompaniments were sent forth from cannon and joy bells. The effect was exceedingly thrilling and the music magnificent.

The Minister of State then read to the Emperor the report of the juries on the successful exhibitors and the productions and objects exhibited by them.

At its conclusion Napoleon rose from his throne and, in a loud clear voice, said:—

GENTLEMEN—After an interval of twelve years I come for the second time to distribute rewards to those who have most distinguished themselves in those works which enrich the nations, embellish life and soften the manners. The poets of antiquity sung the praises of the great games in which the various nations assembled to contend with Greece for prizes in the race and other sports. What would they say to day were they present at these Olympic games of the whole world in which the nations of the earth contend by force of intellect alone, and seem to launch themselves forth simultaneously on an infinite career of progress toward an ideal, which has been incessantly approached without ever being able to be attained. From all parts of the earth have come

representatives of science, arts and industry, who have hastened to vie with each other; and we may say that the people and kings have both come to do honor to the efforts of labor and crown them by their presence with ideas of conciliation and peace. Indeed, in these great assemblies, which appear to have no other object than material interests, a moral sentiment always disengages itself from the competition of intelligence, a sentiment of concord and civilization; and the nations in thus drawing near, learn to know and esteem each other. Hatreds are extinguished, and the truth becomes more evident that the prosperity of each country contributes to the prosperity of all. The Exhibition of 1867 may justly be termed universal; for it unites the elements of all the riches of the globe. Side by side with the latest improvements in modern art appear the products of the remotest ages, so that they represent at one and the same time the genius of all ages and nations. It is universal, for in addition to the marvels which luxury brings for the few, it displays also that demanded by their necessities for the many. The interests of the laboring classes never aroused more lively solicitude. Their moral and material wants, education, conditions of life at a cheap rate of living by the most productive combinations of associations, have been the objects of patient inquries and serious study. Thus all improvements march forward. If science, by turning matter to account liberates labor, the cultivation of the mind, by subduing vices, prevails over the vulgar passions, and liberates humanity. Let us congratulate ourselves, gentlemen, upon having received among us the majority of the sovereigns and princes of Europe, and so many other distinguished visitors. Let us be proud of having shown that France, as she is great, is prosperous and free. One must be destitute of all patriotic faith who doubts her greatness, and must close his eyes to the evidence, who denies her prosperity. He must misunderstand our institutions—tolerant even to license—not to behold in them liberty. Foreigners have been able to appreciate this. France, formerly disquieted and casting out her uneasiness beyond her frontiers, is laborious and calm. Always fertile in generous ideas, she is turning her genius to the most diverse marvels, never allowing herself to be enervated by material enjoyment. Attentive minds will have divined that, notwithstanding the development of its wealth, notwithstanding the enticements towards prosperity, the fiber of the nation is always ready to vibrate as soon as a question of honor of the country arises; but this noble susceptibility could not be subject for alarm, for repose would let those who lived a short time among us carry home just opinions of the country. I feel persuaded that the sentiments of esteem and sympathy we entertain toward foreign nations, and our sincere desire to live at peace with them, will be reciprocated. I thank the Imperial commissioners, members of the jury, and the different committees, for their intelligent zeal in the accomplishment of their tasks. I thank also by name the Prince Imperial, who notwithstanding his tender age, I have been happy to associate with me in this great undertaking, of which he will ever retain the remembrance. I hope the Exhibition of 1867 will mark a new era of harmony and progress, assured that Providence blesses the efforts of all who, like us, desire to do good. I believe in the definite triumph of the great principles of morality and justice, which while satisfying all legitimate desires, are alone able to consolidate thrones, elevate nations, and ennoble humanity. (Loud cheering.

After the speech the exhibitors who were to receive grand prizes marched to the front of the throne, each group separately, the first being fine arts. As each name was called, the recipient ascended the steps of the throne, bowing to the Emperor and Empress, received from Napoleon's hand the gold medals. These were passed one by one to Napoleon by Marshal Vaillan, until all the medals were given. Many of the recipients were called up again and received the decorations of the Legion of Honor, the same ceremony being gone through with, as in the case of delivering the medals. The gold medals only were distributed by the Emperor. Altogether there will be 18,500 recompenses to sixty thousand exhibitors. There are sixty grand prizes, nine thousand exhibitors. There are sixty grand prizes, nine thousand gold, three thousand six hundred silver, and five thousand bronze medals, and nine thousand honorable mentions.

In group eight the Emperor of Russia was awarded a gold medal for fine horses.

In group ten, Napoleon himself was awarded a gold medal for a model lodging house. Marshal Vaillant was about handing in to him, when the Emperor beckoned to the Prince Imperial, who came forward, took it from the Marshal's hand and placed it in Napoleon's, amid loud cheers.

The only one with whom the Emperor shook hands was Hughes, the inventor of the printing telegraph.

When all the medals and decorations were distributed the recipients resumed their seats in the nave. The imperial cortege then left the throne and walked around the entire building, passing various groups and occasionally stopping to examine the trophies.

The imperial cortege left the Exhibition grounds in the same manner in which it arrived, with the exception that the Sultan's carriage preceded Napoleon's.

Altogether it was probably the finest pageant that even Paris has ever witnessed.

DARLING, BROWN & SHARPE desire us to state that it was their firm, not J. R. Brown & Sharpe's which received a silver medal at the Paris Exposition.

THE LAKE TUNNEL, at Chicago, is reported to be in successful operation. It furnishes an unlimited supply of pure water, equal to that supplied to any other American city, and the people are delighted.

Correspondence.

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

Off-Hand Sketching for Mechanics.

MESSRS. EDITORS.—The answer to three inquirers in your issue of June 29th, pertaining to the education suited to mechanics, I think goes hardly far enough, and, without repeating any of your recommendations, I would like to add that in connection with mechanical drawing with instruments, or even entirely apart from it, the ability to make correct free-hand drawings or sketches of machines or structures, cannot be too carefully acquired.

Fortunately our American workmen are not tied down by any such restrictions as prevail in England, so that there could be no hindrance to the practice in proper hours, of drawing in this way many details of machines that are within reach of many men in their places of employment.

I believe the best way to begin mechanical drawing is with the use of models and not entirely from other drawings, and for this purpose nearly every apprentice has, within his own reach just the things he needs, perhaps actually in use, so that the relation of each part to the rest is made very clear.

Many inventors would be saved much trouble and expense had they trained themselves in this most desirable accomplishment, as often a contrivance may be quite as satisfactorily studied out and completed upon paper as by a costly model.

Every man connected in any way with mechanical operations should keep a sketch book either in his pocket or at his elbow in his library, (for he ought to have at least a small one,) that even the smallest item of novelty of thought or observation may be noted down for future use; and it is worthy of mention that ideas can often be recorded in this way far more readily and concisely than by mere writing alone.

While it would not be wise to recommend to any one the practice of inventing new contrivances, as a business, yet I do not hesitate to urge every person who thinks at all, to have something always in mind that is susceptible of improvement, and to endeavor, at least in thought, to make the needed improvement, whether it be a detail of construction or a means of better adaptation to the result sought for in the use of the machine, or process, or whatever it may be. P. BARNES, JR.

Trenton, N. J.

Bolt Eaters in Flour Mills.

MESSRS. EDITORS:—I noticed under "Answers to Correspondents," in No. 23, Vol. XVI., "E. W.," of Pa, desires to know how to rid himself of the pest known as the bolt eater. I have waited hoping that some more enlightened miller than E. W. and myself might answer. I will now give my experience which may bring out information for myself and others

I think there can be no way of exterminating them, as they are bred in the flour, but any means which may be designed to keep them out of the bolts, will of course protect the bolts. It is only when the mill is standing that the bug works on the cloth. I do not think it eats or cuts the silk as the moth does woolen cloths, but finding itself confined, cuts its way through always from the inside. Before stopping the mill with the intention of standing two, three, or more days, unslip your buhrs, and at a quickened motion run your mill until your elevators, conveyors, and reels are quite clean or empty. Another point to be observed at all times is, to keep the mill well cleaned. As every miller knows that it is in the dirt and rubbish about the mill that, not only the bolt eater, but many other bugs and worms breed which are so annoying to the miller and quite often to the cook.

JAS. M. ALLEN.

Grafton, Ill.

The Wants of the South.

MESSRS. EDITORS:—A small, compact machine for making cotton rope is much needed in the South. Can you inform me which is the best patent to use for plantation purposes? There would be needed in connection an effective spinning machine for making the thread, unless the rope could be made from the raw cotton directly. What is the value of tripoli, and is it used to an extent to warrant an expenditure of capital and shipment from this state to New York? We have a great variety of minerals in Alabama; among them are gold, silver, copper, lead, iron, marble, lithographic stone, graphite, sulphate of barytes, etc. What is the value of and demand for sulphate of barytes? I understand it is used in the manufacture of white lead. I should like to be put in communication with some person engaged in its manufacture, with the view of ascertaining all the facts connected with the use of baryta and its value. W. C. BINN.

Montgomery, Ala., June 11, 1867.

"Telodynamic Transmission."

This name is given to a system of transmitting power to incredible distances, perfected after many years of baffling experiment and endeavor, by M. G. A. Hirn. It is applied to distribute the power of the Falls of Schaffhausen throughout the manufacturing district around, and is in use in more than four hundred of the factories of Alsace. The method is very simple, yet the application has been attended with almost endless difficulty. The principle is that of transmitting the power in the form of velocity of motion. Endless steel wire ropes are employed for this purpose, running at great speed—10, 20, 30 or 50 miles per hour—over end pulleys 13 or 14 feet in diameter for short distances, without intermediate support; or for long distances, over pulleys of six or seven feet diameter, at intervals of 160 yards. The chief difficulty to be surmounted, has been the mutual destruction of the ropes and pulleys. This was at last prevented by cutting a dovetail groove in the periphery of the pulley, and ramming it with gutta percha. Neither this face nor the rope that runs on it, it is said, shows any serious sign of wear after seven years' work—a pretty tough gutta percha or a pretty tough story.

The first achievement of M. Hirn, was to transfer twelve horse power from a waterfall to a distance of 88 yards; the next, to transmit 50 horse power 264 yards. In 1857, he transmitted 45 horse power 1100 yards. In 1858, 50 horse power 126 yards. In 1859, 100 horse power was carried 1080 yards, and 60 horse power 1320 yards; and altogether, he records more than 400 successful applications of this sort. He has now no hesitation in undertaking to carry power twelve miles, and calculates to lose not over 20 per cent. in the transmission.

THE CONSUMPTION OF SUGAR.

Our name sugar is probably derived from the Bengalee word *shukkur* a term by which it is still known in India. Although Europe did not possess this agreeable condiment to any extent anterior to the discovery of the West Indies, the Chinese were acquainted with the process of manufacturing it from the sugar cane above two thousand years ago. In small quantities Chinese sugar found its way into ancient Europe where it was valued as a medicine. It is not certain at what time the plant was brought into the Western countries, nor by whom the acquisition was made, but we find that early in the tenth century the cane was cultivated in Persia, whence it was undoubtedly carried into Messopotamia, thence to Syria, and by the Saracens introduced into Egypt, Sicily and Spain. Sugar cane is commonly supposed to be indigenous to America, yet it has never been found growing wild on this continent. More probably it was not a native of the New World, but was early introduced by the Portugese discoverers, who perceived that the climate of this country was peculiarly adapted for its culture, and in time it became so flourishing that sugar was re-shipped as a supply for England and France.

The consumption of sugar now varies very much in different countries, and also fluctuates very much with the rise and fall of prices. In 1860, in Great Britain, the average consumption of sugar was 34 lbs. for each inhabitant. The use of sugar in England was probably much above that average, or that of Scotland and Ireland must have increased very rapidly; because we find that in 1856 the consumption of England was 34 pounds, Scotland 21 pounds, and Ireland 8½ pounds—or about 28 pounds average for Great Britain. Sugar is not much used in France, the average consumption for each inhabitant being only 11½ pounds—exactly one third of the average of Great Britain. In Belgium, though coffee is usually drunk without sweetening, 21 pounds of that sugar is disposed of yearly for each inhabitant. Germans generally either do not care for sweets, or are too poor to buy much of them, as the German States generally only average 7½ pounds for each inhabitant. Among the peasantry of Russia sugar must be an unknown luxury, or at least its use by the people must be confined to Holy days and Festivals, for the consumption per head is but 2 pounds a year. Next to the British, the people of the United States use more sugar than any other nation in the world; and if the consumption of molasses and syrup were added to that of sugar in the respective countries, it would be found that the free use of saccharine food was far greater among us than with our transatlantic friends. In 1864, we consumed 32,582,000 gallons of foreign and domestic cane molasses, 20,000,000 gallons of sugar refinery sirups, 9,000,000 gallons of maple sirups, and 16,000,000 gallons of sorghum. In all, our consumption, therefore, amounted to 73,582,000 gallons, or fully 2½ gallons for every man, woman and child in the United States. This amount looks less extraordinary when we find that the consumption of sugar in that year had declined to 21 lbs. per head. On the other hand, it must be remembered that of both sugar and sirup there was an absolute dearth in the South, the greatest sugar State not producing nearly enough for her own wants, and the reduced consumption must be ascribed quite as much to the non-cultivation of the sugar plantations of Louisiana as to the high prices limiting its use in Northern families. The great demand for sirups, however, has been maintained since the close of the war, and is likely to continue. The quantity of sugar used in the United States in 1864 was only 280,500 tuns, but in the following year it had risen to 412,000 tuns, or 47 per cent increase for 12 months; and yet the consumption of foreign and domestic malasses, and refinery and maple sirups was as much in 1865 as in the preceding year, and the yield of the sorghum plant had increased from 16,000,000 to 25,000,000 gallons. If the use of sweets is any sign of refinement, cultivation, or abundance of the necessaries and luxuries of life, these statistics show the United States to be as far ahead of the most advanced nations of Europe, as England is ahead of France, Germany and Ireland.

American Institute Fair.

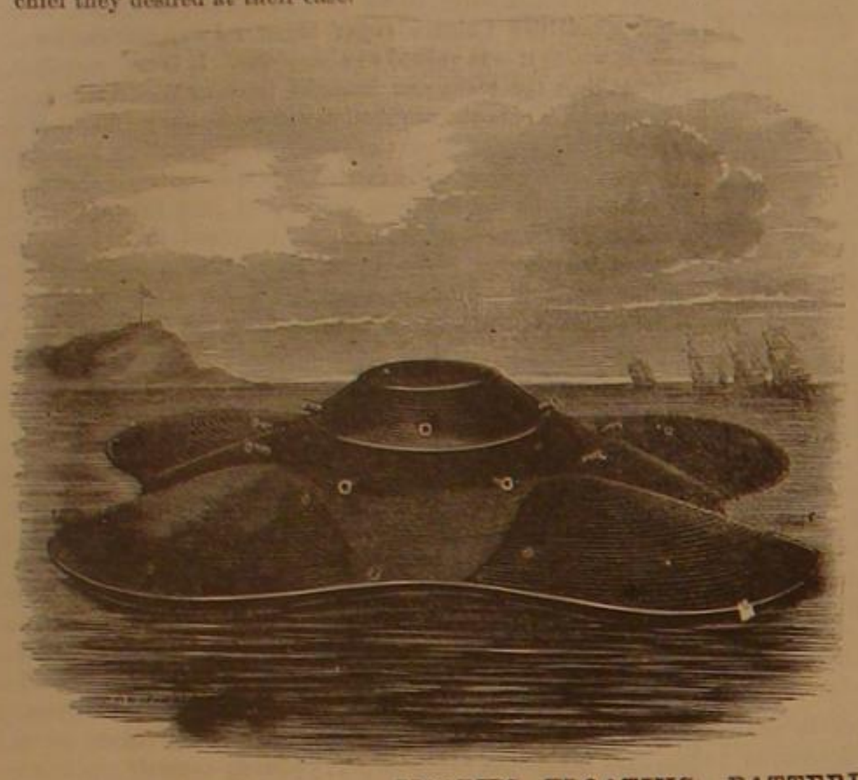
The managers of the Institute announce the opening of the annual exhibition for Thursday, Sept. 12th. Inventors, artists, manufacturers, proprietors of labor-saving machines, and those engaged in agricultural and horticultural pursuits, are invited to send in their best specimens of work and ingenuity. The articles will be classed under the following seven divisions:—Fine arts and education, department of the dwelling, dress and handicraft, chemistry and mineralogy, engines and machinery, intercommunication, agriculture and horticulture. Various medals and the diplomas of the American Institute will be awarded to successful competitors.

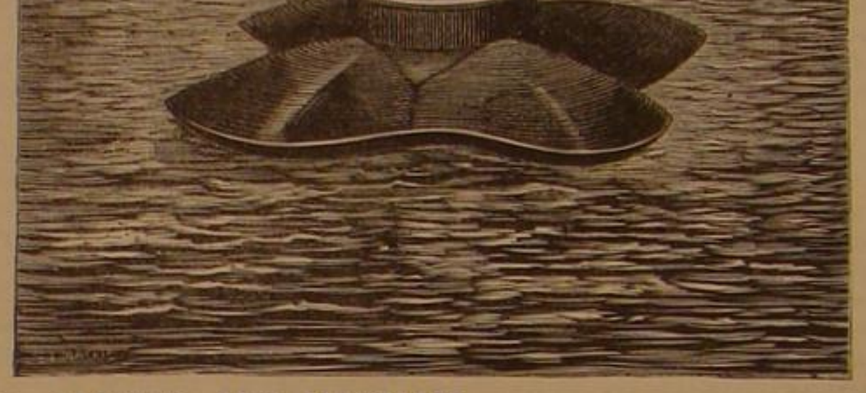
HEMP.—Lafayette county, Mo., is said to be the richest hemp county in the Union. It is estimated that 2,000 tuns were shipped from this section last year.

Floating Batteries, Beacons, and Lifeboats.

From Capt. John Moody, late managing director of the Goole Steam Shipping Company, London, we have received the following communication :—

The use of iron has rendered possible many forms of floating structures which were formerly impossible, and at the same time the requirements of modern naval warfare have necessitated the construction of other forms of floating batteries than ordinary ships. It would be now of very little avail to moor block ships within or in front of harbors for their defence, for such ships would be liable to injury from rams, and, unless thickly plated, would be incapable of resisting the heavy armaments of iron-clads and turret vessels. Moreover, they would require to be stationed in places having considerable depths of water, and therefore it would be possible to get torpedos underneath them, and for an enemy thus to blow them up. At the same time, it is evident that land or shore defences must in any emergency wait to be attacked, and that although their guns might not be silenced, it would only require a certain amount of time for a fleet of iron-clads, presuming them not to be seriously injured by the fire of the forts, to pass the range of their guns, and to effect all the mischief they desired at their ease.

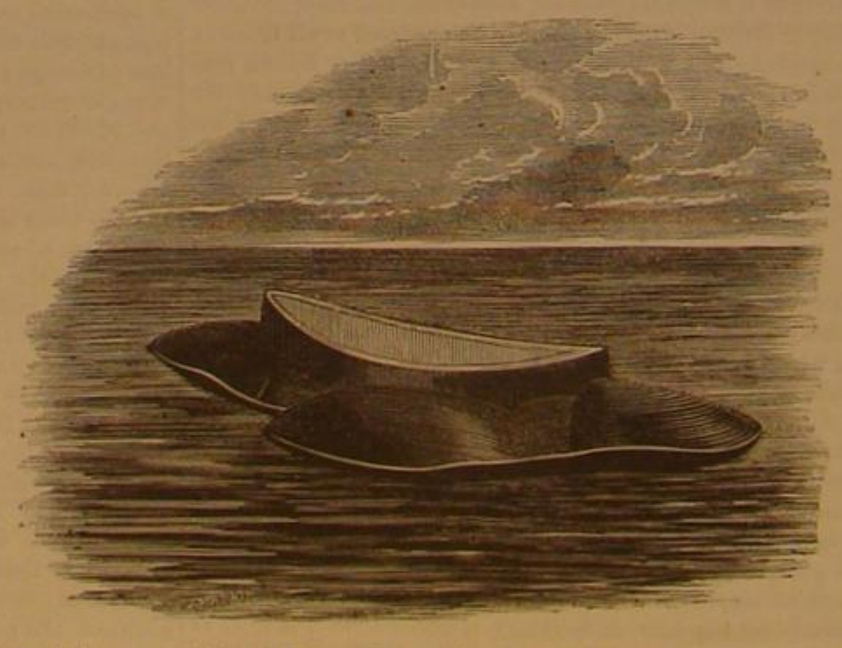




MOODY'S FLOATING BATTERIES, BEACONS, AND LIFEBOATS.

It has become perfectly obvious to all who have properly reflected on the subject that some kind of strong, impenetrable, light-draft floating battery is imperatively demanded for shore, harbor, and river defence, and none, I conceive, will be found to possess equal advantages with the cruciform covered vessels which have been patented by me, and the principle of which is applicable, under certain modifications, equally well for the purposes of floating beacons, ocean stations, and lifeboats.

I propose to construct a floating iron vessel, with four equal rays projecting from a central circular fort; the surfaces of this central dome and its accompanying rays being plated with thick armor, and sloped upward from the edge or circumference of the battery toward the center, at as gradual an angle as may be convenient and suitable for the efficiency of the battery under the conditions under which it is intended to be used. The bottom will be nearly flat, sloping more suddenly upward out of the water to the horizontal line at which the upper and under surfaces meet and form a sharp, projecting, continuous ridge. The draft of water of such a battery would be very light, and by the application of steam power there is no doubt it could be made to glide over the water at a very considerable speed. Plates of enormous thickness could be placed upon its upper surface with very great security and without materially increasing the draft, as the floatage area is enormously great when compared with an ordinary ship, and every foot of superficial area receives a direct vertical support from the water. On account of this extreme buoyancy and the projection of the arms, the pitching and rolling are greatly reduced and almost entirely prevented, while the guns with which the battery is armed being placed over and around the center of gravity, the greatest steadiness of platform is secured.



The primary advantages of its actual fighting capacities are, that its guns can be fired in every direction at the same time, and with equal facility and certainty, so that if surrounded, the battery could fight the enemy's ships on every side, and use all its armament, while broadside ships in attacking it could only bring the guns on one of their sides to bear upon it; and as, so long as the battery's artillery was unsilenced, the boarding of it would be impossible, a cannonade of its iron sides would be all that could be done. Moreover, there is no possibility of approaching the battery in a weak part, as in coming up under the bow or stern of a ship, nor can the battery be raked fore and aft, like ordinary vessels. Moreover, the low inclination of its surface would cause so much glancing of shots, as to diminish greatly the effects of the most violent bombardment.

Against rams, the acute projecting ridge or rim would be a most formidable defence; while the battery itself could in its turn be made use of for ramming, and could be driven north, south, east, west, without turning in the direction of each of its arms against the ships of any fleet by which it might be surrounded. Internally the battery would be divided into a series of water-tight compartments by vertical bulkheads, not only in the arms or rays but the main hull itself, where these bulkheads would join in the center. This method gives security from sinking from partial but otherwise serious injuries, at the same time that it materially increases the strength of the entire structure

The upper arched surface and battery deck being water tight would enable the battery to float, should her bottom be damaged by rocks or torpedos. As the battery is intended expressly to be stationed in shallow water, and as her dimensions would be of very considerable superficial extent, the planting of torpedos underneath her would be an operation of great danger and difficulty for an enemy, who would be subjected during its performance to an enfilade of musketry and grape shot from the central battery over its low, sloping sides. Such an operation must be executed in boats, as ships could not get near to the battery when moored in shoal water. No fear need be entertained of such a battery being boarded, nor could it be flooded during storms, as the port holes could be so constructed as to avoid taking in water, even if the waves broke over the slopes, which they are not likely to do to any extent, as their effect would be taken off by the overhanging of the hull proper above the water line, while the battery itself would be provided with clearing drains on the lifeboat principle, so that if it were actually swamped, it would speedily clear itself.

Furthermore, should it be desirable to give these batteries greater defensive powers, a central tower, with one, two, or three fighting decks, could effectively be added; and all the weight of such a tower tending toward the center of gravity of the structure, the battery would still be maintained in perfect equilibrium by its projecting rays; and not only could larger guns in greater numbers be put upon it, but they would be carried with far greater steadiness than they could be in any ship—and steadiness of platform is, as every one knows, synonymous with accuracy of fire in naval engagements; while the readiness with which, by the use of her engines, such a floating battery could be rotated on its axis, would enable each one of its circle of guns to be trained upon an enemy with the greatest precision.

The advantages claimed are: great floating capacity, and light draft of water; capability of receiving very thick armor-plating, and for carrying the heaviest guns of the largest caliber; adaptability for river and harbor defences; great protection from damage from breakers and on lee shores, and easiness of again floating, should they take the ground; adaptability for landing troops and war materials up rivers, adaptability for pontoon etc.; bridges for crossing rivers; protection to life, in being able to land troops and cross rivers in face of an enemy, as well as being able to load guns under cover of its protecting batteries; safety from "rams," it being impossible for vessels on the "ram" principle to sink the battery, on account of its peculiar construction and sharp edges; great space for magazines, store-rooms, hospitals, and other purposes in the arms of the battery, all of which are built in water-tight compartments; safety from sinking and availability for defence (until all four arms are destroyed) in consequence of being built in water-tight compartments from the deck to the lowest keel; safety from sinking, should it fill with water, owing to its self-emptying apparatus and contrivances; great saving of expense to the country in forts and other permanent defences, at the same time that greater protection would be afforded to inland towns on tidal rivers and to harbors, as owing to their light draft of water these batteries may be pushed beyond the reach of ordinary warships, whether broadside or turret, and even of gunboats, and should they ground on an ordinary bottom they will take little or no hurt; lastly, the important facility for mobilizing defensive power on any part of our seaboard or in harbors or rivers.

Beside the value of the invention for war purposes, its principal has applicabilities of large commercial value, especially for ocean telegraph stations, floating light ships, and for lifeboats.

With regard to telegraph stations: if cables were made in lengths proportionate to the distances between the sites where such vessels could be safely moored, the general security of the line of telegraph would be advantageously increased, while ships on their voyages could dispatch messages ashore in either direction, and the revenue from this source would probably be very considerable.

Such ocean stations might further be made to serve the purpose of store houses for ships whose provisions had run short, and for places of refuge for mariners whose vessels were disabled or sinking; and lastly, they might also form ocean post-offices, where vessels might call for and leave letters.

For light houses the principle is capable of very successful development, as towers of considerable hight could be built and maintained with very great steadiness upon such a stable platform.

For lifeboats the principle cannot be too highly estimated. Existing lifeboats are of a most dangerous character, from being constructed on an entirely erroneous principle. They are said to be constructed expressly for the purpose of righting themselves when upset. The proper principle for a lifeboat is the impossibility of upsetting at all; and this may be well effected by giving greater length to two of the rays, so as to produce something like a boat-shaped form, while the lateral rays will still maintain a sufficient spread, and consequent bearing upon, the waves, as to prevent my lifeboats from overturning. Even if it were possible to upset my lifeboat, there would still be sufficient air coming in through the clearing valves to support the life of the crew and passengers beneath, and with clinging lines attached inside the boat, those so confined might be securely held on. Steam or manual power could also be efficaciously applied for propulsion, and thus oars and sails, so difficult to manage in boisterous weather, could be entirely dispensed with. Sails, however, could be used when required, and when used, the boat could be prevented drifting to leeward by the use of a movable well-keel.

Another advantage of my lifeboat would be, that when lowered at the ship's side, the projections at its sides would act as fenders, and prevent the occurrence of accidents to life and limb which so frequently happen by the jamming of the boat against the ship when taking on board passengers and crew in a stormy sea. And further, it may be mentioned,

that a lifeboat on this principle cannot be swamped like an ordinary boat by the bearing down of any projection from the ship's hull upon the gunwale, for if the wing of my lifeboat were so jammed down, the leverage of the opposite wing would tend at once to draw it up, and the lifeboat would be squeezed away, as it were, between the projection and the water, and would naturally draw out of the dangerous position.

Capt. Moody is now in this country and may be addressed in care of R. H. Emerson, Etna, La Fayette county, Wis.

BAKER'S METALLIC BAG FASTENER.

