# SCIENTIFIC AMERICAN

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

Vol. XVIII.—No. 24. [NEW SERIES.]

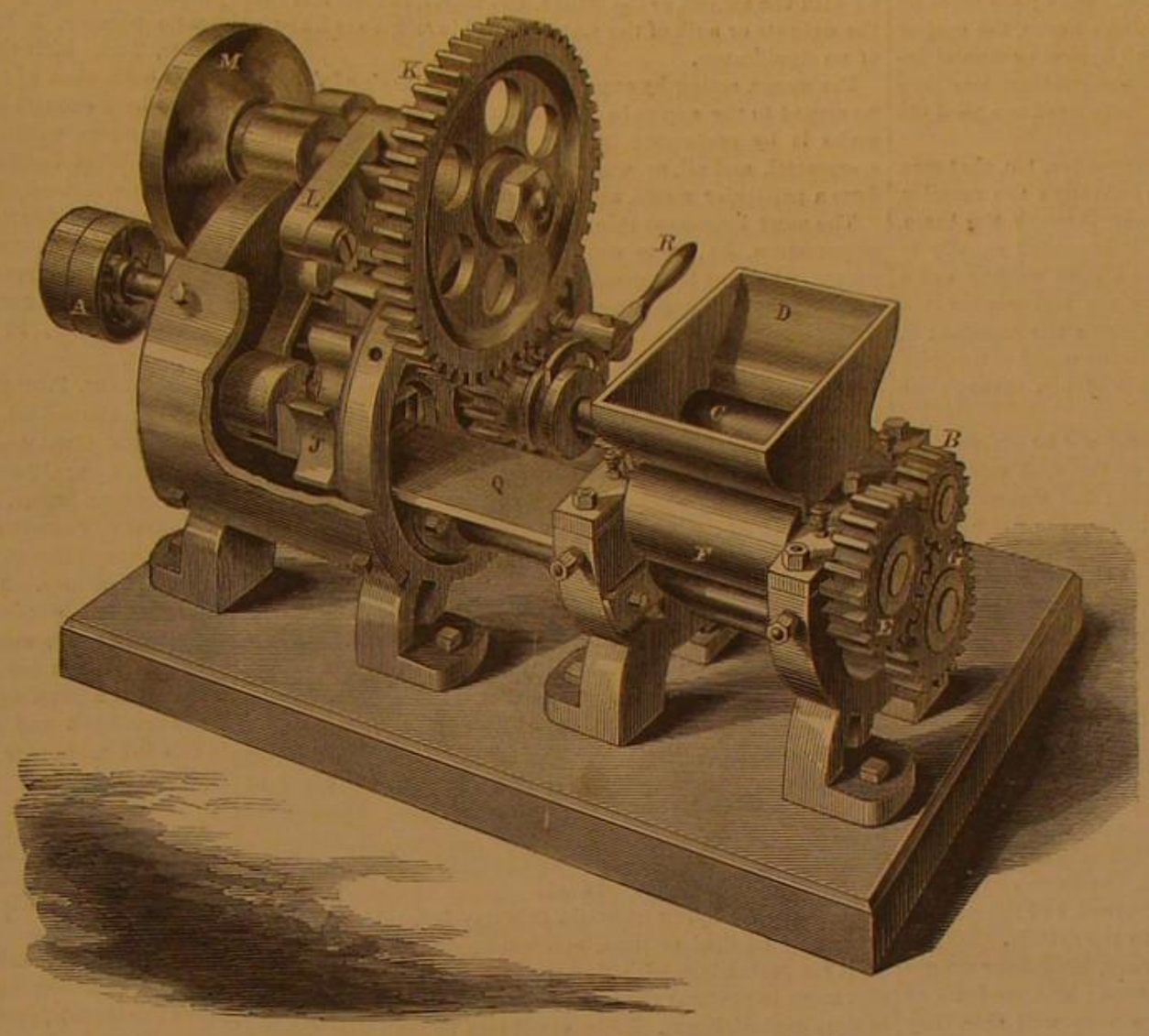
NEW YORK, JUNE 13, 1868.

$3 per Annum [IN ADVANCE.]


### Improvement in Molding and Pressing Bricks.

The machine represented in the accompanying engravings will arrest the attention of brick makers and other mechanics, from its compactness and its ingenious application of mechanical movements. It is direct and absolute in its action, dependent upon neither springs nor weights for correctness, and built of iron, so that there is but little wear and tear.

The machine is driven by the pulley, A—horse, steam, or any other power being used—the shaft having on its further end a gear, B, and a roller, C, which latter revolves in a hopper, D. The gear on the driving shaft engages with a larger one, E, which drives a corresponding roll, F, that, of course, turns slower than the roller, C. The clay—properly moistened—put into the hopper, D, passes between the rolls, being subjected to a comminuting or pulverizing process, in consequence of the abrasive action of the two rolls, the surfaces of which travel at varying velocities. From the rolls the fine clay is carried through a horizontal cylinder under roll, C, by means of a shaft driven by the gear, G, on which shaft are a series of spiral blades, H, Fig. 2, each of which forms a section of a screw, those at the discharge end, however, forming a complete screw extending entirely around the shaft. By this means the clay is carried from the mill to one of the press boxes, seen at I, Fig. 2, which are within a cylinder or disk, J, which revolves on a fixed hub secured to one of the standards of the machine, and through which the main shaft passes loosely. The press boxes, or brick molds, are placed at equal distances apart in the cylinder, which is revolved by a shaft driven by the gear, K, that is rotated by means of a pinion on the driving shaft. A crank, L, on the upper shaft, carrying the gear, K, having a friction roller on its wrist end, gives an intermittent motion to the cylinder, J, by means of recesses in the cylinder or disk; the rotation of the disk to produce a complete revolution, being assured by two gear teeth cut in what may be considered the hub of the crank, and engaging with similar teeth on the periphery of the disk.



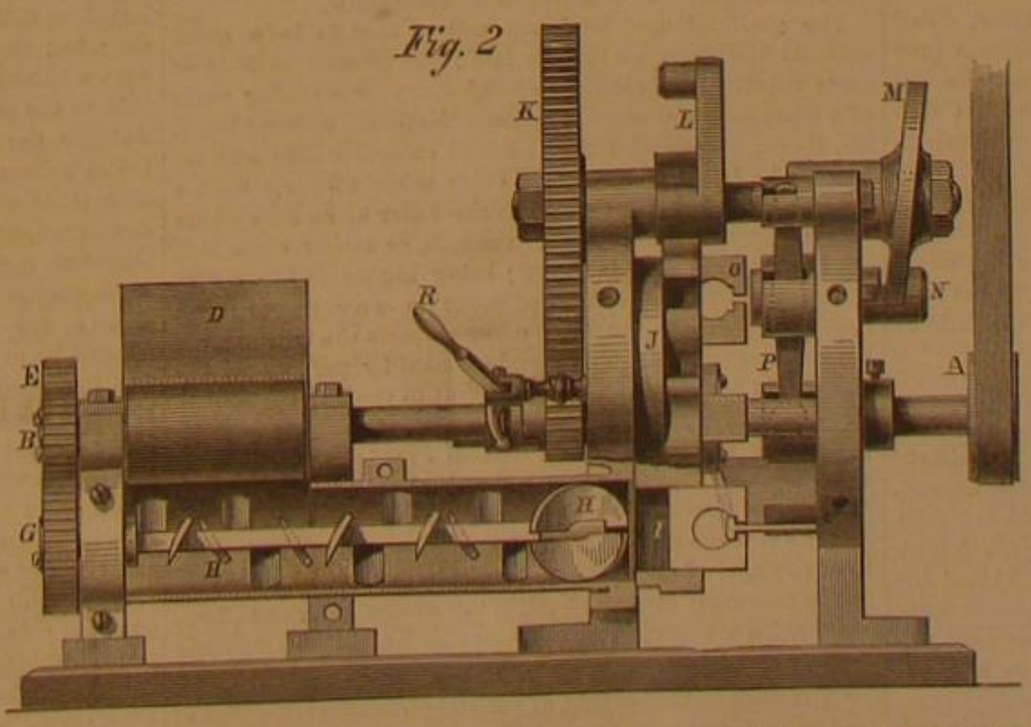

HAYDEN'S IMPROVED BRICK MACHINE.

On the outer end of the shaft carrying the gear, K, and crank, L, is a cam, M, which drives a plunger, N, Fig. 2, against the press piston, O, same figure, compressing the clay in the mold and forming the brick. At the same time, and by the operation of the same cam, a lever, P, actuates another plunger, that throws out the pressed brick upon a table, Q, Fig. 1, from which it is removed to the yard or other convenient place for drying.

The lever and clutch, R, are for disconnecting the mill and the press, so that the former can be run without operating the latter. The boss of the crank, L, after the disk containing the molds has been moved, so that the plungers and mold boxes are in line, traverses around a half of a revolution without imparting motion to the disk, thus affording time for the action of the plungers. It will be seen that at the same time that one mold box has received a charge, another is being carried to the plunger, the plunger is compressing a third, while the fourth is being discharged upon the table.

Patent pending through the Scientific American Patent Agency. Address all inquiries to the inventor, Peter Hayden, Pittsburgh, Pa.

*Fig. 2*




## MIND AND CHARCOAL.

Doctor Hall, in his *Journal of Health* for June, has the following instructive article which we hope every one will read notwithstanding its length:—

The diamond, the most valuable thing in Nature, so sparkling, so beautiful and bright, whose luster does not pale a particle in the lapse of ages, is but another condition of carbon, or charcoal, which you cannot touch without soiling your fingers; beautifully shadowing to us that greater change which shall come over the frail tenement of man, when it shall be raised "a spiritual body," fit for the heavenly mansions, and destined to a beatific existence when time shall be no more. But the human mind cannot act without the agency of carbon, and by this same agency do the trees grow, and the flowers bloom, and the connection between these is called "The Correlation of Mental and Physical Force," which phrase we were afraid to put at the head of this article, lest the reader should be frightened by its apparent abstruseness and skip it over; for all like the kind of reading best which requires the least thinking; the newspapers, civil, religious, and mongrel, have found this out, and load their columns with all sorts of impossible fabrications, as weak as water and as wishy-washy as cold soup; but publishers know that "there is money in it," the thoughtless public are pleased, and down we are going, at railroad speed "*ad infernum*."

Carbon represents heat; vegetation grows by absorbing carbon; and the hotter the climate, the faster does vegetation grow. At the poles there is no carbon, and there is no vegetation. When a tree is growing, it absorbs as much carbon as it will give out, when it is cut down and burned; if a pound of carbon, or wood, is burned and applied to water, so as to make steam, that steam, if economized, will raise a man to the top of Mount Washington. But if a man wants to go to the top of Mount Washington, he can raise himself up there by the force of his will, acting on his feet; but in order to do this, the brain must act upon the muscles of the body, and to do that, carbon must be supplied to it; this carbon is obtained from the food we eat; and unless we eat food which contains carbon, we will soon die, as the body gets cold; in a sense, freezes. Thus we see that carbon, acting on water, will raise a man sky-high; this is called "physical force;" carbon feeding the brain, enables a man to will him self to the same altitude, and away he goes, as fast as his legs will carry him; this is the result of "mental force," and now the reader sees the connection between physical and mental force, that they accomplish the same result, and by the use of the same agency, heat, obtained from carbon, or charcoal. That is to say, the vital force of the body and of the vegetable, is generated by carbon. It would be useless to bother the reader with this long rigmarole, unless we could derive from it some practical lesson, by which we can be made better or happier. The largest specimens of vegetation and animals, grew in the earlier ages, in parts where the atmosphere was a furnace; and as the crust of the earth cools, both grow more slowly, and the time for dying comes before they reach as great a stature as of old; and so it must be with man, the more carbon he absorbs, the more food he can eat and appropriate healthfully to the bodily uses, the larger or stronger will he be, according to whether the greater amount of carbon is absorbed by the brain or muscles; it is the stomach which is to prepare the food for the elimination of the carbon contained in it; this process is called "digestion," hence, the more perfect, the more vigorous; the more healthful a man's digestion is, the more vigorous will he be in mind or body, if not both; so whatever we do to weaken, to disease the stomach, we do that much toward impairing mind and body; toward depraving the race; degrading it toward the mere animal and the idiot. If we eat just enough, both mind and body are invigorated; if we eat too little, both become weak and faint; the body trembles, the mind is inefficient; if we eat too much, the stomach cannot eliminate the material which is to give out a pure carbon, and it then gives out an impure article, and mind and body are oppressed; the former loses its activity, the latter its vigor. Farming or any other active out-door life tends to perfect digestion; city life, with its inactions and its intemperances impairs the digestion, then follows the startling truth, and known to be truth, the world over, that families in cities, whole family names, die out in two or three generations; it has been stated that it rarely happens that a grandchild reaches maturity in Paris; scarcely a dozen of the same prominent family names are found in the New York City Directories of 1868, which were in the directory of 1802—just two generations ago; and but for the replenishment of lads from the country, the progeny of hard out-door workers vigorous of stomachs, eliminating carbon largely, so as to give power to produce children of robust health, New York would be almost depopulated in a comparatively short time. These are serious truths, and to antagonize such results, let every child born in New York, and whose father and grandfather were born in New York, be sent to the country during the first month of its life, to be brought up to out-door labor, so as to renew the constitution. The intelligent reader will feel a very deep interest in these statements, and will regard them as general truths, to be modified by antagonizing circumstances, but not the less true and practical for all that. Let us recapitulate. As much heat or carbon is absorbed by a tree during its growth, as it will give out when it is burned, so as much bodily and nervous energy will be given out by a man, as the carbon contained in the food which he eats will supply.

But it does not follow that the more a man eats the more carbon will he absorb, and, consequently, the larger, stronger, and more intellectual will he become; these depend on the healthful vigor of his digestion, because it is this which prepares the food for the separation of the carbon in it, previous to its absorption into the system; and as an active out-door life is the best means known for securing a perfectly healthful digestion, the inference is fair, logical, and legitimate, and observation will prove its truthfulness, that out-door activities, for the first thirty years of life, at least, are very certain to be followed by high health, bodily power, intellectual

ability, and long life; this intellectual activity being greater or less, according to the greater or less size of the brain proper, which is that portion which lies in the front and upper region of the head.

The mind acts on the body through the brain, making the brain in the nature of a machine, whose working involves waste, and the necessity of repair or renewal, as oil to the wheels of vehicles of locomotion; this renewal is made from the food we eat; the faster a physical machine runs, the faster will it wear out, and there is no help for it; but the human machine had Divinity for its architect, and it does not follow that the faster or more vigorously it works, the more intense the thoughts and sensations, the sooner will it decay; but it only follows that the harder a man works, or thinks, or the more intense are his sensations, the more nourishment must be given to the muscles which work, and to the brain, through which comes our sensations; that is, the more carbon must be supplied to the system; and as was before noticed, that the greater the amount of carbon supplied, the larger was the tree, the greater the animal, the more vigorous the action of the brain—the mental work, it therefore follows that the human machine increases its physical and mental capabilities by the very increase of its activities; that the more a man works, the more and better he can work; the more he thinks, the more and better he can think; hence, the busiest men live the longest, whether it be physical or mental industry; thus, Newton, and others of the greatest intellects in physics, in theology, and in ethics, have lived to a good old age.

But it is a beautiful thought, and suggestive, too, that man expends his carbon in two directions; through the muscles, enabling him to work a great deal; and through the brain, enabling him to think a great deal; if expended equally in these two directions, a man becomes a good worker and a good thinker; but if he would become the best worker, the excess of carbon must be expended through the muscles; if, on the other hand, he desires to excel in the world of thought, he must expend the greater share of his carbon through the brain.

But another beautiful thought must not be omitted. A good digestion takes the carbon out of the food eaten and throws it into the circulation, the blood; but throwing coal into a furnace will not warm the house, the fire must be kindled; the coal must burn, and its burning gives out heat; this is called combustion; the body is the furnace, the carbon put into it by eating, is its coal or fuel, but it must be kindled, must be set on fire by having oxygen introduced: we know that a fire will not burn unless the air can get to it and supply it with its oxygen; so, also, will not the carbon in the blood kindle into warmth and heat, unless a plenty of good air is introduced into it, which is done by breathing it into the lungs, where all the blood goes, and so, being brought into contact there, the oxygen of the air and the carbon of the blood join, and combustion is the result, giving out heat, fire, warmth; and as the out-door air is the purest, freshest, and best, the more we are out of doors, the more oxygen we get, the more perfectly the carbon is burned, and the greater the amount of healthful heat is there in the system.

We all know that the harder we work, the sooner we get tired and the more hungry we become; and students at school, and academy, and college, know very well that they grow weak by hard study; and that their appetites become so imperative and exacting sometimes, late at night, that remorseless contributions have been made on neighbors' corn cribs, dairies, orchards, melon patches, and henneries. Who does not now feel that we have made "the correlation of the mental with the physical forces" as plain as a pikestaff, and very interesting, too; that shows our genius. Reader, don't you feel that it is a plain matter, after all? Any body can make an egg stand on end, after a Columbus has shown him once how to do it!! But O, how little of the immeasurable world of truth does any man know, do all men know! Balloons for ordinary traveling purposes may yet be contrived; some may think that a man may, sometime, travel as fast as a telegram, and who knows but that the science of "mind and charcoal" may be so systematized, that a man may prepare himself for a specified amount of labor by eating a specific food of a specific quantity, may graduate the intensity of his sensations by the measure of his meat; and when conscience reproves him for the meanness of marrying that pretty girl for her money, he may excite a pure and disinterested and raging love, by the articles ordered from Professor Blot!!

## POMADES AND OILS.

According to ancient writers, unguent, pomatum, ointment are synonymous terms for medicated and perfumed greases. Among Biblical interpreters, the significant word is mostly rendered "ointment;" thus we have in Prov. 27:9, "Ointment and perfume rejoice the heart;" in Eccles. 9:8, "Let thy head lack no ointment." "The sons of the priests made the ointments of the spices" (1 Chron. 9:30); "Hezekiah was glad, and showed them his treasures, his spices, and the precious ointment" (Isa. 39:2).