The accompanying engraving presents a view of a simple metallic fastener for closing the mouths of bags, sacks, etc. for holding grain, meal, flour, and other substances. It is always ready, and never out of order; can be readily attached and detached, and will last a life time, while its cheapness is one of its best qualities. It is merely two segmental strips of hard rolled brass connected to a joint of wire passing through the bag and being held by a strip of leather inside and by the bending of the ends of the wire. One end of one of these segments has a catch made by punching a section through the band and bending it into a hook on the inner side, while the other segment has a series of holes punched through it for the reception of the hook. The upright bag in the engraving shows the band fastened and encircling the mouth of the bag like a collar, and the empty bag shows the segments unfastened and hanging loosely.

By the method of attaching to the bag—a wire passed through the ends of the two segments, the bag, and a reinforce of leather, with the two ends brought down and toward one another—the contrivance is very securely fastened so that it is impossible that it should give way; yet, at the same time it can be readily removed, if desired, by simply unbending or straightening the wire. This fastening is very light and will outlast the life of the strongest bag. It is always in place when required, and never, like a string, wears out.

The patentee is ready to give a practical test of the usefulness of his invention to all who desire it. He will sell manufacturing and territorial rights, or the entire right as desired. Patented through the Scientific American Patent Agency, June 11, 1867.

For further information address D. B. Baker, Rollersville, Sandusky Co,, Ohio. See advertisement on another page.

Pneumatic and Telegraphic.

The failure of metropolitan internal telegraphs to compete in despatch with the slowest of foot messengers, is bitterly complained of just now in New York. The same evil was felt in London and remedied by a short pneumatic tube, (so far as it went) fifteen years ago.

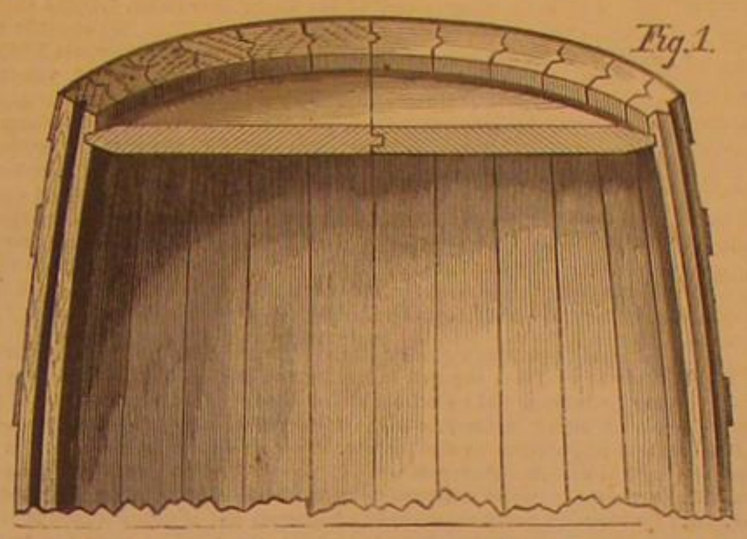
It was found where offices cluster around the great marts of commerce and haunts of business men within a limited area, like the Corn, Royal and Stock exchanges, that without an immense number of wires and apparatus, and a very large staff of clerks, no advantage was gained by sending messages by wire for such very short distances. Indeed, it was found more practical to forward messages by foot-messengers. Mr. Latimer Clark solved this problem in 1852, by proposing the establishment of a pneumatic tube. Such a tube was fixed between the Electric Company's central station, Lothbury, and the Stock Exchange in 1853. The system was subsequently extended to Cornhill, Mincing-lane, etc., and received great development. It has worked most admirably, and the success of Mr. Clark's system has produced successful copyists in Berlin and Paris.

The advantages of this system have been readily appreciated and very fully carried out in Paris. Mr. Latimer Clark adopted lead tubes one and a half inches in diameter, protected by externally split wrought-iron pipes. Messrs. Mignon et Rouart, the clever adapters of this system in Paris, use wrought-iron pipes of nearly the same diameter, but of great length, glazed in the interior, and connected by union joints rendered air-tight by caoutchouc. Their carriers are either of metal or leather, and a fare allowage of windage, and fitted with air-tight collars. They are made short so as to take the sharp curves which are necessary in going round the corners of streets. The pipes are buried beneath the surface, or carried in the subways, like the ordinary gas or water pipes. The mode of employing the pressure in the ordinary waterpipes, for compressing the air, we have already described in the SCIENTIFIC AMERICAN.

MERRILL'S IMPROVED CASK.

The advantages of this method of forming the staves for casks is apparent by a glance at the accompanying engravings. It consists mainly in tongueing and grooving the

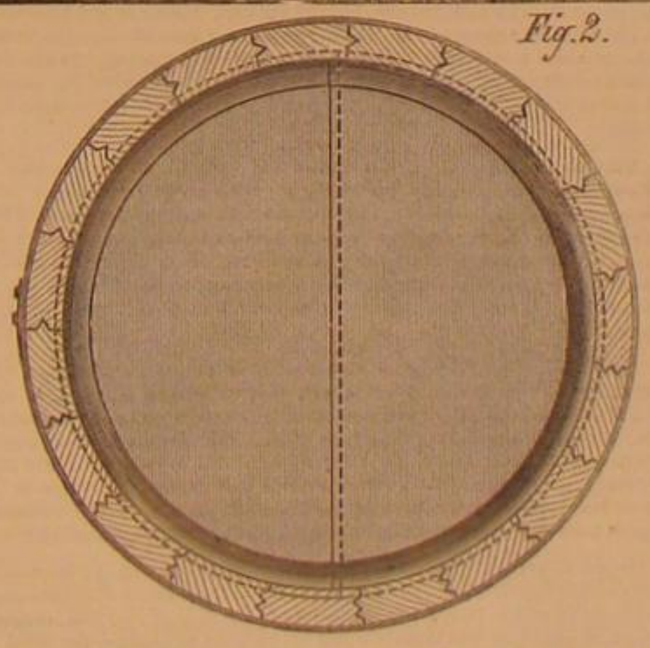
Fig. 1.



edges of the staves with a single or double V-groove. This gives a much larger amount of contact between the surfaces, and thus diminishes the danger of leakage when the contents of a cask are of a volatile nature. It is well known that with the ordinary barrel, even if thoroughly coated internally with hot glue, crude or distilled petroleum will find its way to the outside, and thus leakage and waste made a large item of loss in a cargo of oil. With barrels make on the plan shown in the engravings it is claimed that petroleum has been shipped to Australia, California, the Cape of Good Hope, Malta and other parts of Europe, without losing any oil, landing their contents intact and in perfect order.

Fig. 1 shows a longitudinal section of a barrel with the staves having a single V-groove and tongue, and Fig. 2, the head of a cask, half of the staves having the single and half the double groove and tongue. The tongues are made slightly larger than the grooves so that when trussed and hooped, the parts shall come into very close contact. The edges of the staves are glued by a revolving brush which turns in a kettle of dissolved and heated glue, then put together and trussed and hooped, either by machinery or hand. After the barrel is thus put together it is glued internally by pouring in a quantity of hot glue and rolling and shaking about until every part of the interior surface is coated and thus rendered perfectly impervious to oil, alcohol, or spirits of any kind. Casks built and treated in this manner are so well secured that if the hoops are all removed the barrel can be rolled and moved violently about for a long

Fig. 2.



time without starting the joints. These barrels are now being largely made and used by the Downer Oil Company at their works in Corry, Pa.

Patents for this improvement were issued to Joshua Merrill in May 1866, who can be addressed at 108 Water street, Boston, Mass., for machinery for tongueing and grooving and for manufacturers' and territorial rights.

The Spakowski Night Signal.

Commander Colomb and Captain Bolton's systems of flashing signals, the longer or shorter flashes corresponding to the dots and dashes (- — ——) of the Morse telegraph code now well known. A new signal light, Spakowski's, just introduced for trial into the navy, promises to give great extension to this system of signalling. It enables the light to be readily seen, even in hazy nights and without night glasses, at a distance of seven miles. The instrument itself weighs seven pounds, and is about three feet in length. The staff, of about two inches diameter, is a hollow cylinder, inside of which is fitted a piston that can be pressed down to two separate distances in the cylinder, but which, when not in use, is kept in the upper portion of the cylinder by a strong spiral spring in the lower part of the cylinder or staff Immediately over the top of the piston, and at the upper part of the cylinder is a projecting nozzle-pipe, through which the air finds entrance on the opening of a valve, by drawing the piston downward The upper portion of the cylinder is now full of air, which will be driven out on the piston being released by the operator's hand, and left to the upward pressure of the spiral spring underneath. Let us look at the upper portion of the instrument first. Here a cotton wick is burning from a small spirit-of-wine lamp fixed in the head of the instrument. Opposite to the flame of the lamp is about an inch of horizontally fixed brass tubing, of about the thickness of whip cord, terminating in a needle point from another piece of the same tubing, one being the continuation of the other, and pointing direct at the spirit flame. A reservoir in the head of the instrument contains a little over a half a pint of petroleum, and this reservoir is connected with the two small pieces of tubing, and by means of them subsequently with the air from the cylinder below. Now the piston being released, it is driven upward by the spring underneath, and forces the air through the small tubes in the face of the flame and with it the petroleum in the form of vapor. The result of this is a column of flame of full two and a half inches in diameter, which darts upward from the point of contact be twe-n the petroleum vapor and the flame of the lamp, and this column of light lasts just so long as the piston is moving upward again to its normal position in the cylinder. The length of time during which the column of light is shown therefore, depends upon the length to which the piston is pressed downward in the cylinder. Thus a two-inch movement of the piston may be said to give a short flash—and a six-inch movement to give a long flash ——. A mechanical catch in the cylinder warns the signalman when he has reached the proper distance for a short or long flash.—*Engineering.*

WATSON'S GIMLET

Every one who uses the common gimlet knows that it is almost impossible to bore a hole with it without splitting the

material; further, in hard woods the tool works very unsatisfactorily, as the screw on the end draws out before the hole is completed. In any case the action of the gimlet is defective from the manner in which it is constructed. It is not a cutting tool but performs its work by crowding or forcing the wood to one side.

The object of this invention is to produce a gimlet that will bore without splitting and cut as true a hole as an auger. To this end the tapering portion is provided with a series of shoulders, *a*, which form cutting edges and remove chips as the screw on the end draws in. The object is attained perfectly and the result is a much better tool at little additional cost of manufacture, and can be applied to gimlets already manufactured, either double or single cut. The advantages of this gimlet are apparent. Patent applied for and the right for sale low. Address Egbert P. Watson, Box 4,436, New York City.

Field's Compound Engines.

Mr. Joshua Field, of the eminent firm of Maudslay, Sons & Field, of Lambeth, England, has recently patented some interesting combinations in the steam engine, which we find in the *Mechanics' Magazine*. His combination of high and low pressure cylinders, is singularly compact and ingenious. The small high-pressure cylinder is let into the forward head of the large low-pressure cylinder, like the joint of a telescope; projecting only far enough to allow the valves to be got at. The piston heads of both cylinders are connected by a rod so that both pistons work as one; and the large piston head is also recessed to fit like a cap upon the inner end of the small cylinder, and so fills the annular space around the latter. The high-pressure steam entering the small or inner cylinder is cut off, say at half the stroke, and allowed to expand into the large cylinder, at the same time completing the stroke of the

compound piston by expansive pressure upon both its heads.

Another form of combination patented by Mr. Field is that of three cylinders side by side with a three-throw crank directly in front of them: the central one being the smaller and receiving the high-pressure steam, which is cut off at half-stroke, expands to the end of the stroke, and is then transmitted to both the large outside cylinders and completes its work.

Again, where steam of a very high pressure is used (say from 80 to 150 lbs.) Mr. Field combines both these combinations; entering a fourth and still smaller high-pressure cylinder into the central high-pressure: the latter receiving the expansion in its annular space thus formed, and passing it on into the two outside cylinders.

Another improvement by Mr. Field, mentioned in the same connection, is a warning indicator to prevent damage to valves, pistons and cylinders by excessive superheating of steam. An alarm whistle or bell is adjusted so as to be released and set in action by a heat-gage placed in the current of superheated steam as it comes to the engine, in case the temperature should rise above a certain point, and at the same time a throttle valve, placed at the junction of the pipe leading from the superheater with the main pipe, is actuated so as to shut off the superheated steam and open the communication direct from the boiler.

BUSINESS AND MANUFACTURING ITEMS.

COTTON, ETC.—As an illustration of the decline which has taken place in prices, brown sheetings which sold June 22, 1865, at 32c., and June 22, 1866, at 26c., were selling in New York June 22, 1867, at 18c. The prices for Manchester denims at corresponding periods were 65, 32½, and 35, and of Granville cassimeres, $2.50, $1.75, and $1.50.——On the 22d of June the wages of operatives in the cotton and woolen mills at Manayunk, near Philadelphia, were reduced 25 per cent. Twelve mills had to stop, the hands refusing to work. ——India exported to England last year 1,847,710 bales of cotton, worth $83,000,000.——It is said that the Sprague will not begin the improvement of their recently acquired property at Augusta, by the building of new mills, until next year, when the first of the proposed four new ones will be erected. These mills will be uniform in size and construction, and will probably be the largest single mills in the country. Steps are now in progress toward building two yards near the site which will turn out 4,000,000 brick in the season, for building the new mills.——For the Utica steam cotton mills a new mill is soon to be erected, which will have 16,000 spindles and 300 looms, and give employment to 350 hands, thus doubling the capacity of the works.

IRON.—The American Steel Company, of Pennsylvania, are erecting extensive works at Connellsville, near Pittsburgh. The main building will be 200 by 120 feet. The manufacture of steel will probably begin in October next. A large number of Prussian iron workers have arrived at Pittsburgh, sent over by the agents of mills in that city as a precautionary measure against "strikes."——The iron works of Cincinnati, embracing eighteen foundries and two rolling mills, employ over 3,000 hands, whose annual wages amount to $2,500,000. The product of these works is valued at $6,000,000. Most of the iron used comes in pigs and blooms from Southern Ohio and Tennessee.—— The McCormicks, of Chicago, will turn out 10,000 reapers and mowers this season.——Roy & Co. are building an extensive butt factory at West Troy.

RAILROADS, ETC.—Gov. Fletcher, of Missouri, has again taken possession of the Southwest Pacific Railroad, in consequence of the failure of the purchasers to meet their payments to the state. The latter threaten to contest the Governor's action.——A town of 600 inhabitants has grown up on the Pacific Railroad within six weeks, supporting a $30,000 hotel, billiard saloons, faro, monte and keno banks, and other necessary establishments.——A survey of the Illinois River has been commenced under government orders, for a projected canal from Chicago to St. Louis, starting from Lake Michigan and extending to Alton, Ill. It is intended to admit vessels of 1,200 tuns burden. ——A cable has been ordered in England for a submarine telegraph between Hong Kong and Shanghai.——The navigation of the Colorado River, lately suspended, has been reorganized and will be resumed vigorously by the "Arizona Navigation Company."——The Pacific and Atlantic Company have completed their line to the city limits of Cincinnati. The Western Union Company are strenuously opposing them in their efforts to procure the consent of the Common Council to their setting poles in the streets of the city. The Western Union Company intend to furnish a refreshment room in the New York office, where their employés can obtain refreshments without being under the necessity of leaving the building.——The consolidation of the American, Southwestern and United States Telegraph companies with the Western Union made the largest stock company in this country, with a capital of forty millions of dollars, representing lines of wires from Newfound land to the Rio Grande, to San Francisco and thence to New Archangel, in the new Russian American possessions, with lateral lines leading into nearly every town and village in the country.

MINING.—The Pottsville *Standard* says the development of black band is still progressing, and new localities are opening to demonstrate its general existence as a bed. The striking similarity of the ores taken out at the different openings is of itself sufficient to convince the most skeptical of the great extent of the vein of ore. The Belmont Coal Mining Company's property, consisting of about 1,000 acres, has recently been sold to a wealthy New York Company, who will at once proceed to develop the property for black band and erect furnaces in due time. Those who use the black band ore—the demand for which is greater than the present supply—state that the iron made from it will render the importation of Scotch pig entirely unnecessary. The amount of black band iron ore shipped over the Mill Creek Railroad for the week ending June 8, 1867, was 31·93 tuns; previous, 2,936·08 tuns; total, 2,968·01 tuns.——The Bridgewater, Vt., gold mines are shipping their quartz to Wales to be reduced.

MISCELLANEOUS.—It is reported that one of the largest railroads in the country has adopted the custom of paying its laborers the price of a barrel of flour per week, as the most just and satisfactory mode of measuring the value of labor.——An artesian well about 500 feet deep is being bored at Cohoes, with a view to obtain unusually clear water for the manufacture of a particular grade of paper.——An effort is being made to raise a fund for insuring the lives of members of the Boston Fire Department. Several cities have adopted this wise and benevolent policy. The firemen of Chicago, it is stated, last year had their lives insured by several liberal-minded gentlemen of that city. At a recent fire three were killed and several injured, and the insurers have paid over to the families of the deceased $7,500, while the injured men are given a weekly compensation.——Advices from Sitka, in our new Russian purchase, state that lots are being preëmpted, and there is talk of a City Hall. Sitka contains 500 Russians and 800 Indians.——A grand scheme is on foot in Chicago to build a magnificent system of docks, to extend several hundred feet from shore along the lake for a distance of half a mile. The estimated cost is from $5,000,000 to $7,000,000.——On Saturday, June 22, the United States Treasury held the largest amount of money ever held at any one time since the organization of the government, to wit: $180,000,000, of which $103,000,000 were gold and $78,000,000 currency.——As an illustration of the rapidity with which the conversion and purchase of seven-thirty notes have been pushed forward, it is officially reported that $151,746,000 were taken in by the Treasury Department between Feb. 1 and June 1.——The agricultural societies of Massachusetts are appropriating $50 each for the room rent and tuition of one scholar for each association, to be educated at the State Agricultural College. Committees are appointed to select the beneficiaries.——The trade of the West India Islands is larger than most people have any impression of. Statements prepared by direction of the British government in the year 1866 show that the entire trade of the West India Islands amounted in 1865 to the sum of $410,580,919. Of this sum the trade of Cuba alone amounted to $296,000,000.——The British Board of Trade returns, just published, show a healthy contrast between imports and exports in favor of the latter, very tempting to those Americans who wish to see their country also one of the imperial producers rather than one of the spendthrifts of the world. The total value of imports in the first three months of the present year was £24,281,048, against £26,457,723 in the corresponding period of last year, and £19,253,701 in 1865. The exports in the first four months of the present year amounted in value to £42,881,621, against £46,991,165 in the corresponding period of last year, and £35,635,707 in 1865.——In the new Brooklyn Directory there are 74,000 names, indicating a probable population of 250,000, an increase of more than 15,000 over last year.——The Bank of France has at the present time the largest amount of coin probably ever held by any bank or government at one time, amounting to $156,000,000.

Editorial Summary.

LIVE STOCK IN THE UNITED STATES.—From the returns given by the Commissioner of Agriculture, it appears that on the first day of February, 1867, there were in the country east of the Rocky Mountains, 5,401,263 horses, valued at $429,271,818; of mules, 832,386, valued at $76,094,954; of cattle and oxen, 11,750,957, in value, $349,251,682; of milch cows, 8,384,773, worth $322,039,201; of sheep, 19,985,785, valued at $132,774,660; of hogs, 24,693,534, valued at $134,111,424. The total number of animals is 81,603,521, and of value $1,343,618,739. Illinois supports within her boundaries the largest number of horses. New York ranks next in value owing to the superior estimates given to many fancy specimens, though Ohio stands second in the number of horses owned. In mules, as in cotton, Alabama leads; Mississippi comes next, and is followed by the remainder of the Southern States. Pennsylvania has a very large number of mules employed in her coal mines, but is far behind either of the before-mentioned States. In cattle and oxen, Texas bears off the palm. In sheep raising, Ohio takes the first stand. Indiana, Illinois, and Ohio divide the honor of possessing the largest number of hogs.

DEATH FROM EXPLOSION OF NITRO-GLYCERIN.—On the 9th instant, soon after the workmen engaged in making the Summit tunnel of the Central Pacific Railroad had let off a blast of nitro-glycerin, the foreman of the tunnel, Henry McCarty, went in to see what effect the blast had, or to make preparations for another one. He took a hammer and struck on the rock to ascertain whether it was solid or not. There happened to be a quantity of the explosive combustible in or on the rock, which was ignited by the blow, exploding and scattering fragments and splinters of rock in every direction, wounding him in several places, one piece of stone penetrating his right breast and entering the lung, making a terrible wound. The unfortunate man lived until Thursday, the 23d, when hemorrhage of the right lung took place, causing his death in a short time.—*Sacramento Union of May 29th.*

RUST is removed from metals by plunging the article for twenty-four hours in a bath of muriatic acid diluted with twice its quantity of water. When taken out the metal is to be rubbed well with a scrubbing brush when the oxide will come off like dirt under the action of soap. If any rust still remains, the process needs repeating. When the substance presents throughout the appearance of dull lead, it must be thoroughly washed in plain water and well dried before a fire; the polish may then be restored by a little rubbing with oil and fine emery powder. It is best to prepare the metal by washing with a hot solution of soda before submitting it to the action of the acid, for the purpose of removing any oil or grease. If any trace of acid is allowed to dry on, the metal will absorb oxygen from the atmosphere; hence the necessity of its being well washed in pure water.

THE TUNISIAN PALACE is a beautiful Moorish building; but a palace only in its exterior aspect. Within, though lofty and beautiful, it is occupied by a party of Arabs engaged in the rudest native industries. Two men, squatted on the ground, are weaving in the Arab style, a mat of rushes. Another is working on leather. A jeweler is fabricating with the rudest instruments some rough, but showy ornaments. An old fellow in turban and immense breeches is lying on the ground turning ivory. He has no lathe, but he has fastened his bit of ivory between two pieces of wood so that it will revolve; then with one hand he turns it by means of a sort of fiddle bow drawn across it, while he shapes it neatly enough with a rough looking tool held in the other. The contrast between these rude and primitive methods and the wonderful machinery and manufactures in the palace, is a lesson which covers the whole progress of civilization.

A RUSSIAN ENGINEER exhibits a railway invention which attracts considerable curiosity. The object is to save the power gained in a descent, now lost in the friction of the brakes, with wear and tear, and use it in an ascent. To do this the engineer has attached to the locomotive two very heavy fly wheels. Going down hill they act as a brake, and the force they gather will carry the train up an equal rise, less the friction. Here a model train loaded with water runs down a sharp incline, the water runs off, and the force of the fly wheel carries the train back to the place of starting. In this way a short railway, taking coal down an incline, from the pit mouth for example, could be worked without any power but that gained by each descent of the train.

THE HOOSAC TUNNEL.—The contract just awarded to Messrs. Dull and Gowan, of Chicago-tunnel notoriety, provides for the excavation of six thousand four hundred feet of tunnel at the east end, or over a mile of completed tunnel; also the sinking of the central shaft to grade, which will be about five hundred and forty feet of excavation. They contract to excavate the shaft not less than thirty feet per month, and at the east end not less than ninety-one feet in the same time, the whole work being finished in two years.

THE Austrian Journals state that swarms of poisonous flies have made their appearance in Transylvania, and that more than 100 head of cattle have perished. The farmers are compelled to keep their beasts shut up, and large fires are burning night and day around the sheds to keep off this unwelcome visitation. During one day when the rain fell copiously they disappeared, but as soon as the weather became fine again, they returned. The men in charge of the fires have the greatest difficulty in preserving themselves from their venomous attacks, and find tobacco the best preservative.

STEEL CASTINGS.—Among the novelties in steel from Prussia, displayed in the Exposition, is a locomotive cylinder and valve-casing cast solid in steel—difficult enough in iron, (says *Engineering*,) but in steel very remarkable indeed, as one of the first steps in a new art destined to produce the most important consequences. The cylinder is bored out, to show the quality of the metal, and the bored surface is as sound as the interior of a cast-iron cylinder generally is.

TIN-TYPES, as they are popularly called, are small ambrotypes taken on varnished tin, many repetitions upon the same negative being taken by having a camera with numerous lenses. This necessarily costly apparatus has recently been superseded by a very simple expedient. The sitter is posited opposite a box provided with pieces of looking-glass, in which his figure is multiplied any number of times, and the pictures are thus obtained by a single-tube camera directed toward them.

AN IMPOVEMENT IN WATCHES.—Mr. J. Muma, of Hanover, Pa., writes us that he has made an important improvement in watches. In ordinary watches the isochronous vibration is of the balance are depended upon for keeping up the regular rate. But by reason of increase of friction the vibrations of the balance are lengthened, and for this there has been no simple remedy. Mr. Muma introduces into his watch a second isochronous movement, which he claims will compensate for the variations caused by friction.

MAKING THE DESERT BLOSSOM.—The artesian wells in Algeria, long attempted without success, now number probably about one hundred, delivering five or six million *Litres* of water per hour, and converting deserts into gardens wherever they have been bored. The work is going on, defrayed by tax upon the benefitted population, and is destined to reclaim incalculable wastes. In a single district (Ouled Rir) stretching far South into the desert, and now containing thirty-five wells, 2,000 new gardens have been formed and 150,000 date trees planted. Four military boring brigades, well provided with implements, and with growing skill and experience, are steadily pushing on the conquest of the desert, and with almost unerring success in every attempt.

THE LONDON POST OFFICE in 1865 received and delivered 90,606,000 local letters. The average daily delivery of letters in London at present is about 560,000 of which about half are local and half from abroad. The daily number of newspapers and book packets delivered, is about 55,000. The Postmaster asserts that, if London correspondence continues to increase as it has in recent years, it will soon be necessary to have half-hourly collections and deliveries during certain parts of the day. He also alleges that London local letters are the most profitable that the Post-office handles.

THE ENGLISH RAILROADS rarely cross public roads save by bridge or tunnel, and when they must enter a great city like London they almost invariably run parallel with the tops of the houses. Nothing in these masses of men and mazes of railways so interests and surprises the American as the ever present and conscientious vigilance for the protection of human life. No person is permitted to walk on the track, no idle crowds are allowed to cluster at the stations, and in the few cases where the rail traverses a road on the same level, gates are watched by guards, who allow neither horse nor carriage to cross till the train is out of the way.

THE HONEY ANT OF TEXAS, as described by a Texan newspaper, is about half way between the large and small red ants. Its color is a kind of reddish brown. The honey bag is attached to the posterior part of the abdomen. It is overlaid with thin, dark layers, is about half as large as a grain of rice, and contains a "pure clear honey of a most delicious flavor." Whether these ants have a common store-house, like the bee, our Texan authority does not know.

PREPARATION OF SHEET IRON FOR TINNING.—The usual process, with its manifest disadvantages, of cleansing the surface of the plates in the "black pickle," consisting principally of sulphuric acid, has been superseded by an English manufacturer, by scouring between swift polishing rollers in pure water. The surface is greatly improved in quality and polish, and the lurking corrosion left in the pores of the iron by the acid in the former process, is of course entirely obviated.

A REMARKABLE TOAD.—The Pictou, N. S., *Chronicle* records the discovery of an animal, closely resembling a toad, imbedded in a small cavity filled with water, in the center of a seam of coal 160 feet beneath the surface of the ground. The animal is perfectly shaped and quite lively, but at the same time is blind and has no mouth. When put into fresh water it becomes insensible, but recovers upon being replaced in the turbid water taken out of the coal mine. It is now in possession of the American Consul at Pictou.

AT the Royal palace at Berlin, 40,000 wax candles are instantaneously lighted by one single match. The mode of proceeding is simple enough, the wicks being previously all connected by a thread spun out of gun cotton, on lighting one end of which all the candles are lighted simultaneously and thus the whole of the 700 apartments are illuminated at once. In Russia the same method is employed for lighting up the churches on grand occasions.

THE DUNDERBERG set sail on the 4th inst. for Cherbourg, but owing to a slight disarrangement of her starting gear, returned on the following day. Previous to starting on her trans-Atlantic trip she was docked for repairs in Hoboken. The feat of raising this ponderous mass out of water was one of no ordinary magnitude, and it is doubtful if there is another dock in the country capable of sustaining so enormous a weight.

CANKER WORMS.—English Sparrows have been introduced in some of our city parks, and the result is the entire disappearance of the troublesome canker worms. The beautiful foliage of these parks is in striking contrast with former years, and with the worm-eaten trees in some of our avenues, streets, and churchyards, where the sparrows have not yet been introduced.

OIL.—The Pennsylvania oil wells are at their lowest ebb, the whole State yielding less than 6000 bbls. per day. At Philadelphia, lately, 3000 shares of stock, which once brought a large premium and represented an aggregate of $50,000, were sold for $10.