Oiling and greasing the hair is a custom pretty nearly universal among the people of all civilized nations. There are oil-glands on the scalp, but their power of secretion is very slight, except in a few rare instances; in these cases the hair is said to be naturally moist and soft. The general rule is, that the hair grows harsh and "dry" for the lack of natural oily secretion, hence the instinctive application of an artificial oil, a practice hallowed by its ancient custom, and sanctioned as "necessary," from the court beauty of St. James's to the belle of equatorial Africa. M. Du Chaillu, speaking of the use of njavi oil by the natives of Goumbi, says:

"They mix the njavi oil with a kind of odoriferous powder called *yombo*, and this mixture is then applied in great quantities upon their wool (*i. e.*, hair). They think it gives out a pleasant fragrance, but I differ from them."

Now, oiling the hair, besides making it glossy and soft, has the infinite benefit of rendering it "uninhabitable;" a consideration too often neglected in schools, and similar institutions.

The name of pomatum is derived from *pomum*, an apple, because it was originally made by macerating over-ripe apples in grease.

If an apple be stuck all over with spice, such as cloves, then exposed to the air for a few days, and afterwards macerated in purified melted lard, or any other fatty matter, the grease will become perfumed. Repeating the operation with the same grease several times produces real "pomatum."

According to a recipe published more than a century ago, the form given is:

"Kid's grease, an orange sliced, pippins, a glass of rose water, and half a glass of white wine, boiled and strained, and at last sprinkled with oil of sweet almonds."

The author, Dr. Quincy, observes, that "the apple is of no significance at all in the recipe," and, like many authors of the present day, concludes that the reader is as well acquainted with the subject as the writer, and therefore considers that the weights or bulk of the materials in his recipe are likewise of no significance.

Perfumers, acting by experience or Dr. Quincy's advice, pay no regard to the apples in the preparation of pomatum, but make it by perfuming lard or suet, or a mixture of wax, spermaceti, and oil, or some of them or all blended, to produce a particular result, according to the name that it bears.

The most important thing to consider in the manufacture of pomatum, &c., is to start off with a perfectly inodorous grease, whatever that grease may be.

Inodorous lard is obtained thus:

Take, say, 28 lbs. of perfectly fresh lard, place it in a well glazed vessel, that can be submitted to the heat of a boiling salt water bath, or by steam under a slight pressure; when the lard is melted, add to it one ounce of powdered alum and two ounces of table salt; maintain the heat for some time, in fact, till a scum rises, consisting in a great measure of coagulated proteine compounds, membrane, etc., which must be skimmed off; when the liquid grease appears of a uniform nature, it is allowed to grow cold.

The lard is now to be washed. This is done in small portions at a time, and is a work of much labor, which, however, is amply repaid by the result. About a pound of the grease is now placed on a slate slab, a little on the incline, a supply of good water being set to trickle over it; the surface of the grease is then constantly renewed by an operative working a muller over it, precisely as a color maker grinds paints in oil. In this way the water removes any traces of alum or salt, also the last traces of nitrogenous matter. Finally, the grease, when the whole is washed in this way, is remelted, the heat being maintained enough to drive off any adhering water. When cold it is finished.

Although purifying grease in this way is troublesome, and takes a good deal of time, yet, unless done so, it is totally unfit for perfuming with flowers, because a bad grease will cost more in perfume to cover its *mal odeur* than the expense of thus deodorizing it. Moreover, if lard be used that "smells of the pig," it is next to impossible to impart to it any delicate odor; and if strongly perfumed by the addition of ottos, the unpurified grease will not keep, but quickly become rancid. Under any circumstances, therefore, grease that is not perfectly inodorous is a very expensive material to use in the manufacture of pomades.

In the South and flower-growing countries, where the fine pomades are made by enfleurage, or by maceration, the purication of grease for the purpose of these manufactures is of sufficient importance to become a separate trade.

The purification of beef and mutton suet is in a great measure the same as that for lard; the greater solidity of suets requires a mechanical arrangement for washing them of a more powerful nature than can be applied by hand labor. Mr. Ewen, of Garlick Hill, who is an extensive lard and fat purifier in London, employs a stone roller rotating upon a circular slab; motion is given to the roller by an axle which passes through the center of the slab, or rather stone bed, upon which the suet is placed; being higher in the center than at the sides, the stream of water flows away after it has once passed over the suet; in other respects the treatment is the same as for lard. These greases used by perfumers have a general title of "body," tantamount to the French nomenclature of *corps;* thus we have pomades of hard corps (suet), pomades of soft corps (lard). When drawing *extraits* from the enfleuraged grease, such as *extraite de violette*, jasmin, the pomades of hard corps are to be preferred; but when scented pomade is to be used in the fabrication of unguents for the hair, pomades of the soft corps are the most useful.

The following process of purifying grease prior to enfleurage has been expressly written for this work by M. Auguste Bermond, of Nice:

"Take one hunredweight of perfectly fresh grease, either of lard or beef suet; cut the grease into small pieces, and pound it well in a mortar; when it is well crushed, wash it with water repeatedly, so long, in fact, until the water is as clear after withdrawing the grease as before it was put in. The grease has now to be melted over a slow fire, adding thereto about three ounces of crystallized alum in powder, and a handful of sea salt (common salt); now let the grease boil, but allow it to bubble for a few seconds only; then strain the grease through fine linen, into a deep pan, and allow it to stand, to clear itself from all impurities, for about two hours. The clear grease is then again to be put into the pan, over a bright fire, adding thereto about three or four quarts of rose water, and about five ounces of powdered gum benzoin; it is allowed to boil gently, and all scum that rises is to be removed, until it ceases to be produced; finally the grease is put into deep pans, and when cold taken carefully off the sedimentary water; it is then fit for use, and may be kept for an indefinite period, without change or turning rancid."

It will be observed that the principal feature in this process is the use of benzoin.

Dr Redwood has recently directed the attention of chemists to the fact that certain ointments, particularly zinc ointment, will not become rancid, if a little gum benzoin, or benzoic acid, is added to it when made; that such is the case there is little doubt, for it has been remarked that the prepared fat used by the flower farmers in the process of enfleurage will remain sweet for some years, provided that it be digested for a time over gum benzoin, in the process of its purification,—a practice that has been generally worked for this century at Grasse, Cannes, and Nice. It therefore only becomes only a question of experiment, to determine whether benzoin be a true antiseptic to all fatty bodies.

Pomade called Bears' Grease.—The most popular and "original" bears' grease is made thus:—"Huile de rose, Huile de fleur d'orange, Huile d' acacia, Huile de tubereuse and; jasmin—of each, ½ lb; Almond oil, 10 lbs.; Lard, 12 lbs. Acacia pomade, 2 lbs.; Otto of bergamot, 4 oz.; Otto of cloves, 2 oz. Melt the solid greases and oils together by a water bath, then add the ottos." Bears' grease thus prepared is just hard enough to "set" in the pots at a summer heat. In very warm weather, or if required for exportation to the East or West Indies, it is necessary to use in part French pomatums instead of oils, or more lard and less almond oil.

Circassian Cream.—Purified lard, 1 lb.; Benzoin suet, 1 lb.; French rose pomatum, ½ lb.; Almond oil, colored with alkanet, 2 lbs.; Otto of rose, ½ oz.

Balsam of Flowers.—French rose pomatum, 12 oz.; French violet pomatum, 12 oz.; Almond oil, 2 lbs.; Otto of bergamot, ½ oz.

Castor Oil Pomatum.—Tubereuse pomatum, 1 lb.; Castor oil, ½ lb; Almond oil, ½ lb.; Otto of bergamot, 1 oz.

Marrow Cream.—Purified lard, 1 lb.; Almond oil, 1 lb.; Palm oil, 1 oz.; Otto of Cloves, ½ drachm; Otto of bergamot, ½ oz.; Otto of lemon, 1½ oz.

Marrow Pomatum.—Purified lard, 4 lbs.; Purified suet, 2 lbs.; Otto of lemon, 1 oz.; Otto of bergamot, ½ oz.; Otto of cloves, 3 drachms. Melt the greases; then beat them with a whisk, or flat wooden spatula, for half an hour or more; as the grease cools, minute vesicles of air are inclosed by the pomatum, which not only increase the bulk of the mixtures, but impart a peculiar mechanical aggregation, rendering the pomatum light and spongy; in this state it is obvious that it fills out more pots than otherwise, and hence is more profitable.—*Piesse.*

## THE CLOCK.---HOW TO USE IT.

A clock is a machine composed of wheels and pinions, to keep up the oscillations of a pendulum.

The wheels of a clock are made to revolve by means of a weight or spring called the maintaining power. This power must be sufficient to overcome the resistance of friction, to move the wheels, and to maintain the motion of the pendulum. The wheels of the clock are connected to the pendulum by pallets, which, at the same time that they check the impetus of the wheels, receive their impulse to keep up the motion of the pendulum.

The escapement of a clock is that part by means of which the rotary motion of the escape wheel is made to produce an oscillating motion in the pendulum. Clocks are made with different kinds of escapements: the recoil or common pallets, the dead beat, and the free or detached. They are also made with the lever and pallets similar to watches, for clocks subjected to different motions, such as for ships' use, railroads, etc.; but these last are never made with a pendulum, but with a balance. Ordinary clocks, to which attention has been paid to the proper action, measure time more accurately than watches, the continuance of motion in the pendulum being better understood, and its irregularities more easily corrected than those of a balance. Long pendulums are preferable to short ones, for the greater the length the slower the motion, therefore error is less in a long pendulum. Heavy pendulums are the best, from being less under the variable influences of the impelling power, they are also less liable to be effected by external motion.

A light pendulum shows a clock badly constructed, or deficient in the power necessary for good performance. On selecting a clock, it should be observed whether the pendulum occupies the whole available length of the case; if not, it shows inattention to this advantage. The only exception to this rule is regulators and clocks which have the pendulums beating seconds, and measuring three feet three inches in length; this length is sufficient to insure accuracy. Although weight is preferable to spring as a maintaining power, yet fashion, perhaps, more than convenience, has caused a greater demand for spring clocks. Those which require to be wound oftener than once a week, having a less marked time, are objectionable from the same cause. Clocks are frequently made to go only thirty hours, on account of cheapness, and will keep tolerably good time; but those going eight days are to be much preferred, as in winding it will frequently alter the time a trifle. Small clocks have short pendulums, and from their lightness are liable to be stopped; they should therefore be made as heavy as convenient, and when lead can be put into the case to add to its weight, there is less risk of it being moved accidentally. The additional weight also steadies the suspension, and produces more equal motion in the pendulum, but when the expense can be incurred, it is better to have small clocks made with a balance, as they can be moved with-

out disarrangement. In moving a clock without a pendulum, be particular after you have placed it where you wish it to stay, to listen if the beats are regular; if not, you must make them so by either raising or lowering one side of the clock. Should it be a hanging clock, something should be put at the sides to keep it steady, and in its place, otherwise frequently in winding it, it may get disarranged from its beats, and stop. The heavier the pendulum is, the better it must be in beat. Clocks on brackets, or on feet, for mantels, etc., can be put in beat by raising or lowering one side to make it beat regular. Clocks are regulated by lengthening the pendulum to make them lose, and by shortening it, make it gain. This is done either by the insertion of a key to turn an arbor or square, which lengthens or shortens the pendulum, or by turning a nut for the same purpose. Nearly all the French clocks have the pendulum hung on a fine spring; these mostly regulate by a square at the top of the dial; others have them hanging on a piece of silk, with one end fastened around a wire, which is turned either from the back of the clock by a knob at the end of the wire, around which the silk winds itself, or else by a square, to which a key is fitted in the front part of the clock.

All clocks, whether regulated from the back or front, are made to gain by turning the key or nut to the right, the way in which the hands are set forward, and the contrary to make it go slower. When the screw is under the weight of the pendulum, it is also turned in the same direction; but when the screw is above the weight, the rule is reversed. Do not move the hands of your clock back past the twelve, or you will disarrange the striking; the hands can be moved rapidly forward until they are made to correspond with the hour struck; or the minute hand may be advanced to within two or three minutes of the hour, and then brought back sufficiently to allow the clock to strike, this is repeated until the hour struck is the same as shown by the hands, which should be set forward to show the proper time, suffering each intervening hour to be struck progressively. This applies to French clocks, and to most of the American ones; some, however, are made with a small rod in the case, under the dial, which, by being pushed or pulled, will make the clock strike; in this case, make it strike each hour separately, until you get it correct. But should the hours not strike regular in succession, then show it to some clockmaker, for there is a defect which he can correct.

The hands of English clocks may be turned either way without injury, the same as with a watch, except when having an alarm.

This is all that suggests itself to me as being useful to the public, except this caution: if there is any thing that you do not understand when a clock is out of order it is better to apply to a clockmaker than to attempt to correct it yourself, as by so doing you make bad worse, and increase the cost of repairing.—*H. F. Piaget.*

## THE WATCH---ITS HISTORY AND MANUFACTURE.

BY H. F. PIAGET.

### No. 6.--Conclusion.

NECESSARY PRECAUTIONS AND ADVICE TO PERSONS WEARING WATCHES.

The watch requires care, and it is not enough that the maker is one of character, and that a proper price has been given for it, unless necessary precaution is taken to insure good performance. The watch should be regularly wound up as nearly at the same time as possible, since few springs are so equally adjusted as to pull with the same force during the whole time of action, which is usually about thirty hours; therefore by winding every twenty-four hours, it will leave six hours for the weakest part of the spring to remain idle.

Always have a key with a good pipe or square, and one that fits properly on the square of your watch, for if it does not fit good and firm, it will be apt to slip, often breaking either the chain, the ratchet, or the click. If the square of your watch is too short, or worn nearly round, get a watchmaker to repair it, or make a new one. Be particular to wind your watch the proper way. English watches, or those with fusee and chain, usually wind to the left, and almost all the Swiss ones, or those with the going barrel, wind to the right. While being wound, the watch should be held steadily in one hand, so as to have no circular motion, which always produces variation of the vibration of the balance, and sometimes considerable derangement in the escapement. It is better to keep a watch continually going, than to lay it by and wind it up occasionally. The going of the watch keeps the oil in a limpid state, and the watch keeps its regulation better. Many will (when their watch is first wound up, after having lain by for some time) say, "I have not wound or used it for so long." They do not consider that the oil will thicken or evaporate, and cannot be in the same state as if the watch was kept going regularly. Always wind steadily and slowly, holding on the key to hold the spring while the click slips from one tooth to the other, otherwise there is danger of breakage of chains, clicks, ratchets, etc. The click chain or spring is sometimes broken by winding a watch too fast. When a watch stops in winding it, if in one with a chain, it is frequently by the going fusee works not being correct, or it may stop by the escapement not being correct. In a watch without a chain, it may also be by some defect in the escapement, or by the stop works on the barrel being out of order; in either case, take it to a watchmaker.

Watches frequently stop by the springs breaking, owing to the changes of the atmosphere, particularly in cold weather. That is one of the accidents which cannot possibly be avoided by the best workmen, and in the very best watches. It is impossible to make a main spring which will not be influenced by the sudden changes of the weather. Therefore, if the spring of your watch breaks, do not blame the watchmaker, as they often break from the same cause while the watch is in his care. I have frequently, on taking watches out of the safe in the morning, that had been put in, in good order on the previous evening, found several with the springs broken; in that case, it is generally more loss to the workman, than to the wearer of the watch.

Be not afraid that your watch will not go as well after a new spring has been put in as before; if a good new spring has been properly put in, your watch will go as well as ever.

English, or watches with chains, will usually wind about four and a half turns to every twenty-four hours, while those with a going barrel about three and a half turns; this will partly serve as a guide to ascertain if your watch winds right.

If the springs or chains break frequently, be sure there is some defect in the stop work, which must be corrected by a watchmaker.

Many persons say, "I have overwound my watch;" it may be possible to do it in winding very fast, and in a hurry. If the stop works of a large and thick watch, or one with a chain are in order, it will take a strong key to resist the strain that you can give to overwind it. If not in order the chain will break. In a flat watch, or one with a going barrel, if the stop works are not in order, or there is only one, or perhaps none, and you force it, you will break the spring, or some of the teeth of the wheels, or pinions, and sometimes both; if when the spring is broken you keep winding, you are likely to break or injure some other parts of the works.

Be particular never to trifle with a good watch, or use it as a toy, but as a piece of delicate and complicated mechanism, requiring great care; by so doing, you may preserve your watch, and avoid a great deal of expense for repairs.

Before winding or setting your watch, it is advisable to see that the key and the inside of the pipe contain no dirt or dust that may get on the winding or setting square, and from thence to the wheels or escapement.

When a watch is hung up, it should be perfectly at rest. If hung on a round hook without further support, the motion of the balance will generate a pendulous motion of the watch, and will cause much variation in the time. Powerful watches should never be laid horizontally, unless placed on a soft substance; if placed on a smooth flat surface, from the convexity of the glass or case, the watch only rests on a point, and the vibration of the balance alone is sufficient to produce motion in the watch.

Should a watch stop, see if the hands rub on the dial, and are free of each other, if they are caught together you may free them yourself by taking the point of a small knife blade, and disengaging them; your watch, if there is nothing more the matter with it, will then start by giving it a slight shake.

Frequently after a watch has had a new glass put in, it will stop; that is through the glass being too flat, and touching either on the center pinion, or by pressing on the hands; in that case, blame the person who put the glass in, and let him put another in; if there is not, as in very flat watches, room enough for the hands to work free of each other, it will often be advisable to have the cover of the case raised a little; in thin watches, the case may have been pressed flat in the center by wearing.