GAS WORKS are to be established in Yokohama, Japan, by an enterprising Yankee.

IT is reported that Krupp has offered his monster cannon as a present to the King of Prussia. It is valued at about £20,000.

Recent American and Foreign Patents.

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

PHOTOGRAPHIC COPYING BOARD.—W. D. Blackman, Defiance, Ohio.—The object of this invention is to facilitate the copying of old pictures, such as photographs, ambrotypes, daguerreotypes, and others by photographic process.

LADLE.—H. W. Benton, Lebanon, N. H.—This invention relates to ladles used for the pouring of metals in casting, and it consists in hanging to the top of the ladle a guard of suitable form, that while allowing the metal to pass or run out it will hold back and retain the dross, skimming it from the surface of the melted metal as the metal is poured.

CHURN.—John F. Brown, New London, Conn.—This invention has for its object to furnish an improved churn, simple in construction, easily operated, readily cleaned and which will do its work thoroughly and quickly.

SEPARATING WATER AND OTHER VOLATILE PROPERTIES FROM PEAT AND OTHER SUBSTANCES.—Thomas George Walker, New York City.—This invention has reference to the manner in which the article peat or other substances may be prepared for use.

CAR COUPLING.—James Depew and J. Darah Hall, Peekskill, N. Y.—This invention consists in an arrangment of parts whereby two railroad cars may be automaticaly coupled together in a safe and convenient manner and uncoupled in the most expeditious manner from the side or platform of the car

RAILROAD CAR SAFETY BRIDGE.—Lester Traxler, Butler, Ohio.—This invention relates to the manner in which a safe and commodious passage way is formed from one railroad car to another.

WATER COCK.—George D. Hadley, Cincinnati, Ohio.—This improvement relates to a new and improved method of constructing water cocks to be used for hydrants and in similar situations.

PLOW.—James M. Hawley, Holton, Ind.—This invention has for its object to furnish a cheap, strong and durable plow, which may be adjusted for use as a single, double or triple plow, and which may be readily converted into a scraper when desired.

ROOFING AND CLAPBOARDING BRACKET.—H. W. Holden, T. J. Moore, D. H. Stratton and Gilbert Reynolds, Blossburgh, Pa.—This invention relates to a new bracket which can be easily applied to roofs of houses, for shingling purposes, or to the sides of houses for supporting platforms for the builders to stand upon, and for many other purposes, and which is so arranged that it will firmly hold itself in position without injuring those boards, posts or shingles to which it is clamped. The invention consists in so constructing the main bracket that it will not only hold itself in position, but also so that a truss for supporting the platform in clapboarding or one for holding the board for shingling can be easily attached to and held in the bracket.

WATER WHEEL.—Thomas Pattinson, Little York, Cal.—This invention relates to a new and improved water wheel, in which the water is applied to the wheel in such a manner as to insure the most favorable results as regards the percentage of power obtained, economy in the consumption of water, and in the construction of the wheel.

MEDICAL COMPOUND.—A. M. Cox, Elizabeth, N. J.—This compound is especially designed for the relief and cure of colds, coughs, and other similar complaints.

PRESSURE FILTER.—Charles N. Brock, Philadelphia, Pa.—This invention relates to a method of filtering and deodorizing sirup, in the process of refining sugar, and it consists in passing the sirup through a battery or succession of closed filtering vessels, under pressure.

PITMAN CONNECTION FOR HARVESTERS.—Hiram L. Wanzer, Clyde, Ohio.—The object of this invention is to reduce the friction of the cutting apparatus and its connections on harvesters; also, to prevent the rattling of the said connections, and their becoming loose by wearing.

BOTTLE STOPPER.—Robert F. Boccmsles, Wallingford, Ct.—The object of this invention is to provide a convenient and perfect stopper for bottles, or decanters, and consists in an India rubber cylinder, of proper shape to fit the mouth and neck of the bottle or decanter, which is fitted around a metal tube for receiving a screw fastened in the head of the stopper. The stopper is inserted in the bottle when the screw is partly withdrawn, and the India-rubber cylinder is elongated by its elasticity, so that it enters easily, and the screw is then turned for the purpose of compressing the India rubber, and expanding it laterally, so that it shall fit in the neck of the bottle tightly, and fill the sides completely, effectually preventing the admission of air or the loss of the contents.

DEVICE FOR SUPPORTING HOP POLES.—Norman C. Roberts, and Ezra W. Badger, Fly Creek, N. Y.—This invention consists in providing for hop poles a chain and ring formed of wire or any other suitable material; the rings being placed over the tops of the poles, and forming a part of the chain which is drawn over each row of hills to support the tops of the poles, to prevent them from surging in the wind, as well as to keep them separated, and in their proper positions.

METHOD OF MAKING ILLUMINATING GAS.—A. C. Rand, Union Mills, Pa.—The object of this invention is to make illuminating gas from benzine and other hydro carbon liquids, by a very simple and compact apparatus, and in such a manner that no fire or other expensive process is employed.

MACHINE FOR FURROWING MILL STONES.—J. J. Zinn, Albion, Pa.—The object of this invention is to furnish millers with a machine for picking the cross furrows or channels of mill stones with perfect regularity and accuracy, and great facility, without laying off the furrows by measurement.

GRADUATING LEVEL.—N. Hollingsworth, Rosetta, Ill.—This invention relates to a leveling instrument, which is provided with a telescope, a needle box and adjusting springs, in such a manner that by means of the needle in the needle box the inclination of the telescope, or its position towards the horizon, can be determined at a glance; and furthermore, the telescope, when adjusted in a horizontal position, can be leveled so that it can be made to swivel in a horizontal plane without being permitted to deviate from its horizontal position. If the telescope is released, it can be readily adjusted to any desired inclination, and an instrument is obtained which can be used with advantage in cross-leveling and in surveying operations of any description.

CORN PLANTER.—Soloman G. Dentler, Orangeville, Ill.—This invention has for its object to furnish an improved machine by means of which the furrow may be opened and the corn dropped and covered easily and accurately.

GATE.—Hiram Turner, Ripon, Wis.—This invention has for its object to furnish an improved gate, strong and simple in construction, and which may be easily adjusted to swing at any hight, to pass over mud, snow, or other obstructions.

STEAM GENERATOR.—William Young, Easton, Pa.—This improvement relates to a new portable arrangement and combination of parts for the purpose of generating steam for various purposes, and the invention consists in arranging a boiler or generator over a fire box and connecting it with a steam drum (which stands above it) by pipes, and also in a device for heating the water before it is pumped into the generator.

GATE.—Cornelius Trexler, La Grange, Ind.—This invention has for its object to furnish an improved gate so constructed and arranged that it may be opened to its full extent without its being necessary to slide the gate back its entire length or swing the entire gate upon its hinges.

HAY LOADER.—George W. Swartz, Newburgh, Pa.—This invention relates to a machine which is attached to and travels with the wagon for the purpose of raising the hay from the ground and depositing the same into the wagon.

BEEHIVE.—S. Hutchinson, North Lewisburg, Ohio.—This invention relates to a new and improved beehive of that class which are constructed in sections. The invention consists in a novel and improved manner of clamping the sections together whereby close joints are obtained, closer or tighter than usual, so that no crevices are allowed in which moth eggs may be deposited. The invention also consists in providing the hive with a bottom composed of an endless space having moth traps and cleats attached and arranged whereby the hive may be kept in a perfectly clean state and the propagation of moth within the hive avoided.

COTTON PRESS.—Samuel D. Roberts, Washington, La.—This invention relates to an improvement in the construction of a cotton press and it consists in an arrangement of double levers operated by a capstan connected with drums, ropes and pullies which work a single vertical follower block for compressing cotton in an ordinary packing box or chest.

SIRUP PITCHER.—John Hyslop and Charles E. Phillips, Abington, Mass.—This invention relates to the cover or lid of the sirup pitcher, and it consists principally in so constructing that portion of the cover which covers the nose of the pitcher that it will enter the said nose and thus as it were cut off the flow of liquid therefrom, consequently not only causing and forcing the liquid to flow back in the pitcher, but also serving to wipe off the liquid from the nose.

REGISTER.—John McLauchlin, Brooklyn, N. Y.—This invention relates to hot-air registers. It consists in the use of a sheet of wire gauze or netting within the body of the register for the purpose of preventing papers or other articles dropping or passing through the register to the fire below, while no hindrance is given to the passage of the heated air.

EXPLOSIVE POWDER.—Gustav Adolph Neumeyer, Duchy of Saxe-Altenburg, Germany.—This invention relates to an explosive powder which is intended to be more safe, but as powerful, as the ordinary powder now in use.

POST.—A. W. Gore, Manhattan, Kansas.—This invention relates to a post for fences and other purposes, which post is made of sheet metal and provided with cross wires having eyes or loops at its ends for securing the ends of the sections of a wire or other fence thereto, or for convenience in hitching a horse, if used as a hitching post.

INDICATOR.—David P. Davis, Jersey City, N. J.—This invention relates to an indicator more particularly intended for use in connection with steam boilers although it can be applied to other purposes. The invention consists in the application to or the combination with any ordinarily constructed or other suitable pressure gage, of a dial or disk of any suitable material for receiving and retaining marks or indentations, which disk is arranged to revolve with a regular and continuous motion and in such a manner as to be marked by a pencil or any other suitable marking device arranged to operate in connection with the said pressure gage and to be thus moved according to the pressure therein over the surface of the said disk either in a straight or a curved line as may be found necessary.

PAPER FABRIC FOR THE MANUFACTURE OF WATER-PROOF INSOLES AND OTHER ARTICLES.—L. M. Crane, Ballston Spa, N. Y.—The invention consists in constructing the fabric of two or more layers of paper with a sheet or sheets of gutta-percha interposed between them.

SCAFFOLD.—Benjamin Best, Dayton, Ohio.—This scaffold consists of a series of upright posts, which are anchored to the ground by means of braces, and on which sliding braces for supporting the platform are arranged in such a manner that the latter can be raised or lowered at will by the parties on the platform. The length of the scaffold can be regulated by the number of uprights employed.

BALING PRESS.—A. J. Purviance, Mount Zion, Iowa.—The nature of this invention consists in combining gearing with windlass and shackle rigging power for compressing and baling hay or cotton.

BALING PRESS.—Wm. B. Smith, Aberdeen, Ind.—This invention relates to a hay press of that class in which the hay, cotton or other article to be baled is held in place by a follower while it is being operated upon by a beater, both the follower and beater moving in a horizontal direction.

PUNCHES.—Lorenz Wolf, St. Jacob, Ill.—The object of this invention is to provide a standard for guiding a sliding punch in such a manner, that the socket in the standard may be enlarged or diminished at pleasure, according to the diameter or size of the tool, which is to slide therein.

THROTTLE VALVE LEVER.—Norman King, Etna, Pa.—This invention relates to a method of operating the throttle valve of a steam engine, and it consists in the arrangement of two levers, which have arms attached and which have their fulcrums upon a stationary standard, and which operate in such a manner that the valve is moved with the greatest ease and can be set or locked in any desired position.

HAMMERS.—Henry Cheney, Little Falls, N. Y.—This invention relates to a new manner of forming the sockets of wrought iron hammers, and consists in making the same of malleable iron and brazing, soldering or otherwise securing it to the head.

DRAY.—F. Van Doren, Adrian, Mich.—This invention relates to a new manner of arranging and constructing the bottom or the bearing surface of dray carts, the same being so arranged as to be removable from the frame of the dray. To one side of the said bottom are secured a series of rollers which when on top, facilitate the loading and unloading of the cart, while, when the bottom is turned around, so that the rollers are on the underside, the dray has an ordinary flat bottom which can be removed with its load and rolled to any desired place within a building.

WATER WHEEL.—Thomas Pattinson, Little Rock, Nevada Co., Cal.—This invention relates to a new and improved water wheel, in which the water is applied to the wheel in such a manner as to ensure the most favorable results as regards the per centage of power obtained, economy in the consumption of water, and in the construction of the wheel.

OXYGEN.—Henri Adolphe Archereau, Paris, France.—This invention consists in a new process for producing Oxygen, industrially on a large scale, by the decomposition of sulphur acid through heat, and in the compression of Oxygen gas, and its utilization to various purposes, chiefly metallurgic.

BAG HOLDER.—Lafayette Turner, Cedar Rapids, Iowa.—This invention relates to a device for holding bags during the process of filling and for closing them when filled. It consists in an adjustable frame set on pins on the ground; the mouth of the bag is folded over the ends and the bag hangs down within the frame, which is then stretched by means of a hinged adjustable cross-piece or bar. A clutch closes the bag when filled, beneath which the string is passed and tied.

CIGAR POINT PERFORATING MACHINE.—Oliver Quinand, Vicksburg, Miss.—This invention relates to a machine for perforating the points of cigars and consists of a block of wood or other suitable material seated on a spring in a hollow block having spikes hinged in its walls, and passing through slots or mortices in the shape of right angled triangles in the walls of the inner block.

GRAIN SCREENS.—Reason Hawkins, Philadelphia, Indiana.—This invention relates to an improvement in the construction of screens for separating the trash and foul seeds of cockle and cheat from wheat and other small grain, and dividing the grain into first and second qualities.

HORSE POWER MACHINE.—John Schley, Savannah, Ga.—This invention relates to an improvement in the construction and arrangement of a machine to be used as a horse power, and is especially designed for plantation use, to be applied to mills and all other purposes.

MANUFACTURE OF SUGAR.—Ursin Naquin and Theodale Morrillson, Parish of La Fourche, Louisiana.—This invention relates to new and useful improvements in the manufacture of Sugar, and consists in a new mode of saturating cane juice and bleaching it with sulphurous acid, for the purpose of making it white bright sugar.

BENDING SCYTHE SNATHS.—O. W. Stearns, Lebanon, N. H.—The nature of this invention consists in machinery for bending scythe snaths, whereby the work is more rapidly and economically performed than by the ordinary method of bending them by hand.

EXTENSION FRUIT LADDER.—John E. Treat, Oxford, Mich.—This invention relates to a new and improved extension step ladder, designed more especially for picking fruit and for general household purposes. The extension feature admitting of the device being used in many cases where the ordinary step ladders cannot be employed.

SCHOOL SETTEE AND DESK.—John Peard, New York, N. Y.—This invention relates to a new and improved combination of a School Settee and Desk, whereby a very cheap and durable article of the kind specified is obtained, and one which will admit of being compactly folded when not required for use, and contain both a book and a slate rack.

HAY RAKE.—Sylvester Johnson, New Harmony, Indiana.—This invention relates to the frame from which the rake is pivoted, made with curved side timbers; to the sash for holding the rake head in proper position while raking; to the combination of a lever, chain or rod, arm and pawls with the rake head; to the formation of notches in the rake teeth, so that the sash may have an inclined position; and to the combination of an arm and link with the sash and arm of the rake head.

MACHINE FOR CUTTING STRAW, &C.—S. Pettinode, Corunna, Mich.—This invention consists in the application of feed rollers to the lever straw cutter; in operating the feed rollers by means of a toothed arm and cogs formed upon the hub of the knife lever, in the combination of ratchet wheels, pawls, connecting rod and lever with the feed rollers and with the toothed arm, in the combination of metallic side pieces with the box frame and upper roller of the cutter, and in the combination of adjustable guide arms, guide rods, and springs, with the metallic side pieces and with the upper feed roller.

MACHINERY FOR MAKING HOT PRESSED NUTS.—Lewis Thierry and Geo. B. Hill, Detroit, Mich.—This invention relates to improvements in machinery for the manufacture of hot pressed screw taps or nuts, and consists of devices for cutting the nuts from the heated iron bar with hexagonal, octagonal or quadrilateral sides, and by an automatic slide moving the blanks over a die and under a punch, which punches out the center hole for the screw, the whole operation of cutting off the blanks and punching the holes being continuous and simultaneous and performed with great rapidity, allowing a whole bar of heated iron to be fed into the machine and converted into blank nuts without intermission or a second heating and without waste of material, except the core from the hole.

COMPOSITION FOR TANNING LEATHER.—A. Westbrook and —— Campbell, Leona, Pa.—This invention relates to a composition for tanning fur skins and glove leather, by the application of which the process of tanning will be facilitated and hastened, and whereby the leather will be made more tough, softer, and more pliable than it can be made with the methods now in use, and whereby stretching and working while drying the leather is made unnecessary, thus saving a great amount of labor, besides producing a superior article.

SUSPENSION BRIDGE.—A. S. Hallidie, San Francisco, Cal.—This invention relates to a suspension bridge which is suspended from strong cables or ropes that are attached to substantial posts or pillars, and which is strengthened by means of suspension rods, which connect the aforesaid cables with the girders, upon which the planking rests, and by braces which connect the cables on each side of the bridge with each other, so that thereby the bridge is made very strong and durable, and capable of sustaining heavy weights, and of withstanding the force of strong gales.

CAR COUPLING.—John Pettengill, Jr., Lisbon, N. H.—This invention relates to a self-acting car coupling, which is so arranged that the link will be held between the elastic sides of the coupling box, so as not to rattle, and is always held firmly in any desired position. Provision is also made that high and low cars can be coupled.

HOLDER FOR BROOMS, ETC.—H. W. Warner, Watertown, Conn.—This invention relates to a holder by means of which brooms, brushes, and other similar articles can be suspended to and upon the walls or sides of a room or other apartment with the utmost ease and readiness, and in such a manner as to offer no obstruction to their being removed when desired for use.

DEVICE FOR TETHERING ANIMALS.—James P. Thorp, Southington, Conn.—This invention relates to a new and improved device for tethering animals, designed more especially for horses, whereby said animals may be allowed a length of rope to admit of them grazing over a considerable area without danger of having their feet entangled in the rope.

MOLDING AND PRESSING BRICKS.—A. J. Sprague, Toledo, Ohio.—This invention relates to a new and improved machine for molding and pressing bricks, and it consists in a novel means for pressing the clay into the molds with a feeding and discharging device, and a guard grating, whereby clay may be molded and pressed into proper form very expeditiously and in a perfect manner.

SKATE.—John Forbes, Halifax, Nova Scotia.—This invention relates to a new and improved fastening for securing skates to the feet, whereby skates may, with the greatest facility, be firmly secured to the boot or shoe, and very readily detached from it when required. The fastening is of that kind in which straps are dispensed with, and the skate clamped to the sole of the boot or shoe.

CLAMP FOR SUSPENDING WHIPS.—Alvin C. Mason, Boston, Mass.—This invention relates to a new and improved clamp for suspending whips when not in use, in order that the same may be kept straight and in proper shape.

SETTEE FOR SCHOOLS AND OTHER PURPOSES.—John Peard, New York City.—This invention relates to a new and improved settee for schools and other purposes, but more especially designed for class rooms in our public schools. The invention consists in a novel construction of the settee, whereby a very strong and durable seat is obtained, and one which may be manufactured at a small cost, and be capable of being adjusted and secured in any position required either against a wall or against a raised platform.

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."

A. M. R., of Mo.—The amount of heat evolved by compressing air, and of cold by rarifying it, have not been carefully determined by experiment. But there are good reasons for supposing that when 2 cubic feet of air are compressed into the space of one cubic foot sufficient heat is evolved to raise 9½ lbs. of water 1°. If this heat be allowed to escape, the expansion of the air to the original bulk might be able to cool 9½ lbs. of water 1°. The freezing machines constructed on this principle, however have not been successful. The best freezing machine appears to be Carre's which depends for its action on the rapid volatilization of ammonia. Ice is now practically manufactured in all parts of the world; in the frigid and temperate zones by nature, and in the tropics by Carre's machines.

G. R. D., of Mass.—The cast iron to be tinned should be well cleaned by an acid pickle and rinsing in water. It is then dipped in a strong solution of chloride of zinc, and finally in the bath of melted tin. You will find an answer to your other question above.

D. S. H., of Pa.—"I notice that you do not always spell correctly. In spelling a word of three letters, you used two wrong letters and placed the only correct one at the beginning of the word instead of at the end. H. M. T. (page 367 Vol. XVI) enquires: How many revolutions on its own axis will a wheel make in rolling once around a fixed wheel of the same size?" You spelled your answer o-n-e. You should have spelled it t-w-o." Very good! Also E. W. D., of Conn., H. N. S., of Ohio, and T. J. W. of Minn., are not content with our answer. Whether the proper answer be one, or two, depends upon the understanding of the question. A wagon wheel is a reasonable example of a rolling wheel, and we think the question very easily suggests it. Now in a rolling wagon wheel the axis or axle always maintain the same position with reference to the point of contact with the ground. A line drawn on the end of the axle towards the point of contact will always keep its relative position; in rolling around a fixed wheel the line will be directed to the center of the fixed wheel. Now no one will doubt that under such an explanation of the question our answer is the only one admissable. The case which permits the other solution requires that a line drawn on the end of the axle shall be kept parallel with a fixed line, a case which is not so easy to conceive or to put in practice. Now we do not offer this as a complete discussion of the question, for that might fill a whole page of this paper, but rather to show how difficult it is to satisfy all with a short answer. We still think our original answer is the best which can be expressed by three letters.

J. L. W., of Ohio believes that telegraph wires are less liable to oxidation on account of the current of electricity passing through them. He has no faith in the electro-anti-incrustators heretofore alluded to in this paper, but thinks that a current from a battery made to pass through a boiler would be a perfect preventive of incrustation.

E. J. W., of Ill.—A tin vessel will not be suitable for holding your plating solution. If you were to put your solution into an ordinary tin kettle, the silver would speedily be precipitated, and the solution would in time work its way through the metal.

P. J., of N. Y.—A solution of phosphorus in sweet oil or ether, seems to be what you want. The solution shines in the dark when it is exposed to the air. An ounce of it in a two ounce vial would be sufficient to illuminate the dial of a watch or a compass so that it could be read. When the solution is used in a vial, the cork is to be removed for a moment, then replaced, and the liquid shaken. . . . P. J. quotes from an old French book of 1681, a description of a concave mirror two and a half feet in diameter, with which a silver coin was melted, wood set on fire candle light reflected several hundred feet, etc.

D. S. McD., of Ill.—If your shafts are perfectly in line one with the other there can be no question about the running of your belt, if that itself, is straight. Level and line one shaft to the other, which cannot be a very difficult job and you will have no trouble with a belt running on the edge of the pulley. Of course the pulleys must be true and in line with each other.

J. Q. C., of Mass.—Almost any ordinary kitchen utensil, as a quart tin pail with the cover made tight and proper connecting pipes, will be found sufficient to generate steam for your toy engine of 2 inch by half inch cylinder.

C. C. W., of Pa.—The details of the process of producing an artificial skating surface, we suppose have not been made public. Probably some of the artificial stone compounds would be found suitable for the purpose. It is not likely that any imitation of ice can be made so perfect that the ordinary skates can be used on it. All that is required for the roller skates is a smooth hard floor.

J. H. L., of Pa.—The brown powder which you send and which you say is deposited in large quantities from the water of a spring, is mainly oxide of iron. If you heat it to a bright red heat it will turn a permanent red and become merchantable red ochre. The hardened deposit in the neighborhood of the spring, if there is enough of it may prove valuable to you as an iron ore.

J. H. G., of Ky., has a mill at the bottom of a cave 150 feet from the surface. He drives the mill by water of 150 feet head, and wishes to know how much of the water he can return to the surface by means of the mill. The proportion of water that may be returned to hight of the head will vary within wide limits according to the machine employed and the size of pipes. A good turbine might return 80 per cent of the water which drives it.

A. W. G., of Conn., wants a cement insoluble in water to be used with a mass-like paper pulp for the purpose of solidifying it. Shellac or gutta percha have been found useful for such compositions. They become adhesive by heat, or they may be used in solution.

M. B. S., of N. Y., suggests that horse radish may be distilled and used for medical purposes in the room for mustard, etc." The oil of horse radish is isomeric with oil of mustard, and a drop of either applied to the skin will produce a blister. Each contains more than a third of its weight of sulphur.

Business and Personal.

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

GREENWOOD CEMETERY ENTRANCE.

Greenwood is probably the most beautiful cemetery in this country, and it is doubtful if it is surpassed in natural beauty or artificial embellishment by any in Europe. The entrance shown in our engraving is a splendid specimen of the florid Gothic, built of brown sandstone from New Jersey. It has two entrances, one for visitors and the other for funerals. These are guarded by a central tower and two side towers, each terminating in lofty pinnacles ornamented with crockets. The buildings on either side are appropriated, one to the reception of visitors and the other to the business of the cemetry, containing offices, etc.

GRAND ENTRANCE TO GREENWOOD CEMETERY, BROOKLYN, N. Y.

The gateway has a clock, and a bell to be used for a passing procession. Over the gateways are recesses on both sides, crowned with the Gothic arch in which are sculptures representing the Entombment of Christ, His Resurrection, the Resurrection of the Widow's Son, and the Raising of Lazarus. These are of Nova Scotia limestone. The shields in the quatre-foils show bas-reliefs of Faith, Hope, Memory and Love; the whole eminently appropriate to the uses of the structure.

The full effect and beauty of this entrance cannot be represented in an engraving. For those of our readers who have a curiosity in regard to this elegant abode of the dead, and who cannot personally visit the locality, we propose, hereafter, to give some idea of its beauties both natural and artificial.

Science Familiarly Illustrated.

Pyrotechnics.

While the recollection of the celebration of our national anniversary is still fresh in mind, it may be profitable to learn how, and of what materials those devices which are judged by some so essential to the proper observation of the day—fireworks—are manufactured. That singular people, the Chinese, were experts in this art long before gunpowder was known among the civilized western nations, and to this day we are indebted to this people for some of our best fireworks and for all the fire-crackers which are used in this country. The Italians were the first to make any attempts at rivaling the Celestials in this field, and the French soon followed the lead. Indeed there is a published account wherein it was proposed, in 1598, employing rockets in war, thus anticipating Congreve by nearly three hundred years. Coming now to more modern times, we find the finest inventions in this line ever made were those of the celebrated Ruggieri, father and son, who exhibited most brilliant and beautiful fireworks in Rome, Paris, and other principal capitals of Europe. The first pyrotechnist of note in this country was William Hall, an Englishman, who appeared at Castle Garden, in this city, some thirty years ago. The leading manufacturers of the country are few in number, the business being dangerous and the demand for this work very light and principally confined to the annual celebration just passed

The materials used in the manufacture are simple enough, niter, sulphur and charcoal forming the prime constituents; black antimony, potash in two or three forms, nitrate of strontia, arsenec, camphor, and verdigris are used at times. Gunpowder is used either in grain, half crushed, or finely ground, for different purposes. For producing pleasing scintillation, filings or borings are employed, and the longer they are the brighter sparks will be thrown out, hence such are preferred as are very coarse, and quite free from rust. Steel filings and cast-iron borings contain carbon and give a brilliant fire with wavy radiations; copper lends a greenish tint to the flame; zinc causes a fine blue color; sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber affords a yellow fire, as well as colophony and common salt. Lampblack produces a very red color with gunpowder, and a pink with niter in excess. Yellow sands or glistening mica make golden radiations. Shades of green are produced by adding verdigris, sulphate of copper, and sal-ammoniac. Camphor yields an intensely white flame, and aromatic fumes which overpower the unpleasant smell of other substances; benzoin and storax have also the same property. Lycopodium burns with a rose color and magnificent flame. So much for the materials, and now as to the mode of constructing the different pieces.

The rocket is perhaps, the most important article of fire works, having been made use of as a weapon of war, a signal for ships in distress, and as a means of carrying a line to otherwise inaccessible objects. The rocket case is made with care of the best "tip," or hardware paper, cut in strips, soaked in paste, and rolled around an iron core. As the rocket must fly off with rapidity, its composition must be such as to kindle instantly throughout its length. To effect this, a cylindrical axial space is left vacant, around which the charge is packed. The head is a lighter case attached to the rocket and contains the stars, serpents, or showers of fire, which burst forth when the rocket reaches the end of its flight. A pasteboard tube terminating in a cone, encloses the whole. The stick to which it is fastened, is simply for guiding the rocket in its flight, for without this addition, it would become one of the interdicted "chasers," or "serpents." In firing, the gaseous products violently ejected from the lower end, react with equal force, carrying the rocket forward in the other direction. The stars which are used as garnitures for the skyrocket pots, are small, round or cubic solids, variously compounded, as of niter 16 parts, charcoal 6, sulphur 4, steel filings 3; the materials are mixed with gum arabic and molded into this shape.