If anything is the matter with your watch which you cannot discover immediately, do not try to put it in order yourself, and meddle with the works, but show it at once to a good watchmaker. I have had watches to repair in which the wearer thought he could detect the defect himself: in opening it, he would see the spiral spring, and think that it was some hair which had no business there, and in trying to remove it, would spoil or break it.

Many watches are injured by the wearers thinking that they can make them go by opening, winding, and shaking them.

Watches should be opened as little as possible, merely to wind, set, or regulate them. By continually opening them, particularly in the inside cap, opportunity is offered to minute particles of dirt from the case, or otherwise, to intrude into the works. I have known many watches which had been recently cleaned, stopped by some small particle of dirt sticking fast between the teeth of some of the wheels, particularly near the escapement.

Should a watch get wet by falling in the water or otherwise, if you are not near a watchmaker, as soon as possible open it, and pour in some oil, any kind will do in an emergency, but olive oil is the best; as soon after as convenient place it in the hands of a watchmaker, and if attended to in time, the whole movement, or at least many parts may be saved. If left too long without oil, to prevent rusting, particularly if wet with salt water, the steel works will be past repair.

If a watch is not regular in its vibrations, which can be discovered by any one having a good ear, take it to a watchmaker, and let him correct it. This only applies to the verge, cylinder, anchor, or lever watches; in the duplex and chronometer escapement, the beat or vibrations being very different, none but an experienced watchmaker will know if they are right; with these last escapements, the ear is not to be depended upon entirely.

In setting your watch to time, be particular to do it as follows:—When the hands set from the front part, which may be known by noticing a square above the minute hand, always set them with the key on the square; never do it by pushing the hands, as in most cases you would break or bend them. In Lepine watches, or in any of those setting from the back, the minute hand is fitted on a round pivot, instead of a square, and by pushing it you would be sure either to loosen, break, or disarrange the minute from the hour hand, so that they would neither perform together, nor point right.

When the hands of a watch set from the back, which can be easily ascertained by there being two holes to the inner back of the case—one to wind the watch, the other in the center for the hands—take your key, and putting it on the square in the center, you then can turn the hands as you wish. But do not open the glass, as, in very flat watches, it will frequently break or fall out, and will cause trouble to replace it.

In independent seconds watches, there are four holes in the back—one to wind the regular time or watch part, one to set it, one to wind the seconds part, and one to set that also.

Many persons think it injures a watch to set it back; it is a mistaken idea, as a watch will not be injured by it unless the pinion which carries the hands turn hard, in which case it would injure it as much to turn it forward as to set it back; and recourse must be had to a watchmaker.

Sometimes the pinions of the hands are too loose, and are too easily moved; the watch will then continue to go, but the hands will not mark the correct time. This can be easily remedied by a watchmaker, who will correct it without taking all the watch apart. Where the case opens at the inner back, care must be taken to close it well, as otherwise the outer back will not shut down properly, and thus dust will be allowed to accumulate in the works.

In English watches, if you have to take off the cap to regulate them, or for any other purpose, in replacing it be sure to put it on straight or flat. I have seen many watches that, by the cap being put on sideways, the chain has been pushed flat on the barrel; the consequence being, that in winding, the chain will either slip off the cone of the fusee, or break. After it is in its place, be sure to fasten it properly by the spring at the top of the cap. If the spring does not hold it down properly, recourse must be had to a watchmaker. If the cap is not properly fastened in its place, the watch will be in danger of stopping by the balance touching it. Sometimes the chain will slip off the cone of the fusee in winding. This is a very bad defect, as the more it happens the more it wears the groove out in which the chain works. In this case, recourse must be had to a watchmaker to correct it, or to put on another chain; at other times, the chains, particularly in cheap work, are too brittle, and continually break. It is useless to mend them. It would be better to put on chains of better quality. The English chains are the best, and not so brittle as the Swiss ones.

Particular care should be taken to keep the works of a watch clean, even though perfectly free from dust; they ought to be taken to pieces and cleaned when the oil has become dry, as, without this precaution, the best watches would be spoiled. They are good watches that will continue to go, until friction and wear prevent their going any longer; they are the most liable to be neglected.

Watches, under ordinary circumstances, should be cleaned every second or third year at furthest. Those that are small and flat, or have complicated works, require cleaning more frequently. Neglect in this particular is the reason why many imported watches are injured by not being attended to in time, and having the oil changed. They may have been made some time previous to being sent out; then the journey here, then from the importers to the dealers, where they may lie for a long time before being sold; so that years may possibly elapse before the wearer has it in his pocket. Therefore, is it to be expected that the watch can perform correctly? If it does, all the time you keep it going, you are only causing it more injury.

No good watchmaker will allow a watch to go too long without changing the oil.

When an accident has happened to a watch, or even if it simply requires cleaning, care should be taken to place it in the hands of an honest and competent workman.

The possessor of a good picture would doubtlessly inquire into the ability of the artist before he entrusted it to him to retouch. This caution is equally necessary for a watch, as many of the best construction have sustained irreparable injury at the the hands of unskilled workmen. Even inferior watches, which are by far the greater number, require the aid of better hands to repair than those that constructed them. A good watchmaker may, in some cases, by judicious alterations, and giving a due proportion, make a watch perform tolerably well, which a bad workman never can do, as he does not understand the principle of the machinery he is working at, and will more frequently make such alterations only to make bad worse.

If the watch does not go its full time, from twenty-eight to thirty hours, there may be some defect in the stop work which prevents it winding up in full, or sometimes the hook at the end of the spring may break and the watch still continue to go for some time after. If the spring is broken toward the center, the watch cannot go; hence the difference. You must apply to a watchmaker, who can soon find out the difficulty. Frequently, after being repaired or cleaned by even the best workman, a watch will, when worn, require a little attention to its regulating. The watchmaker cannot wear all the watches he has to repair; neither can he know the different habits of his customers.

Many persons will say—"I have had my watch repaired, and it does not keep time." It is often an injustice to a good workman who may regulate a watch very closely while in his hands, but when worn by the owner, and the different way in which he uses it, causes it to vary; therefore, it will be necessary to attend to it, and, should it vary, alter it according to the wearer's use of it.

Almost every careful person can regulate his own watch as well as the watchmakers, who frequently alter so many, that they may forget how much and when they altered the regulator of your watch. I have often asked persons when

they wished to have their watches altered, when did you set your watch? The answer frequently is—"I forget exactly; it may be about a week or ten days." In that case, how is it possible to know how much to move the regulator? It is essential, in order properly to regulate a watch, to do it at stated times.

Swiss Regulator.

If your watch is a French or a Swiss one, and loses time move the curb or regulator towards the F or A to make it go faster; if it gains, towards the S or R to make it go slower. These letters are engraved on every French or Swiss watch, F signifying fast, and A advance, and S signifying slow, and R retard, although on most of those made now, they are engraved in full, slow and fast. In English watches with caps, the regulator is either on the cock or on the plate, and you will generally find them engraved on the plates in full—Slow and Fast. Move the regulator but very little at a time, until you get it right, but be sure and set it by the same timepiece, and by one that can be depended upon.

London Regulator.

Liverpool Regulator.

The correct time can always be found at any respectable watchmaker's. If you have moved the regulator or curb as far as it will go, and your watch is not regulated, you must take it to your watchmaker, who will either lengthen or shorten the hair-spring, and put the curb in the center, where it ought to be. A watch regulated to keep time in the pocket, will, when not worn, gain a minute, and perhaps more, per day. The regulator must not in this case be altered, as the watch, when again worn, will lose as much as it had previously gained. Should a watch which has gone well for some time suddenly vary a little, without change in the temperature, the hands only should be set, as the irregularity may have been produced by some external motion.

Few watches are correctly compensated for the effects of heat and cold, and changes of the temperature will produce corresponding variation in the rate of going. If, therefore, a watch has been exposed to a greater degree of heat or cold than usual, the hands may be set to time, but the regulator should not be altered. A watch should be made to go to time at the ordinary temperature of the season. Cold will cause it to gain, and heat will cause it to lose; thus a little attention will enable the wearer to know when it is necessary to alter the regulator.

Should your watch suddenly gain from one to two hours a day, which is sometimes the case after a watch has had some very severe motion, such as a fall, a blow, or a sudden jerk, let a good watchmaker see to it, and he will show you that two turns or coils of the spiral or hair spring have come together between the pins of the curb, and giving the balance a very quick and short motion, has caused it to gain so suddenly.

The same jerk, or falls, etc., may, on the contrary, have caused the spring to get out of the regulating pins, and then the watch would lose considerably. Any honest watchmaker will correct it for you in a few minutes at a trifling charge. But if this defect happens frequently, or a slight jar causes it, there is a defect either in the curb or in the spiral spring, which must be corrected; or, if the curb moves too easily, that, too, must be corrected, as it may be moved by external motion; then it would be impossible to regulate your watch

Watches that stop when being worn, and go on again when taken out of the pocket, without any apparent cause, have sometimes a defect in the escapement which none but a good workman can correct. Another fault with some watches—particularly with cheap ones—is, that the balance is too heavy for the power of the main spring after the watch has gone for some time. The proper manner, and which I consider the only effectual means of remedying the defect, is to lighten the balance and put in a new spiral spring that will regulate the watch. Other means are frequently used, such as new main springs, etc., but, after a time, they will again have the same defect, although frequently, if the main spring is not properly tempered, it will set in the barrel and lose its power. In that case, the defect can be remedied by putting in a good new main spring. I do not by this advocate light balances for good time-keepers. For correctness, they must be as heavy as possible, so that the balance can have a good motion; they regulate better, but all the other parts must be well proportioned, and made on good principles. Some watches, even though uninfluenced by a change of temperature, are liable to a variation from the change of position.

There are some so favorably disposed to their watches as to describe them as keeping time within a minute for months, under all the circumstances of change of place, temperature, and irregular motion. They are excelled by others who say that their watches keep exact time with the sun, notwithstanding its well known irregularity.

Watches have been known to keep their rate for many months, even when subjected to jolting, hard riding, etc., but accuracy under such circumstances is accidental.

The extreme accuracy of marine chronometers is partly produced by their being constantly kept in a horizontal position. Their construction is the same as a pocket chronometer (except sometimes in the spiral spring), from which they differ but in size.

Marine chronometers are only required to show equal time; whether they gain or lose is of no consequence, provided they are regular and keep their rate.

Sir John Herschell has well said: "From the great perfection of the art, we have a right to expect wonders, but not miracles." If, therefore, a watch which measures time from the equal and undisturbed vibration of the balance, were to perform correctly under all the jerks and various motions to which it is liable when carried in the pocket, it would be more than wonderful. Many accidents and unavoidable derangements may happen to a watch, which could not be explained here without extending this essay far beyond its prescribed limits, and which can only be detected by a good and practical workman.

### Commencement of the University Law School

The annual commencement of this institution was held on Thursday evening, May 28th, in the chapel of the University building, Washington square, New York city. There was a large attendance, and the proceedings, which consisted of music by Dodworth's band, addresses, and other exercises usual on such occasions, were very interesting and attractive. Among the ten graduates upon whom degrees were conferred by the venerable Chancellor Ferris, were Messrs. A. V. Briesen and W. F. McNamara, employés in the Patent Soliciting Department of this office.

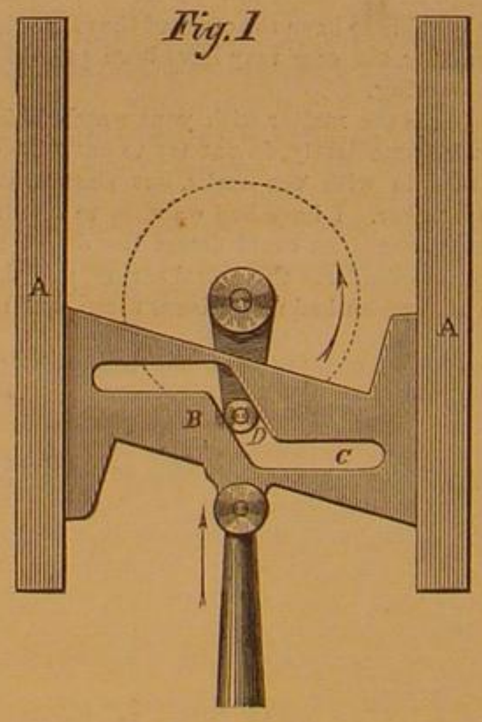
### New Method of Converting a Reciprocal or Oscillatory Motion into a Rotary Motion.

Some years since, a gentleman of our acquaintance had occasion to devise some way of converting the motion of an oscillating arm into a rotary motion, and for certain reasons he could make use of none of the known devices. A flywheel was out of the question. The ratchet and pawl movement made too much noise in working. The rotary motion required was very slow, and not desired to be perfectly continuous and uniform, so long as a rotation could be depended upon for each oscillation of the arm.

After much thought he at last invented the movement which we now, with his permission, give to the public, as it may prove a useful contribution to the stock of devices for generating circular motion from reciprocal. The device has been in operation for more than two years, and has been found to answer the required purpose perfectly, the object being to impart to a registering train of clockwork, and to record the number of oscillations of the arm alluded to. The invention has not been patented, and may be used by any one who may find it serviceable.

Fig. 1 is an illustration of the apparatus for converting a rectilinear reciprocating motion into a rotary. A A are guides for the reciprocating block, B, in which is cut the slot, C, in which slides the crank pin, D. The slot is so cut that no portion of its sides can ever be a tangent to the circle described by the crank pin. The directions of the motions of the crank and block are shown by the arrows. If the position of the

*Fig. 1*

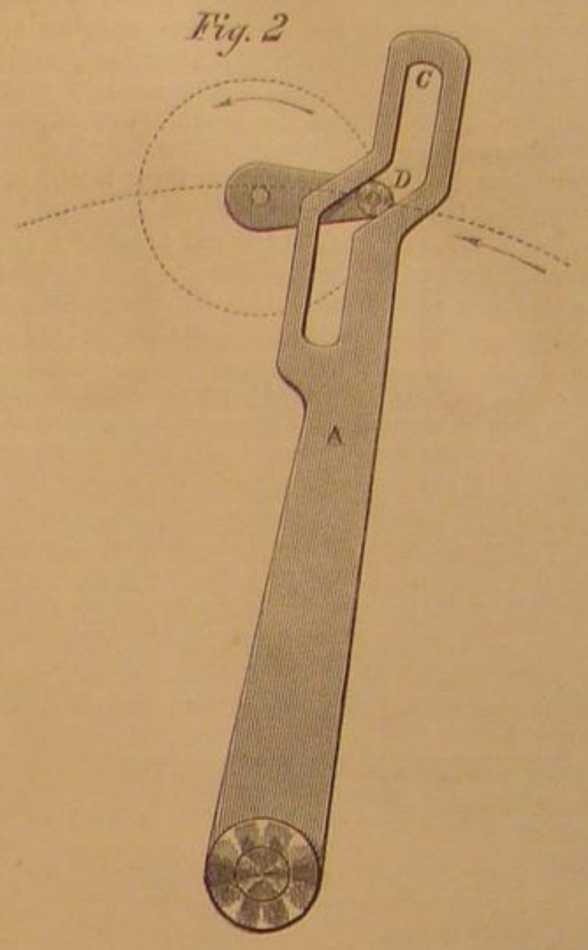



block were reversed, the direction of the rotation would be reversed. To work well in any position, the crank should be balanced so as to have no tendency to turn by its own weight.

By inspection of the figure it will be seen that there is no point in the revolution of the crank where it will not be moved by the motion of the block; that it will pause at the end of each semi-revolution, but that it can rotate only in one direction.

Fig. 2 represents the modification of this device for an oscillating arm. The arm, A, is shown moving in the direction indicated by the arrow at the right of the figure. The crank pin, D, is passing over an inclined portion of the slot; when it has reached a vertical position it will pass down the same side of the slot until the slotted arm has passed through its arc of oscillation, when it will pause at the point, D. When the arm reverses its motion, the inclined plane of the slot opposite D presses upon the upper side of the crank pin, and sliding along it, depresses it past the center. The crank pin passes down the same side of the slot until the crank has assumed a vertical position below its center, then up along the same side again until the arc of oscillation has been again described, when it pauses at the angle, having completed its revolution. To work well, the distance between the center, upon which the oscillating arm performs its motion, and the center of the crank should be at least three times the diameter of the circle described by the crank pin, and the inclined planes of the slot should be in length, at least, about the distance between the center of the crank and the center of the crank pin. The angles included by these planes and the other portions of the side of the slot need to be more obtuse when the oscillating arm is used than when the reciprocating block is employed, at least enough so to bring those portions into planes parallel with a line drawn from the center upon which

*Fig. 2*




the arm makes its oscillations to the center of the crank pin. When the crank pin is fitted with a friction roller, the movement takes place without noise and without much friction: certainly much less than the ratchet and pawl movement. It also has this advantage over a fly wheel, that it can never permanently stop on the center.

The principle of this movement is, that the force is constantly applied in a line which forms a considerable angle with the radius passing through the crank pin. We have never met with this movement elsewhere, and believe it to be new. Perhaps, at some future time, we may give the mathematical relations which exist between the different parts of the device, together with rules for drawing it so that it shall work with maximum power and with the least possible friction.

### A Look into Vesuvius.

At a recent meeting of the Royal Institution Professor Tyndall was invited to state what he saw during his recent visit to Vesuvius, and he stated that he had just returned from Naples, where Sir John Lubbock and himself had been examining the phenomena of the eruptions. The country all round Naples is very smoking and hot, showing the existence of extensive subterranean fires, but they had gained no information of scientific value. On different occasions they ascended the mountain from different sides, and in one instance, when a hurricane of wind favored them, they went further than the guide would lead them, and had a look down the fiery tube of the crater itself. The wind was so strong, that on the way Sir John Lubbock was blown down flat on his face. They also explored some hot subterranean galleries in the side of the mountain, and visited the Grotto del Cano, the well-known cavern, where the floor is covered several feet deep with carbonic acid gas. The heavy invisible gas, in fact, runs out of the cavern in a great stream, and will in the open air put out torches when they are held near the ground. He repeated some of the commoner experiments with the carbonic acid gas, by collecting some in his hat, and carrying it away a litttle distance from the cave, where it was poured over lighted matches, and put out the flame. A little dog is kept near the cave to be half suffocated by immersion in the gas when visitors arrive; and Professor Tyndall protested against the cruelty of the experiment, which, he says, serves no useful purpose, and ought to be stopped.

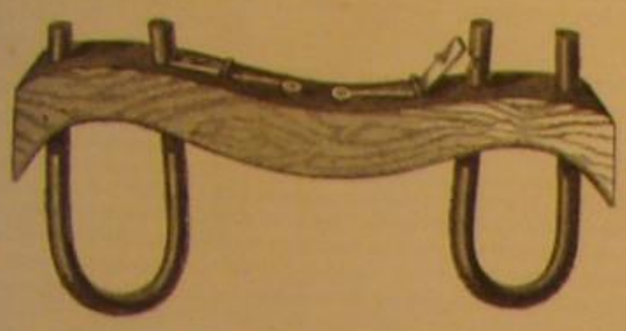
AN English gentleman, by means of a mile of insulated wire, sustained on poles one hundred feet high above the tall trees of his park, has collected, during a heavy fog, enough free electricity from the atmosphere to charge and discharge a battery of fifty jars and seventy-three square feet of coated surface, twenty times in a minute, with a report as loud as a cannon.

THE ear cannot distinguish one sound from another, unless there is an interval of one ninth of a second between the arrival of the two sounds. Sounds must, therefore, succeed each other at an interval of one ninth of a second to be heard distinctly.

IN several mines in Cornwall, England, there are galleries which extend under the sea, where the sound of the waves is clearly heard when the sea is agitated, rolling the pebbles and boulders over the rocky bottom of the ocean.

### POST'S IMPROVEMENT IN OX YOKE BOWS.

The mortise through the bow of an ox yoke greatly weakens that part, and the key sometimes gets misplaced and lost, even though attached to the yoke by a leather thong; the thong may break, and just when the key is most needed it is *non est inventus*. To remedy this is the design of the improvement shown in the illustration, patented through the Scientific American Patent Agency Aug. 13, 1867. It is so simple as to be readily understood without extended explanation. Two hinged plates are secured to the top of the



yoke, as seen, the free ends engaging with notches cut in the bow and holding it securely in place until it is forcibly raised by hand. The object and construction of the device is easily understood from the foregoing. For particulars Charles H. Post may be addressed at Guilford, Conn.

## Correspondence.

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

### Pyrites as a Source of Sulphur.

MESSRS. EDITORS:—At present, when, in consequence of the general dullness of business, the price of sulphuric acid is extremely low, it is to be regretted that manufacturers persist in the use of costly, imported brimstone, to the neglect of the excellent and cheap pyrites so abundant in this country. Their case is similar to that of the British chemical manufacturers, who persistently ignored pyrites till compelled to adopt it by the brimstone monopoly attempted by the King of Sicily, but since they have adopted it, find the benefit resulting from its use so great, that every large producer of sulphuric acid in Britain now uses pyrites as the source of sulphur.

During my experience of fifteen years in England, I have used an average of one hundred tuns of pyrites weekly, and had at least twenty different varieties of the mineral to work, and have usually found that each kind required, to some extent, a special mode of treatment to ensure the best results. When pyrites was first adopted in England, this was not understood, and, in consequence, it was no uncommon thing to find from ten to fifteen, and even more, per cent of sulphur left in the burnt ore; but as the subject was studied, and improved modes of burning adopted, this was reduced, till from one to four per cent of sulphur became the range, with an average of two to three per cent in well conducted factories. This point was not reached till much time and money had been spent in experiments, and I regret to learn that one or two manufacturers near New York have lately attempted to burn pyrites with poor success, in my opinion, owing to the to the badly constructed kilns they employed. I have seen a good deal of American pyrites, and have no doubt that those acid manufacturers who first adopt its use will obtain a great advantage over competitors in trade who continue to use brimstone. The proper apparatus for burning pyrites is not very costly, while by using it sulphur may be obtained at from one fourth to one third the cost of sulphur derived from brimstone. The quality of the sulphuric acid produced from pyrites is as good as that from brimstone, provided proper precautions are adopted to separate the arsenic, which may be easily and cheaply done. In short, the numerous objections to pyrites at present urged here, are the same phantoms which formerly haunted British manufacturers, and have been so successfully laid by a closer acquaintance with the subject.

A. G. HUNTER.

Fair Haven, Conn.

### Foreign Matter in Wood.

MESSRS. EDITORS:—I have noticed in your publications several interesting facts under the above head, and wish to add two which came to my notice. About sixteen years ago, three English bayonets were found in a tree on Staten Island. The tree was about two feet in diameter, and the bayonets were found nearly in the center, and about five feet below where the body of the tree was forked. About the same time, I saw a musket ball exposed in a pine board. The ball fitted perfectly close, the wood was solid around it, the fiber was not ruptured, neither was there the least sign of it before the board was planed, and it was evident to all who saw it that the ball could not have entered since the board had been cut from the log. The tree from which the board had been cut could not have been less than two and a half feet diameter, and the ball was about eight inches from the center.

J. NADER.

Sandy Hook.

### Improvement Needed in Railroad Management.

MESSRS. EDITORS:—Can I say a word about railroads, or is the verdict of a coroner's jury all that can be allowed, however softly worded, against the management of our railroads? Why is it that with all our inventions and improvements looking to the safety of railroad travelers and the property of shippers, the directors of our lines choose to adhere to their old-time and obsolete notions rather than give our inventors and mechanics a chance to help themselves and benefit the public, railroad directors and stockholders included?

It would seem that it would be the part of policy to have such an oversight of a track as to keep the road bed and rails in good condition; and that it would be better to use *good* iron and steel rails in preference to *poor* ones, even if the former did cost more at first. Do not our railroad companies lose by using heavy locomotives and cars and by drawing almost incalculable loads over their insufficient roads? I think it would be better to employ locomotives of from eight to twelve tuns, with cars corresponding in weight, and smaller trains, rather than to crush the rails with the enormous weight now put upon them.

"The times are out of joint." A reform is demanded, or we must all stay at home.

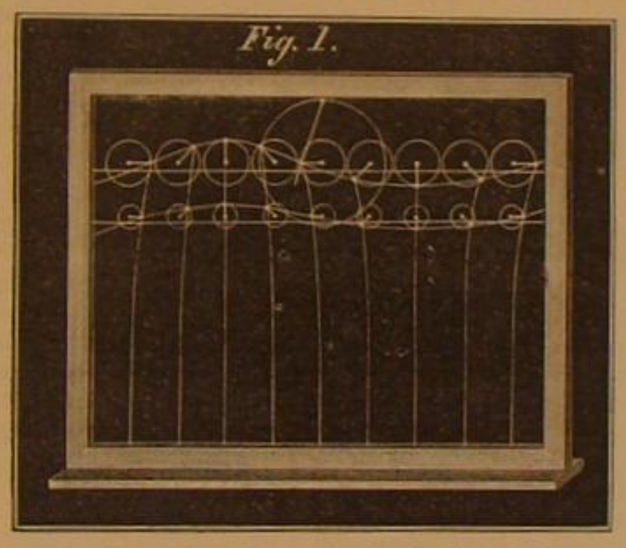
D. P.

### The Wave Theory.

MESSRS. EDITORS:—In the *American Journal of Science and Arts* for May, there is a description of a new wave apparatus, invented by Prof. Lyman, to illustrate the modern wave theory, viz., "that in wave motion all the particles of a liquid are revolving synchronously in vertical circles." The author of the article alluded to, states that, "In teaching this theory, however, it is often difficult to make pupils understand how the infinitude of simultaneous revolutions, which it supposes, can take place without mutual interference, and in such a way as to produce the observed phenomena." Now, Messrs. Editors, when I read the last quotation I was glad, for I myself have had difficulty in comprehending the new theory, and I was really beginning to depreciate my own mental capabilities, when this timely paragraph set my mind at rest. There are others who are "at sea" upon this wave theory as well as myself, and I should certainly find some in a New England University who find its comprehension difficult. It is not, then, because I read my *Silliman's Journal* in a shop, or exercise my muscles at the work bench rather than in rowing or at football, that I find difficulty in comprehending the modern wave theory. There seems to be something in the theory itself which *is* difficult to comprehend, and that necessitates the invention of special apparatus.

If you will kindly grant me space, I will here transcribe the cut and description of the apparatus from the journal referred to, and afterward explain to you the difficulties which my friends at Yale and Harvard no doubt, in common with myself, find in comprehending it. I am well aware that in your estimation an opinion, provided it be based upon sound logic, is as valuable propounded by a man in his shirt-sleeves, as though he wore a professor's gown. The mechanics esteem you as the champion of practical ideas in America, and no

*Fig. 1.*

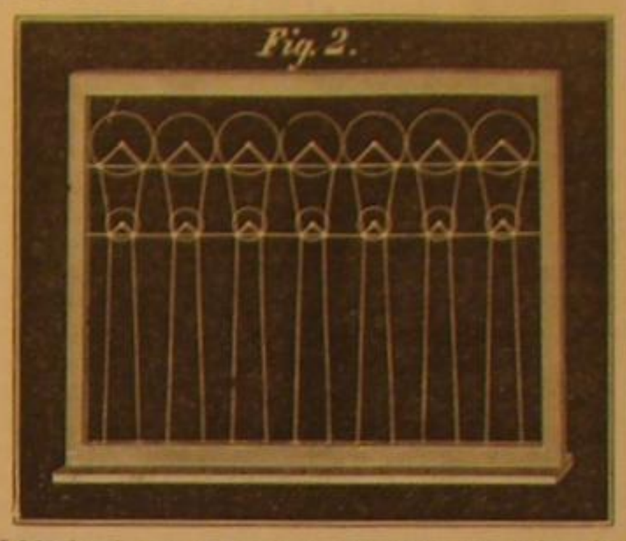


doubt the *Journal of Science* is the leader of theoretical science on this continent, and we respect it and bow to it as such; but in this case I have found a conflict between the theory and the facts (at least I am so convinced), and my experience has taught me in such conflicts to always stick to the facts.

"In front of a plane surface are two series of revolving arms or cranks, the length of the lower ones being half that of the upper. Two elastic wires connect the crank-pins of each series; upright wires also connect each pair of cranks, and pass down through a plate into the base. The cranks all revolve synchronously; they thus keep their relative position, and come into any given position successively, each in its turn. The relative position of the cranks of each horizontal series is such, that the directions of any two, in regular order, differ by the same fraction of a whole revolution, that the distance between their axes is of a whole wave length. Thus, in the apparatus, the wave length is supposed to be divided into eight equal parts, and hence the common difference between the directions of adjacent crank arms is one-eighth of a circle, as shown in the figure. The cranks in each vertical set have their positions always alike. The number of cranks, whether taken horizontally or vertically, is arbitrary—a matter of convenience in construction. The synchronous revolution of the cranks is effected by means of any suitable mechanism, such as equal toothed wheels on the several axes, with alternate idle wheels connecting them; or, equal rag-wheels, with endless chain, or metallic ribbon; or, equal cranks, with a rigid connecting frame, or plate. The first method is used in the original machine, the third in the model for the patent office, the second and third in the larger and smaller sizes, respectively, for the market.

"The crank pins represent as many liquid particles; the circles on the background their orbits. The transverse wires represent continuous lines of particles, which at rest would be horizontal, and be represented by the lines on the background drawn just below the centers of the orbits; the upper one of these being the surface line, the lower a line of particles one-ninth of a wave's length down. The upright wires represent lines of particles which at rest would be vertical. Every point in these moving lines describes its own distinct orbit. The apparatus is constructed to a scale, and so, represents a wave of given length, hight, and period; but equally represents, also, a wave of any other length and proportionate hight, though of period proper to its length, according to the law of that relation, as stated further on. In the original instrument, for example, the wave length is 36 inches; hight from trough to crest, 4 inches; and period for that length, 0s 76; but it equally represents a wave whose length is 36 feet, and hight 4 feet, with period 2s 63; and similarly for other proportional dimensions."

*Fig. 2.*



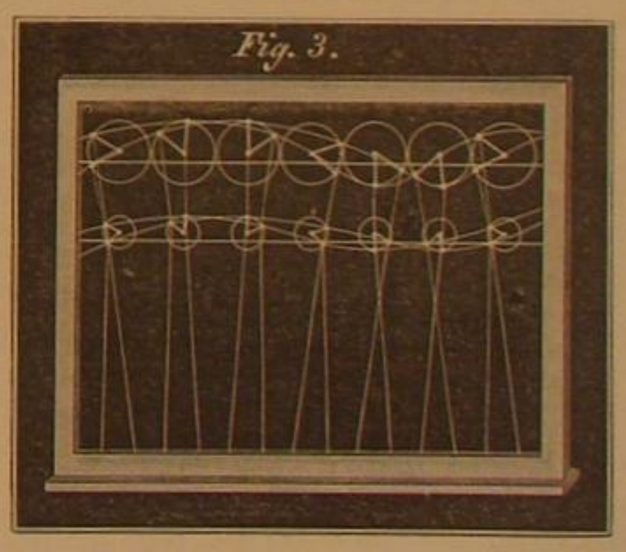
I felt that it was presumptuous in me to entertain a doubt that this apparatus was all that was claimed for it, and that it illustrated so many characteristics of wave motion; but a habit of overlooking authority and thinking for myself (a habit, by the way, which has injured my reputation among the good orthodox people who are my neighbors) led me to examine it, and my examination led to doubts, which my experiments made with a similar apparatus, extemporized for the occasion, confirmed. I give a drawing of the apparatus which I constructed.

Conceiving that the apparatus constructed by Prof. Lyman was deficient, in that it showed only one horizontal and one vertical line of particles traversing the orbits of the particles represented by the crank pins, I made my apparatus with two cranks for each orbit, and connected them with strips of india rubber. I was not surprised when, upon attempting to arrange these cranks as in Prof. Lyman's apparatus, so as to represent the form of a wave, I found the result indicated in Fig. 3.

Clearly a case of interference; one which I could not reconcile with the modern wave theory.

After all, thought I, what is the use of such apparatus, when I can have the "real thing?" If I could only dig a vast pit by the ocean, and erect a shore of transparent glass and look through it at the motion of the water, I might see what the real motion is, and thereupon I set to work to construct an ocean with glass shores. It is eighteen feet in length and 12 inches from shore to shore, and its depth sixteen inches. It was a little more difficult to make a gale of wind; however by the aid of an old blacksmith's bellows, I contrived to simulate all the phases of wind, from the

*Fig. 3.*



"zephyr softly breathing" to the steady breeze and the hyperborean blast. In order to enable myself to see the internal mysteries of my ocean, I sought for some fine particles which the eye could easily distinguish, and distributed them pretty uniformly through the water.

*Experiment* 1.—Steady and continuous but moderate breeze in a direction nearly horizontal upon the surface. Result—A surface current in the same direction as the wind, with undertow in the opposite direction. Current well defined.

*Experiment* 2.—Steady and continuous but very strong blast, in the same direction. Result—As in first experiment, except that the current was more rapid, and involved more of the mass of the fluid.

*Experiment* 3.—Sudden gusts at regular intervals. Result—Distinctly marked waves of apparently equal length, except at the extremity opposite the bellows, where the waves were changed into well-marked breakers, upon the vertical end of the tank. Seen through the sides of the tank the particles floating in the water gave no sign of revolution, but danced up and down with the undulations of the surface, the motion growing less toward the bottom, where there was comparatively little motion.

*Experiment* 4.—Sudden gusts at irregular intervals and of different degrees of force. Result—The waves no longer of equal length, but interfering with and crossing each other, in

the wildest confusion. Particles beneath the surface crossing each other and coming in contact, but showing no sign of revolution.

Now, Messrs. Editors, it may be perhaps justly considered as proof both of my own weakness and boldness, to assert that I do not believe in the modern wave theory, but I have always been so unfortunate as to differ from somebody about something, and having been called by hard names in consequence, have got to be somewhat indifferent to such things. But while writing to you my work has got into arrears, so I will drop the pen and resume my ordinary occupation.

CARPENTARIUS.

### Wine Production of the United States.

MESSRS. EDITORS:—The United States pay annually to Europe several hundred million dollars for wines and brandies, which could be made here of as good a quality from the product of our own soil. This is the result of two serious evils in the management of our wine production.

One evil consists in the improper treatment of the wine in the manufacture now prevailing, but which will be corrected by the universal adoption of the air treatment or air fermentation. The other evil is caused by the mistaken notion that the producers of the grape should be also the manufacturers of the wine, and even the dealers in the manufactured article. Nearly all such attempts so far have proved disastrous failures, averted only in few cases by large capital invested, yielding nothing like fair returns. Experience in all branches of manufacture has taught that it is more advantageous to leave the production of the crude material to certain parties, while capitalists undertake the manufacture, and others attend to its exportation to the various markets of the world. This is nothing more than recognizing a proper system of division of labor, the application of which has proved of incalculable advantage to those engaged in the production of grain, sugar, cotton, tobacco, as well as of copper, iron, and other metals. Why should wine be an exception? There should be growers of grapes, as there are of grain, tobacco, cotton, etc., and in the midst of the wine-growing districts capitalists should establish their presses, vats, and stills, purchase the grapes, and dispose of the manufactured article to shippers to foreign ports. The manufacture carried on in this manner will yield certain, fair remuneration to all parties concerned, and steadily increase the profits, which in the present mismanaged way are either reduced to a minimum or, as we have occasion to know, enter on the wrong side of the ledger.