Roman candles come next in importance to rockets. The cases for these are made like the rocket cases, though lighter, smaller in the bore, and longer. The composition of the balls is the same as that designed for the rockets. When the ingredients are properly mixed, the mass is molded into small globes with a hole pierced through their centres. Into the case is first placed a lump of clay, then a small charge of gunpowder, afterwards the star; the charges being repeated until the tube is filled.

Pin wheels are made by simply winding a tube of paper filled with explosive compound, around a card board disk; sealing wax, for lack of something better, is used for fastening the coil to the wheel, and from the flame of the lamp needed to melt the wax, or from the melted wax itself, a premature display frequently takes place, with often serious consequences.

Exhibition pieces are ingenious combinations of wheels Roman candles, and brilliant colored fires, the adjoining parts being lighted by quick match strings planted among them, or they are connected by conduits whereby they take fire simultaneously. Electricity was first employed for setting off these pieces, by J. W. Hadfield, one of the leading manufacturers of this city, nine years since, in firing a triumphal piece two hundred feet long, in honor of the successful laying of the first Atlantic Cable.

Blanching of the Hair.

Physiologists have been at a loss to account for the sudden whitening of the hair which is known to be produced by intense and sudden terror or profound grief. Mr. Erasmus Wilson, in a paper recently read at the Royal Society, threw considerable light upon the question The paper was founded on a case apparently unique, in which every hair of the head was colored alternately brown and white from end to end. The white segments were about half the length of the brown, the two together measuring about one-third of a line. Mr. Wilson suggested the possibility of the brown portion representing the day growth of the hair, and the white portion the night growth, and this opinion was corroborated by the remarks of Dr. Sharpey and others of the Fellows who took part in the discussion which followed the reading. Under the microscope the colors of the hair were reversed—the brown became light and transparent, the white opaque and dark, and it was further obvious that the opacity of the white portion was due to a vast accumulation of air globules packed closely together in the fibrous structure of the hair, as well as in the medulla. There was no absence of pigment, but the accumulation of air globules veiled and obscured the normal color and structure. Mr. Wilson observed that, as the alteration in structure, which gave rise to the altered color, evidently arose in a very short period, probably less than a day, the occurence of a similar change throughout the entire length of the shaft would explain those remarkable instances, of which so many are on record, of sudden blanching of the hair; and he ventured to suggest that during the prevalence of a violent nervous shock the normal fluids of the hair might be drawn inward, toward the body, in unison with the generally contracted and collapsed state of the surface, and that the vacuities left by this process of exhaustion, might be suddenly filled with atmospheric air. Dr. Sharpey mentioned a recent example of sudden blanching of the hair, which had been observed by Dr. Landois, of Greifswalde, as reported in Virchow's Archiv., and which was ascertained to be due to the accumulation of air globules in the fibrous substance of the hair.—*Lancet.*

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NOTICE TO SUBSCRIBERS.

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A WORD TO CORRESPONDENTS.

Our system of replies to correspondents is intended not merely as a gratification of a curiosity nor as a means of deciding a dispute, but solely for the dissemination of knowledge which may be useful to a portion, at least, of our readers. It is our intention in publishing replies to questions to answer, in this manner, only those which may benefit others beside the inquirer. The SCIENTIFIC AMERICAN does not assume, in any case, to usurp the functions of the post office. If a question is asked the reply to which cannot interest any one but the questioner, we cannot employ the medium of this journal to forward a reply. If we did, there would be scant room for other more interesting matter in our columns. To all these replies, except such as are evidently trifling, we reply by mail at a large yearly cost for postage, as few of our correspondents seem to consider the demands of business, custom, and gentlemanly courtesy, which require the inclosure of a small sum for postage, paper, etc., where the benefit is all on the side of the inquirer. Where, as in our case, these inquiries count by the hundred weekly, the *onus* is somewhat heavy.

Long communications on subjects which, by our correspondents and our editorial staff, have been repeatedly discussed in our columns, seem to be superfluous; but as we desire to give all a fair hearing, we sometimes feel compelled to reprint the statements which have before appeared, rather than to have any of our correspondents imagine we willingly ignore their attempts to assist in the elucidation of a subject. Of course, we cannot expect entire originality in every communication we receive, and are willing to publish any additional facts which merely throw more light on a subject; but if we published *in extenso* all that is sent on a single subject we should surfeit the mass of our readers. Under such circumstances, it ought not to seem strange that some communications, well written as well as honestly conceived, do not see the light in this paper.

Owing to the number of communications and inquiries, some of which necessitate investigation, labor, and time, they do not appear in the number of the paper in which they are expected. Our room is limited, and some must wait for their turn. Although we have, perhaps, better facilities for ascertaining facts than our correspondents, it must be remembered that no man and no corps of editors can be encyclopedias of scientific and mechanical facts, and frequently we are compelled to spend time and money to procure the knowledge sought.

But no other annoyance is so great as that of endeavoring to ascertain the wishes of correspondents who withhold the data upon which a reply may be predicated. For instance, one of our recent inquirers desires to know the difference between a water wheel of 5 feet diameter with buckets three feet long and one of 6 feet diameter with buckets two feet long. He does not give the description of wheel, whether overshot, undershot, or breast. Another asks, "what proportion of a horse power will a wheel of 6⅝ inches diameter give under 5 square inches of water with a 4 feet head." He does not give the velocity of the water nor the style of wheel to be used. Another wishes to know the actual power of his engine, giving diameter of cylinder, length of stroke, and pressure of steam on his boiler. He does not give the number of revolutions per minute—number of feet per minute of piston—nor the distance of engine from boiler, size of pipe, nor means of exhaust. In all these cases it is impossible to give an answer approximating the truth because we do know the essential facts.

The neglect to use proper terms is another annoyance. When an inquirer asks about *melting* india-rubber we can not understand whether he means melting or dissolving. When one calls for a cement for an aquarium, without stating whether it is a small one to be placed on a table or in a window—in these cases built of iron and glass, or marble and glass—or whether it is a tank built of brick and stone, it is difficult to give a decisive and exact answer.

Our correspondents too often leave much to be inferred, or worse, imagined. If they would be more explicit they would be better satisfied with our replies and save us much useless labor and annoyance.

HOW LONG IS A YEAR?

There are a great many people who do not understand the philosophy of the leap year. Some even suppose that leap year was instituted by the goddess Venus only to confer upon ladies the privilege of popping the question, or that February has twenty-nine days that it might have a chance of the luck of odd numbers. Of course it is not necessary to bring any science to bear against such notions. The subject really involves certain important niceties, which we are persuaded not more than one in a thousand clearly comprehends, and for that reason we shall try to elucidate it.

Our civil year is founded upon the period of the revolution of the earth about the sun. We say founded upon, only, for the natural or astronomical year as determined by astronomers is not the same period of time as the civil year. If the natural year had exactly 365 or 366 days, there would be no trouble: the civil year would accord with it and represent precisely the same period of time. But the natural year cannot be divided into an exact number of days; and to complicate the matter still more, astronomers show us that there are several kinds of natural years in consequence of there being several distinct but legitimate ways of measuring the period of the earth's orbit.

We give two examples. Let the earth, the sun and a fixed star be in the same straight line at a given instant. Now the time which will elapse before they will be again in the same relative position is one kind of year. This year is called a sidereal year and its length is 365 d. 6 h. 9 m. 9·6 sec. But if the period be measured on the ecliptic, as for example the time which elapses between the sun's crossing one of the equinoctial points and again reaching the same we get a different result. This year is called the equinoctial, tropical or solar year, and its length is 365 d. 5 h. 48 m. 49·7 sec.

Now it has been agreed that this solar year shall be the foundation or standard of the civil year, and that the two shall be brought as nearly as possible into accord. In ancient times the subject was very poorly understood, and the civil year was constantly getting out of reckoning with the sun. The discrepancy evidently became a serious affair, when the natural winter encroached on the summer of the calendar.

Julius Cæsar, 46 B. C., made the first reasonable and substantial reform. He saw that the solar year was about 365¼ days long,—the figures were near enough to the truth to answer his purpose. If the civil year be 365 days, it is a quarter of a day short of the solar year; four civil years would have lost just a whole day. He therefore ordered that every fourth civil year should have 366 days. Thus originated the leap year. By his changes in the reckoning of time, Cæsar's name is made to live forever and to be on the lips of all men. The month July is named in his honor, and the Julian Calendar is still followed, over a considerable part of the earth.

If the solar year were exactly 365¼ days, there would never have arisen an occasion to reform the Julian Calendar. In fact, every Julian year gets in advance of the solar year about 10 minutes; in a century nearly a whole day. In Cæsar's time the vernal equinox fell on the 25th of March, in the sixteenth century it had fallen back to the 11th. The difference was getting to be important and the subject was ably discussed. The result was that Pope Gregory XIII., in 1577, approved and ordered a reform. The change actually took effect in 1582. In honor of the Council of Nice, ten days were dropped from the calendar, in order to bring the vernal equinox for all time on that day of the month, the 21st of March, at which it occurred in the year (325) of the meeting of the council. If there had been respect for the memory of Cæsar, fourteen days instead of ten would have been omitted.

To prevent a discrepancy in the future, between the solar and civil year, it was found that if only those centennial years of which the number after suppressing the two cyphers, is divisible by four, be regarded as leap years, the purpose is accomplished. The plan was adopted. In accordance with it 1900 will not be a leap year.

The protestant nations and those under the rule of the Greek Church, of course looked upon a reform instituted by a pope, with no favor. But protestant Germany and Denmark adopted it in 1700; England followed in 1752, and from that time forward "old style" and "new style" of necessity became household words wherever English was spoken. The Greek Church is however still unrelenting, and all those nations which are under its government still adhere to the Julian Calendar. The most conspicuous among these nations is Russia Julian reckoning is now twelve days later than Gregorian.

A SHATTERED THUNDERBOLT.

One of the most remarkable effects of lightning that we remember ever to have heard of, was experienced during a thunder shower that fell upon the crowds assembled at the Fair grounds at Springville, Erie Co., N. Y., June 27th. One of the exhibition sheds in which the spectators had taken refuge from the rain, was struck by lightning, and about a hundred persons were stunned and prostrated—invariably falling on their faces—some fifty remained insensible for five or ten minutes, a dozen were seriously burned, three or four were injured probably past recovery, but two horses, only, were killed outright. The escape of so many persons from instant death, while two horses alone were killed, seems miraculous: but a little attention to the circumstances may show that it was not unaccountable. It would seem that the force of the thunderbolt was divided into some hundred of nearly equal portions, probably in consequence of the crowd of persons standing erect, with their heads nearly approaching the roof of the shed, which acted as a distributor to that number of conductors. If, as may be presumed, the roof was at the moment sheeted with the pouring rain, the supposed distribution was greatly facilitated. The killing of the horses may probably be explained by the fact that one, at least, and probably both, were fastened by iron chain to the post or posts which afforded the most direct conductor to the current. The lightning struck a post in the center of the shed, against which Henry Tillou, the landlord of the West Falls Hotel, was leaning, and to which a horse was attached by a chain halter. The horse was killed instantly, while Mr. Tillou escaped by being dazed and knocked down. One woman was prostrated and deprived of her senses but not of her power of locomotion; she instinctively gathered herself up, and ran to the 'bus and was conveyed to Holmes' Hotel, and declared she had no knowledge of what took place after the flash until she found herself in a room at the house. Another woman was struck on the shoulder, the fluid passing down her side raising a blister in its course. A man from Otto was hit on the right side of the head, and on his recovery the mark was found to commence at the right eye, and could be plainly traced down the neck, across the chest and off the left arm.

BORING THROUGH THE HEART OF TREES.

In No. 25 Vol. XVI, was a communication relative to the boring of holes in diseased or non-productive trees and introducing sulphur, strongly condemning the practice and asserting that it is injurious if not fatal to the trees.

A correspondent, T. McG. of Ohio, gives the results of his observation and experience which differ somewhat from those of "F. R.," referred to above. He says: "A neighbor of mine has a cherry tree that is about nine or ten inches diameter, and every year the fruit either dropped off, or that which remained was so knotty and wormy as to be unfit to eat. Having seen a statement that boring through the heart and introducing roll brimstone would improve such trees, he tried it some three or four years ago, and whether from this cause or not, it is certain that the change was at once apparent. The tree put on quite another appearance, the leaves assumed a healthier color, and the yield ever since has been splendid in quality and large in quantity. After introducing the brimstone the hole was plugged up.

"Another neighbor bored a five-eighth hole completely through his trees, leaving the hole open, and they have since yielded excellent crops. The same neighbor, when a young man, was sent by his father to repair the back post of his cider press—one of the old-fashioned lever kind—and used for the post a worthless apple tree, which stood convenient and had been left only to preserve the uniformity of the orchard. He made a mortise through the tree of some 18 or 20 by 4 inches. From that time forward until the tree rotted down, by the moisture collecting around the tenon, which was a number of years, the tree bore excellently.

"These are facts, but I do not pretend to give the philosophy of them; if there is no connection between the boring and the subsequent improvement of the trees, the coincidence is at least remarkable."

TORPEDOS IN EVERY HOUSE.

Gunpowder in the open air burns quietly; in order to show that it has power we must confine it. Except for guns, firecrackers, &c., we might not have found out that gunpowder can make a great noise.

There is a common sort of friction-match composition that is a little more explosive than gunpowder. It burns quicker and when confined it gives a sharper and louder report. The matches to which we allude ignite with a flash and with a slight crackling sound; most of the matches, called parlor matches, are of this sort. The readiest way of making a match explode is to lay it on the floor and press it with the heel of your boot. The report in sharpness and loudness is about the same as that of a percussion cap. Another way of making the experiment is to wrap the match closely in stout paper and give the composition end a light blow with a hammer. The explosion will be as loud as before and the paper will be torn to shreds. There is without doubt enough explosive force in a box of matches to burst the stoutest musket. Children should never try the experiment of exploding matches. It is dangerous. The melancholy fate of the Austrian princess, betrothed to the son of Victor Emmanuel, and burned to death but the other day in consequence of treading on a lucifer match, is a warning in point. The greatest care should be taken of these too plentiful and perilous little articles.

THE PARIS EXHIBITION.

SMALL ARMS.

After Napoleon's wars came the long peace. Arms were almost forgotten. But after awhile there sprang up feelings of distrust, and every nation about the same period began to burnish its weapons, too late to check revolutions, but yet in time to re-establish dynasties. The rifle increased the power of infantry over the mob, and far-seeing Prussia made one step more, amid the careless criticism of her neighbors. The needle gun was perfectly well known in England and France, but an idea prevailed that nothing could be more dangerous than to store up cartridges which carried, beside powder, detonating composition. This was the true barrier raised up in the minds of soldiers against the needle gun; for its other defects, though apparent enough, need not be followed in new systems. It is a mistake to suppose that breech-loaders are new to England. About ten years ago Sharp's [American] carbine was introduced for cavalry service, and since then several others have been introduced and issued to different cavalry corps. The Westley Richards is about the best of these, and was all that could be desired, so long as cartridges carrying their own means of ignition were under a cloud. But if a rifle has to be capped half the value of breech-loading is unattained. Inventors were called forward to devise methods of adapting the Enfield rifle to modern requirements if by any means the task could be accomplished. The advertisement was issued in August, 1864. About fifty systems were proposed; five only were actually tried. Out of these Snider's was the only one with a self-igniting cartridge. Step by step it advanced till it made better targets than the old Enfield, and the Government Small Arm Factories were directed to throw their whole energies into the conversion, while the laboratory at Woolwich poured forth cartridges by hundreds of thousands.

The Snider method of conversion is undoubtedly simple and strong, the drill is far easier to learn than that of the old arm, and the whole alteration is effected at a cost considerably under 20 shillings. It may, therefore, be considered a success, especially as its ammunition, devised by Colonel Boxer, is strong, and so water proof that it can be laid under water for some hours without injury. Like most of the inventions of modern days the system is no novelty. A few weeks ago a lecture was delivered in London by Captain Majendie, R. A., who showed two weapons manufactured during the reign of Henry VIII., and wanting only some minor details to be veritable Sniders. The ammunition of the time was, however, very inferior to modern work, and it is upon this that the safety and good shooting of the arm depends. Here, as in all cases, the credit is due to those who work out a system, and after much labor arrive at a successful result.

But are all objections to breech-loaders disposed of when accurate shooting and safe ammunition have been attained? By no means. There are many people who still urge minor reasons for hanging back in the race, and point to the dangerous nature of the prize for which all the world are now striving. One great point with objectors has always been that men fire away their cartridges too quickly already, and will leave themselves without ammunition now that the possible rapidity of their fire is trebled or quadrupled. Nor is this question to be put aside without careful discussion. The campaigns in Denmark and Germany have shown that the Prussians fired away fewer rounds than the ordinary average; but, then, all the world are not Prussians. There is a danger, and the liveliest and most dashing nations are precisely those to whom this danger is greatest. France was one of the last to commence her rearmament, and her wisest soldiers would, even now if they could, put off the necessity. The brilliant and self-reliant Frenchman is too ready with his trigger, and just as the knight's charge, lance in rest, was rendered obsolete when fire-arms attained accuracy and facility, so does the present improvement in rapidity of fire place the advantage in the heads of cool, determined men rather than in the hands of dashing warriors, be their *elan* never so great. It is quite time that this should be well understood in England, for every report of practice with the Snider or the Chassepot is full of admiration of the rapidity with which the men fired, but says no word of means being taken to check that rapidity in ordinary work, leaving it to develop itself naturally on the spur of emergency. Is the English army generally aware that the Russians spend much time and trouble upon cooling the ardor of their soldiers, who are certainly not famous for dash at the warmest of moments? Do our infantry officers and non-commissioned officers walk behind their men when at drill, and touch on the shoulder first this one and then another, saying quietly "Now fire?" Is the spirit cultivated which led the inferior marksmen to hand their ammunition to their clearer sighted comrades before the intrenchments at Dybbol? If not, then we are in the wrong path, and the croakings of the slothful are in a fair way to be verified.

There is another great danger more likely to be risked in England than in France. It is the danger of training our troops to open fire at long ranges. A few sharpshooters may be usefully employed now and then for particular purposes, but the great secrets of modern success may be summed up in six words—shoot late, shoot straight, shoot strong. To shoot late requires coolness and training; to shoot straight demands absolutely that the range should be short. To shoot strongly the arm and ammunition must be adapted for the purpose. Here again steps in that useless, because impractical, longing for far ranges. A long and therefore heavy bullet (the bore being the same) will, of course, range further and with greater accuracy than a short one, but its initial velocity, and, therefore, hard hitting at short distances will be less with the same charge of powder. The French have chosen a light bullet and heavy charge, and they are right. The English bullet was lightened lately, and behold an outcry because it won't penetrate quite so many deal boards at 600 yards.

The advantages of breech-loaders are chiefly these—1, *Multiplication of fire*, so that for all contests, not actually hand to hand, the number of men are practically multiplied, say, threefold; but every loss of a soldier is in such a case equal to the loss of three; 2, *Facility of loading in all positions* and in all weathers; this enables the soldier to seek any cover,—a stone, a log, even a sod of earth behind which he can lie and maintain a steady fire, without exposing body or limbs. At close quarters, too, his bayonet need never be moved from the line with his enemy's breast, while he puts in the cartridge which will settle matters between them; 3, *Reduction of fatigue*; joined with No. 2 this improves the actual shooting; there are few rifles that are not more accurate than the average soldier who points them; 4, *Ease of repair and cleaning*; an oiled rag has only to be drawn through the barrel to clean it, and a damaged breech apparatus is readily replaced in all systems worth naming.

These advantages are now so palpable that it is not surprising to find all nations who exhibit at all showing breech-loaders. First among them all for beauty and adoption of the latest ideas stands France herself. Belgium stands next but not on account of her own inventors. She will make a Snider or a Chassepot, an American Remington or Peabody, and all of excellent workmanship, and at a moderate low price; but France is after all, the military nation, and, though to our eyes a plain well-made rifle looks more business-like, we have no reason to despise the love of arms which makes our neighbor lavish gold and silver and cunning workmanship upon the weapons they love.

If the visitor wishes to study the different systems most in vogue at present in Europe, he will find this Belgian Court by far the best to examine. England shows comparatively little, and that little, though generally good of its kind (Lang's case, for instance, and Whitworth's accurate and far-ranging rifle), strikes an inquirer at once as very high in price. Whitworth's little pea rifle costs £30. His double barrels, forged from one piece of metal, cost, with stock complete, £60, and though the Birmingham Small Arms Company sell single rifles with Whitworth barrels for £4 each, you can buy a double gun, with proof mark on it, for 15f. 75c. in the Belgian Court, a single one for 6f. 25.

Such weapons are not intended for real work; but if stock, lock, and barrels can be made at such prices at all, and really excellent double rifles for 400 francs (£16), whence arise these immense English prices which are daily driving English sportsmen to Liege and Prague for their guns? If Prussia designs to substitute a new weapon for her needle-gun she shows no signs of it at the Exhibition, and she is at this moment behind all other great Powers in her system, though she has enough of the awkward *zundnadel-gewehre* to arm all her troops with, and none of her neighbors can say as much. Russia is converting her arms on the Carl system, a modification of the gun that contributed so much to the success of Prussia in the late war. What her new system will be is uncertain. She has flirted with the Peabody rifle, but will probably wait, like ourselves, till she can satisfy herself better. Austria is hard at work changing her old weapons into breech-loaders upon Wänzl's plan, a sort of rough Albiny. While the Austrian Government exposes its cannons and torpedoes for free examination and discussion, the spirit of secret counsels seems to have fallen upon the private manufacturers, for though Wänzl shows his guns, they are wrapped around with wire, the inventor is absent from Paris, and no man may touch them. Enough is visible, however, to make the method perfectly clear.

It is a demonstrable fact that nations are open or close in their views as to information just in proportion to their preparations for war. Before the Danish campaign no government was more forbidden to strangers than the Prussian, because they were unready in many respects, and the value of the needle-gun was still unproved. Afterward they boasted of their powers, and made no secret of their military preparations. Austria continued silent because she was behindhand, and, though warned by her own commissioner sent to study foreign breech-loaders that the change must be made, was hesitating, and did at last hesitate too long to adopt any one system. France is now the closest of all, but she cannot hide her backward condition in many matters. A few days ago an English officer wished for explanations of certain pieces of artillery exhibited in the Exhibition of the French war department. He had been sent from England officially, and due application was made to the officer in charge. He replied courteously that he should have much pleasure, but dared not act without permission from the Minister of War. For what purpose, then, were the guns displayed at all? Pacific England is really best prepared in weapons, so she shows them freely, and wisely too. She is backward is some matters, and takes care to leave them in the shade.

The small arms in the Exhibition are so numerous and so wide in their range of system that I can do no more than draw attention to a few of the most interesting, and it is quite possible that some worth mentioning have escaped my notice, mixed up as they are with apparel and jewelry, and including guns for shooting every living thing, from whales to flies. This is no exaggeration. There are breech-loading pistols, shown by Gavelot, about an inch long, adapted for pin fire cartridges; capping pistols about the same size, and systems are the fowling-pieces shown by Barella in the Prussian department, but invented by Prince Pless. Their great feature consists in the absence of all hammers or anything that could destroy the smoothness of the exterior of the breech. They are well worth examination. Spencer's [American] rifle is known by name in England, and Russia tried it. The stock contains a copper tube holding seven cartridges, which could be pumped out rapidly if required, and a new tube with its supply introduced. But to guard against too reckless an expenditure of ammunition the gun can be used as an ordinary breech-loader for general purposes, the reservoir remaining in the stock to meet sudden emergencies. Then, there are methods, both French and English, for loading a gun at either breech or muzzle, if want of breech-loading cartridges should render the latter advisable. Another point worthy of remark is that pin fire seems to be dying out, and that central fire cartridges are more approved generally than those called rim fire. Revolvers are chiefly made to load from behind; indeed those issued for use in the French and Italian navies have long been arranged on this principle. Colt still adheres to the old plan, but it is said that a knowing American patented the "notion" of piercing the chamber through from end to end, even before any use was made of the invention. If simplicity and fewness of parts were alone to be considered, the Remington [American] must bear away the palm. The whole breech-closing apparatus consists of two pieces, which are very similar in shape, strong, and it would seem, easily made. The firing is rapid enough, too, but there is one objection to his system. The whole backward action of the discharge has to be borne by one of the pieces in the direction in which it opens and shuts. It thus acts upon the piece as upon a lever, the fulcrum of which is the hinge whereon is turns. The second piece supports its comrade, but its direction of movement is the same. One cannot but dread a gradual loosening of the apparatus, and a consequent escape of gas. The Chassepot has more parts than the Snider, and is less easily dismounted and repaired. They both have a weak point—spiral springs. The only spiral spring in the Snider of any importance might, however, be got rid of, as the French and other nations have shown. Lancaster's new breech-loader has, I believe, no spiral spring. But the Chassepot has a greater defect, and it is one which is generally spoken of. The close fitting of the breech depends in great measure upon an india-rubber buffer, and it needs not the opinion of foreign gunmakers to advise us of the dangers of such a system

There is a good weapon by Loron exhibited in the Belgian department. Only three motions are required before firing, and the parts are compactly put together. The Prussian needle-gun requires five operations in the hands of the most skilful, six in those of a less practised soldier. Mont Storm [American] has adapted his rifle to self-igniting cartridges, but Albiny's, adopted by the Belgian government, is, perhaps, the best on the general principle of hinging the breech-block in front, and turning it over upon the barrel before loading. It has a spiral spring like that of the Snider, but this could no doubt be expelled without loss to the system Boxer's cartridges are used for the Albiny gun, and are well thought of generally among foreign gunmakers. The Prussian and French government cartridges are of paper, and not waterproof. Most of the others are of copper or sheet brass. Boxer's are of thin sheet brass, rolled round a model, gaining a power of yielding slightly to the explosion of the powder, and thus obviating bursts. A peculiar base is also part of his system. All metal cartridges can be made waterproof, but the Chassepot and needle-gun will not admit of stiff cartridges. Spain has a few handsome guns, of no particular interest, and the curious weapons shown by all sorts of barbarians may be called weapons for fighting, but hardly weapons of war. There is one point, however, on which opinions in England differ. Is steel or wrought iron the best material for barrels? The strain on a small arm is so slight, and the manufacture of steel in bars so easy, that there is no danger as to strength; but the metal is apt to be damaged by the fire applied to it in various operations, especially brazing two barrels together for a double gun. If Whitworth has succeeded in overcoming this difficulty by making an accurate pair of barrels in one piece, he will have earned the gratitude of gunmakers, unless his prices are too high. Two firearms yet remain to be named, Devisme's, who shows a sort of improved Chassepot, which has some practical advantages, and explosive bullets for shooting lions, elephants, and even whales, according to the gun from which they are fired, and Le Baron's system of igniting the cartridge by electricity. The stock is hollow, and contains a whole apparatus of galvanic battery, accumulating coil, and wires. The cartridge has two small wires with a little space between their points. When it is introduced and pressed home, one end of the conducting wire touches the center of its base, and so communicates with one of the wires contained in it. The other end of the conducting wire is brought into contact with the second cartridge wire by touching a spring—the trigger, in fact. A tiny spark leaps over the interval from point to point, and fires the cartridge. If M. Le Baron could simplify and diminish his apparatus, it might supersede all hammers, anvils, and caps, but at present it weakens the stock too much.—*London Times.*

A HEAVY TRAIN.—Probably the heaviest train that ever run on any road recently passed over the Lehigh Valley Railway. It consisted of two hundred and seventy-five loaded cars, each, including couplings, being fourteen feet in length, making a total extension of 3,850 feet, or over two thirds of a mile. Allowing six tuns as the average weight per car, the total weight amounted to 1,650 tuns.

A GIGANTIC ENGINEERING PROJECT is now the sensation out West, which contemplates nothing less than tunneling the Atlantic for a railway. The plans are already supposed to be drawn up, complete in detail, even to lighting the cars with the magnesium and electric lights. The undertaking is to employ one hundred thousand men for thirty years, and when completed it will take the trains but five days to complete the journey from New Foundland to Ireland, *via* the telegraph route. The amount of capital required to carry out this project is estimated at two billion five hundred million dollars

Leather Splitting.

In the commerce of leather in France, we apply the word crust to that part of the leather which is nearest the flesh, and which is separated from the other portion of the skin bearing the hair. The strength for resistance in a tightly stretched skin is entirely in the portion nearest the flesh, the fiber, as we approach the upper or grain side, gradually becoming looser, and the force to resist stretching, gradually diminishing in such a manner that it is always here that the breaks or cracks in leather begin to manifest themselves, with the slightest increase of the usual strain.