Growers of grapes will cheerfully contract to furnish grapes at the rate of seventy-five cents to one dollar per hundred pounds, equal to a gross yield of about $100 per acre. Manufacturers of wine and brandy, purchasing the grapes in sufficient quantity, may be certain of fifty per cent or upwards per year on the money invested; shippers will find sure profits, and consequently all the parties interested will be benefitted by reducing this branch of industry to a system, unlike what it is at present, always supposing the air treatment is employed, by which the wine is ripe and ready for shipment the same year it is made, and the trouble and expense of storage ripening avoided. Here is suggested an inexhaustible source of wealth, by which the country may be enriched and improved to an extent inferior to that of no other branch of industry. There are planted now upward of thirty millions of vines in the valley and foothill counties of California alone, which this year could produce 15,000,000 gallons of wine under a system as proposed; as it is, the produce is mostly wasted, profitable to none, and rather injurious to the whole country.

The eastern slopes of the Rocky and Alleghany mountains are equally well qualified for wine production, now dormant.

The annual demand for wine, which is not only constant but steadily increasing, would exceed 1,000,000,000 gallons, if it could be supplied, and every sensible man will grant that the United States should cease to import, and rather export, what could as well be produced at home.

Capitalists will find it worth their while to attend to this matter in season.

R. D'HEUREUSE.

San Francisco, Cal.

### Replacing Drawn Teeth.

MESSRS. EDITORS:—Noticing an article on teeth in Vol. XVIII., No. 21, induced me to send this. In the year 1853, I had three teeth extracted at the same sitting; the first tooth extracted was sound. At my request the doctor replaced it, and laughingly remarked that it would not take hold, as it was out too long and had become cold, thereby losing its natural heat. I returned home, took the tooth out and again replaced it myself; it remained there until the year 1866, when it became so loose that it was an annoyance to me when eating, and I extracted it. The above are facts.

C. E. WHITMORE.

New Orleans, LA.

### Use of Old Files.

MESSRS. EDITORS:—In Vol. XVII., No. 20, page 313, is an article on files and the uses to which old files may be put. Allow me to give some of my experience. I am a machinist, but I do mostly brass work; a great many of my tools I make out of old files. My mode of working is as follows: The files must be first annealed from end to end, then they are heated to a very low red heat, then hammered briskly; this flattens the teeth to a thin scale, which each successive heating will cause to peel off. This must be repeated until the file marks are obliterated, when the file can be worked like ordinary steel. By this method I am able to make thin springs from old files and I venture to say you will hardly find a flaw. To grind an old file on the grindstone takes considerable time, especially a small file, and to set apprentices to that work is doing them injustice, for it is certainly teaching them how to work and yet be idle.

WM. TROWBRIDGE.

New Orleans, La.

### Divisibility of Matter.

Gold can be beaten into leaves ·00004 of a millimeter thick.

Silver wire, gilded with ·00277 of its diameter of gold, can be drawn so fine that one meter weighs only eight milligrammes. The gold film of this wire is now only ·00000125 of a millimeter thick. By placing a short piece of this wire in nitric acid, the silver core is dissolved out, leaving a tube of gold, having a wall only the ·00000125 millimeter thick. Now under the best microscopes, we can discern a surface of ·00025 millimeter in diameter, and ·0000012 millimeter thick; yet each of these parts has all the physical and chemical properties of a large mass, as can be determined by testing it under a microscope.

Dr. Wollaston drew platinum wire so fine that its diameter was only ·000833 millimeter (·000033 of an inch): and although platinum is the heaviest of the metals, yet it took 200 meters of this wire to equal one centigramme in weight; or, in other words, one mile of this wire weighed about one grain. Dr. Wollaston accomplished this by wire drawing a cylinder of silver ·2 of an inch in diameter, having in its axis a platinum wire ·01 of an inch in diameter, and after having obtained a very fine wire—having in its interior a platinum wire of still greater tenuity—he dissolved with nitric acid the silver coating, and thus obtained an almost invisible platinum wire.

The thickness of a soap bubble, in the dark spot which is formed on it just before it bursts, is ·00001 millimeter.

One grain of carmine tinges ten pounds of water, which we can divide into about 617,000 drops, If we suppose that 100 particles of carmine are requisite to produce a uniform tint in each drop, it follows that one grain of carmine has been divided into 62,000,000 parts.

The thread of a spider is composed of more than 1,000 separate threads.

The diameter of the red disks contained in human blood is ·00025 of an inch; while the diameter of the blood disks of the Java musk-deer is only the ·000081 of an inch, so that a drop of this deer's blood, such as would adhere to the point of a fine needle would contain 150,000,000 disks.

It has been calculated that some of the siliceous plates which cover and give rigidity to the minute vegetable cell-plants called diatomaceæ, weigh only the ·0000000005 of a grain yet the surfaces of these plates are covered with the most exquisite tracery of siliceous stria or bars, often not more than ·0000117 of an inch in width and thickness. Now we can discern a surface of ·0000117 of an inch in the best microscopes, and a portion of one of these silicious disks of that area would weigh only about ·00000000062222 of a grain.

A portion of musk will give off a powerful odor during a year, and yet its diminution in weight has not been sufficient to be detected by the most delicate balance.

"In order to offer an inexact idea of the minuteness of the particles of musk which are still capable of imparting some odor, we state, after a well known experimenting physiologist, that a certain liquid, containing as much of an extract of spirit of musk as ·000000005 part of its whole weight, was at this time still distinctly odorous. A grain's weight of a liquid of which ·0000005 part was of that extract, spread an intensely penetrating odor. Next after musk are to be mentioned certain flower ethers, especially the oil of roses, a little drop of which is sufficient to fill with odor an immense atmosphere. The same physiologist states that a certain space filled with air, of which, at the highest, only ·000001 part was vapor of oil of roses, still diffused a distinct odor of roses."—*Prof. Mayer.*

### The Dust Bin.

There is not one particle in the heap the scavenger removes from our houses that is not again, and that speedily, put into circulation and profitably employed. No sooner is the dust conveyed to the yard of the contractor than it is attacked by what are called the "hill women," who, sieve in hand, do mechanically what the *savant* does chemically in his laboratory, separate the mass, by a rude analysis, into its elements. The most valuable of these items are the waste pieces of coal, and what is termed the "breeze," or coal dust and half-burnt ashes. The amount of waste that goes on in London households in this item of coal can hardly be conceived, unless the spectator sees the quantity that is daily rescued in these yards. It may be measured by the fact that, after selling the larger pieces to the poor, the refuse "breeze" is sufficient to bake the bricks that are rebuilding London. Most of the dust contractors are builders as well, and the breeze is used by them for the purpose of imbedding the newly-made bricks into compact square stacks, which are seen everywhere in the suburbs of London. The breeze having been fired, the mass burns with a slow combustion, aided by the circulation of air, which is kept up by the method of stacking; and in the course of two or three weeks the London clay is converted into good building material. Thus our houses may be said to arise again from the refuse they have cast out, and not only are the bricks baked by their aid, but they are built in part with mortar made from the road scrapings, which is pounded granite, and combines very well with the lime and ashes of which the mortar is composed. Nay, even the composition with which some of the smaller houses are faced is very largely adulterated with this particular refuse.—*Quarterly Review.*

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

A locomotive designed for the use of the Mount Washington railway, which has been building for four months past, at Franklyn, N. H., is now ready for service. As illustrated on page 145, Vol X., SCIENTIFIC AMERICAN, this engine, in ascending the mountain, is coupled to the rear end of the train, and pushes the cars before it. The boilers of the locomotive are upright, with five hundred square feet of heating surface; cylinders, ten inches in diameter, with sixteen inches stroke; total weight, about seven tuns.

The Nevada papers report that a turquoise mine has been discovered in the Columbus district, and that, in addition to its silver mines, their territory may lay claims to notice for its gem riches. The turquoise, although not strictly a precious stone, is greatly prized as a gem. It is quite hard, and is susceptible of taking a high polish. The choicest specimens are brought from Persia, and are of a sky-blue and greenish color. The occidental turquoise, found in Siberia, Languedoc in France, and a few other places, is either dark, light, or greenish, blue, and is of organic origin consisting, probably, of colored teeth of antediluvian animals. Little attention has yet been paid to this deposit in Nevada, but, judging from the fact that specimens varying in size form a small shot to an almond have been discovered, it is not improbable that a small amount of labor might be generously rewarded.

The rails on the Troy and Greenfield railroad are now laid to Charlemont station, and passenger trains will be running to the Hoosac tunnel, within the time limited by the contract, July 15, 1868. A White Mountain stage contractor has engaged to run a fast line of stages in connection with the railroads across the mountain, in one hour and forty minutes, and an express train will accomplish the whole distance from Boston to the Hudson river in from eight to ten hours.

Several engines, especially designed for running heavy express trains, have recently been put upon the Great Northern Railway of England. These locomotives, drawing a train of twenty heavy English coaches, make the journey between King's Cross and Peterborough, a distance of seventy-seven miles, in one hour and twenty-eight minutes: averaging fifty five miles per hour, although contending with heavy gradients forty miles of the distance. One half this speed per hour is considered very fast traveling on our most level railroads.

The mineral produce of Mexico is remarkable, even when compared with that of the richest countries in the world. Her vast silver resources, however, are yet substatially in a state of embryo, the richest district probably in the republic—Sonora—being almost an unknown land. Mining is carried on in the crudest manner, the natives abandoning operations whenever the water level is reached, preferring the chances of discovering shallow deposits to the more laborious and undoubtedly more profitable explorations in deep mining. Time and experience will remedy this state of things, and another half century may find mining enterprise carried on with all the modern improvements and imported mechanical skill.

In 1829, but three miles of railway existed in the United States; to-day, there are 38,500 miles, costing with their equipments and rolling stock $1,700,000,000. If extended in a straight line, the rails would go around the globe more than once and a half times. The passenger cars, if placed in a row, would more than reach from Boston to New Orleans, and they annually carry about 145,000,000 passengers, or four times the entire population of the country, men, women, and children. At the average rate of building for the past thirty years, there are employed some 75,000; in the work of renewal, 145,000 more; and in operating our roads, 200,000 more; making a total of 420,000 men in the railroad business in the United States.

Fast freight cars have recently been transported from New Orleans to this city, a distance of 1,825 miles, in six days' running time. The trip was accomplished at a rate of speed never before attained, but which, with the increased facilities for freighting, and the improvements of the roads, it is expected will soon be greatly increased.

Lead has been found in more than five hundred localities in Missouri; the veins run through twenty counties, and intersect an area of more than 6,000 square miles. The average of assays of ore from all parts of the State, is seventy-five per cent of pure lead. Coal has been found underlying thirty counties of the State, the deposits amounting in the aggregate to 25,887 square miles, with a mean thickness of eight feet. Dr. Litton thinks the iron mountains of Missouri contain enough metal above surface to afford an annual supply of 1,000,000 tuns for two hundred years. The ore is almost exclusively specular, and yields 56 per cent of pure iron, strong, tough, and fibrous. Zinc is very abundant, thousands of tuns being annually thrown away by the miners as a vexatious and worthless impediment to their progress. Copper has been found in fifteen counties, but very little attention has been paid to the zinc or copper deposits, because of the large profits derivable from the working of lead and iron mines. These wonderful facts we gather from a pamphlet on the "Resources of Missouri," just issued by Mr. Sylvester Waterhouse, of St. Louis.

## Recent American and Foreign Patents.

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

RING.—Alexander Goodhart, Newvill, Pa.—This invention is a neat and substantial ring or link which can be used in place of a hook for connecting two chains, and, when in place, will present the appearance of a common link.

PROCESS FOR TANNING HIDES AND SKINS.—F. J. Burcham, Racine, Wis.—The nature of this invention relates to an improved process for tanning hides and skins, which cannot be readily described in brief.

TAYLOR'S T SQUARE.—Daniel Tierney, New York city.—This invention relates to an instrument which is designed to facilitate the drawing of designs upon cloth in obedience to actual or computed measurements.

PRESS.—B. S. Norris, Ripley, Ohio.—This invention consists in providing, in a suitable frame, a vertical presser, which is worked in a downward direction by a ratchet on the same, and a pawl on a lever, which is worked by hand, a spring-holding pawl is also provided for preventing it from sliding backward, and a weight for balancing the same.

WINDING AND SETTING APPARATUS FOR WATCHES.—Louis Victor Piguet, New York city.—This invention relates to a pendant winder and setter, and consists in the use of a key which fits through the pendant, and which has at its inner end a hooked crownwheel that gears into a pinion fitted in the movement; the latter pinion gears into two other toothed pinions, of which one is mounted on a swinging bar, and gears into the barrel ratchet.

ICE CALK.—G. W. Farley, Manchester, N. H.—This invention relates to an improvement in the construction of an ice calk or creeper, and consists in attaching to the device a button provided with a spiral spring, or its equivalent, for holding the button and preventing it from turning when the calk device is in place on the heel of a boot or shoe.

LATHE FOR TURNING WOOD.—A. J. Van Ornum, Hartford, Vt.—This invention consists in providing a sliding sleeve on the mandrel of the lathe, having a square socket in one end, which, in combination with the spurs in the end of the mandrel, serve to hold the shaft of wood while it is being turned from the other end by the sliding tool of ordinary construction, until the said tool comes in contact with the end of the said sleeve, when the latter will be shoved back by the tool, whereby the whole length of the shaft may be turned.

PLOW.—John Koffend, Appleton, Wis.—This invention has for its object to furnish an improved attachment for plows, by means of which the landside of the plow may be adjusted to cause the plow to run deeper or shallower, according to the character of the soil to be plowed, and which shall at the same time be simple in construction, cheap, easily adjusted, and readily applied to any plow, whether new or old.

AGRICULTURAL STEAM BOILER.—Louis S. Robbins, New York city.—This invention relates to improvements in boilers which are used for agricultural purposes, as for steaming and boiling feed for cattle, horses, or other live stock, heating water, and generating steam for other purposes.

FRUIT CAN.—John R. Williamson, Bethlehem, N. J.—This invention relates to a device for holding down the cover of a fruit can and consists of a cam

working in grooves in the sides of the can, and provided with a lever by means of which it can be operated. The grooves in the sides of the can are semi-annular, so that the can can be inserted from either side and applied on either side of the cover.

MITERING MACHINE.—John J. Sanders, Jr., New York city.—This invention relates to a machine for mitering moldings and other articles, and consists in a new manner of combining planing knives with circular saws, so that the edges of the moldings which are being sawed may, at the same time and by the same instrument, be planed.

POTATO DIGGER.—John W. Burnham and Wilson Coulon, Middletown Point, N. J.—This invention relates to a potato digger which is so arranged that the scoop may be placed at any desired angle, and may be raised and lowered at will, inpependent of the frame to which the lower roller, holding the endless apron, is secured, although the latter frame may also also be raised or lowered at will.

PIPE WRENCH.—Nardo F. Loi, New York city.—This invention relates to a wrench which is so arranged that it can be adapted for clamping all sizes of pipe, from the smallest to the largest, and also for clamping plates or other articles of suitable shape. It is in fact a universal wrench, useful in every machine shop, and wherever wrenches are required.

UNIVERSAL HOLDER FOR CARVING MACHINES.—Isaac Hall, New York city. —This inventionghas for its object to furnish an improved holder for holding the pattern and work for carving machines, designed especially to be used with the improved carving machine patented by the same inventor March 10, 1868, and numbered 75,413, but equally applicable for use with other machines for similar purposes.

AIR-CHAMBERED SHIPPING CASE.—Moses H. Nichols, Hancock, N. Y.—This invention has for its object to furnish an improved shipping case, designed especially for shipping butter and honey, but which may be used with equal advantage for other similar articles.

CONSTRUCTION OF QUILTED SHOES, SLIPPERS, ETC.—Marie L. Hill, New York city.—This invention relates to a manner of constructing quilted shoes, boots, and slippers, and consists in arranging between the filling and outer covering of the quilting a layer of flannel or other suitable materal, of the same color as the outer covering. The object of the invention is to produce a shoe which, after the outer covering is worn at some places, will still appear whole, and will not be made useless by the exposing of the generally white filling.

BRICK MACHINE.—John S. Wood, Hartford, Conn.—This invention relates to certain improvements in brick machines, by means of which the pressure upon the clay in the molds can be regulated at will, by means of which the machine can be interrupted at once, whenever desired, without, stopping the motion of the main driving shaft, whereby the grate will be enabled to yield to stones or other obstacles that may project from the molds, and whereby the gate in front of the mold box will also be automatically raised by such obstructions.

WATER WHEEL.—Patented May 5, 1868. Alonzo J. Hall, Derry, N. H.—This invention consists of an inner reacting wheel acting in conjunction with an outer wheel, together with a governor and valve for regulating the quantity and force of water. The inner wheel is constructed with four arms, through which the water is conducted to the outer wheel, where the water issuing from each arm impinges against two of the floats at once, and at such an angle as to produce greater effect than if the whole volume of water were directed against one float at a time. The outer wheel is supported upon a body of water, whereby the friction is greatly reduced, and at the same time the water acts as a lubricant to the bearing surfaces.

HAY FORK.—M. H. Pope, Susquehanna Depot, Pa.—This invention consists of the arrangement and operating devices of the lifting tines, which latter are thrust out horizontally from the main shank and case containing it, through suitable slots.

GAS REGULATOR.—S. F. Mathews, Mechanicsburgh, Pa.—The object of this invention is to provide means for governing and controlling the flow of gas from the main pipe in a house before it is distributed to the burners, and it consists in arranging an adjustable thimble on the end of a gas-pipe nipple, the position of which thimble is regulated by the pressure of the gas, and determines the quantity which is allowed to pass through to the burners.

WINDMILL.—Hiram M. Shaw and Geo. G. Tindall, Fremont, Ohio.—This invention consists in an arrangement for pumping or raising water by the power of the wind, and in controlling that power by the weight of the water so raised, whereby many advantages not hitherto secured by the application of such power are obtained.

GLOBE AND CHECK VALVE.—John B. T. Van Patten, Sing Sing, N. Y.—This invention relates to an improvement in globe valves, whereby they are made to operate as check valves.

WOOD CLEAVER.—John Van Winkle, New York city.—This invention relates to an improvement in implements used for splitting the wood used in cities and other places for kindling fires, and for other purposes.

BROOM HOLDER.—F. B. Batchelder, Prairie du Chien, Wis.—The object of this invention is to furnish a cheap and convenient article for holding brooms, mops, brushes, and other articles of a similar nature, and for household or other purposes.

SAFETY VALVE.—F. Harden, Conshokocken Pa.—This invention relates to an improvement in safety valves, whereby they are made much more sensitive and sure in their operation than those hitherto in use.

BRICK MACHINE.—Lewis M. Vansickle, Woodbridge, N. Y.—This invention relates to a machine for molding and pressing brick, tile, etc., and it consists in a new and improved construction of the scraper of the mud mill, whereby the scrapers are rendered less liable to break than those of ordinary construction. It consists in a peculiar mechanism for molding, pressing, and discharging the bricks, whereby said work may be rapidly performed, and in a perfect manner.

SEEDING MACHINE.—E. P. Harris, Conneautville, Pa.—This invention relates to a machine for sowing seed of various kinds, and may be adapted for planting potatoes. It consists in a peculiar construction of certain parts, whereby an exceedingly simple and efficient device for the purpose specified is obtained.

HAND AND BENCH DRILL.—Charles G. Miller, Brattleboro, Vt.—This invention relates to a hand and bench drill, and consists of a peculiar construction and arrangement of parts, whereby an exceedingly convenient and desirable article for the purpose specified is obtained.

SAWING MACHINE.—James R. Logan, Rolla, Mo.—This invention relates to improvements on cross-cut sawing machines, and is more especially designed to be applied to a machine of that kind for which Letters Patent were granted to this inventor Dec. 19th, 1865. It consists in a novel manner of applying the wheels, on which the machine is mounted to the axle thereof, whereby they may be adjusted in a plane parallel with the log, to ensure the ready adjustment of the saw to the log, after each cut. It also consists in an improved means for suspending the saw, or keeping it in an elevated state when the machine is not in use, or is being drawn from place to place.

CORN PLANTER.—W. R. Clark, Indianola, Ill.—This invention consists in certain devices which conduce to a more perfect and satisfactory operation in planting corn or other grain of similar character.

NECROSETER.—Mary E. Mott, Rouses' Point, N. Y.—The object of this invention is to preserve a corpse from decomposition before burial. It consists of a rubber case or envelope for holding ice, and is provided with a discharge tube of the same material for conducting off the water as the ice is melted. It is filled with ice and laid upon the abdomen of the corpse, and a tube conducts the water from the sack into any suitable vessel.

HOSE.—Edwin M. Chaffee, Providence, R. I.—This invention consists in the employment of Grenoble hose as a means of sustaining the pressure of the water within the waterproof or inner hose. The two hose being cemented together by rubbery by a suitable process.

PLOW.—Gabriel Utley, Chapel Hill, N. C.—This invention has for its object to furnish an improved plow so constructed and arranged that the mold-board and point may both be detached from the plow when desired and so that the said parts may not be weakened by having bolt holes formed in them.

CONVERTING CAST IRON INTO WROUGHT OR MALLEABLE IRON.—Alexander Lisk, Philadelphia, Pa., and Adam Woolever, Allentown, Pa.—This process consists in commingling with melted cast iron certain chemical substances, which, being decomposed by the intense heat of the iron, produces the requisite chemical change and quality in the latter which is known as malleable or wrought iron.

COOKING STOVE.—B. Newbury, Coxsackie, N. Y.—This invention has for its object to improve the construction of cooking stoves so as to make them more convenient in use.

ANIMAL TRAP.—John C. McClamrock, Edina, Mo.—This invention has for its object to furnish an improved self-setting animal trap, which shall be simple in construction, durable and reliable, which will require little attention, and with which any desired number of animals may be caught without the trap being visited.

FOLDING STOOL.—W. E. Cameron, Green Island, N. Y.—This invention has for its object to furnish an improved folding portable stool, so constructed and arranged that it may be folded into a very neat and compact form for storage or transportation.

BILL POSTER.—A. H. Fatzinger, Washington, N. J.—This invention relates to a device for securing bills in position or holding them against a wall or other fixture. The invention consists of a series of clips, of peculiar construction, attached to a cleat which is nailed or secured to the wall or other fixture, so that the upper end of the bill may be readily inserted in the clips and retained or held thereby.

GRATE BAR.—Henry King, Waterbury, Conn.—This invention relates to a method of constructing the grate bars of furnaces, fire boxes, etc., whereby air is more freely admitted to the burning fuel.

TAPE BOX.—A. J. Fellows, Meriden, Conn.—This invention relates to the catch by means of which the drum of the box having the tape wound around it, is held or released, as may be desired.

GAS APPARATUS.—James McCleish, New York city.—This invention relates to a gas apparatus for lighting steamboats, railway cars, and other conveyances and movable structures. The object of the invention is to obtain a means for the purpose specified, which will be compact, so as not to monopolize much space, efficient in its operation, and, especially as regards pressure, simple in construction, and not liable to become deranged by use.

SURCINGLE.—Stephen Hyde, New York city.—The object of this invention is to provide a surcingle or girth for horses, which will yield sufficiently when the animal breathes, or lies down, or exerts himself in any unusual manner. It consists in the inter position of two rubber straps or joints on each side of the buckle, these joints being sewed to the ends of the girth or surcingle and to the buckle strap. The tongue strap is sewn to the other rubber joint in the same manner, and the joints are inclosed in leather sheathes for protection.

## 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 advertisemets at $1 00 a line, under the head of "Business and Personal."*

☞ *All reference to back numbers should be by volume and page.*

G. W. A., of Mass.—Excellent emery wheels which may be used with water, as are grindstones, are made by dissolving gum shellac in alcohol, mixing the emery with it and pouring and pressing in molds. Good wheels may also be made by a mixture of glue, dissolved, and emery, treated in a similar manner. Ordinary wheels are made by covering the periphery of a wooden disk, suitably secured to a mandrel, with folds of woolen or Canton flannel, and covering the whole with leather or strong cloth. Upon this is placed a coating of emery secured by glue.

P. B. C., of Ind.—For car or other axles plumbago—black-lead—mixed with the oil prevents heating and insures smoothness of rotation.

J. E., of Mass.—This correspondent is entirely mistaken in supposing that we ridicule what are called spiritual manifestations. But before we open our columns to the discussion of this subject we wish to see some evidence that it may be "made useful," as our correspondent seems to think. We are always ready to advocate and present the useful, but not to devote the columns of our paper to discussions annoying to most and valuable to none of our readers.

W. P. H., of Mass., asks "why are the cones of fly frames convex and concave? Some contend that straight cones will produce the same result, which is not correct. I think the necessity for this form is because of the position the belt is inclined to occupy, in changing places on the cones." We were not aware that cones were so made, but if so it is evident the concave cone should be the driver and the convex the driven, as a belt will always seek the highest place on the pulley face, as is well known.

S. A. M., Jr., of Pa.—"Can you give me the titles of works or papers on aluminum?" We cannot. Better refer to D. Van Nostrand, corner of John street and Broadway, New York city, or to H. C. Baird, 406 Walnut street, Philadelphia.

E. H. C., of Iowa.—Kalsomining is simply a species of distemper painting, the ingredients being whiting, glue, and water, with such colors added as will give the required tint, if any but pure white is desired.

J. H. M., of L. I.—"Is there more power gained by a long belt than a short one? What shall I put on leather belts to keep them soft? What is the best work on stationary engines?" A long belt adheres with more force to the face of a pulley than a short one because of its superior weight. As long belts may be run slacker than short belts, millwrights and mechanics prefer a considerable distance between shafts driven by belts running from one to the other. Neatsfoot oil is the best softener and preserver of leather belts with which we are acquainted. "Bourne on the Steam Engine," and "Bourne's Catechism" are among the best treatises on the subject. Castor oil is perhaps the best oil for greasing belting; see Vol. XV., p. 357.

J. K. P., of Miss., asks what is the best water wheel for a small stream, one that will give the most power, suitable for a corn mill. He says, "I have a small stream that will afford a body of water only three feet wide, and three inches deep, with six feet fall; what is its power with the best wheel, and what the cost of the wheel?" The proper persons to refer to in regard to power and cost of wheels are our advertisers. H. C. Baird, Walnut street, Philadelphia, will furnish you with the latest edition of Pallett's "Miller and Millwright" and D. Appleton & Co., New York city, will furnish their encyclopedia.

J. P., Jr., of R. I.—We are not responsible for the published opinions of correspondents. The information you seek can undoubtedly be obtained by addressing the writer of the article to which you refer.

A. N. C., of Mass.—Rubber does not dissolve easily enough to give you a varnish by simply placing it in a bottle with the solvent. Ether is one of its regular solvents, but then it must be real ether and not the mixture of ether and alcohol which is sold for ether in many drug stores. It also must be pure rubber, and not the sulphur vulcanized article; then this pure rubber must be cut into small pieces, soaked in the ether in a warm place for about twenty-four hours until they are swollen up, and then it must be kneaded in a mortar. In such a way rubber varnishes may be made and are made even with common benzine.

R., of Md.—Your method of covering glass with a crystallization of some salts of course is old, as you suggest. Salts of soda absorb too much the moisture and therefore will not last. Sulphate of zinc is better, to be dissolved in some gum water, which is as good or perhaps better than beer.

J. R. N., of Pa.—That your fruit did not keep in glass jars with "thin corks" as well as in tin cans with "tin covers" is very natural. Sealing with wax even does not make a cork proof against the penetration of oxygen when it is dry: therefore wine bottles must lay down and a champagne or beer bottle kept in a position that the cork remains dry, they will surely be spoiled in a week even with the best style of corking. For fruit even the inversion will not do, as all air must be prevented from coming in contact with the liquid even in the pores of a cork.

W. H. G.—Tobacco ashes would be good for manuring soil where tobacco grows, only they cannot be obtained in sufficient quantity; they are also recommended for tooth powder, and sometimes contain small quantities of the rarer new metals, rubidium and cæsium. We have in our possession a bottle with pure white salt, crystallized out of a lye made from tobacco ashes sent us by a correspondent. However we do not know any use for it.

H. M., of S. C., sends us a few algebraical problems with the answers and partial solutions, and states that he will "disclose them in full, for an adequate remuneration;" we do not feel inclined to pay a man for solving his own puzzles.

S. S., of Ind.—Lemon juice may be preserved by making an almost saturated solution with sugar; likewise all other extracts of fruits. It is, in fact, the way by which all the flavoring sirups for soda water are preserved. Flavoring extracts are preserved by the addition of a small quantity of alcohol.

W. C. W., of Ala.—Rubber coming in contact with fruit in air-tight preserving jars may in some cases communicate its peculiar odor to the fruit; the fruit will act less on the rubber, but it must be kept in view that all soft rubber in the course of time (some years) always becomes rotten, in fact oxidizes by atmospheric influences.

P. C. D., of Pa.—The latent heat of vapors of different liquids has been determined by Andrews, Despretz, Favre, and Silberman. (See Quart. Jour. Chem. Soc., Vol. I., p. 27). Brix found that for water, alcohol, ether, and turpentine, the latent heat of the vapors was for equal weights respectively 1000, 420, 194, and 167, and the specific gravity of these vapors is as 0·45, 1·26, 2·28, and 3·2, the latent heat for equal volumes therefore is 600, 635, 509, and 590. Alcohol therefore contains the greatest amount, and ether the least amount of heat for equal volumes, of course under the ordinary atmospheric pressure. (The boiling points are 212°, 173°, 95°, and 315° respectively.) For all these reasons vapor of ether is theoretically the most economical and several years ago a large ether engine was built and experimented with at the Novelty Works, New York city; practical difficulties, however, caused the utter abondonment of this principle.

T. W. B., of Ky.—A very good white soft metal that may be rolled into sheets is that used for the plates music is engraved upon, and may serve your purpose; it is an alloy of block tin with 10 per cent of antimony.

## Business and Personal.

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

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

For Improved Lathe Dogs and Machinists' Clamps, address, for Circular, C. W. Le Count, South Norwalk, Conn.

Brick Machine.—Lafler's New Iron Clad has more advantages than any other ever invented. For descriptive circular address J. A. Lafler & Co., Albion, Orleans county, N. Y.

Wickersham's American oil feeder—the best and will lead. For proof, see advertisement.

See Wheeler & Wilson's buttonhole attachment, making one hundred buttonholes an hour. The desideratum for families, dressmakers, and manufacturers. No. 625 Broadway, New York.

Mill-stone dressing diamond machine, simple, effective, and durable. Also, Glaziers' diamonds, and for all mechanical purposes. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

Funston's electric toy.—See advertisement.

Wanted—the address of plow makers everywhere. Address J. E. Jinkins, Milton, Fla.

Wanted—a practical brass cock maker—to conduct and take an interest in the brass finishing business. One that can furnish from $1500 $2000. Good reference required. For full particulars address postoffice box 446, Richmond, Va.

Wanted—Wood-working machinery. Illustrated priced lists of wood-working machinery, such as for making buckets, chairs, bedsteads, etc. Also, spoke and hub lathes, and bending fellies, shafts, plow handles, etc. And a steam engine, with and without boiler, about 12-in dim. and 30 in. stroke, and a muley saw mill. Address A. B., Columbus, Ga.

Employment for all at $5 50 to $8 75 per day. Send two stamps to P. & K., Box 2359, Cincinnati, Ohio.

Lubricators for valves and cylinders, Broughton's are far the best. Made by Broughton & Moore, 41 Center st. They make, also, the best gage cocks.

Two valuable patents for sale—now in successful operation, and sold only to close an estate. Inquire of S. N. Muir, 123 Waverly Place New York.

All genuine Bartlett sewing machines are provided with a guarantee bearing the trade mark and signature of J. W. Bartlett, the patentee, from the depot, 569 Broadway, New York. Beware of bogus machines and agents.

Winans' Boiler Powder (11 Wall st., N. Y.) A positively uninjurious remedy for incrustations. 12 years' references. Beware of frauds

## NEW PUBLICATIONS.

ATLANTIC MONTHLY. Ticknor & Field, Boston.

The June number is issued, and the subjects of the writers are treated in the masterly manner which characterizes most of the articles in that journal but the subjects lack the usual interest. Price $4 a year; 35 cents for single numbers.

## EXTENSION NOTICES.

Daniel Halladay, of Batavia, Ill., formerly of Ellington, Conn., having petitioned for the extension of a patent granted to him the 29th day of August, 1854, for an improvement in governor for wind mills, for seven years from the expiration of said patent, which takes place on the 29th day of August, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 10th day of August next.

Abner Whiteley, of Springfield, Ohio, having petitioned for the extension of a patent granted to him the 23d day of August, 1854, and reissued the 8th day of January, 1856, for an improvement in track clearers to grass harvesters, for seven years from the expiration of said patent, which takes place on the 22d day of August, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 10th day of August next.

Philippine S. Brackenridge of Natrona, Pa, administratrix of the estate of Edward Steiren, deceased, having petitioned for the extension of a patent granted to the said Edward Steiren the 12th day of December, 1854, for an improvement in process of treating the mother-water of salines, for seven years from the expiration of said patent, which takes place on the 12th day of December, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of November next.

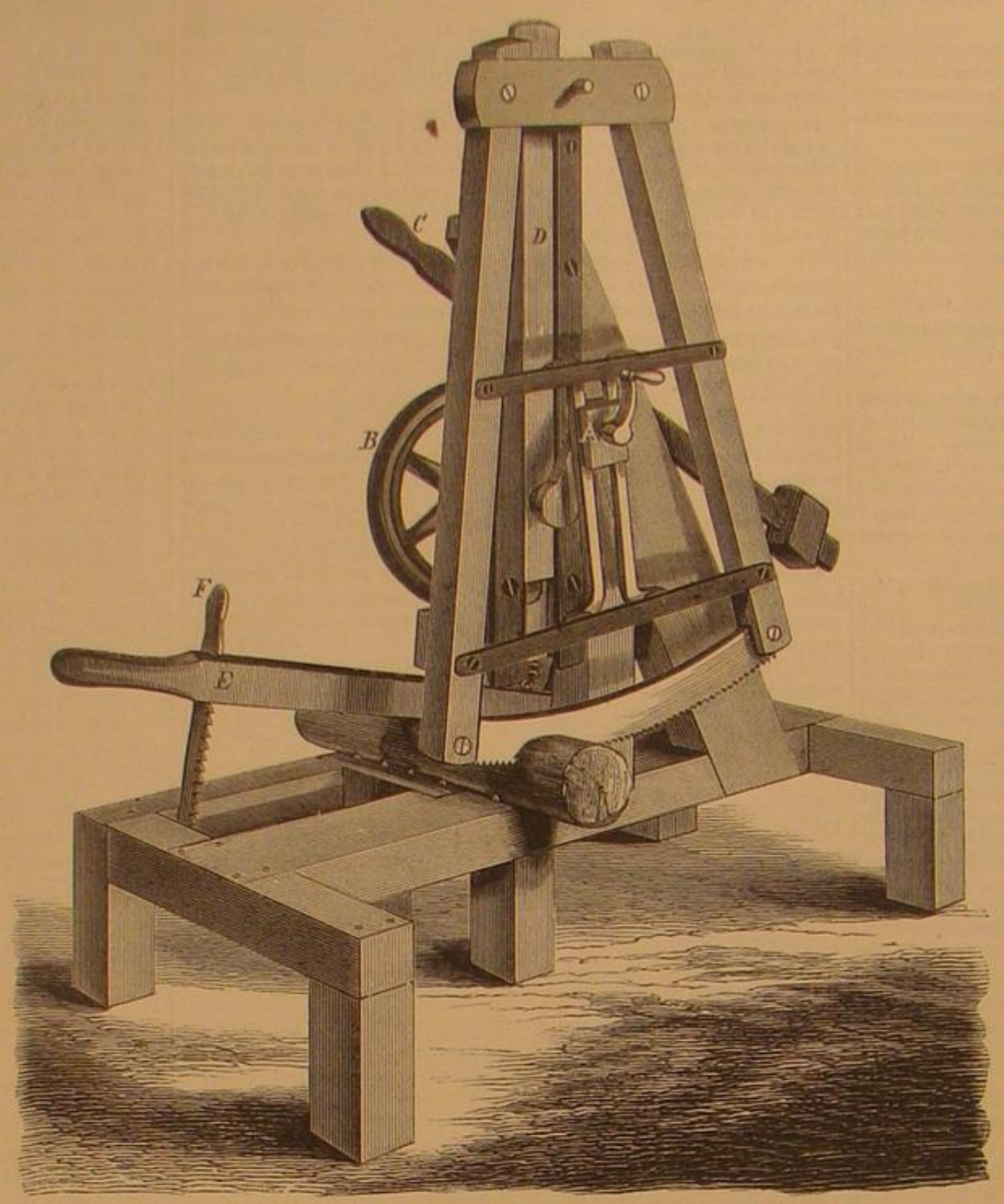
### Improved Hand Sawing Machine.