If then, the grain of such leather be removed, the force of resistance and the expansion of the balance will be much more even, and the whole will be better balanced, as it were; the grain will no longer be present to mark by cracks and fissures where the excess of strain began to operate.

Before the genius of inventors was directed to the invention and perfection of leather-splitting machines, leathers were used in their entire thickness, and if only a moderate thickness was required, they obtained it by shaving off as much as they found necessary from the flesh side of the hide; now, for the purpose of preserving its strength and making its capacity for extension even and regular, this was the very contrary of what should have been done.

Since the employment of machines for splitting, the manufacturer is able to employ the grain for the purposes to which it is best adapted, and to make the crust, or flesh side, serviceable to the best advantage, notwithstanding that the latter was in discredit for some time. We well recollect the repugnance with which the general public beheld anything made of the crust of shaved or split leather. People then thought that all parts would crumble into pieces in the hand when the grain was taken off. Since it has entered into consumption it has come to be a great necessity, and is largely used to manufacture saddlery and trim carriages, in trunk making, in forming the tops of sabots and galashes, and when waxed and varnished, etc., in inferior grades of shoes, shoe tips, etc.

The hose and the leather piping we exhibit, are made of the split crust of the leather, as above mentioned; their quality is no less a recommendation than their reasonable price. Tubing and hose made of the entire leather with the grain on, become slacker and tighter by the influence of water, or the weather. With those made of split leather the case is different; the effect of shrinking and expanding is produced in the first wetting they get, and they never again change their form, but remain rigid, notwithstanding all the changes that may take place in the temperature. The grained leather then is easily altered by atmospheric and other influences; the crust, on the contrary, remains firm and not liable to moisture.—*Picot & Co., in La Halle aux Cuirs.*

Caramel Colors.

Sugar is the only fit material to prepare caramel; and for this purpose the sugar is best heated in capacious roomy vessels made of copper (in Vienna, copper lined with silver, is preferred), the vessel containing a thermometer to indicate the temperature. The latter must not be below 410° nor above 428° Fah. The heating of the sugar is continued so long as aqueous vapors are given off. The crude caramel so obtained is best purified by being placed upon a parchment paper dialyser, which is placed on water. The undecomposed sugar and intermediate compounds are thus got rid of; they dissolve out with facility, and what remains on the filter is, weight for weight, five times as strong in coloring matter as the crude caramel. While the sugar is being exposed to heat, it is preferable to stir it with a spatula.

Another mode of obtaining a pure caramel, free from bitter produce (assamar and the like) is to heat the sugar as above, and to treat the powdered caramel with alcohol (pure methylated spirits) to digest it for three or four hours therewith, and repeat this until all bitter taste is gone. An aqueous solution containing 10 per cent of purified caramel, is gummy and forms a jelly. When a solution of caramal in water is evaporated *in vacuo* (small vacuum pans as used in sugar refineries), it dries up to a black, shining mass, freely soluble again in water, hot or cold; but if the solution is evaporated on a water bath to dryness in contact with air, the whole mass becomes insoluble in water, either hot or cold.—*Chemical News.*

PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JULY 2, 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.

66,203.—LAMP BURNER.—Philander Baker, Chicago, Ill.

1st, I claim the combination and arrangement of the disk, e, and safety plate or diaphragm, b, t-en connected at their perimeters by a spiral coil or its equivalent, as described, with the two sections of the wick tube, arranged as specified with respect to each other, and the cone, I, arranged and operating as and for the purposes set forth.

2d, I claim, in combination with the elastic arms, l, the arrangement of the spring hoop, k, constructed and applied so as to operate in the manner and for the purposes specified.

66,204.—VALVE GEAR FOR STEAM ENGINES.—Louis D. Bartlett, Fitchburg, Mass., assignor to Putnam Machine Company.

I claim operating the valve of a steam engine by means of the lever, D, actuated by the eccentric cam, E, in combination with the lever, B, substantially as described.

I also claim, in combination with the above, the supplementary cam or toe, G, operating substantially as described for the purpose set forth.

66,205.—CORN SHELLER.—George Bevitt (assignor to himself and John George Ott), Madison, Wis.

1st, I claim the cylinder, B, provided with the oblong inclined teeth, D, constructed substantially as described.

2d, in combination with the cylinder, I claim the concave slats, E, when arranged to operate in connection therewith, substantially as described.

3d, Providing the concaves, E, with the spring, F, as and for the purpose set forth.

66,206.—DRYING BRICKS.—Joseph R. Bowers, Concord, N.H.

I claim the application of artificial heat by means of steam or hot-air pipes, when such pipes pass beneath the surface of the drying ground, and are constructed as described for the purpose of drying bricks.

66,207.—CIDER MILL.—E. W. Branch, East Henrietta, N. Y.

I claim the combination and arrangement of the spring board, K, and adjustable bed, I, with the grinding apparatus, consisting of the disk, E, fitting in the rim, h, of the wheel, C, which is driven by jointed pawl, D, the whole constructed as described and operating in the manner and for the purpose set forth.

66,208.—PROCESS OF PRESERVING FRUITS AND OTHER PERISHABLE ARTICLES.—William D. Brooks, Baltimore, Md.

I claim filling cans or other vessels, containing fresh fruits or other perishable articles, with hot sirup or other fluids by means of a supply tube, delivering the same under pressure at or near the bottom of the can, substantially in the manner and for the purpose herein set forth.

I claim also the use of steam in the process of preserving fruits and other perishable articles, when delivered into the vessels containing the same, substantially in the manner and for the purpose set forth.

I claim also the combination of a steam or hot-air space, D, with a reservoir C, to encircle the same and maintain its contents in a heated state, when said supply pipe is arranged to operate substantially in the manner and for the purpose herein set forth.

66,209.—HEDGE FASTENER.—C. D. Brown, Tampico, Ill.

I claim the method herein described of holding down young plants for the purpose of producing strong and thickly set hedges.

66,210.—DEVICE FOR BENDING DOWN PLANTS TO FORM HEDGES.—C. D. Brown, Tampico, Ill.

I claim the use of a tapering trough constructed substantially as described for the purpose of bending down hedges.

66,211.—APPARATUS FOR GATHERING APPLE SEEDS.—Russell Brusie, Cleveland, Ohio.

I claim the construction of a box, A, provided with the gates, B H and E, in combination with the blades, L, substantially as and for the purpose described.

66,212.—BOTTLE CAPS OR TOPS.—W. Burnet, N. Y. City.

I claim a bottle cap made of rubber or other suitable material, provided with one or more closed tubes, all made and operating substantially as described, or their mechanical equivalents.

66,213.—TOPS FOR MUCILAGE AND VARNISH BOTTLES.—W. Burnet, New York City.

1st, I claim an elastic cover for gum and varnish bottles, so shaped that it will at the same time cover the mouth of the bottle, furnish a spring to allow endwise motion to the brush, and return it to its normal position, and clasp the handle of the brush so that it may be moved up and down in the cap, and held at any desirable hight.

2d, I claim the combination of the above top, made of any suitable elastic material, with a brush for varnish and mucilage bottles, all made and operating substantially as described, or their equivalents.

66,214.—SHIFTING BUCKET PROPELLER.—Jacob Busser, Philadelphia, Pa.

I claim, in combination with the pairs of hinged buckets, the shifting bar and slides, so that by means of a lever the propulsion may be forward or backward without stopping or reversing the engine or changing the direction of motion of the crank shaft, substantially as described.

66,215.—INSULATOR HOLDER.—Richard Calrow, Mamaroneck, N. Y. Antedated June 22, 1867.

I claim the combination of the block, g, metallic covering, c, and the holder A, for the purposes set forth.

66,216.—CLAP-BOARD GAGE.—A. Carson, Memphis, Tenn.

I claim a clapboard gage, composed of the graduated plate, A, jointed and sliding arm, F, having projections, G and H, with point, J, and adjusted upon and held to plate, A, by means of the thumb screw, D, when all the parts are constructed to operate substantially as described and for the purpose set forth.

66,217.—MITER BOX.—E. C. Cheek, Placerville, Cal.

1st, I claim an adjustable miter box, composed of a bed or frame, A, to which are secured the swinging arm, B, the permanent stops, H H, and the movable stop, I, all constructed and operating substantially as described and for the purpose set forth.

2d, The movable stop, I, to hold the work close to the saw cut, and on either side of the same, and operating substantially as set forth.

66,218.—MANUFACTURE OF SOAP.—John Chilcott, Brooklyn, N. Y. Antedated June 15, 1867.

I claim the manufacture of soap from gelatine, either with or without grease, oil, or fatty matter, by first subjecting the gelatine to the action of a suitable degree of heat to render it saponinable, and afterwards treating it with alkali, substantially as herein specified.

66,219.—CHURN.—Norman B. Clabaugh, Frederick, Md.

I claim the construction of a rotary churn dash of longitudinal parallel bars or wings, C C h, applied to heads, D D', and provided with pins, p p, applied substantially as and for the purposes described.

66,220.—SINK.—Hugh H. Craigie, New York City.

1st, I claim a trap for sinks, formed by the detachable cup, d, attached to the under side of the sink, in combination with the downward projecting ferrule or pipe, b, as and for the purposes set forth.

2d, I claim the bend, f, and trap, d, in combination with the soft metal pipe, g, connected to the bend, f, by the ring, h, and neck, substantially as and for the purposes set forth.

66,221.—BRIDLE BIT.—John M. Crawford, Philadelphia, Pa.

1st, I claim the slotted cheek pieces, B B', either curved or straight, when attached to a bridle bit, substantially as and for the purposes set forth.

2d, Making the cheek pieces capable of being reversed, by acting in combination with bit, A, and screws, C, substantially as and for the purposes set forth.

3d, The combination and operation of the bit A, screws C, and cheek pieces B, with the cheek strap, F, and reins, D and E, substantially as and for the purposes set forth.

66,222.—POWER HAMMER.—Albert Cunningham and Alonzo Sharp, Salem, Ohio.

1st, We claim the links, R S, lever, R', and slotted segment, Q, as arranged in combination with the lug, H, for the purpose and in the manner as set forth.

2d, The adjustable collar, L O, springs, M N, in combination with the rod, K, and adjustable lug, H, as and for the purpose herein described.

66,223.—BOILER FEEDER.—Jeremiah Darling, Cincinnati, O.

1st, I claim the construction of the mouth, B, of the pipe, C, when connected with and operating in a steam boiler, as herein described and for the purpose set forth.

2d, I also claim the arrangement of the rotating exhauster, R, with its ducts S and T, when operated around the pipe, P, in the tank, L, as herein described and for the purposes set forth.

3d, I also claim the arrangement and combination of the steam whistle, K, with its reservoir, J, and steam and water cells, I and F, as herein described and for the purposes set forth.

4th, I also claim the arrangement of the pipe, C, with the boiler, A, and cells, I and F, with the whistle, K, as connected by pipe, U, and cell, L, with the exhauster, R, all when combined and operating as herein described and for the purposes set forth.

66,224.—WASHING MACHINE.—Samuel Davis, Kansas, Mo.

I claim the combination as well as the arrangement of the annular suction ring or board, O, with the perforated or grated plunger, B, and the application of the plunger to its working lever, C, by means of a swivel connection in order to enable the plunger to revolve while in use, the whole being substantially as described.

66,225.—HYDRANT.—W. P. Dickinson, D. S. Witman, and G. W. Rabold, Reading, Pa.

1st, We claim valve, M, in combination with its lubricator recesses and holes, discharge hole, m, constructed and arranged in the manner and for the purpose above described.

2d, The combination of valve, M, lubricator recesses and holes, f f f, valve rod, K, and key rod, R, globe case, A, and goose neck D, constructed, arranged and operating together in the manner and for the purpose above described and set forth.

3d, The key rod, R, combined with valve rod, K, by means of a cogged lever and five-teeth pinion, as above described and for the purpose set forth.

69,226.—STOVE FOR CARPENTERS' USE.—H. Dietz, N.Y. City.

I claim the construction of a carpenter's stove by the combination of angle irons and sheet iron together with fire-brick or soap-stone bottom lining, in the manner and for the purpose substantially as described.

66,227.—PRESSER GAGE FOR GAS FITTERS.—R. B. Donaldson, Washington, D. C.

I claim a gas fitter's pressure gage, constructed by combining the base, A, containing the reservoir, b, elastic bottom, c, and socket, a, with the shank, of the tube, B, in the manner and for the purpose described.

66,228.—CAR SEAT.—A. S. Dotter, Philadelphia, Pa.

I claim one or more leaves or plates attached to arms of a car seat, so as to be either folded and depressed or elevated and secured in a horizontal position, all substantially as and for the purpose described.

66,229.—DRILLING APPARATUS.—John Fanning, N. Y. City.

I claim a drilling apparatus constructed as described and shown.

66,230.—WATER INDICATOR FOR BOILERS.—Ambrose G. Fell, Brooklyn, N. Y., assignor to himself and Wm. Bell, New York City.

I claim the construction of a water indicator for steam generators having one or more sides of mica, substantially as and for the purpose herein set forth and described.

66,231.—APPARATUS FOR FORMING SKELPS FOR SHEET METAL TUBES.—Robert Feller, Taunton, Mass., assignor to himself and the Dighton Furnace Company, Dighton, Mass.

What I claim is the above described improved apparatus for forming sheet metal tubes.

66,232.—MACHINE FOR SKEINING SILK, THREAD, ETC.—Cyrus Fisher, Canton, Mass.

I claim the combination and arrangement of the thumb rest, r2, with the next adjacent rotary hook and its puppet.

I also claim the arrangement of the driving shaft, K, of the flyer with respect to the flyer shaft, and to the driving gear of the next adjacent rotary hook.

I also claim the combination as well as the arrangement of the skein case, F, with the flyer and the rotary hooks and mechanism for revolving them, as described.

66,233.—WATER-CLOSET VALVE APPARATUS.—James Gillilan, Charlestown, Mass.

I claim the combination of the elastic metallic concavo-convex cap, D, with the flexible cup-shaped piston, d, applied to the valve stem, B, and arranged within the vacuum chamber, C, as and for the purpose specified.

I also claim the arrangement of the spring, E, within the vacuum chamber, and with respect to the piston, as set forth.

66,234.—CAPPING PAD SCREWS.—C. F. Grilley, New Haven, Conn., assignor to the Grilley Company.

I claim the method of drilling or perforating the screw head and cap blank, after the two have been united together, and at one operation, substantially as herein specified.

66,235.—CHURN.—O. Hawley and J. W. Ward, Wheeling, West Va.

We claim the agitators, F F F F, also the combination of the springs, D, stops, E, and balls, C, operating in the manner and for the purpose described.

66,236.—SEED PLANTER.—George E. Herrick, Lynn, Mass.

I claim the combination and arrangement of the two perforated disks, and their clamps, with the hopper, and the agitator of the said planting machine, the whole being substantially as described.

66,237.—FRUIT JAR.—Edward D. Holman, Buffalo, N. Y.

I claim the combination of the spring, A, with the conical cap, B, and rib, D, when constructed substantially as and for the purposes described.

66,238.—NUT MACHINE.—David Howell, Louisville, Ky.

In the described combination with the die, H, and punches, F G and O, I claim adjustable guide blocks, J and M, for the purposes explained.

66,239.—DEPTH GAGE.—Ivory A. Hurd, Boston, Mass.

I claim the combination as well as the arrangement of the wing piece, B B, with the spindle, A, check nut, E, and collet, D.

66,240.—COMBINED PLOW, HARROW, CULTIVATOR, AND ROLLER.—James Johnston, Pemberton, Ohio.

I claim the rollers, D, and trucks, E, or either of them, and the harrow frame, C, adapted to receive harrow teeth, shovels, or cultivators, and to be lifted by the levers, c, in combination with the axle and the adjusting washers, e, the whole arranged and operating substantially as set forth.

66,241.—MACHINE FOR DRAINING SUGAR.—Cassius Macumber, Aurora, Ill.

I claim, 1st, Constructing the revolving separator of a series of draft chambers by means of the inclined partitions, substantially as described.

2d, The arrangement and combination of the revolving and fixed disks, T T2, and cone, T5, for the purpose and in the manner substantially as described.

3d, Placing the beaters obliquely on the revolving disk for the purpose described.

66,242.—RAILWAY CHAIR.—John Mohn, Detroit, Mich.

I claim, 1st, a railway chair, which is constructed with a solid portion, a a, slotted base, j, an elevated table, K, and an abutting lip, a', adapted for receiving the notched rail sections, A A, a supporting and covering plate, c c', and a key, f, substantially as described.

2d, The mode herein described of securing the chair by means of the spikes, f f, for the purpose set forth.

66,243.—CONDENSER FOR STILLS.—Clarence Morfit, Baltimore, Md.

I claim a condenser which is adapted for use in conjunction with a still, and which is divided into a number of chambers, communicating with each other, and provided with two series of pipes or conduits, so arranged as to admit of the separation and revaporization of the distillates and their return to the still, substantially as described.

66,244.—BAND COUPLING.—Stephen Moulton, Hartford, Ct.

I claim, 1st, A ball and socket joint, having an aperture in the side of the socket for hooking in the ball, substantially as herein described.

2d, The application of a ball and socket joint of the form and construction herein described, to the purpose of coupling of a band or cord, substantially as herein set forth.

66,245.—REVOLVING HARROW AND CULTIVATOR.—Amos Newell, New York City.

I claim the combination and arrangement of the spiked harrow, substantially in the manner and for the purposes described.

66,246.—RAILWAY RAIL COUPLING.—Joseph Newham, Kent, Ohio.

1st, I claim the combination of the bar block and washer, with the ends of the rails and spike, substantially as and for the purpose set forth.

2d, Securing the ends of railroad rails in position, substantially as and for the purpose set forth.

66,247.—MACHINE FOR SHAVING HORN.—William Noyes, Jr., Newburyport, Mass.

I claim a machine or combination consisting of a bed plate, A, two cutters, c c, two guide-plates, a a, and two feeders, B C, such feeders being provided with springs, g g, and operative mechanism, substantially as described.

I also claim the combination of the bed plate, A, cutters, c c, d d, guide plates, a a, and the feeders, B C, such feeders having springs, g g g, arranged to operate with the bed plate guides and knives, substantially as specified.

I also claim the feeding mechanism or combination composed of the two feeders, B C, the cams, l k, eccentrics, o o, and connecting rods, p p, arranged to operate as specified, such feeders having springs, g g, as explained.

I also claim the combination of the cooling tank or trough, F, with the machine composed as described, of the bed plate, A, its cutters, c c, guide plates, a a, and the feeders, B C, having springs, g g, and being provided with mechanism as explained, for advancing and retracting such feeders.

I also claim the construction of the receiving end of the bed plate, viz., as oblique to the edges of the plate as set forth.

66,248.—DRAW PLATE.—J. O'Kane, New York City, assignor to Edward H. Hotchkiss, Brooklyn, N. Y. Antedated June 20, 1867.

I claim the construction of a draw plate, with a communicating slit, r, arranged with reference to each hole, substantially as and for the purpose herein specified.

66,249.—WINDOW WASHER.—Nat Palmer, Newcastle, Me.

I claim the combination of a hollow staff or tube, with the bulb and tubing of a rubber syringe, a sponge or mop, and metal tube, in manner aforesaid.

66,250.—EXPANDING REAMER.—William F. Patterson, Charlestown, Mass.

I claim the combination of the shell, A, piston, B, cutters, C, and springs, D, all constructed and arranged substantially as and for the purpose set forth.

66,251.—HOISTING MACHINE FOR VESSELS.—Horatio O. Perry, Buffalo, N. Y.

I claim forming a line of shafting in sections, A D, connected by variable and extensile couplings, B C, for use on shipboard, constructed arranged and operating substantially as set forth.

I also claim, in combination therewith, the friction pulley, E, wheel, F, lever, J, and brake, K, arranged and operating substantially as set forth.

66,252.—POTATO DIGGER.—Charles H. Pickering, Indianapolis, Ind. Antedated June 27, 1867.

1st, I claim the double-shared plow, G, with the slats, g, and side boards, as shown, in combination with rotary gatherer, H, substantially as and for the purpose set forth.

2d, The scraper plow, F, in combination with the double shared plow, G, substantially as and for the purpose set forth.

3d, The arrangement of the levers, D, for supporting and operating the wheels, B, substantially as and for the purpose set forth.

4th, The slotted inclined plane, O, for conveying the potatoes to the box, L, in combination with the rotating carrier, H, substantially as and for the purpose set forth.

66,253.—CORN PLOW.—Mathias Redlinger, Freeport, Ill.

I claim the arrangement of the lever, A, with its roller, E connected to beams, G, and the treadle, C, as arranged with the plows, B, when combined with the beams, G, as herein described, and for the purposes set forth.

66,254.—MACHINE FOR BUNDLING KINDLING WOOD.—John Richardson and Frederick H. Stevens, New York City.

1st, We claim the use of a tube having its end provided with a sharp edge, and having its interior slightly conical, for the purpose of receiving, shaping, and holding the bundle, substantially as described.

2d, The combination of the driving wheel, E, mounted on the tubular shaft, F, with the arm, H, secured to the shaft, G, and the lever, d, or its equivalent, arranged to trip the dog, c, and to be operated by the wood carrier, as the latter brings the wood to the bundling tube, B, substantially as set forth.

3d, The wire clasping and twisting device, consisting of the mandrel, M, and the slid ng rod, k, provided with the lip, l, or its equivalent, when arranged to operate as and for the purpose set forth.

4th, Regulating the twisting of the wire, and the shifting of the clutch by means of the disk, R', operated by the mandrel, and returned by the spring, l, substantially as described.

5th, The combination of the mandrel, M, level gear, O1 O2, sliding clutch, P, excentric, u, and arm, P', arranged to operate as and for the purpose set forth.

6th, The combination of arm, P', elbow lever, Q, and disk, R, arranged to be operated by cam, R3, or its evuivalent, in connection with the movement of shaft, G, for the purpose of moving the clutch, P, at the desired time, substantially as described.

7th, The tube, B, having its end arranged to operate in connection with the edge or lip of the recess in the end of the mandrel through which the wire is fed for cutting off the wire by a shear cut, as set forth.

8th, The wood carrier, consisting of the sliding box, C2, mounted on the reciprocating plate, C3, when arranged to operate substantially as described.

66,255.—MACHINE FOR HUSKING CORN.—Daniel Sager, New York City.

1st, I claim the arrangement of the picker, C, shaker, E, endless apron, F, husking rollers, G G, and adjustable blades, M M, essentially as described, for the purpose set forth.

2d, The shaker, E, for delivering and directing the course of the ears, by motion communicated through the eccentric, L, or its equivalent, in the manner substantially as specified.

3d, The endless apron, F, arranged in relation to the husking rollers, G G, so as to carry the ears of corn thereto, and rotate them, whilst husking, and afterward to discharge them from the machine, essentially as described.

4th, The husking rollers, G G, supported in bearings, O O, having elastic supports, P P, substantially as and for the purpose set forth.

5th, The adjustable blades, M M, essentially as and for the purpose specified.

66,256.—DRY GAS METER.—John Schatt, assignor to himself and Samuel P. Mervine, Jr., Philadelphia, Pa.

I claim attaching the leather, B, and the ring, A, together, by means of the single cord, C, and the groove, a,'' closed tightly over the said cord and leather, substantially in the manner described and for the purpose specified.

66,257.—PAINT COMPOUND.—Mortiz Schneider, Cleveland, O.

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

66,258.—MACHINE FOR DRESSING PAPER PULP.—George E. Sellers, Seller's Landing, Ills.

1st, I claim the annular chamber, B B, through which the pulp is delivered into the chamber, C. The chamber, C, and agitator, Q, to collect the heavy

particles into the center, over the receiver, D, substantially as described, and for the purposes specified.

2d, I also c aim the pulp screen, F, with the slit or slits, a a, the agitator or float, Q, to give direction to the pulp in the line of the slits, the pulp receiver, J J, and regulating valve, L, and the knot receiver, M M, all substantially as des ribed, and for the purposes specified.

66,259.—PLOW.—James B. Skinner, Rockford, Ills.

1st, I claim adjusting the coulter, both vertically and lat: rally, substantially in the manner described.

2d, The combination of the coulter spindle, with the bracket plate, and socket, as shown in fig. 1.

3d, The combination of the coulter spindle, with the double bracket plates and stop pin, as shown in fig. 2.

4th, The combination of the laterally adjustable bracket plate, spindle socket, and diagonal champ, as shown in fig. 3.

5th, The combination of the spindle, laterally adjustable bracket plates and clamp bolts, as shown in fig. 4.

6th, The combination with the caster spindle, of a series of locking washers, as shown in fig. 5, for the purpose described.

66,260.—PLOW.—James B. Skinner, Rockford, Ills.

1st, I claim the combination of the caster yoke, with the horizontal caster spindle, as shown in fig. 1.

2d, The combination of the caster yoke, with the horizontal caster spindle, by pivoting the yoke on a vertical pin in the loop on the spindle, as shown in fig. 2, for the purpose of preventing wabling of the coulter, and yet leave it free to vibrate lat: rally.

3d, The combination of the caster yoke, with the squared thimble turning on the fixed spindle projecting from the bracket plate, as shown in fig. 3.

4th, The combination substantially as described, with the horizontal caster spindle, o, of the double half round boxes, p, suspended in the loops, pl, and a cross bar, P, for the purposes set forth.

66,261.—SPLICING BELTING.—N. E. Smith, East Cleveland, O.

I claim the herein-described method of splicing belts, in the manner substantially as specified.

66,262.—CIDER PRESS.—A. D. Strong, Ashtabula, Ohio.

I claim the screws, K, and ratchet wheels, I, supported in the cross pieces, B G, of the frame, A, and operated by means of the levers, M, pawls, L, and

66,263.—EXTENSION UMBRELLA.—William H. Sutherland, Seven Mile, Ohio.

1st, I claim the combination and arrangement of the extension stick, and extension ribs, substantially as shown and described.

2d, I claim the tongues, z z, the grooves, j j, the bands, l l, the pins, t t, the notches, s s, and collars, u u, as seen in figs. 4 and 5, by which the sections of the stick are made to glide equally, and locked and unlocked and kept in position, all substantially as shown and described.

3d, I claim the handle, b c c, with all its parts, as seen in figs. 4 and 8, as described.

4th, I claim the tablet, k, with its pin, m, and ledge, p, in fig. 6, the ferrule, q, with its slots, o o, adapted to move around the runner, h h, as seen in same fig., and already described.

5th, I claim the slot, ol, with its beveled edges, r r, in runner, h, in fig. 7.

6th, I claim clasps, 3 4 and 5, as combined and arranged of sections, A B and D, as seen in figs. 3 and 9, the tip, c, the shoulders, 8, and the center punch, 6, with the cavity, 7, for the reception of center punch, 6.

7th, I claim the wings, 15 15, of clasps, 4, adapted for attaching cover, as seen in fig. 9.

8th, And I also claim, in combination with an umbrella stick, the sliding sections, A B and D, substantially as described, by which the rib is shut up or distended.

66,264.—METHOD OF PROPELLING VEHICLES.—Abijah Taylor, Indianapolis, Ind.

I claim propelling mechanism consisting of an endless chain or chains, bands or ropes, E, way or rails, A A1, anti-friction pulleys, I I, and legs, G, with feet, the said legs being carried by the chains, bands, or ropes, and the whole being arranged and operating substantially as and for the purpose set forth.

66,265.—MACHINE FOR ROLLING STENCH-TRAP PIPE.—H. H. Taylor, and J. H. Wilson, Rochester, N. Y.

We claim the method herein described, of forming stench-trap pipes, by the employment of the rollers, A B B1, operating in such a manner as to swage the sides and edges of the pipe, unequally, so as to produce the necessary bends as herein set forth.

66,266.—THERMOMETER.—Lewis C. Tower, Rochester, N. Y.

1st, I claim a thermometer whose frame is made from a single piece of sheet metal, corrugated as described, to give it stiffness, and provided with a groove and socket to receive the tube and bulb, substantially as herein set forth.

2d, The combination of the sliding shield, d, with the frame, A, and bulb, a, as and for the purpose specified.

66,267.—SHOVEL PLOW.—Rufus Trowbridge, Waterloo, Iowa.

I claim the combination of a flat glass plate, to the face of the share of shovel plows, substantially as specified.

66,268.—PACKAGE FOR HOLDING AND SHIPPING LARD.—Charles L. Tucker, Chicago, Ills.

1st, I claim the box herein described, when constructed without a lid or

2d, The application of gum arabic, or its equivalent, to small lard packages, either to wood or paper, for the purpose of making them non-absorbing, substantially as specified.

3d, The application or use of a tin or lead foil, or foil paper covering for lard packages, constructed of wood or paper, substantially as and for the purposes specified.

4th, The mode herein described of packing lard for transportation, by first packing the lard in separate small packages of wood or paper, and inclosing such small packages in an outer close fitting case, substantially as and for the purposes specified.

66,269.—COUNTING MACHINE.—U. Turner, Versailles, Ky.

1st, I claim the wheel, B, with its spring coil, C, and dial, D, in combination with the feed-finger, E, and detent, G, substantially as and for the purpose described.

2d, The feed-finger, E, spring, F, detent, G, wheel, B, and coil, C, for reversing the dial, D, and resetting it at zero, and without changing the position of the instrument, or of the hand that holds it, substantially as herein shown and described.

66,270.—BOTTLE STOPPER.—Theo. A. Weber, New York City.

1st, The combination of the cap, a, and elastic diaphragm, b, the latter being perforated and applied to said cap, substantially as and for the purposes described.

2d, The combination of a perforated cap, a a, perforated diaphragm, b, and a ring, c, when adapted for being held down tight upon a bottle, substantially as described.

3d, The cap, a, diaphragm, b, with or without ring, c, stirrup, b, an eccentric, m, all combined and adapted to serve the purpose explained.

66,271.—SAW MILL.—Carlyle Whipple, Detroit, Mich.

I claim the curved guides, F and G, when the curvature of the upper is the reverse of the lower, arranged in relation to the saw, and operating substantially as and for the purpose specified.

66,272.—FLY AND MOSQUITO BAR FOR WINDOWS.—F. D. Wright, Jordan, N. Y.

I claim the combination with the sash of a window, of the automatic fly and mosquito bar, made up of the screen, D, roller, C, and cord, E, arranged and operating in the manner and for the purpose herein set forth.

66,273.—SPRING CLASP.—A. C. Wurzbach and William Wurzbach, Memphis, Tenn. Antedated June 22, 1867.

We claim an adjustable clasp, when constructed and operated, substantially as herein described.

66,274.—MANUFACTURE OF GLASS.—Theodor A. Zellers, East Birmingham, Pa.

1st, I claim treating glass cylinders in a flattening oven, and reducing them to flat sheets, by the heat evolved from the combustion of hydrocarbon oils, or their products or compounds, substantially in the manner and for the purposes hereinbefore set forth.

2d, In connection with an oven for flattening glass, the car, b, and turn table, c, or a raised vibratory platform in lieu thereof, for the purpose of so

66,275.—WASHING MACHINE.—O. W. Alger, Richmond, Vt.

I claim the arrangement of the box, A, with ribs and perforations, and the ribbed and hinged lid operating substantially as described.

66,276.—HANGING AND VENTILATING WINDOW SASH.—Chas. Allen, Petersburg, Ill.

I claim the tightener, b b', when applied to the cord, a, of the sashes, A B, substantially as described and set forth.

I also claim the ventilating p ece, C', applied to the frame, C, in combination with the self-balancing sashes, A B, and cord tightener, b b', substantially in the manner and for the purpose set forth.

66,277.—MACHINE FOR PREPARING PEAT FOR FUEL.—John H. Ames, New York City.

1st, I claim the revolving separator, c, in combination with the hopper a, conveying b it, b, and receptacle, d, for the purposes and as specified.

2d, I claim the compressing and mixing rollers, h h', to one of which an end motion is given, in combination with a hopper, g, to which heated air is admitted for the purposes and as set forth.

3d, I claim drying peat by means of heated air, within a chamber in which the peat descends in thin sheets, strips, or pieces, substantially as set forth.

4th, I claim the charger, o, separating the hot air and exhaust chambers, and delivering the peat into the latter as set forth.

5th, I claim the chamber, p, and plunger p', in combination with the revolving press block, 16, and an exhausting apparatus substantially as set forth, for producing a partial vacuum in the chamber containing said peat, before said peat is pressed, for the purposes and as set forth.

6th, I claim a revolving press block with tapering openings for receiving the peat and holding the cake after being pressed, as and for the purposes set forth.

66,278.—LAMP.—Joseph K. Andrews, Antrim, Ohio, assignor to himself and J. C. Tilton, Pittsburgh, Pa.

1st, I claim the gas tube, M, perforated, slotted, projecting above the cap, N, cut at the lower end and constructed as shown in fig. 2 of the accompanying drawing.

2d, The adoption of the tube or tubes, O, burning the oil direct in combination with the gas, constructed and operating substantially as and for the purpose set forth.

66,279.—MODE OF PREPARING OXYGEN AND APPLYING THE SAME TO USEFUL PURPOSES.—H. A. Archereau, Paris, France, assignor to himself J. M. O. Camin Despalles, Joseph de Susini, and E. O. Stern.

1st, I claim the process of decomposing sulphuric acid at its various degrees as found in trade, for obtaining oxygen therefrom, substantially as described.

2d, The hereinabove described and represented apparatus, and specially the apparatus for decomposing sulphuric acid, whatever may be the mode of heating employed.

3d, The compressing process for the better utilization of oxygen gas.

4th, The application or utilization of oxygen to all purposes, especially to metallurgic operations and to producing excessive high temperatures allowing of the most refractory bodies being melted without melting their containing capacities.

5th, The process for melting iron without carburetting or production of cast iron, in the manner and for the purposes hereinabove specified.

66,280.—CUTTER FOR PLANING MOLDINGS.—Edward John Arens, Boston, Mass.

I claim a molding cutter whose cutting edges for each member consists of diagonal faces meeting at the angle or ridge on the face of the cutter relatively to the form or contour of the molding, substantially as described.

66,281.—VENT PLUG.—James Bain, Brooklyn, E. D., N. Y.

1st, I claim the valve, C, nut, a, and spring, b, in combination with the seat, B, in the inner end of the plug, A, substantially as and for the purpose described.

2d, The movable seat, B, in combination with the valve, C, nut, a, spring, b, and plug, A, substantially as and for the purpose set forth.

3d, The air chamber, D, and cup, E, in combination with the plug, A, and valve, C, constructed and operating substantially as and for the purpose described.

66,282.—WINDLASS AND CHAIN STOPPER.—Wm. B. Baker, Marshfield, Mass.

I claim a ship's windlass or chain stopper, or both, composed of a plurality of shafts, A, provided with drums, C, and pulleys, E, with metallic straps, F, applied to them and all connected at one end to a single shaft, G, substantially as shown and described.

66,283.—RAILROAD SWITCH.—L. M. Batty, Canton, Ohio. Antedated June 12, 1867.

1st, I claim the combination of the lever, C, the post, B, the connecting rod, D, and the treadle, E, in the manner and for the purpose herein described.

2d, The adjustable plate, F, with its lugs, b, and notch, a, when combined with the treadle, E, and connecting rod, D, in the manner and for the purpose herein described.

3d, The treadle, E, when combined with the several devices, H I J K e and f, in the manner and for the purposes herein set forth.

4th, The casing, M, surrounding the outer part of the treadle, D, to protect the treadle and devices, H I J K e and f, from injury, as and for the purposes

66,284.—PLOW.—Henry F. Bemendefer and George Smith, Attica, N. Y.

I claim, 1st, The bar, D, spring catch, e, and spring, g, when used for shifting the standards, substantially as specified.

2d, The arrangement of the beam, A, bars, d f, standards, B B B', with their plows and the roller, b, when constructed, arranged, and used in the manner substantially as set forth.

66,285.—LADLE FOR POURING METAL.—H. W. Benton, Lebanon, N. H.

I claim the combination with a ladle of a guard or skimmer, substantially as and for the purpose described.

66,286.—SCAFFOLD.—Benjamin Best (assignor to himself and London Marts', Dayton, Ohio.

I claim, 1st, The combination of the uprights, A A', pivoted and adjustable braces, b C, pivoted sliding and supporting frame, B F G H, friction rollers, n, clip, d, with its appendages, pivoted spring catch, i, hinged planks, l, pulleys, E, and cord, h, operating in the manner described for the purpose specified.

2d, The clip, d, when made in one piece with the lugs, e, so that it serves to guide the supporting frame on the upright and to hold the windlass for raising and lowering the said supporting frame, as set forth.

66,287.—MACHINE FOR CUTTING CORN STALKS IN THE FIELD.—Henry Bilharz, Seneca, Ill.

I claim, 1st, The peculiar construction of the cutting apparatus, D D, consisting of the plates, a a, and the double-edged knives, b b, substantially as and for the purpose described in the foregoing specification.

2d, The lever, E, in combination with the knives, b b, and the plates, a a, substantially as and for the purpose described.

3d, The lever, I, in combination with the hinged shelves, G G, substantially as and for the purpose described.

4th, The railing, L, in combination with the cutters, D D, the lever, I, and the shelf boards, G G, substantially as and for the purpose described.

66,288.—PHOTOGRAPHIC COPYING BOARD.—W. D. Blackman, Defiance, Ohio.

I claim, 1st, A photographic copying board made and operating, substantially as and for the purposes herein specified and described.

2d, The device for centering the picture that is held on the plate, F, said device consisting of the ratchet bar, d C, pinion, e, and shaft, D, all made and operating substantially as herein specified and described.

3d, The device for adjusting the focus of the picture that is held on the plate, F, said device consisting of the sliding block, B, nut, g, and screw shaft, E, all made and operating substantially as and for the purpose herein specified and described.

4th, The device for increasing the size of the frame for holding the picture to be photographed, said device consisting of the stationary disk, F, revolving disk, G, pins, j j, plates, H, and spring bars, m, all made and operating substantially as and for the purpose herein specified and described.

5th, The device for clamping the picture consisting of the revolving clutch, I, in combination with the stationary clutch, F, disk, G, pins, j and plates,

66,289.—CALENDAR FOR CLOCKS.—Alphonzo Boardman, Forestville, Ct., assignor to himself and N. C. Hubbell, New Haven, Ct.

I claim, 1st, The combination and arrangement of the cylinder, A, representing the days of the week upon its surface, with a ribbon upon two cylinders, D and F, arranged and operated so as to present the date corresponding to the day of the week.

2d, The combination of the wheel, G, and lever, H, provided with its two arms, a and b, with cylinders, D and F, arranged so as to release and hold the cylinders, substantially in the manner herein described.

66,290.—BOTTLE STOPPER.—R. F. Bocemsdes, Wallingford, Ct.

I claim the tube, b, the upper end cut to receive the screw, c, of the hollow head, d, having a hinged cap, the lower end flanged to support the rubber cylinder, a, all constructed and arranged in such a manner that the liquid shall be discharged from the bottle without removing the stopper, as herein shown and described.

66,291.—PAINT BRUSH.—J. Dean Bonney, Pembroke, Mass.

I claim the combination with the removable and adjustable metallic band which surrounds the bristles of the clasp and its tapering slide for holding the said band upon the brush, substantially as and for the purposes set forth.

66,292.—HAY RACK.—Charles G. Boyer, Greenfield, Ind.

I claim a hay rack with top rails, A', dovetailed to the standards, D, and ends connected by the plates and hooks, c c, in combination with the pivoted arms, a a, and cross pieces, B', for forming a portable rack provided with upright beams at one end and ladder to the other, substantially as set forth.

66,293.—PRESSURE FILTER.—C. N. Brock, Philadelphia, Pa.

I claim the combination of a force pump with a battery of filters, substantially as described, whereby I am enabled to use any desired number of filters in battery, thus filtering and decolorizing the sirup, whether the same be heated or not.

66,294.—MACHINE FOR CLEANING AND SOFTENING SHEEP SKINS.—James M. Brown, Boston, Mass.

What I claim as my invention is my above described process of treating skins, such being by a fulling mill and water and by collecting the waste wool in a screen or its equivalent, as set forth.

I also claim the combination and arrangement of the screen with the fulling mill having a discharging hole in its reservoir, as set forth.

66,295.—CHURN.—John F. Brown, New London, Ct.

1st, I claim the combination of the curved metallic bottom, B, with the sides and ends of the box, A, for the purpose of forming a water chamber in the lower part of said box, substantially as herein shown and described.

2d, The butter gatherer and worker, M, constructed, arranged, and operated substantially as herein shown and described and for the purpose set forth.

66,296.—GROMMET.—Wm. Brown, Middletown, Ct., assignor to Wm. W. Wilcox and Joseph Hall, Jr.

I claim the improved grommet having a cast metal flange united substantially as described to a sheet metal tube.

66,297.—MACHINE FOR CUTTING DOWN AUGERS.—E. O. & E. Carrington, Wallingford, Ct.

We claim the combination of the bit holding device, G, and the forming cams, L, with the mill or cutter, D, all constructed, arranged, and operating in the manner and by the means substantially as herein set forth.

66,298.—CONSTRUCTION OF HAMMERS.—Henry Cheney, Little Falls, N. Y.

I claim the combination of the cast iron socket, B, with the wrought-iron head, A, both made and connected substantially in the manner and for the purposes set forth.

66,299.—CAPSTAN.—David N. B. Coffin, Jr. (assignor to himself and Irah P. Spaulding), Boston, Mass.

1st, I claim the application of pawls to a capstan by means of a cast joint or hinge, in any manner so as to allow the pawl to operate in both directions.

2d, The employment of a side opening, g, in combination with the inclosed bolt, in the construction of a capstan.

3d, The arrangement of the inclined lifters made movable in combination with the lock notches or spaces, h, so as to be used both to slide the bolts out of connection automatically, and also at the pleasure of the operator.

4th, The arrangement of the inclined lifters, i i, in duplicate and in reverse order, in combination with lock notches or lugs and sliding bolts

5th, The arrangement of an elevated flat part, j, between two inclines arranged in reverse order, substantially as and for the purpose set forth.

6th, Radially sliding keys or bolts in combination with a retaining socket in one part and a locking space or shoulder in another of two parts of a capstan or windlass, to be connected and disconnected substantially as described.

7th, A roller or sheave arranged with its axis obliquely to the windlass and its axis, substantially as described.

8th, The employment of conical or cylindrical rollers arranged in combination with the spindle and barrel of a capstan or windlass, to relieve the friction incident to the side or transverse thrust, substantially as described.

9th, The arrangement of rollers longitudinally between the shoulder of the barrel and that of the spindle or bed plate, to sustain or support the barrel endwise.

10th, The arrangement of sliding bolts in sockets on the fulcrum gear, as described.

11th, The lifting and sustaining ring, r, in combination with the bolts or locking mechanism of a capstan, and inclined lifters arranged either on it, or an auxiliary part, x.

12th, The employment of an elastic or spring element interposed between the part bearing the pawl pockets and the fixed portion of the bed plate.

13th, The inclines, X, for automatically lifting the fulcrum gear, substantially as shown.

14th, Locking or clutching the center or first moving gear of a capstan to the lever head automatically, by interlocking lugs formed on each, substantially as described.

15th, The arrangement of a concentric, circular, or annular flange or rib, or flanges or ribs, s, between the spindle or hub and the rim or periphery of the bed plate of a capstan or windlass, substantially as described.

16th, The arrangement of a friction wheel between the two barrels of a capstan or windlass, with provision for connecting or disconnecting it to or from one or both, at pleasure.

17th, The application of the differential windlass to the friction mechanism of a capstan or windlass.

18th, The employment of the combined bearing and brake or friction shoe in the friction mechanism of a capstan or windlass.

19th, The employment of chain lugs spanning the groove in the chain wheel and made adjustable radially in sockets at the bottom and extending up the sides of the groove between the two cheeks of the chain wheel, substantially as described.

20th, The employment of keys back of said lugs, with or without the circular form, substantially as described.

66,300.—FARM GATE.—Albert W. Cox, Indianapolis, Ind.

1st, I claim the provision in a jointed gate of the latch E, and handle, E', connected in such a manner that the raising of the latch shall effect the elevation of the gate, substantially as described.

2d, I claim the combination of the gate, B C C1 C2, latch, E, handle, E', and arms, F F', arranged and operating in the manner and for the purpose set forth.

3d, I claim the arrangement of the parts, H I J K, for sustaining the gate and latch in their elevated position when the gate is opened, and permitting them to assume their normal position when the gate is closed, as described.

66,301.—MEDICAL COMPOUND.—A. M. Cox, Elizabeth, N. J.

I claim the medical compound composed of the ingredients mixed together in or about the proportions substantially as described, for the purpose specified.

66,302.—WATER-PROOF PAPER FABRIC.—L. M. Crane, Ballston Spa, N. Y.

I claim as an improved article of manufacture a water-proof paper fabric made substantially as herein shown and described.

66,303.—CONNECTING LINKS.—Robt. Creuzbaur, Newark, N. Y.

1st, I claim the two parts, A and B, each with one opening, pivoted together at p, with these openings on opposite sides, substantially in the manner as shown and described and for the purposes named.

2d, Strengthening the ends of the link subject to bending by shaping them in the manner named, the two parts forming the link, being pivoted together through the parts thus strengthened, substantially as set forth.

66,304.—SWAGES FOR UPSETTING SAW TEETH.—Joseph Crookes, St. Louis, Mo.

I claim the die stock, A, having the mortises for setting the die, B B', transversely in the stock and the passage, A2, when arranged and combined with the split die, B B', substantially as set forth.

66,305.—HARDENING PAN FOR CIRCULAR SAWS.—Joseph Crookes (assignor to himself and Joseph W. Branch), St. Louis, Mo.

1st, I claim the pan, A, when provided with the inclined ways, a, either with or without the rollers, a', substantially as and for the purpose set forth.

2d, I claim the clamp, B, for the purpose of confining the plates, C, in a true position while immersed in the bath in the pan, A, as described and shown.

66,306.—CHURN.—Jonathan Davison, Plymouth, Mich.

I claim the arrangement of the staff, D, provided with its tube, a, and dashers with the churn body, and the lever, F, provided with its swivel block, for the purpose of churning milk or cream, substantially as herein specified.

66,307.—REGISTERING STEAM GAGE.—David P. Davis, Jersey City, N. J.

I claim the combination with a pressure gage, or any equivalent therefor, of a marker of any suitable form, and revolving diaphragm disk, or its equivalent, when all combined and arranged together substantially as and for the purpose described.

66,308.—CORN PLANTER.—Sol. G. Deutler, Orangeville, Ill.

I claim the combination of the sliding valve plate, C, having a rigid arm, E, and a flexible arm, F, attached to its rear end with the hopper, B, beam, A, and operating wheel, G, substantially as herein described and for the purpose set forth.

66,309.—CAR COUPLING.—James Depeu and J. Darrah Hall, Peekskill, N. Y.

1st, We claim the sleeve, f, which holds the link, and the arrangement by which the sleeve and the coupling pin, C, are moved longitudinally in the drawhead, substantially as described.

2d, We claim a coupling with coupling links and sleeves, f, arranged in each drawhead, substantially as described.

3d, We claim the weighted lever, D, and the catch pin, E, in combination with the sleeve, f, and pin, C, arranged substantially as set forth.

66,310.—METHOD OF EFFECTING THE CEMENTATION OF RAILS, AXLES, ETC.—T. M. Dodds, Rotherham, England. Patented in England, Dec. 1, 1865.

I claim the conversion of an iron surface into steel by treating the same in a suitable cementing furnace with a mixture composed of charcoal or other carbonaceous matter, potash or other alkaline matter, and lime, or matter containing lime substantially as herein set forth.

66,311.—STEAM GAGES.—R. B. Donaldson and Emmett Quinn, Washington, D. C.

1st, We claim the construction of tubes for steam gages of india-rubber, gutta-percha, or other compounds, or other suitable material, substantially in the manner and for the purposes as herein set forth.

2d, The construction of hollow cores of metal, or other suitable material, supported by mandrels, substantially in the manner and for the purposes as herein set forth.

66,312.—SAFETY BRIDLE.—Daniel M. Donehoo, Beaver, Pa.

I claim the arrangement of the safety rein, F, and gag rein, H J, with the rings, E I L, operating as described and represented.

66,313.—SPITTOON ENVELOPE.—A. J. Doolittle, Hamden, Ct.

I claim the spittoon box, A, provided with a hinged cover, B, which is operated by means of the spring, c, and levers, a and d, substantially as and for the purpose specified.

66,314.—HORSE RAKE.—Samuel Eberly and George Hauck, Mechanicsburg, Pa.

We claim connecting the rake teeth to the swinging rake head by the combined use of the shanks, e, and their extended bearings in the boxes, i, and the reactionary springs, f, constructed, arranged, and operating substantially in the manner and for the purpose described and represented.

66,315.—MEDICINE.—J. Fischer, St. Louis, Mo.

I claim the chemical compound when composed of the ingredients and used substantially as and for the purposes set forth.

66,316.—SKATE.—John Forbes, New York City.

1st, I claim the slotted guide box, S, in which the slotted jaws, D, are adjustably secured and operated by means of the centrally pivoted plate, E, in the concentric slots, d, of which the ends of the bolts work, all constructed and operating as herein set forth for the purpose specified.

2d, The combination and arrangement of the longitudinally sliding plate, H, slotted plate, I, arm, G, and spring arm, F, pivoted slotted plate, E, slotted jaws, D, and slotted guide box, C, as herein set forth for the purpose specified.

66,317.—PATTERN FOR CASTING POT-HOLE COVERS.—William J. Fryer (assignor to himself and John P. Witbeck), West Troy, N. Y.

The chamber, d, in combination with the plate, B, and its chamber, g, fitted to occupy the cavity, f f, and to slide within the channel, h, substantially as described and for the purposes set forth in this specification.

66,318.—GLOBE VALVE FOR STEAM ENGINES.—Joseph J. French, Baltimore, Md., assignor to himself and Reuben A. McCauley.

I claim a globe valve having a wheel or lever, A, carrying a hollow screw, B, to operate the valve, C, by means of the stem, D, constructed and operating in the manner substantially as shown and described and for the purpose set forth.

66,319.—MANUFACTURE OF CLAY PIPES.—G. D. and H. A. Goodrich, Joliet, Ill.

I claim, 1st, The grooved disk, T, when applied to clay-pipe machine and arranged to descend, while cutting the pipe, with the same motion as the pipe.

2d, The combination of a suspended rotating disk or wheel, T, with one or more cutters, h.

3d, The weighted guide heads, U, when provided with arms, V, substantially as and for the purposes specified.

4th, The two-edged knives or cutters, h, provided with the heel or projection, t.

5th, The cams, I, provided with the springs, J, substantially as and for the purposes specified.

6th, The combination and arrangement of the cams, I, and springs, J, with the cutters, h, heel, t, and rotating disk, T.

7th, The combination and arrangement of the guide heads, U, with the weights, o and W, substantially as specified.

8th, The arrangement of the weights, o p, upon a single cord so as to increase the weights as they ascend, substantially as specified.

9th, The rests or ledges, z, in combination with a series increasing in lateral dimensions, operated by a single cord, substantially as specified.

10th, The arrangement and combination of the cross bars, Y Z, standard, l, and mandrel, K, with the cords, n, weigh s, o p, and ledges, z, substantially as and for the purposes specified.

11th, The combination and arrangement of a descending platform for receiving a vertical pipe constructed and arranged substantially as specified, with a rotating disk provided with cutters and descending with the same motion as the platform while cutting, substantially as specified.

66,320.—MANUFACTURE OF CLAY PIPE.—Horace A. Goodrich, Joliet, Ill.

I claim, 1st, The bridge, a, when located between the screw or feeding portion of the shaft, G, and the revolving core, F, of a mold in a clay-pipe machine, substantially as and for the purposes specified.

2d, The plate, B, when provided with a gathering flange, C, projecting inwards, and permanently attached, substantially as set forth.

3d, The plate, D, when provided with the outer portion, E, of the mold and made adjustable by means of the holes and bolts, b, substantially as described.

66,321.—FENCE POST.—A. W. Gore, Manhattan, Kansas.

I claim a post for fences, etc., made of sheet metal, provided with cross wires or rods, substantially as and for the purpose described.

66,322.—HAND SCOOP.—David N. Green, Cold Water, Mich.

I claim a cylindrical hand scoop with a flat base to prevent the same from turning over, as and for the purpose described.

66,323.—APPARATUS FOR RECTIFYING DISTILLED LIQUIDS.—C. Greslachas & L. Jarchow, New York City.

We claim, First, The arrangement of the receiver, A, provided with one or more dishes, D, and a water vessel, E, in combination with the rectifiers, G G1, provided with dishes D1 D2 D3 D7, K, water jackets, I I1 I2, water vessel L, and suitable connecting pipes, all substantially as shown and described.

2d, The arrangement of cups, d1 d2 d3 d7, in combination with the dishes D1 D2 D3 D7, and shelves, H, in the rectifier, G, substantially as and for the purpose set forth.

3d, The arrangement of dishes, K, with depressions, m, and descending tubes, n, in the interior of the rectifier, G, constructed and operating substantially as and for the purpose described.

66,324.—BUCKLES.—Henry C. Griggs (assignor to Holmes, Griggs & Smith), Waterbury, Ct.

I claim the herein described buckle consisting of the plate or frame, A, and

the looped tongue, B, formed so as to be inserted through the plate, and to operate substantially in the manner herein set forth.

66,325.—PERFORATING CIGARS.—Oliver Guinand, Vicksburg, Miss.

I claim, 1st, The hollow block, A, having the spikes, C, pivoted in slots or mortises in its walls, as and for the purposes described.

2d, The hollow block, B, having right-angled triangled slots or mortises, D, to receive, and for the passage of the spikes, C, and seated on the spring, a, in the block, A, substantially as and for the purposes described.

66,326.—STOP COCK.—George D. Hadley, Cincinnati, Ohio.

I claim the eccentric lever by which the valve is operated, the elastic disk, D1, the cap, D, confining the disk, D1, and the valve, B, with its guides, a, in combination with the shell of a water cock, the whole constructed and arranged substantially as herein shown and described for the purposes set forth.

66,327.—SUSPENSION BRIDGE.—A. S. Hallidie, San Francisco, Cal.

I claim the cables, C C, in combination with the suspension rods, D D, and girders, E E, all made and operating substantially as herein specified and described, and the rods, D, being made adjustable as set forth.

2d, The combination of the adjustable cables, C C, posts, A, rods, D, girders, E, and adjustable braces, G, with each other and with the flooring, F, all being made substantially as herein specified and described.

66,328.—RAILWAY CHAIR.—T. C. Hargraves, Boston Mass.

I claim, in combination with the chairs and rails of a railway track, an indented wedge and spring detainer, arranged to operate together substantially as described.

66,329.—BOILER FOR HEATING WATER.—C. A. Harper, Rahway, N. J. Antedated June 24, 1867.

I claim the boiler, A, having an internal flue or fire chamber, B, surrounding the pipe-formed water heater, C, through which the water in the boiler circulates by means of pipes, D D1, said parts being constructed and arranged for use, substantially in the manner and for the purpose set forth.

66,330.—PROPELLING CABLES FOR RAILROAD GUIDES.—Chas. T. Harvey, Tarrytown, N. Y.

1st, I claim the cable heads or ferrules hereinabove described, having plain operating faces so that they act on the cable clutch or arm, C, of a car, by simple contact therewith, substantially as described.

2d, I claim the horizontal roller, E, on the under side of the cable head, in combination with the supporting vertical rollers, substantially as described.

3d, I also claim the combination of the vertical supporting rollers of the cable head, A', with the upper horizontal rollers, D D, and the lower horizontal roller, E, all placed and operating substantially as set forth.

4th, I also claim the vertical spur, B, of the cable head or ferrule projecting above the top of the cable guide, substantially as described.

5th, I also claim the beads, a a, of the cable guide, in combination with the cable heads or ferrules, A' of a propelling cable, substantially as described.

6th, I also claim the ledges, t t, of the cable guide, in combination with the cable head or ferrule, substantially as shown.

7th, I also claim the steam pipe, r, in combination with a cable guide, substantially as described.

66,331.—NAIL.—Hayward A. Harvey, Orange, N. J.

I claim the combination of the head of a nail with one or more cavities and protuberances or ratchets upon the sides and edges of the shank thereof, substantially as described, whereby the lateral diameter or width of the shank is increased as shown.

66,332.—SCREW CLAMP FOR PLANKING VESSELS.—James D. Hathaway, Medford, Mass.

I claim a screw clamp consisting of a frame, a male and female screw, and serrated cam, combined and operating substantially as described.