No labor is more exhaustive to the wind or requires more monotonously muscular exertion than that of sawing wood for fuel by the old-fashioned buck saw. It may be excellent exercise for those of sedentary habits and others of a dyspeptic tendency, but we never heard of any one choosing the wood sawyer's as his vocation, however agreeable it may be to officiate as a "wood sawyer's clerk." The inventor of the machine shown in the engraving evidently agrees with us, as he has constructed a neat and portable machine, which, if it does not make wood sawing a pleasure, greatly diminishes its labor.

The machine is a frame with a braced upright, to the top of which is pivoted a segmental swinging frame, holding between its lower ends a curved saw plate. The movement of the frame and its saw is like that of a pendulum, and it is produced by a handle attached to the wrist pin of a crank, which pin carries a sliding box traversing between vertical slides the length of which is equal to the full stroke of the crank. The shaft that carries the crank has on its other end a balance wheel to equalize the reciprocatory motion of the saw.

In the engraving, A is the sliding box and handle, and B the balance wheel. The lever, C, is for elevating the saw and its appurtenances by means of a sliding bar, D, traversing between two uprights. This lever is weighted at the end opposite the handle, C, by a weight that may be moved toward or from the center to act as a means of forcing the saw into the wood. The bar, E, with the toothed catch, F, is intended to hold the stick or log while being sawed.

This simple machine will saw wood much more rapidly and with less labor than the work can be performed by hand, and it is cheap and durable. It is the subject of a patent obtained through the Scientific American Patent Agency, dated Nov. 6, 1866, and an application for improvements is now pending. Further information may be obtained by addressing H. A. Daniels, at Thomaston, Conn.




DANIELS' PATENT WOOD SAWING MACHINE.

### Burying Alive.

A method for determining when death has taken place without that of actual decomposition, which in very cold weather might be delayed for weeks, has always been a desideratum. The fear of being buried alive, which has undoubtedly occurred in many instances, has proved a source of anxiety to persons during life and of sad conjecture to their surviving friends. It is said that it has been recently discovered that if the skin of a deceased person is blistered, as by holding the flame of a candle against the body, when punctured the blister will give out only air, whereas if death has not taken place the flame causes inflammation and a watery serum will be deposited under the blister. It is claimed that this is a certain test when inability to feel the pulse, cold skin, no deposit of breath on glass, and other methods fail.

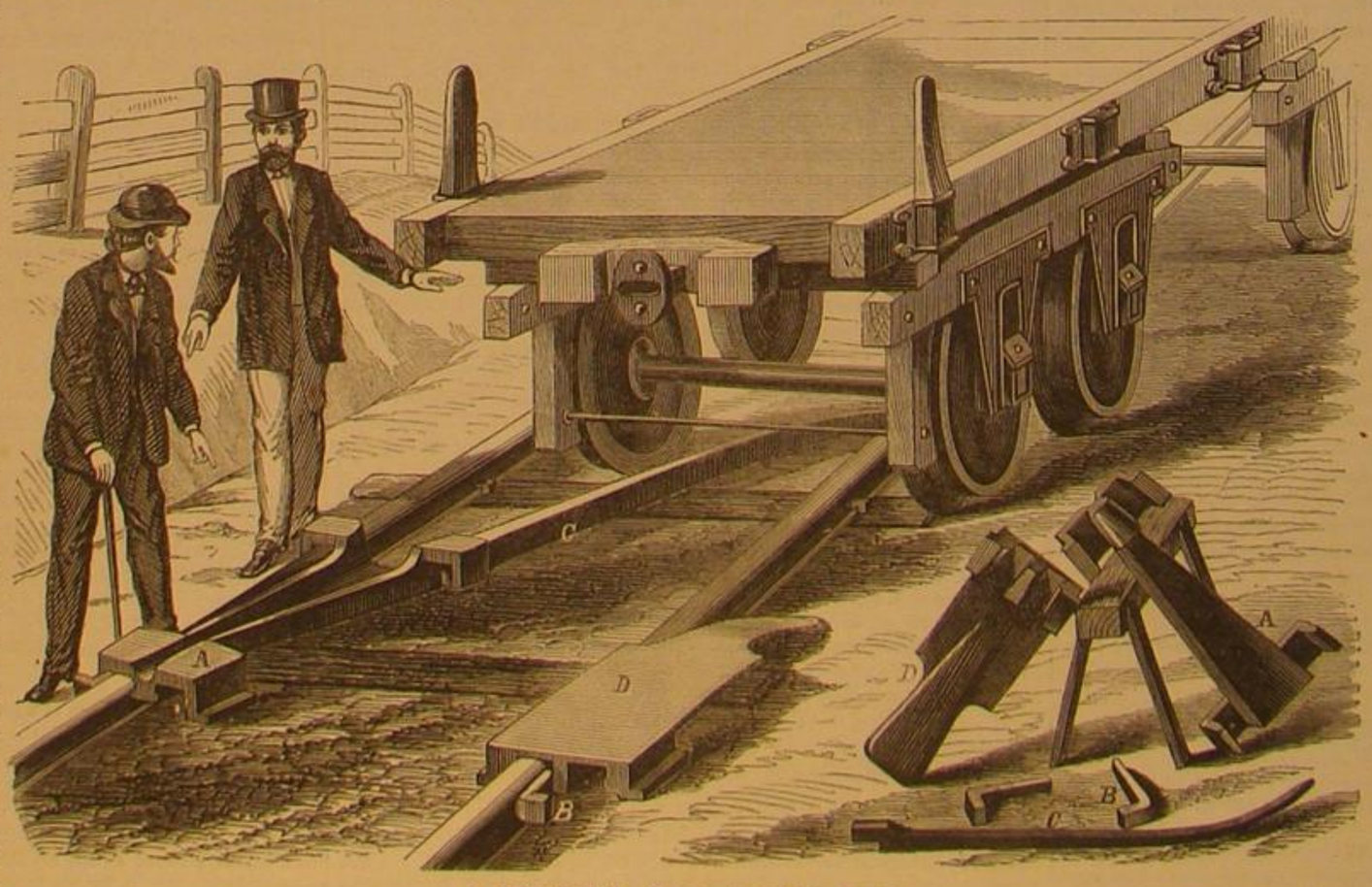
### Device for Replacing Cars on the Track.

Notwithstanding the frequent accidents from the displacement of locomotives and cars from railways, the use of the jack screw and frequently other less mechanical and still cruder means are employed to replace them. Even the former is not always carried on the train, and the latter demand the oversight of some well balanced and executive mind to make their use effectual. A portable and convenient device for remedying the annoyances attending these almost unavoidable accidents seems to be really a desideratum. It would seem that the one repre, sented in the engraving accompanying this article was well fitted to answer this want.

The pieces to be used are only three in number, and are not so heavy but that either of them can be readily carried by one man. They consist of a grooved plate-A, with side projecting flanges to slip over the rail and to be held in place by means of wedges, or keys, B, fitting between the flanges of the plate and the web of the rail. This plate has a gradually opening or expanding groove, guarded on each side by flanges. It is so constructed that from the forward end it declines to the road way, forming an easy incline for the wheels of a car. To further assist the car in its progress to the track, a bar, C, is used, one end of which fits in a proper socket in the plate, A, and the other end of which is curved so as to fit either one track or the other, as the run-off cars may be. It can be easily reversed so as to suit either contingency.

On the other side of the road, or on the other rail is placed a curved plate, D, secured to the rail as the plate, A, is, by a key or wedge, which assists the wheel of the car to assume its normal and proper position. These comprise all the appliances of this device. They are simple in construction, can be easily carried on any engine tender or street car, and the pieces composing them can be readily handled by one man in case of accident. It will be seen that while the flanged incline, A, pilots the flange of one wheel to its position on the rail, the other is assisted to its place by the smooth incline, D. The device is as well adapted to street cars as to steam cars. It is recommended by Franklin Peal of the Baldwin Locomotive Works, Philadelphia, Robert H. Sayers of the Lehigh Valley Railroad Co., and other prominent engineers and railroad men.

It was patented through the Scientific American Patent Agency, April 14, 1868. Railroad companies and others desirous of purchasing rights may address B. K. Jamison, 301 Chestnut street, Philadelphia, Pa.




JAMISON'S CAR REPLACER.

### Vitality of Insects' Eggs.

The Troy *Times* says: "A gentleman who lives on Ida Hill informs us that ten years ago he bought a piece of enameled cloth for a table cover, on which there was at that time and has been ever since a small knot or bunch, apparently in the make of the cloth. A day or two since a child of his scraped the bunch with a knife, when out crawled a bedbug, as lively as ever."

This case may be a remarkable one, but newspaper men and dealers in paper will not hear of it with much surprise. The *Cimex Lectularius* or common bedbug is very tenacious of life, as all our neat housewives know. He will stand boiling water, oil, soap, and even some of our patent bug destroyers, and rather seems to enjoy his rough treatment, as we superior animals enjoy the rough usage of the Russian bath. But his embryo offspring seem to be still more tenacious of life. Some years ago, in writing on unprinted news paper, we detected a bunch which occasioned some annoyance, as such an obstruction will to a writer, and opened it with the point of a pen, when a veritable *cimex* made his appearance, apparently as fresh as though he had just awaked from a long winter nap. Subsequently, under similar circumstances one fairly cut through his paper envelope and walked out before our eyes. In both cases the enveloping film of paper appeared to be whole, and we could not resist the conviction that the embryo had passed through all the stages of the paper manufacture—the sorting and washing of the rags, their grinding, steaming, pulping, manufacture into paper, calendering, and putting up for the market.

### A New Life Saving Invention.

Last summer public interest was excited in watching the success of two trans-Atlantic excursions undertaken by certain foolhardy individuals who were willing to stake their lives against a short-lived notoriety. It having been demonstrated that the ocean passage can be made in an ordinary sail boat, or raft, with a fair share of safety, we should not be surprised if some future adventurer desirous of creating a sensation and rendering himself famous in this line, should undertake a trip, or rather swim, to Europe, the feat being possible with the life-saving apparatus of Captain Stoner, exhibited in this harbor on the 27th ult. The apparatus, whose design is for service in case of shipwreck, consists of an india-rubber suit, in one piece and made large enough to put on over the ordinary clothing of the wearer. The buoyant power resides in a cork jacket worn inside the rubber suit. A covered framework fastened to the hands furnishes propelling or swimming device, and a light metallic case serves as a reservoir for provisions, holding enough food and water to last for a month or more. The trial on Wednesday was under the auspices of the National Life Saving and Ship Ballasting Company, who chartered a government steamer for the occasion. Two persons dressed in this suit remained in the water for nearly two hours without wetting their clothing in the slightest degree.

The apparatus is somewhat similar in construction, and for the same purpose, as an india-rubber suit with an air bag on the back, making the wearer when in the water, resemble a porpoise, which was exhibited by the inventor in our harbor several years ago, much to the amusement and consternation of great numbers of persons who gathered upon the docks to witness the exploits of the exhibitor. Similar apparatus has been experimented with on the Continent for a number of years, but we have never known of their useful application except for wrecking purposes.

### Petroleum in Parliament.

The English journals notice the introduction of a bill into parliament imposing additional restrictions upon the sale and use of petroleum. The bill—which by this time has undoubtedly become a law—while serving as an amendment to what is known as the Petroleum Act of 1862, is still more stringent in its provisions, and virtually puts an end to the sale of all lamps using the light hydrocarbons, and also the various styles of portable illuminating-gas machines which have proved themselves of great service in many localities in this country, but of whose value, it seems, the Britons are never to be acquainted. The test for lawful petroleum is placed, by this bill, at one hundred and ten degrees Fah., the commercial test for kerosene in this country, and any person selling, or exposing for sale, oils giving off inflammable vapors below that point, is subjected to a fine of five pounds sterling. Venders of "patent non-explosive oils" will not find much encouragement for driving a very extensive trade in England.

THE French towns of Narbonne and Passy, near Paris, have been lighted at night, for several years past, by illuminating gas made by passing the vapor of water over incandescent coal.

# Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

☞ "The American News Company," Agents, 121 Nassau street, New York
☞ "The New York News Company," 8 Spruce street
☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.
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VOL. XVIII., No. 24....[NEW SERIES].. *Twenty-third Year.*

NEW YORK, SATURDAY, JUNE 13, 1868.


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## NO LIMIT TO INVENTION.

That the mechanical arts have reached a very advanced stage of improvement, as compared with their status in medieval ages, cannot be denied. How far modern civilization, dependent upon progress in those arts, exceeds that of a more ancient period, is a difficult question to answer satisfactorily. The remains of Egyptian, Roman, and Greek architecture, together with such knowledge as can be gathered from a few Latin and Greek writers, and the discoveries recently made in the excavations among the ruins of Herculaneum, indicate that in many things the ancients were not inferior to us of the present day, while in others they probably possessed knowledge that was superior to that at present possessed upon the same subjects. The arts of stone cutting, fresco painting, and sculpture, the mathematics, and speculative philosophy, were cultivated by them with great success. Could the books and manuscripts lost in the wanton destruction of the Alexandrian library be restored, there is no doubt that many mathematical theorems and mechanical devices, considered as belonging to the present age, would be found to have their prototypes in the ages whose records were lost in that ever to be lamented conflagration.

However, it may not only be fairly presumed that we have regained the greater portion of the art knowledge of the past, but that we have explored vast fields of knowledge, the very existence of which was not even suspected by the ancients. As progress in the sciences has been made, the scope of mechanical invention has been also enlarged, until the number and variety of machines which have been produced, and applications of substances discovered in chemical research to the supplying of the necessities and luxuries of mankind, are beyond computation.

The questions naturally arise, how much further the inventive powers of the human mind can find scope; whether there is not a limit to progress in mechanical construction; or if not limited by want of materials, or subjects upon which to operate, whether the constant increase of labor-saving machinery, and the increasing supply of fabrics, will not at last reach a point where the wants of the human race will be so fully supplied that demand will cease, and thus, the necessary stimulus to further attempts at improvement no longer existing, the epoch of invention will not forever terminate. The discussion of these questions forms the subject of the present article.

The development of new resources is constant and increasing. Chemical research is being almost daily rewarded by important discoveries which add to the already vast resources of materials available for mechanical purposes. To the ordinary observer, it might seem as though these resources were sufficient already; but to show the fallacy of such an opinion, we will state a few of the wants now seriously felt in the mechanical arts, and the supply of which would give a powerful impulse to invention:

A substance perfectly flexible, impermeable to fluids or gases under heavy pressure, and not acted upon chemically by ordinary substances in general domestic use, oils, liquors, etc. A substance which can be produced in large quantities at a cheap rate, of as low a specific gravity as the body of a goose-quill, and with equal strength, that shall be easily molded into required forms. A substance having, or capable of having imparted to it a surface as smooth as the surface of water at rest. A method of producing the galvanic current in large quantity, as cheaply as heat is obtained from the combustion of coal. We might enlarge the list greatly, but our object is simply to illustrate the fact, that extensive as the mechanical resources in material might seem to be at first glance, there are still many deficiencies to be supplied.

That these deficiencies will be supplied we have not the slightest doubt, and their discovery will commence a new era in hydraulics, aerostatics, photography, and the construction of electro-motive engines. But could all such requirements be placed at once within our reach, we should find that in their utilization new and hitherto unsuspected necessities would arise for other materials and processes, which would in their turn become objects of research for the chemist or the metallurgist. Such discoveries would give rise to numerous inventions developed by the same gradual march of improvement that has characterized the history of the steam engine, navigation, and other departments of mechanical engineering.

Nor is it probable that the wants of the human race will ever be so completely supplied that demand for improvement will cease. Man, in a state of barbarism, has but few wants except those possesses in common with the animal creation. As he advances in the scale of civilization his wants increase in a far greater ratio than his progress. He is no longer an animal, satisfied with sufficient food, and warmth, and rest; his mind and affections begin to assert themselves, and to not only modify those wants which are purely physical, but to create new ones. Even if man could for a space find his every desire completely satisfied, the craving for variety, which is an attribute of the human intellect, would create new desires, and novelties in dress, in food, in amusements, would become not certainly essentials to his existence, but most surely they would be necessary to a refined and cultivated existence. "The eye is never satisfied with seeing, nor the ear with hearing;" and this universal truth is a sufficient guarantee that while skill can supply it shall always find a demand for its products.