66,333.—GRAIN SCREEN.—Reason Hawkins, Palestine, Ind.

I claim the arrangement of the screens, h and m, and the cross bars, K K, in the box, D, and the trash screen, e, at the head of the box, in combination with the octagonal roller, E, operating as and for the purposes herein described.

66,334.—SORGHUM EVAPORATOR.—B. R. Hawley, Normal, Ill., assignor to himself, E. Washburn, and C. A. Montross.

1st, The construction of an evaporating pan in such a manner as to create a continuous upward and downward flow of the boiling sirup, as represented by the arrows, a a, substantially in the manner and for the purpose set forth.

2d, I claim the filtering pockets, D, in combination with the boiling pans or defecator of an evaporating apparatus, substantially in the manner and for the purpose set forth.

3d, I claim the cooler, E, in combination with the finishing pan, C, as described and set forth.

4th, I claim filtering the boiling sirup by continuously passing the surface fluid down through a filtering substance in the pocket, D, to the bottom of the boiler, substantially in the manner and for the purpose set forth.

5th, I claim the strainers, D', in combination with the boiling pans or defecator, and the pockets, D, substantially as described and set forth.

66,335.—PLOW.—James M. Hawley, Holton, Ind.

1st, I claim the standards, H and E, constructed substantially as herein described, in combination with the shovels, K and G, and beam, A, in the manner and for the purpose set forth.

2d, The combination of the handles, B, and forked and slotted connecting bar, C, with the beam, A, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the bent bars or frame, M, with the beam, A, and standards, H, substantially as herein shown and described and for the purpose set forth.

4th, The combination with the scraper plate, P, with the forward standards, H, substantially as herein shown and described and for the purpose set forth.

66,336.—BEEHIVE.—Jasper Hazen, Bethlehem, N. Y.

I claim the combination of the central apartment, g, the movable partitions, d d, and the side surplus honey boxes, I I, arranged in the manner described.

66,337.—DETECTING COUNTERFEITED BANK NOTES, ETC.—Laban Heath, Boston, Mass.

I claim the mode of detecting counterfeit bank notes by the means of impressions made from duplicates of parts of the genuine dies or plates mutilated, substantially in the manner set forth.

66,338.—MODE OF TREATING BAMBOO CANE AND OTHER FIBROUS PLANTS.—Charles Heaton, New York City.

1st, I claim saving and utilizing the resinous and other soluble portions of vegetable fibrous matters which are usually washed out and wasted, in the manner set forth.

2d, The employment of alum or acid, in paper making, whenever the same is so applied as to precipitate that portion of the gum which is now washed out and wasted.

3d, In the disintegration of vegetable fibrous matter, when an alkaline solution has been used and become discolored or opaque, or partially so, I claim the employment of alum, and for precipitating the suspended matter or clarifying the solution, as herein set forth.

66,339.—CHIMNEY.—Jacob Heed, Temperanceville, Ohio.

I claim, in a chimney constructed as described, the projections, A A, and the diaphragms, B D, one or more, each provided with an aperture, and arranged substantially as described and for the purposes specified.

66,340.—CULTIVATOR.—Stephen H. Herrick, Grinnell, Iowa.

I claim the frame, B, turned up and threaded at its forward end, and connected to and regulated at the rear end of the beam by the bolt, D, as and for the purpose set forth.

66,341.—ROOF AND CLAPBOARDING BRACKET.—H. W. Holden, T. J. Mooers, D. H. Stratton, and G. Reynolds, Bloomsburgh, Pa.

1st, We claim a combined roofing bracket, A, support, C, and brace, D, when made and operating substantially as herein shown and described.

2d, The bracket, A, when combined with a truss, B, both made and operating substantially as herein shown and described.

3d, The bracket, A, with a hook, d, and platform, e, substantially as and for the purposes herein shown and described.

4th, The truss, B, with a brace, i, hook, h, and lug, j, and pins, l, substantially as and for the purpose herein shown and described.

5th, The support, C, with a hook, h, pin, j, and pins, n n, substantially as and for the purpose herein shown and described.

66,342.—GRADUATING LEVEL.—Nathan Hollingsworth, Rosetta, Ill.

I claim the weighted arbor, l, and arms, m, with index, n, traversing over the scale, p, in combination with the telescope, A, and brake, g, constructed and operating substantially as and for the purpose described.

66,343.—SHIFTING RAIL FOR CARRIAGES.—Henry F. Holt assignor to himself J. Thaddeus C. Abbott, Fredonia, N. Y.

I claim a self-fastening shifting rail for buggy tops, constructed substantially as herein described.

66,344.—RAILROAD GATE.—Nelson Houck, Canton, Ohio.

I claim, 1st, The peculiar arrangement and combination of the part, L, of the rail, L M, the rods, c d, rock lever, i m, rods, O P, and turning plate, B, the several parts being arranged as and for the purpose set forth.

2d, The peculiar arrangement and combination of the turning plates, B C D E F, rods, S T t1 a b t2, S2 T2, connecting rods, A A, bars, g h, and combined levers, p p, q q, the several parts being arranged as and for the purpose set forth.

3d, The spring, V1, when used in connection with the axle, V, of the turning plate, D, substantially in the manner and for the purpose specified.

4th, The rods, A3, with springs, a3, when used in connection with the part, L1 of the compound rail, L1 M1, substantially in the manner and for the purpose specified.

5th, The vertically slotted holes either in the part, L1, or the part, M1, of the compound rail, L1 M1, when such slots are used for the purpose of allowing a vertical motion to the part, L1, substantially in the manner and for the purpose specified.

66,345.—BOAT DETACHING APPARATUS.—W. H. Houston, New York City.

I claim the combination of the catch pawl, P, locking bar, h, and spring m, with the lock frame the whole arranged to operate as described for the purpose set forth.

I also claim an automatic boat eye or lock so constructed as to unlock when the weight of the boat rests fairly on the water, substantially as herein before described.

66,346.—FRUIT BOX.—William Huey, Galena, Md.

1st, I claim as a new article of manufacture the fruit and vegetable box with the lid all constructed substantially as set forth.

2d, The lock, H, composed of the plate, b, with a key hole, the hooked plate, l, and the spring, l, arranged substantially as set forth.

3d, The slats, a, notched slats, g, and rabbeted corners, e, in combination with the rabbeted rim, b, and rivets, c.

4th, The slats, a, notched slats, g, rabbeted corners, e, and locks, H, in combination with the lid, p, substantially as set forth.

66,347.—VIOLINS.—G. H. Hulskamp, New York City.

1st, I claim the straining of sounding boards in violins and other instruments before named and referred to of whatever material made, by the tension and pressure of the strings, substantially as herein before described.

2d, Transmitting the vibrations of the strings by posts or pulleys braced to different points of the upper and lower sounding boards and making the feet of the bridge, K, to bear upon the oblique braces, substantially as described.

3d, Making the finger board and string holders in one piece with an orifice, O, for the bridge, K, and connecting the same with the oblique brace, d d, substantially as set forth.

4th, Securing the strings directly on the end of the extended finger board at p p p, substantially as described.

66,348.—BEE HIVE.—Sam. Hutchinson, North Lewisburgh, O.

I claim the endless apron, G, provided with cleats, e f, and placed underneath the body or main portion of the hive, substantially as and for the purpose herein set forth.

66,349.—SIRUP PITCHER.—John Hyslop and C. E. Phillips, Abington, Mass.

We claim the block, F, applied to the lid or cover of a sirup pitcher, substantially as and for the purpose described.

We also claim the spring, E, or its equivalent in combination with the cover or lid, B, substantially as described and for the purpose specified.

66,350.—BED BOTTOM.—W. B. Ingersoll, New York City. Antedated June 27, 1867.

I claim the combination of the pulleys, c, around which the cord, r, passes, the cross bar, a, to which the pulleys are attached, the movable arms, b, the windlass, g, and the springs, f, under the arms or head-piece or cross bar, all as and for the purpose specified.

66,351.—DOUGH KNEADER.—C. C. Johnson, Springfield, Vt.

1st, I claim the combination of the revolving standard, B, lever, C, and one or more rollers, F, and cross pieces, D, substantially as and for the purpose set forth.

2d, The combination of the cross piece, D, when formed to set as a scraper and the roller, F, when attached to a lever, C, operating substantially as and for the purpose set forth.

66,352.—HORSE RAKE.—Sylvester Johnson, New Harmony, Ind.

1st, I claim the combination of the lever, M, chain or rod, L, arm, K, pivoted sash or frame, I, pawls, O, with the shaft of the rake head, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the arm, P, and link, R, or its equivalent with the arms, K, notched rake teeth and sash, I, substantially as herein shown and described for the purpose specified.

66,353.—BLEACHING PAPER PULP.—W. C. Joy, and John Campbell, Penn Yan, N. Y.

We claim treating paper pulp of all kinds with air pure or mixed at any temperature by causing a current or currents of air to pass through the mass by means of a forced blast or current or by an exhausting fan or pump that will cause sufficient air to pass through the mass to accomplish the result specified, substantially as and for the purpose specified.

66,354.—GEAR CUTTER.—H. N. Keables, Worcester, Mass.

I claim a gear cutting tool of continuous operation by revolving the cutting teeth, of which are arranged radially at equal distance from their center of revolution groups leaving equidistant and equalized clearing spaces between said groups and otherwise constructed substantially as and for the purpose set forth.

66,355.—BRICK MACHINE.—Philip H. Kells, Adrian, Mich.

1st, I claim the bed plate, B, formed with the annular flanges, B' B', for the reception of the pug mills, F F, substantially as described.

2d, I claim the cut off plate, J, arranged and operating in the manner and for the purpose specified.

3d, I claim the bed plate, B, when supported so as to be adjustable in relation to the mold wheel substantially as described.

4th, I claim the adjustable incline, L, arranged and operating in the manner and for the purpose explained.

5th, I claim the reversible knife, N, formed with cutting edges on its opposite sides and arranged and applied to operate as set forth.

6th, I claim the combination with the knife, N, of the clay guard or shield, N' arranged and employed in the manner and for the purpose set forth.

7th, I claim the combination with the wheel, I, of the adjustable supporting frame, F', stationary base plate, P2, projections, p p, screw bolt, p3, and nut, p3, substantially in the manner and for the purpose specified.

8th, I claim the arrangement of the intermediate gear wheels, I2 I2, in connection with the mold wheel, E, and cog wheels, I1 I1, as herein described and represented.

66,356.—WASH OR STEEP FOR ROOTS, SEEDS, ETC.—P. G. Kenny, Rahway, N. J.

1st, I claim a wash or steep for seeds, roots, trees, plants or vines composed of sulphate of iron dissolved in water in or about the proportions described and for use in manner, substantially as specified.

2d, Sulphate of iron dissolved in or admixed with urine or chamber lye, to form a wash or steep, essentially as and for the purpose or purposes herein set forth.

66,357.—MANURE.—P. G. Kenny, Rahway, N. J.

I claim a fertilizer composed of farm or stable yard manure or other suitable animal or vegetable substances decomposed, or having sulphate of iron admitted with or dissolved in it or them by the passage of urine therethrough, substantially as specified.

2d, The employment of aluminous earth in connection with stable yard manure or other animal or vegetable substances and sulphate of iron as a fertilizer, essentially as herein set forth.

66,358.—MACHINE FOR DIGGING POTATOES.—Henry Kewley, Perry, Ohio.

1st, I claim the employment and use of the belts, K K' and pullies, J J J,' J2, fig 6, when arranged to operate substantially in the manner and for the purpose herein specified.

2d, The employment and use of the digger, herein described and shown in fig. 3, consisting of blades, L, constructed as described secured in series on the seat, L,' constructed as described, journals, d, and handle, M, located and operating as and for the purpose specified.

3d, The combination of the hooked fingers, F, conveyor belt, E2, digger fig. 3, and inclined screen chute, H, arranged and operating substantially as and for the purpose set forth.

4th, The employment and use of the lift rods, R R, constructed as specified and shown in Fig. 6, and made adjustable in the manner described and shown in fig. 7 all located and operating in combination with the belts, K K' as and for the purpose herein set forth.

66,359.—CAR REPLACER.—Charles King, Morristown, N. J.

1st, I claim the inclined planes, B B, in combination with the pivoted rail, D, on B', and the clamps, C, all constructed in the manner as and for the purpose set forth.

2d, The arms or anchors, E, fitted or pivoted in bars, F, clamped to the rails, A A, in combination with the cables or chains, H, and the windlass, J, on the axle of the engine, said parts being arranged substantially in the manner and for the purpose specified.

66,360.—THROTTLE VALVE GEAR.—Norman King, Etna, Pa.

I claim the standard, A, and the levers, B and F, with the arms C, and G, constructed, arranged and operating substantially as shown and described for the purpose set forth.

66,361.—CRADLE.—S. W. Knowles, New Haven, Ct.

1st, I claim the arrangement of the levers, D and E, pivoted to the cradle, C, and to the frame, A, constructed and arranged so as to operate substantially in the manner herein set forth.

2d, The arrangement of the guide, G, in combination with the cradle, C, so as to prevent the lateral movement of the cradle and operate substantially as herein set forth.

3d, The arrangement of the block, I, in combination with the cradle, C, and levers, D and E, so as to operate as and for the purpose specified.

66,362.—CLOTHES WRINGER.—C. H. Knox, Mount Pleasant, Iowa.

1st, I claim the arrangement and combination of lever, M, hinged to box, A, roller, L, rods, K, levers, I, and plate, C, arranged to operate upper roller, D, as set forth.

2d, The double cog wheel, P P, arranged to operate in combination with double pinion, S, for turning the rollers, D D, substantially as described.

66,363.—WASHING MACHINE.—Ira A. Livingston, Hornellsville, N. Y.

I claim the arrangement of a series of vibrating wash boards, E, E, operated by levers, e, e, in combination with double or triple cranks and fly-wheel motion, substantially as and for the purposes herein set forth.

2d, I claim the rubbers, E, E, as constructed in combination with the rod, F, springs, f, i, cords, j, j, pulleys, i, i, and foot-piece, a, as and for the purpose described.

66,364.—BURNING FLUID.—Wm. R. Loomis, Nelson Wells, Harmon Hitchcock, and Samuel G. Stryker, Elmira, N. Y.

We claim the manufacture for sale of a burning fluid (crystallized oil) made by adding to 40 gallons of naptha, 2 lbs. of alum, 2 lbs. common salt, 1 lb. potash, and 4 oz. camphor gum finely pulverized, and half a pint of spirits of nitre.

We also claim the use of potash when it is combined with substantially the substances mentioned, for the purposes of making a burning fluid as described.

66,365.—SOAP STONE STOVE.—Albion K. Lowell, Manchester, N. H.

I claim a metallic fire pot, C, in combination with an outer casing of soapstone placed at such a distance as to leave an air space between the two, suitable openings, c, being provided at or near the bottom of the stove, to admit cold air to the lower portion of the fire pot, all constructed and operating substantially as and for the purpose set forth.

I also claim the soapstone casing, B, B', held together by a series of bands, a, b, the latter, b, being so constructed and arranged as to have openings, c, for the admission of air substantially as and for the purpose set forth.

66,366.—LAMP SHADE CLASPS.—John J. Marcy, (assignor to E. Miller & Co.), West Meriden, Ct.

I claim the combination of the two rings, A and C, with the springs, B, when the said springs, B, are formed so as to hold the ring, C, substantially as and for the purpose specified.

66,367.—CLAMPS FOR SUSPENDING WHIPS.—Alvin C. Mason, Boston, Mass., (assignor to self and H. H. Mason), Springfield, Vt.

I claim a clamp for suspending whips, constructed with a pivoted or jointed jaw, one or more arranged so that the clamp may be opened by means of a cord or its equivalent to receive the upper end of a whip, substantially as shown and described.

66,368.—GATES.—E. A. Matthiesen, Cornwall, N. Y.

1st, I claim the fixed double inclined plane, f, and the two vertically moving inclined planes, g, m, in combination with each other, and the laterally swinging gate, A, substantially as and for the purpose specified.

2d, The laterally moving plate, n, and the weights or catches, b, b*, in combination with the levers which operate the inclined planes, g, m, whereby the gate is retained in an open position, substantially as herein set forth.

3d, The levers, h, h*, levers, i, i*, and vertical rods, k, k*, arranged in relation with each other and with the inclined planes, g, m, and the arm, c, of the gate, A, substantially as and for the purpose specified.

4th, The vertical bars, t, levers, s, and links, s*, arranged with reference to each other and to the lever, r, and plate, n, whereby the said plate may be operated to hold and release the weights or catches, l, l*, substantially as herein set forth.

5th, The guides, D, plates, w, and aprons, x, arranged in relation with each other and with the vertical rods, k, k*, and bars, t, substantially as herein set forth for the purpose specified.

66,369.—SUGAR CRYSTALLIZING TANKS OR WAGONS.—Franz O. Matthiessen, Jersey City, N. J.

I claim the combination with the tank or wagon of an air pipe or air pipes or tubes arranged to project through the body of the tank and open at its or their ends with a valve or valves to exclude or control the circulation of air, substantially as and for the purpose or purposes specified.

66,370.—VACUUM PANS FOR BOILING SUGAR AND OTHER SUBSTANCES.—Franz O. Matthiessen, Jersey City, N. J.

I claim the combination of an umbrella or cap or cover of open work construction with the dome or cover to a vacuum pan constructed to form an escape outside of the boiling vessel for the condensed vapor and provided with a Torricellian discharge pipe or tube, said umbrella being arranged within the dome and over the boiling vessel or chamber, essentially as and for the purpose herein set forth.

66,371.—COMBINED MEASURE, FUNNEL AND FAUCET.—G. W. McCann, Springfield, Ohio.

1st, I claim the combined faucet and funnel herein described, constructed so that the same may be used in connection or separately.

2d, In combination with the funnel, D, the conical strainer, H, constructed and arranged as set forth.

66,372.—DRILLING AND PUMPING APPARATUS.—Mark T. McCormick, Meadville, Pa.

1st, I claim the ram, G, in combination with the rack, N, the segment, M, and the wheels, H and Y, with the lever, D, the swinging frame, E, when the same are constructed as described for the purposes set forth.

2d, I claim the pumping attachment described, fig. 6, consisting of the frame, t, t, the pitman, l, constructed as described, in combination with the drilling device as described for the purposes set forth.

66,373.—SLEIGH RUNNERS FOR BUGGIES.—John S. McIntire, Chicago, Ill.

1st, I claim the pipe box, B, provided with flanges, a, and arm, C, constructed substantially as and for the purposes specified.

2d, The hook, D, set screw, E, and pipe box, B, in combination with the axle G, and runner, A.

66,374.—REGISTERS.—John McLaughlin, Brooklyn, N. Y.

I claim the screen, B, to register substantially as and for the purpose described.

66,375.—APPARATUS TO CURE HORSES OF CRIBBING.—G. W. Metcalf, Hummelstown, Pa.

I claim the combination of the bow, A, spar, B, and the two spring shields, C, C, constructed and arranged as and for the purpose herein specified.

66,376.—MACHINE FOR DISINTEGRATING PEAT.—Abraham Michelbacher, New York City.

1st, I claim one or more vibrating digging rakes arranged upon a suitable carriage, substantially as and for the purpose herein set forth.

2d, The combination with a vibrating digging rake constructed and operating as described of an adjustable roller E, substantially as and for the purpose herein set forth.

3d, A caster wheel or roller operated by a lever b, and arranged in relation with the frame of the carriage and the vibrating digging rake or rakes substantially as and for the purpose herein set forth.

4th, The crank shaft F, balance wheel r, pinion n, and driving gear wheel A*, arranged in relation with each other and with the supporting wheels of the carriage and the vibrating digging rakes substantially as and for the purpose herein set forth.

66,377.—APPARATUS FOR TREATING CANE JUICE WITH SULPHUROUS ACID GAS.—Theodule Morrillon, and Ursin Naquin, Parish of La Fourche, La.

We claim a tight wooden box provided with pipes of induction and eduction for cane juice, and also with a pipe for introducing sulphurous gas therein to saturate the juice with sulphurous acid by mechanical agitation thereof substantially as and for the purpose herein described.

66,378.—POWDER FOR FIRE ARMS AND FOR BLASTING.—Gustav Adolph Neumeyer, Altenburg, Germany.

I claim a blasting and explosive powder when made of the ingredients and in the manner herein set forth.

66,379.—ROOF FOR RAILROAD CAR.—J. Palmer, Cleveland, O.

I claim the construction and arrangement of the metal plates or sheets E, when lapped or hooked continuously together substantially as herein described and shown in combination with the caps F, the cleats sheathing or resting surface C, cornice D, and carlines or rafters B, all constructed and arranged substantially as and for the purpose herein set forth and described.

66,380.—DRAIN FOR WASTE WATER.—C. H. Parker and G. N. Copeland, (assignors to Charles H. Parker,) Cortland, N. Y.

1st, We claim the conducting waste water or other liquids into the earth, by means of the pipe a, or its equivalent either down to water, or to a strata of earth sufficiently porous to absorb or drain off such liquids.

2d, We claim the pipe a, in combination with the conductor c, and strainer d, (where such strainer shall be necessary) as and for the purposes above described.

66,381.—SEALING WAX STAMPS.—John H. Parsons, Quincy, Mich.

I claim the arrangement of the standard A, constructed with a lamp n, rack E, the adjustable table C, and moistener k, substantially as described and set forth.

66,382.—WATER WHEEL.—Thomas Pattinson, Little York, Cal.

I claim the construction and arrangement in the case C, of the water wheel A, provided with the buckets c, whose under sides d, are beveled, the pen stock E, having supply pipe or tube F, and provided with the gate H, operated by the screw I, the removable discharge tube G, attached to its under side, whereby the water under static pressure is delivered in a perpendicular column upon the buckets c, substantially as herein shown and described.

66,383.—SETTEE FOR SCHOOL ROOM.—John Peard, New York City.

1st, I claim a settee constructed of cast iron side pieces A, cast entire with cleats or projections to form grooves to receive the ends of the plank seat B, and the lower plank B, and the ends of the planks or back strips C C, and also cast with lips b c, through which screws pass to secure said planks in position, substantially as and for the purpose set forth.

2d, The fixed bracket D, cast with one or more of the side pieces A, substantially as and for the purpose specified.

3d, The adjustable or sliding bracket E, fitted on a dovetail cleat d, of one of the side pieces, substantially as and for the purpose set forth.

66,384.—SCHOOL SETTEE AND DESK.—John Peard, New York City.

1st, I claim the sliding desk E, containing the metallic strips a*, arranged in the manner substantially as and for the purpose set forth.

2d, The seat F, provided with slotted metal bars or strips f, at its ends in combination with the pivoted supports G G, having pins h, at their upper ends to work in the slots of the bars or strips f, substantially as shown and described.

3d, The combination of the sliding desk E, with the pivoted seat F, and supports G G, and the side pieces A A, all arranged substantially as and for the purpose specified.

4th, The book and slate racks C D, in combination with the desk E, pivoted seat F, and side pieces A A, substantially as and for the purpose set forth.

66,385.—CAR COUPLING.—John Pettengill, Jr., Lisbon, N. H.

I claim the combination of the box, A, link, C, springs, D, and elbow plate, E, with each other, all made and operating substantially as herein shown and described.

66,386.—STRAW CUTTER.—S. Pettibone, Corunna, Mich.

I claim, 1st, Operating the feed rollers by means of a toothed arm, G, and cogs, F, formed upon the hub of the knife lever, E, substantially as herein shown and described.

2d, The combination of the ratchet wheels, O J, the pawls, I N, connecting rod, L, and lever, H, with the feed rollers, K H, and toothed arm, G, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the adjustable guide arms, M S, guide rods, T, and coiled spring, U, with the metallic side pieces, R, and with the upper feed roller, P, substantially as herein shown and described and for the purpose set forth.

66,387.—BOILER TUBE SCRAPER.—E. L. Pratt, Boston, Mass.

I claim, in combination with a series of scraping blades arranged as described, a sliding rod by movement of which the scraping edges may be expanded or contracted when they are within a tube, substantially as described.

Also in combination with the blades and their shanks and the movable rod, the springs upon which the shanks are cushioned when the blades are expanded, substantially as set forth.

66,388.—BALING PRESS.—A. J. Purviance (assignor to himself and J. A. Moss), Mount Zion, Ohio.

I claim, 1st, The combination and arrangement of the sliding pinion, d, rack beam, C, spur wheel, i, pinions, e g p, sliding shaft, P, spur wheel, I, windlass, E, swinging frame, H, shaft, F, loose block, G, ropes, h l k' pulleys, z z, roller, i I', constructed and operating in the manner as and for the purpose specified.

2d, I claim the windlass, E, in combination with the guide pullies in the block, G, the rope, r, the adjustable frame, H, and the rack beam, C, arranged and applied to compress the bale, substantially in the manner herein described.

3d, I claim the shifting levers, m and n, in combination with the shifting shaft, P, the shifting pinion, d, and the rack, c, constructed and applied substantially as and for the purposes herein set forth.

66,389.—ICE-CREAM FREEZER.—John H. Rae, Syracuse, N. Y.

I claim, 1st, The combination of the open cylinder, C, and raised bottom, A', of the can, A, substantially as described for the purpose specified.

2d, The beater, C, with double spring scrapers, c c, in combination with the can, A, and internal cylinder, B, constructed and operating substantially as and for the purpose set forth.

3d, The funnel cover, E, in combination with the can, A, and internal cylinder, B, constructed and operating substantially as and for the purpose described.

66,390.—BED BOTTOM.—C. D. Read, Burlington, Vt.

I claim the combination and arrangement of the slat, A, with blocks, D, and rail, B, with its hooked nails, x x and d, with coil spring, C, and strap, a, when constructed and used in the manner and for the purposes specified.

66,391.—HARNESS HOOK.—I. C. Richmond (assignor to J. N. Hough), West Meriden, Conn.

I claim a hook having toe bar, D, formed upon the point of the hook each end of the said bar extending down and partially around the shank of the hook, in the manner and so as to operate substantially as set forth.

66,392.—VALVE GEAR FOR STEAM ENGINES.—A. K. Rider, Nazareth, Pa.

1st, I claim the combination with the reciprocating piston, B, and main valve controlling the same, of a regulator so constructed and operating as not only to admit of the valve stroke being lengthened or shortened to change the speed or force of engine strokes but also of being so varied in position relatively to the engine cylinder ports as to secure, when required, to the engine piston a more forcible stroke in one direction than the other, substantially as specified.

2d, The regulator to the engine cylinder valve, arranged and operating substantially as described.

3d, The arrangement of the sub valve, J, relatively to the main valve, G, the one being controlled by the other, as specified, when said valves have a common inlet and exhaust and are otherwise arranged for operation together, substantially as specified.

4th, The combination of the arm operated by the engine piston of the

block, N, lever, O, spring, r, to the sub valve, J, lever, S, and detent lever, P, operating in connection with the rests, lifting nuts, or stops to operate the sub valve, as herein described.

5th, The combination with the engine piston, of a sub valve operated thereby main valve controlled by the sub valve and regulator governing the action of the main valve, essentially as and for the purpose or purposes herein set forth.

66,393.—DEVICE FOR SUPPORTING HOP VINES.—N. C. Roberts and E. W. Badger, Fly Creek, N. Y.

We claim the chain, A, secured to the posts, B, provided with rings, C, encircling the bearing poles, D, in the manner and for the purpose represented and described.

66,394.—COTTON PRESS.—S. D. Roberts, Washington, La.

I claim the double lever, H H, connected by toggles, G G, with the follower block, F, in combination with the capstan, I, the drums, e e and K, and the hoisting rope, h, when employed in a baling press, arranged and operating substantially as herein described.

66,395.—LIQUID METER.—William Robjohn, New York City.

1st, I claim the combination of the reciprocating piston, G, with its rod, b, measuring cylinder, E, with tight box or case, I and lever, H, all for operation together and with outside mechanism, substantially as specified.

2d, The combination with the shaft, c, of the lever, H, of the arm, J, slotted bar, K, lever, L, double inclined plate, M, and roller, j, for operation together, as herein set forth.

3d, The combination of the lever, O, slotted bar, F, provided with studs, r, in mangled rack gear with a double toe, Q, and driver, q, furnished with teeth, r, essentially as and for the purpose specified.

4th, The longitudinally sliding spring horse wheel, Y, having an aperture x, in combination with a locking stop, w, and geared with a stop cock, W, for control of the latter, substantially as herein set forth.

5th, The rod, Y, operated as described, spring catch, c2, and stop cock lever or handle controlled by a spring, all for operation together, essentially as and for the purpose or purposes specified.

66,396.—SHOE LACING.—Adolph Rock, Foxborough, Mass., and William Moorhouse, Mansfield, Mass.

We claim the combination and arrangement of the shoe lacing consisting of the grooved rollers, B, pivoted between the arms, A, in such a manner that an opening, C, shall be left in said arm inside of said rollers, said arms secured opposite each other upon each side of the slit in the shoe or upon a frame, D, substantially as described for the purpose specified.

66,397.—STEAM GENERATOR.—Hiram Rosbrook, Chicago, Ill.

1st, I claim in a steam generator the use and employment of the tube, F, for the purpose and in the manner substantially as described.

2d, Combining the tube, F, with the flues, C C C, in the manner substantially as described.

3d, Combining the reservoir, D, pipe, F, and flues, C C C, substantially as described.

66,398.—BEDSTEAD.—Andrew Rothwell, Washington, D. C.

I claim so disposing the slats of bedsteads as to produce a curved depression therein adapted to the form of the human body, substantially as described and represented.

66,399.—GUN HAMMER GAGE.—W. H. Round, Middletown, Conn.

I claim a gun hammer gage consisting of the plates, A B and D, constructed and arranged so as to be adjustable, substantially as and for the purpose set forth.

66,400.—WINDOW FASTENER.—C. H. Sawin and J. A. Titus, Worcester, Mass.

1st, We claim the combination of the recessed holding plate with the bolt under the arrangement herein described so that while the locking end of the bolt slides under and parallel with the plate its opposite end shall project up so as to be flush with or to extend above the said plate, substantially as and for the purposes set forth.

2d, The combination of the bolt with its spring formed in the manner herein specified so that the bolt shall be both held in place and pressed forward by the action of the said spring as and for the purposes set forth.

3d, The combination with the recessed holding plate of the sliding bolt and its spring, the whole being arranged for operation substantially as shown and described.

66,401.—HORSE-POWER.—John Schley, Savannah, Ga.

I claim the arrangement of the vertical gear wheels, K, upon the horizontal shaft, L, secured to the vertical shaft, M, and pivoted on the post, D, meshing into the horizontal gear wheel, H, turning loosely upon the post, D, said wheel, H, provided upon its under side with horizontal shafts, b, upon which the vertical gear wheels, G, are supported, the latter meshing into the stationary wheel, B, and double cogged revolving gear wheel, A, substantially as described for the purpose specified.

66,402.—VEGETABLE CUTTER.—J. M. Schwartz, Philadelphia, Pa.

I claim the plate, A, with its knife, d, in combination with the adjustable plate, A', and the set screws, F, or its equivalent, the whole being constructed and operating substantially as described.

66,403.—CLOTHES-LINE HOLDER.—A. J. Simpson, Washington, D. C.

I claim the clothes-line holder consisting of the swinging lock, C, and hook, B, constructed and arranged substantially as described.

66,404.—BALING PRESS.—W. B. Smith, Aberdeen, Ind.

1st, I claim the arrangement of the drums, f1 f2, clutch, b', ropes, g1 and g2, pullies, f and g3, lever, G, and links, b b, for the purpose of operating the follower, B, substantially as and in the manner herein shown and described.

2d, I claim the arrangement of the collar, i, rope, i', pullies, i'', rocking frame, l, weight, M, and link, c, for the purpose of operating the beater, C, substantially in the manner herein shown and described.

3d, I claim the combination of the collar, i, projection, i', and catch, K, with the incline, m, substantially in the manner and for the purpose herein shown and described.

66,405.—WAGON-HUB BORING MACHINE.—William Snodgrass (assignor to himself and James Statler), Macomb, Ill.

1st, I claim the laterally-adjustable frame, having the chucks, V Q, mounted therein, in combination with the cutting and feeding mechanism, arranged to operate as and for the purpose set forth.

2d, The cutter bar, H, pivoted upon the front end of the carriage, C, in combination with the screw rod, E, mounted on the carriage, and arranged to operate the cutter bar, as described.

3d, The strap, m, or its equivalent, arranged to unite the independent chucks, V and Q, for the purpose of causing both to revolve together when motion is applied to one, substantially as herein set forth.

4th, Keeping the cutter bar to its work by means of the screw thread, Q', on the chuck, Q, wheel, S', mounted on the shaft, S, and cord, u, attached to the carriage, C, when said parts are arranged to operate as herein shown and described.

66,406.—MEASURING FAUCET.—Dwight S. Spafford and Geo. Elsey, Morrison, Ill.

1st, I claim the fixed and revolving barrels, B1 B2, of a faucet, when the latter is so connected with the beam of a scale, that when the beam rises, it shall disengage a catch, and the faucet be caused to close automatically by mechanism, substantially as set forth.

2d, The combination of the beam, G, platform, H, lever, F, flange, D, lever, E, and faucet, B, with barrels, B' and B'', substantially as described.

3d, A scale beam, G, and faucet, B, so arranged that the pivot of the beam shall have their bearings on flanges formed on the faucet, and the beam and faucet shall be so connected by intermediate mechanism that the rising of the beam shall cause the faucet to be closed automatically, all substantially as described.

65,407.—MANUFACTURE OF BRICKS.—Samuel B. Spaulding, Brandon, Vt.

I claim the composition for the paste and the manner of its application for the purposes herein set forth.

66,408.—BRICK MACHINE.—A. J. Sprague (assignor to himself and Paul Jones), Toledo, Ohio.

1st, I claim the rotary presser, G, arranged within the press box, F, to operate in the manner substantially as and for the purpose set forth

2d, The gratings, E, placed over the opening, b, in the bottom of the mud-mill, B, substantially as and for the purpose specified.

3d, Operating the mold-feeding plate, U, through the medium of the revolving arms, Z Z, on the shaft, H, the uprights, Y, on the bars, W W, and the spring, A', or its equivalent, all arranged substantially as shown and described.

66,409.—WOOD-BENDING MACHINE.—Otis W. Stearns, Lebanon, N. H.

1st, I claim the connected presses, b and b', with their heads, d and d' e and e', arranged as described and operated upon by cams, B, or their equivalents, so as to be moved in concert for receiving a straight stick between them, and bending it into shape for a scythe snath, substantially as herein described.

2d, The sliding frame, E, with vertical followers, n, constructed and arranged substantially as and for the purposes herein specified.

3d, The double clamp, F, in combination with the iron mold r, arranged and operating substantially as and for the purposes herein set forth.

4th, The combination of the cams, B, the presses, b b', the followers, n, and the lever clamps, D, constructed arranged and operating in the manner and for the purposes herein described.

66,410.—BED BOTTOM.—William Stenger and Aloys Beyrnheimer, Jefferson, Ohio.

We claim the loops, a a, bands, t t, and wedges, x x, when used upon the bedstead frame, in combination with the cords, z and y, in the manner substantially as and for the purposes set forth.

66,411.—MACHINE FOR FORMING SHEET METAL PANS.—Benjamin D. Stevens, Decorah, Iowa, assignor to himself and Charles Gill, Exeter, N. H.

I claim the combination and arrangement of the bed piece, B, and the clamp bar, A, and forming bar, C, hinged to said bed piece on opposite sides thereof, substantially as and for the purpose herein specified.

I also claim hinging separate clamp bars, A and F, to the same bed piece, B, for forming sides of different lengths, as herein set forth.

I also claim the gage pins, c c, applied in combination with the grooved clamp bars, A, for the purpose specified.

66,412.—HAY RAKER AND LOADER.—George W. Swartz, Newburgh, Pa.

1st, I claim the coupling or staple, C, and keys, C', for attaching the loader to a wagon, substantially as described.

2d, I claim the looped and curved double rake teeth, H, in combination with the guide, A2, and the drum, E, substantially as and for the purpose described.

3d, I claim the rope or cord, L, for attaching the rake teeth, H, to their adjusting rod, K, as and for the purpose specified.

66,413.—BUTTONHOLE FOR CARRIAGES.—S. C. Talcott, Ashtabula, Ohio.

I claim, 1st, The washer, A, provided with the arms, E, disk, B, and serrated washer, C, arranged in the manner and for the purpose substantially as set forth.

2d, A washer, Fig. 3, in combination with the disk, B, substantially as described and applied to the purpose set forth.

3d, The serrated washer, C, in combination with the disk B, when applied to the purpose in the manner specified.

66,414.—MACHINE FOR MAKING HOT-PRESSED NUTS.—Lewis Thierry and George B. Hill, Detroit, Mich.

I claim the combination of the die, clamps, cutter slides, hollow plungers, and center punch, or equivalents, constructed and arranged substantially as described.

66,415.—BEEHIVE.—John Hopkins Thomas, Rochester, N. Y.

I claim, 1st, The use of the beveled bearings, d d d, in combination with the upright projecting stops, a a a, constructed in the manner and for the purpose herein set forth.

2d, The use of the back entrance in combination with the sliding gage for the purpose herein set forth.

66,416.—CHURNING APPARATUS.—J. Thompson, Hartville, O.

I claim the use of the double crank shaft Q, in combination with the connecting rods R and S, and the working beams, D and E, when said crank shaft is operated by wheel work, cord and weight, in the manner and for the purpose specified.

66,417.—DEVICE FOR TETHERING ANIMALS.—J. P. Thorp, Southington, Conn.

I claim the frame, B, fitted on the stake, A, so that it may turn loosely thereon, in combination with the shaft, C, fitted in the upper part of said frame, and having the reel, D, upon it, with halter rope, G, attached, the shaft, C, also having the ropes, E E, applied, with weight, F F, at their ends, and all arranged substantially in the manner as and for the purpose set forth.

66,418.—CAR COUPLING.—Daniel J. Tittle, Albany, N. Y., assignor to Abbie M. Tittle.

1st, I claim the lever, e, fulcrum, f, and the rod or chain, g, or both, in combination with the rack wheel shaft, s, as and for the purpose described.

2d, I claim the lever, e, the rack, h', and the rack, i, in combination with the shifting bar, k, for the purpose set forth and described.

3d, I claim the hinged draft bar, a a, in combination with the lever, e, fulcrum, f, rod or chain, g, or both, operated by the lever, h, or rack wheel shaft, s, as and for the purposes described.

4th, I claim the hook head covering perforated as described, in combination with the clevis, O, or its equivalent, as and for the purpose set forth and described.

66,219.—SAFETY BRIDGE FOR RAILROAD CARS.—Lester Traxler, Butler, Ohio.

I claim forming a passage way between the cars of a train by means of the wings, B, boxes, D, and adjusting block and screw, E F, the parts constructed and arranged substantially as herein shown and described for the purpose set forth.

66,420.—EXTENSION FRUIT LADDER.—John E. Treat, Oxford, Mich.

I claim the hinged brace, C, when arranged with the pieces, a a, and steps, A, journaled thereto, in the manner and for the purpose herein specified.

66,421.—GATE.—Cornelius Trexler, La Grange, Ind.

I claim the combination and arrangement of the gates, B and E, constructed as described, gate posts, A and B, bars, a1 and b1, pullies, C1 C2, and projecting bar, e3, with each other, substantially in the manner herein shown and described and for the purpose set forth.

66,422.—ROCK-DRILLING MACHINE.—Edward M. Troth, New York City.

I claim, 1st, The combination, in the one machine, of separate engines for independent action of a combined drill holder and ram, substantially as specified.

2d, The combination of the sliding box, L, rotating tube, J, and ram or drill holder, M, for operation together as herein set forth.

3d, The cushions, h, when applied at or near opposite ends of the sliding box, L, substantially as specified.

4th, The combination of the wheel, K, tube, J, and piston rod, I, provided with a coupling, a, for operation together, as herein set forth.

5th, The combination with the sliding box, L, of the screw, S, screw box, R, and clutch box or frame, Q, or other equivalent gear, whereby the feed of the drills is established, a short picking action given to the same or a distinct ramming stroke or action produced, essentially as specified.

6th, The application to the frames, A and B, of the eccentrics, V, substantially as and for the purposes described.

66,423.—GATES.—Hiram Turner, Ripon, Wis.

I claim the combination of the hinged part or crane, B, and adjustable part, C, with each other, said parts being constructed and arranged substantially in the manner herein shown and described.

66,424.—BAG HOLDERS.—Lafayette Turner, Cedar Rapids, Ia.

I claim an adjustable folding and gathering bag holder having its frame so connected by bars hung upon pivots as to enable its sides to lie upon each other when closed, and furnished on one side with an adjustable hinged cross piece or bar to stretch the frame, substantially as shown and described.

66,425.—EXCAVATOR OR DIGGING MACHINE.—F. J. Vandenwinne, Brussels, Belgium,

I claim, 1st, the general arrangement and construction of an excavating or digging machine, as hereinbefore described and represented in the accompanying drawings.

2d, The peculiar arrangement and construction of the picks in combination with the endless chain carrying the troughs, and mechanism for working the same, as hereinbefore described and represented in the accompanying drawings

66,426.—DRAY.—Francis Van Doren, Adrian, Mich.

I claim, 1st, the platform, E, when provided with rollers, F, in the manner set forth, in combination with the dray frame, A, substantially as and for the purpose herein shown and described.

2d, Having rollers, F, F, arranged on the surface of a dray, for the purpose of facilitating the loading and unloading of the same, substantially as set forth.

3d, A dray when so made that its platform or bearing portion is made in shape of a detachable skid, substantially as set forth.

66,427.—CIDER MILLS.—T. Van Kannel, Cincinnati, Ohio.

I claim providing the cones or beveled disks, I, I', with a series of concentric circles of teeth meshing or gearing into a corresponding series of cavities upon each, as herein set forth for the purpose specified.

66,428.—DRYING AND PREPARING PEAT.—T. G. Walker, New York, N. Y.

I claim subjecting peat and other substances, when confined in a close retort, to a high degree of heat or to any requisite temperature, and then operating a communication between the retort and another vessel, the interior of which other vessel being either under a lower pressure than the retort or a vacuum, and from such vessels allowing the vapors and volatile portions to escape, substantially as described.

66,429.—MACHINE FOR MAKING PAPER COLLARS.—Wm. H. Walton, Brooklyn, N. Y.

1st, In combination with the cylinders, e and f, I claim the curved knife, g, the straight knife, h, and the spring, g', all constructed, arranged and operating substantially as described.

2d, I claim the folding conductor, m, constructed, arranged in the machine, and operating substantially as described.

3d, I also claim in combination, the rollers, e, f, provided with forming and severing knives, g, h, and suitable devices for embossing or stamping the folding conductor and forming rollers, all constructed and arranged, substantially as described, and so geared as to make and finish collars by one continuous, rotating, progressive movement of machinery, forming a collar at each revolution of the said cylinders, e and f.

66,430.—CONNECTIONS FOR HARVESTERS.—H. L. Wanzer, Clyde, Ohio.

I claim the pin, l, in combination with the packing, k, all made and operating substantially as and for the purpose herein shown and described.

66,431.—HOLDER FOR BROOMS.—H. W. Warner, Watertown, Conn.

I claim the improved holder herein described, the same consisting of the plate, B, or its equivalent, and arms, C C, hung therein and arranged substantially as and for the purpose described.

66,432.—COMPOSITION FOR TANNING.—Abram Westbrook and Justin Campbell, Leona, Pa.

We claim, 1st, the application of licorice for tanning purposes, for the purpose set forth.

2d, The composition for tanning leather when the same is compounded of the ingredients in about the proportions set forth.

66,433.—IRON BRIDGES.—T. B. White, New Brighton, Pa.

I claim a tubular iron beam, consisting of the upper plate, a, with the external flange, e, the side plates, b, provided at their lower edges with similar flanges, e, and the lower plate, c, all constructed and united as described.

66,434.—ATTACHING TOOLS TO THEIR HANDLES.—L. P. Wilcox, Brooklyn, N. Y.

I claim the wood stock or handle, A, constructed with its one end, a, tapering and slotted longitudinally as at c, in combination with the tapering, sliding ferrule, B, substantially as and for the purpose set forth.

66,435.—MODE OF PREVENTING CORROSION AT THE JOINTS OF STEAM BOILER FLUES.—Parker Wineman, Minooka, Ill.

I claim a boiler tube or flue having its end or ends coated or covered with a metal, which is less corrodible than the metal of which the tube or flue is made, substantially as described.

66,436.—PUNCH.—Lorenz Wolf, St. Jacob, Ill.

I claim the grooved cap, D, curved and grooved standard, B, screws, b, b, and springs, d, d, in combination with the punch and die, all as set forth.

66,437.—RAILWAY CHAIR.—J. E. Wootten, assignor to himself, C. E. Byer, and W. Wharton, Jr.

I claim the rolled bar, B, with its under rib, b, side rib, e, and bent flange, d, when the said ribs are constructed and arranged as described.

66,438.—STEAM GENERATOR.—Wm. Young, Easton, Pa.

I claim the water heater, D, arranged with reference to the fire box, B, the flue, G, and the steam chamber, C, for the purpose set forth.

66,439.—MACHINE FOR FURROWING MILL STONES.—J. J. Zinn, Albion Pa.

I claim, 1st, the vibrating bar, c, and the guide bar, b, combined with the bed plate, A, substantially as and for the purpose herein described.

2d, The pick handle, d, with the taper socket, g, in combination with the nut, e, and the hollow end of the arm, c, constructed and operating substantially as and for the purposes described.

REISSUES.

2,664.—HARVESTER.—Harvey L. Hopkins, Eaton, N. Y. Patented Dec. 17, 1861.

1st, I claim combining with the frame of a harvester a finger bar which may be turned horizontally upon its pivoted connection, from one side of the frame to the opposite side, substantially as described.

2d, Combining with said finger bar and elevating and supporting apparatus, so arranged as to perform the same service whether the finger bar projects to the right or left of the main frame, substantially as represented and described.

3d, A reversible pole or tongue for the purpose of drawing the machine in either direction, substantially as described.

4th, A driver's seat which may be reversed to accommodate the operator, substantially as and for the purpose set forth.

2,665.—MANUFACTURE OF PAPER PULP.—J. B. Palser and Gardner Howland, Fort Edward, N. Y. Patented Nov. 22, 1859.

We claim the boiling of straw or other paper stock in a caustic alkaline solution of any desirable strength, according to the refractory character of the stock being treated, at a temperature indicated by an internal pressure due to heat, making 110 pounds to 130 pounds pressure to the square inch, substantially in the manner and for the purpose described.

2,666.—SWELL FOR MELODEONS.—G. A. Prince, C. E. Bacon and C. F. S. Thomas, Buffalo, N. Y., assignees by mesne assignments of Thomas F. Thornton. Patented May 22, 1855.

We claim so constructing and operating the swell valve of melodeons and other reed musical instruments that a part of the valve may be opened in a manner to uncover and permit a free escape of the sound from only a part of the notes, while other portions of the notes remain covered by other portions of the valve, for the purposes and substantially as described.

2,667.—FARM GATE.—A. C. Teel, Girard, Ill. Pat. Dec. 1, 1863.

1st, I claim the hanging or suspending of a gate in such a manner that it will have a combined and swinging movement in the opening and closing of the same, the gate sliding from a closed position or state to a central balanced state and then swinging while in a state or equipoise to an open position and closing from an open position by swinging around in line with the gate posts and sliding to a closed state, substantially as shown and described.

2d, I claim the placing of the gate posts, C' D C' D', in such a relative position with each other and constructing and hanging the gate between them to admit of the opening and closing of the gate, substantially as herein set forth.

2,668.—SHEET-METAL BEAM.—Richard Montgomery, New York City. Patented July 12, 1853.

I claim a beam formed of sheet metal bent into a series of longitudinal folds the sides of which are flat and parallel and the tops and bottoms uninverted and inverted arches respectively.

I also claim the combination with such beam of a pair of saddles to support its ends, substantially as herein set forth.

DESIGNS.

2,690.—KNITTED FABRIC.—F. Bleckle, Philadelphia, Pa.

2,691.—BLIND BINDING.—H. A. Oesterle and Co., (assignor to Stephen Hascubuhler), Philadelphia, Pa.

2,692.—FLOOR CLOTH PATTERN.—James Paterson, Elizabeth, N. J., assignor to Edward Harvey, Brooklyn, N. Y.

2,693.—METALLIC BAND FOR RAILROAD CAR SEATS, ETC.—D. F. Randall, Chicopee, Mass.

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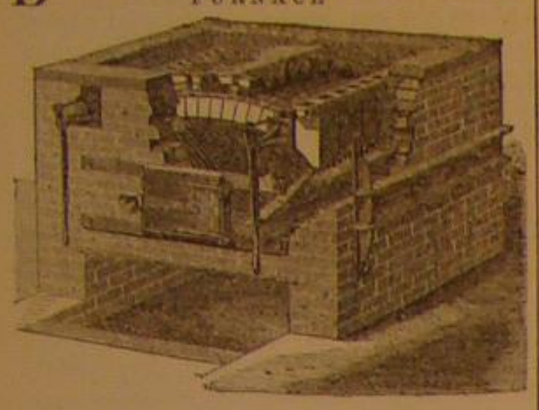

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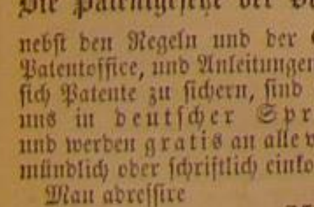

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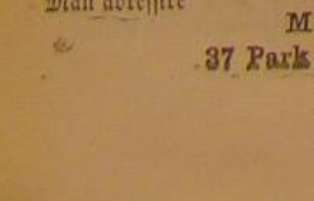

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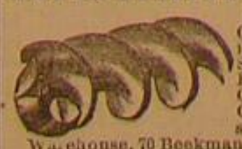

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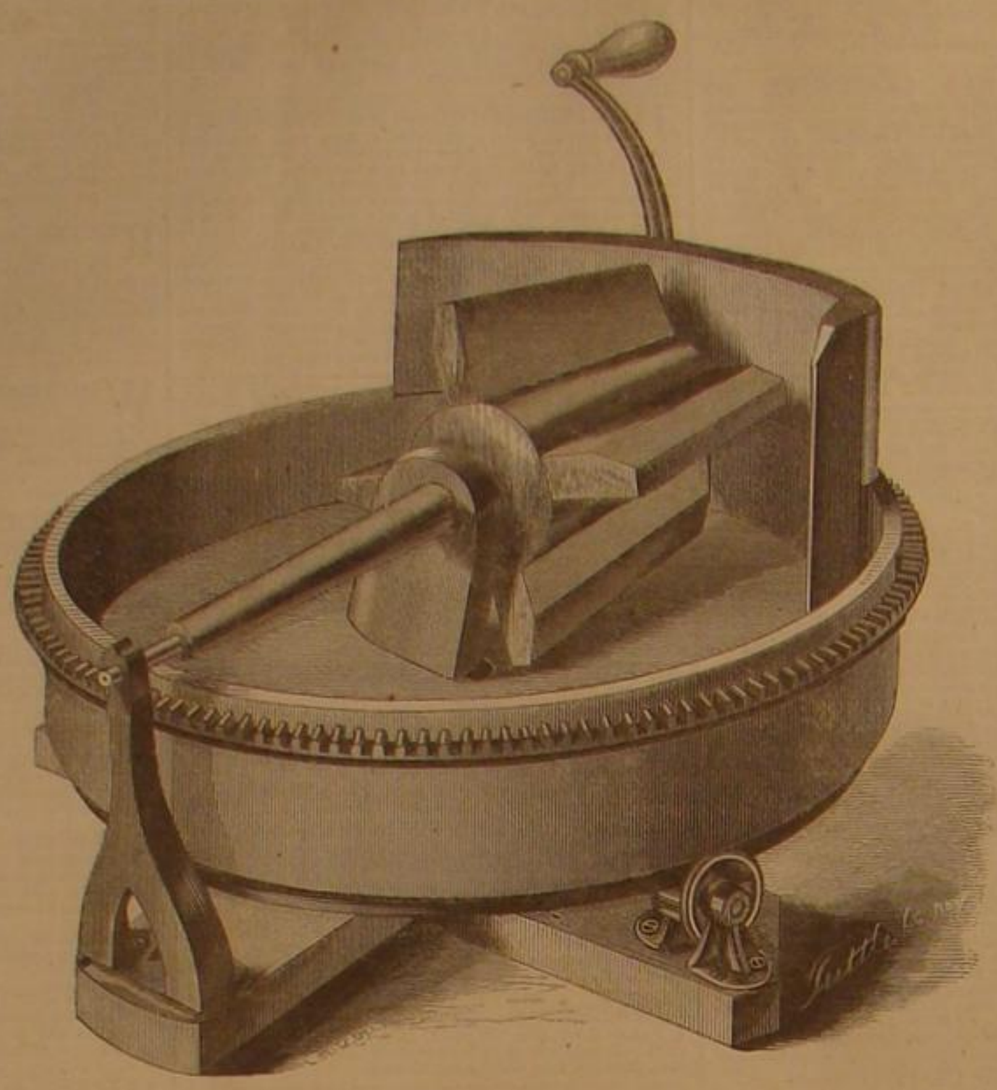
This is a simple device for expressing the buttermilk from newly-made butter, a work for which it appears to be excellenty well adapted. The machine is a tub-shaped receptacle, with a concave bottom converging from all points of the circumference to the center. In this is mounted, on supports rising from a frame on which the tub revolves by means of rollers or trucks, a worker of four or more dashers. Around the exterior circumference of the tub are segments of gears which form a continuous wheel, by which and a pinion on the shaft of the dasher, the tub is rotated through the medium of a crank,

The blades of the dasher are so formed as to fit the convex surface of the tub bottom, and their rotation, as the butter is carried around, presents the butter at a differing angle to their action at each revolution, thus effectually exposing every portion of the butter successively to their operation. In this is one of the main advantages of this worker. A central guide and a guard and scraper on the crank side continually return the butter to the action of the dasher or breaker, while the buttermilk and the aqueous particles find their way down the incline of the bottom to the center, where there is an aperture through which they escape.



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The machine is portable, compact, strong, easily cleaned, and not liable to get out of order. As by its use all the buttermilk and other substances liable to become decomposed are expelled from the butter, the product will keep much longer than that from which these are less perfectly extracted. It requires but a few minutes to thoroughly work a churning, and the butter is not left in an oily state liable to become rancid. The machine can be worked by a child. It was patented through the Scientific American Patent Agency Nov. 26, 1861. Further particulars and information regarding rights, etc., can be obtained by application to Joseph R. Angel, Sterling, Wayne Co., Pa., or Buel D. Pease, Madison, Luzerne Co., Pa.

Bridging the British Channel.

A French engineer has made a plan for a bridge which is greatly praised by the Paris *Moniteur*, broad enough to hold a double line of railway, a carriage road and a path for foot passengers. There would also be space for a row of shops along this Dover and Calais road which, once established, would, no doubt, become a very popular thoroughfare; and half way across there would be a restaurant. The bridge would rest on a series of thirty-two vertical, rectangular iron piles, each pile to be about 670 feet high and 335 feet broad. The depth of the channel between the two points named is found to be not over 135 feet, so that the bridge would be about 535 feet above the sea level. The journal quoted continues that in building the bridge the first step taken would be to connect the iron piles by means of sixteen cables of plaited wire, stretched in parallel lines from Shakspeare's Cliff, on the English side of the channel, to Cape Blanc Nez, on the French side, a distance of about twenty miles. The body of the bridge would thus be formed of iron tresses stretched from pile to pile. The iron piles would not be nice things for a vessel to run against; but they would be of great value as lighthouses, and accordingly each pile would be fitted with a signal light. The cost of the bridge is estimated at $80,000,000.

A New Source of Alcohol and Illuminating Gas.

Mr. Mosheimer, of this city, has shown us a letter received by last steamer, from Baron Rittinger, Chief of the Austrian Imperial Mining Schools, etc., in which, among other matters, he communicates the fact that a company of scientific men, in the interest of certain capitalists, have recently been inquiring carefully into the best mode of utilizing the waste products of coal oil refineries and distilleries. The result has been a successful and economical plan for obtaining alcohol from the oil waste, and a very superior illuminating gas from distillery waste. The gaseous product of the latter is said to have four times the illuminating power derivable from coal gas, and can be produced cheaper; while alcohol can be produced so cheaply from the residue of the oil refining, that it is thought it must work a complete revolution in the production of that article. A large company was being formed to introduce both these branches of manufacture throughout the Empire.—*San Francisco Press.*