## WIND WHEELS---SOME OF THEIR ADAPTATIONS.

It is somewhat surprising that while in other countries the wind mill, or wind wheel, is extensively employed to save the labor of man and beast and the eating expenses of the steam engine, there are so few of them used in this country as stationary motors. No one, not even those who make its manufacture or sale a specialty, pretend that it can supersede either the steam engine or water wheel; but they claim, not without reason, that where neither of the others are available, or where the expense of their establishment and care precludes their employment, the wind wheel may be economically used. Our western prairies afford no water powers, and as they are not overburdened with fuel, the use of the steam engine is almost interdicted. In this respect parts of Holland and Belgium resemble these portions of our own country, as they are level and not wooded, but the wind mill is a prominent feature in the landscape. It is so also in other parts of Europe.

The wind wheel is not well adapted to such mechanical work as requires a steady, uniform motion, owing to the variable and unreliable character of the power; although it has been and still is employed to run the stones for grist mills. But for some of the services needed on the farm, especially for pumping water for cattle and for household use, it seems to be admirably adapted. It would appear, also, that while the wind wheel can elevate water for domestic or irrigating purposes, or for the draining of mines, it might be employed to produce a reservoir of that fluid to be used on a small turbine or water motor, to give motion to a sewing or knitting machine, a loom, or churn, and for various other purposes that will readily suggest themselves. Its first cost is light and its after management requires but little care.

## ROUGE---ITS COMPOSITION AND USES.

In the mechanical arts rouge is used for polishing purposes. It is entirely different from the cosmetic known by the same name, which is a vegetable preparation and used only for the complexion. But the rouge used by machinists, watchmakers, and jewelers is wholly a mineral substance. In its preparation crystals of sulphate of iron, commonly known as copperas, are heated in iron pots, by which the sulphuric acid is expelled and the oxide of iron remains. Those portions least calcined, when ground, are used for polishing gold and silver. These are of a bright crimson color. The darker and more calcined portions are known as crocus and are used for polishing brass and steel. For the finishing process of the specula of telescopes, usually made of iron for large instruments—although lately cast of steel—crocus is invaluable; it gives a splendid polish. Lord Rosse prefers for the production of rouge the peroxide of iron precipitated by ammonia from a dilute solution of sulphate of iron, which is washed and then compressed until dry. It is then exposed to a low red heat and ground to powder.

### To Deposit Copper, Silver, or Gold by the Electric Battery on Paper and other Fibrous Material.

The whole question is to make the paper a good conductor of electricity without coating it with a material which may peal off. One of the best methods is to take a solution of nitrate of silver, pour in liquid ammonia till the precipitate formed at first is entirely dissolved again, and place the paper, silk, or muslin for one or two hours in this solution. After taking it out and drying well, it is exposed to a current of hydrogen gas, by which operation the silver is reduced to a metallic state, and the material becomes so good a conductor of electricity that it may be electroplated with copper, silver, or gold in the usual manner.

### An Electrical Thermometer.

One of the most interesting adaptations of electro-magnetism is an English invention for making electricity in connection with a thermometer regulate the temperature of a room. An ordinary mercurial thermometer is provided with a platinum wire connecting with the mercury in the bulb. Through the other end of the tube is inserted another platinum wire capable of being elevated or depressed. These two wires are in connection with the poles of a battery, and in the circuit is an electro-magnet whose armature controls the opening or closing of a valve for the admission of hot air. If it is desirable that the temperature of the air should not rise above sixty degrees Fah., the free end of the movable wire is brought to the required number on the tube. When the heat is such as to cause the mercury to rise to that degree, the electric circuit is completed, the armature closes the hot-air valve until the temperature is diminished, when the circuit is broken, and the valve again opened.

### To the Disciples of Icarus.

From the number of letters received elaborating various plans for navigating the air, we are aware that there is a large class of our readers who are intensely interested in aeronautics, and for their benefit we announce the prizes to be awarded by the English Aeronautic Society at their approaching exhibition in the London Crystal Palace:

For the best form of kite or other aerial contrivance for establishing communication between ship and shore in the case of a wreck, or between two vessels at sea, $250.

For a machine whatever may be its motive power, which shall sustain itself in the air at a hight not less than ten feet from the ground for a period of twenty minutes, $250.

For an apparatus (not a kite or a balloon) that shall ascend with a man to the hight of 120 feet, $500.

For the lightest engine in proportion to its power, whatever the power may be, $250

Competition is free for citizens of every nationality, and let our boasted ingenuity display itself to the amazement and gratification of our British cousins.

### Meteors and Comets.

Professor Pepper, in his Lenten Lectures on "physical astronomy," at the London Royal Polytechnic, stated that fourteen years ago, Dr. Bedford discovered the relation between meteor and comet, and announced their actual identity; that at the time, and long since, it was regarded as mere theory; but within the last two years astronomers have proved the truth of Dr. Bedford's discovery, which was made by a careful comparison of recorded phenomena from the earliest times. The Professor said that it had been proved by five mathematical elements of the orbits of five several comets and meteors, and that the discovery is regarded as one of the grandest additions to astronomical science; and stated that Dr. Bedford has propounded entirely new theories of astronomy, which are most profound and very interesting, and well worthy of being studied.

## A NEW TELEGRAPH PATENT FOR OLD INVENTIONS.

In March last an act was passed by Congress and approved by the President, authorizing the issue to Charles Grafton Page of Letters Patent for alleged inventions in the science of electro-telegraphing, the position of Prof. Page as Examiner in the Patent Office disqualifying him from either taking out a patent or acquiring any interest therein without special legislation. Prof. Page died on the 5th instant, but prior to his decease, under the pretended authority of this law, a patent was granted to him which virtually hands over to his representatives the whole control of American telegraphy, entirely ignoring the claims of other recognized inventors, and taking from the public, rights they have enjoyed for years by the expiration of former patents. The heirs of Prof. Page now step in and insist upon securing to themselves the profits promised by this singular law.

The direct claim of Professor Page, as set forth in the law, was for the invention of the induction-coil apparatus known among telegraphers as the Ruhmkorff coil; but the patent covers much more than this. It embraces the "employment of one electro-magnetic instrument to open and close the circuit of another electro-magnetic instrument, using either one battery for both or separate batteries for each," which is, in fact, the famous "local circuit" years ago patented to Prof. Morse; the "combination of an automatic or mechanical circuit breaker with either a primary coil alone or a primary and secondary coil combined," invented and patented by Royal E. House; the "employment of separate and independent batteries to operate an electro-magnetic circuit breaker and the circuit which is broken by it," which is the famous "repeater" patented by Mr. Hicks; and, indeed, covers all automatic closers, repeaters, local circuits, and all points of value known in the electro-telegraph business.

The bill and the patent founded upon it are outrageous impositions upon the public, and will not for a moment stand the test of the courts. It is singular that Prof. Page's name should never have been known and associated with these important inventions, and that as Examiner of Patents for many years he should have passed favorably upon the claims of those who have secured patents for these very discoveries, which he afterward claimed to have originated with himself. The Morse and House patents have expired long since, and by limitation of law their inventions have for years been public property. The Hicks patent has yet some years to run. The truth is, the bill bears upon its face evidence of having been the work of lobby legislation, and the patent is glaringly absurd, unjust, and illegal. We understand that an effort is being made to induce some of the telegraph companies to buy up the pretended rights of Prof. Page's heirs; but we advise them to keep their money in their pockets and to take no notice whatever of the claim. The passage of such a law shows how careless and stupid our legislators at Washington have become since the small amount of brains they possess has been muddled up by impeachment, and the best thing

they can now do is to repeal the act and take care that they are not hoodwinked into such absurd legislation in the future.—*N. Y. Herald.*

[In connection with this subject we present a letter written by Prof. Page, only a few months before his decease, to the editor of the London *Scientific Review*, in which he frankly admits that priority of invention in respect to the circuit breaker belongs to Prof. McGauley.—EDS. SCI. AM.]

Prof. Page, of the United States Patent Office, in a pamphlet recently published on the history of the induction coil, shows clearly, by documentary and other evidence, that Ruhmkorff has no claim whatever to any merit in respect to the invention of the coil which bears his name. Not only were all the principles on which the action of the coil depends, discovered long before Ruhmkorff embodied them, but even the details of the apparatus had all been invented and described, and not only so, but a complete, nay, a more powerful apparatus, had been made and exhibited in Paris. This apparatus was constructed by an American, Mr. Ritchie, who modestly attributes its merits to the researches and discoveries of Faraday and others, who had made electro-magnetism their study. It was exhibited in Paris to many scientific men, and was actually taken to pieces by M. Ruhmkorff, an instrument maker, so that its construction might be thoroughly understood. A few years afterward M. Ruhmkorff obtained the Imperial Prize of 50,000f. awarded by a commission of men eminent in science, to the author of the most important discovery concerning the applications of electricity. Among the members of this commission were gentlemen who had seen Mr. Ritchie's coil, but who found it convenient to forget it. The French journals awarded to Ruhmkorff all credit for the invention, and refused to publish explanations of the real facts of the case, forwarded to them from scientific gentlemen in America. Du Moncel, Ganot, and other French writers on the subject of this invention, though they were all fully conversant with the truth, and though some of them were present at the experiments with Ritchie's coil, and even at its dissection, have carefully ignored any apparatus of the kind as a competitor in merit with Ruhmkorff's.

In pleasing contrast to conduct like this, we turn to Professor Page's frank and honest acknowledgment of merit to those who had anticipated himself in some very valuable inventions relating to induction apparatus. Among the gentlemen credited with such inventions, the late Professor McGauley, who was so long connected with this journal, and whose recent death created so much and so well-merited sympathy among scientific men, is prominently mentioned. We remember that on several occasions Prof. McGauley mentioned in his modest, unassuming way, that he had invented what was called the Ruhmkorff coil, but we never had an opportunity of ascertaining the details of his claim. Now, some months after his death, information comes to us across the Atlantic, which connects his name with the history of induction apparatus, for it appears from the evidence furnished by Professor Page, that Professor McGauley was the first to invent and apply the automatic contact-breaker, the type of all now employed in such apparatus. A coil fitted with such a contact-breaker, was exhibited by Prof. McGauley, at the meeting of the British Association in 1837, and a description of it was published in 1838, among the proceedings of that body. It appears that Prof. Page, who was himself engaged in working out induction apparatus, independently invented a similar but more complete contact-breaking apparatus early in 1838, having had no information as to McGauley's invention. Yet Prof. Page, with the true modesty of science, frankly awards to Prof. McGauley all the honor of priority in this matter. Not only so, but having heard of that gentleman's death, and of the exertions made on behalf of his bereaved widow and children, he has written to Sir David Brewster, the chairman of the McGauley Memorial Relief Fund, the following letter, which we now publish, and which will be read with the melancholy interest attaching to all connected with the great name of him, now no more, to whom the letter was addressed :—

UNITED STATES PATENT OFFICE, Feb. 6th, 1868.

DEAR SIR:—Noticing the death of Professor McGauley, mentioned in the *Scientific Review*, I take the liberty of sending you a book on Induction I have recently published, in which I have had occasion to make honorable mention of his name, in connection with an invention of interest and importance, of which he was undoubtedly the originator. The hammer circuit-breaker, which has been so extensively used in connection with Induction Coils all the world over, has been in England, France, Germany, and Europe, generally attributed to Dr. Neef, of Frankfort-on-the-Main. In this country it has always been accredited to me, as I invented it at least six months in advance of its introduction by Dr. Neef. My investigations, however, have traced it to Professor McGauley as the original author, and it appears to me somewhat singular that Dr. Golding Bird omitted to mention the originator's name when he brought the apparatus before the London Electrical Society. He simply said "it was not his own invention." It cost me a considerable search to find it out, but I have proceeded upon the principle of according to every inventor and discoverer his just dues, regardless of personal and national considerations. If this discovery in his favor should be of any benefit in raising means for his family, I shall rejoice and feel proud that my humble efforts to do justice to a co-laborer in the cause of science have met with such a reward.

With great respect and esteem, I am, very respectfully, yours,

CHARLES G. PAGE,
Chief Examiner of Patents.

Sir David Brewster.

SINGULAR ROBBERY.—Recently, at Seymour, Ind., while a railroad train was stopping to take in water, a gang of robbers took possession of the engine, tender, and Adams' Express car, detached them from the train, and started off down the track. The engine and car were found abandoned next day, standing on the track about eighteen miles from Seymour. The robbers threw the express agent out of the window and rifled the Adams' Express safes of over fifty thousand dollars in money.

THE object glass in the great refracting telescope at Cambridge, Mass., with a clear aperture of fifteen inches, cost unmounted about $15,000. A French artist employed in a Birmingham (Eng.), glasshouse, has succeeded in making a disk of flint glass twenty-nine inches in diameter, two and a half inches thick, and weighing two hundred pounds.

## Science Familiarly Illustrated.

### First Attempts to Propel Vessels by Steam.

Before Fulton made his successful steam voyage on the Hudson others had conceived the idea, proposed plans, and in some cases tested them. Pepin, Savery, the Marquis of Worcester, and Dr. John Allen, of London, all had proposed, prophesied, or tried steam navigation. The device of using wheels instead of oars, the propelling power being men or animals, is believed to have been employed by the Egyptians and Romans in their war galleys.

In 1737 Jonathan Hulls published a pamphlet describing a method of propelling a vessel by steam, for which he had secured a patent. He proposed placing the wheel at the stern, that being the proper place for it because water fowl pushed their web feet behind them. In 1786 Benjamin Franklin, and also Oliver Evans, suggested the action of steam upon a column of water, forcing it out of the boat at the stern on a line with the keel, the water having been received forward. This plan has many advocates at the present day, and a modification of it, but really the same in all essential respects, has latterly excited considerable attention in England.

About the same time this plan was tried by Mr. James Rumsey, of Sheppardstown, Va., who made a public experiment on the Potomac. His boat was about eighty feet long and was propelled by a steam engine working a vertical pump in the middle of the vessel, by which the water was drawn in at the bow and expelled through a horizontal trunk at the stern. She went at the rate of four miles an hour when loaded with three tuns in addition to the weight of her machinery, one third of a tun more. The whole machinery, including boiler, occupied a space but little over four feet square.

John Fitch, in 1786, made a number of experimental excursions on the Delaware with a boat propelled by paddles worked precisely as those of an Indian canoe. The following is Mr. Fitch's account of it: "The cylinder is to be horizontal, and the steam to work with equal force at each end. The mode by which we obtain what I term a vacuum is, it is believed, entirely new, as is also the method of letting the water into it, and throwing it off against the atmosphere without any friction. It is expected that the cylinder, which is of twelve inches diameter, will move a clear force of eleven or twelve hundred weight after the frictions are deducted; this force is to be directed against a wheel of eighteen inches diameter. The piston moves about three feet, and each vibration of it gives the axis about forty evolutions. Each evolution of the axis moves twelve oars or paddles five and a half feet; they work perpendicularly, and are represented by the strokes of a paddle of a canoe. As six of the paddles are raised from the water, six more are entered, and the two sets of paddles make their strokes of about eleven feet in each evolution. The crank of the axis acts upon the paddles about one third of their length from their lower ends, on which part of the oar the whole force of the axis is applied. The engine is placed in the bottom of the boat about one third from the stern, and both the action and reaction turn the wheel the same way."

In 1796 Fitch moved a small boat on Collect Pond, in New York city, by means of a small engine and propeller screw projecting from the stern of the boat. This is probably the first employment of the screw for propulsion.

The *Charlotte Dundas* was built by Symington in 1801 and used to tow boats on the Forth and Clyde canal three and a half miles per hour. Its use was abandoned from a belief that the action of the wheels washed the banks.

Oliver Evan's dredging machine, built by order of the Board of Health of Philadelphia, being a flat scow with a small steam engine on board for working the mud-raising machinery, propelled itself one and a half miles on wheels to the Schuylkill, and then, by means of a stern paddle wheel, navigated the river to its junction with the Delaware.

We come now to Robert Fulton whose claim to have been the first to successfully introduce steam navigation as feasible and profitable cannot be successfully disputed, although steam for propelling vessels had been used before his first trial on the Seine and his subsequent triumphant demonstration on the Hudson. Reigart, the author of the "Life of Robert Fulton," justly says, "he never attempted to put in practice any improvements in mechanics without having made his calculations, drawn his plans, and executed his models. None of the projectors prior to him, whose claims have been set up to rival his, have left any traces of calculations, or even an account of the principles upon which their machines were contrived. They were among the multitude that thought steam might be applied to navigation. They went to work to form a machine, with a crude notion that it might do something, without having attempted to calculate what, and without any precise plan for its execution; when it did not answer their expectations it was abandoned, because they could not perceive the cause of its failure or any mode of improvement upon it."

Fulton succeeded because he knew what he was about. He was a thorough mechanic, a good draftsman, a practical workman, a studious and careful thinker, and a man of persistency. When, in the spring of 1803, he had completed his trial boat on the Seine, and in a gale it sunk before the trial could be made, he went to work to recover such portions of the wreck as might be made valuable, and succeeded in the ensuing August in making a trial before the members of the French National Institute. This experiment so encouraged him that he ordered an engine from Messrs. Watt & Boulton, of Birmingham, to be built and shipped to him in America.

In 1807 his boat was launched, and in September of the same year the *Clermont* made her first trips between New York and Albany. From this time forth inland steam navigation was an established fact, and ocean navigation is only an extension of the same principle.

### Wages Before the War and Now.

Among all classes of workingmen in the city the subject of wages is attracting a great deal of attention. With the revival of business much complaint has been made that the pay of mechanics is inadequate for their support, since it has not kept pace with the increase in rents and other expenses of living. In order to show whether or not this is really the case, we present the following comparison between the wages and expenses of workingmen in 1861 and at present, compiled from accurate sources:

WEEKLY WAGES IN NEW YORK.

| *Class of work.* | 1860-61. | 1868. |
|---|---|---|
| Bakers | $10 | $12 |
| Coopers | 9 | 24@27 |
| Blacksmiths | 12 | 18@20 |
| Carpenters | 10@12 | 21@24 50 |
| Cabinetmakers | 6@ 7 | 21 |
| Iron molders | 12@15 | 21 |
| Boiler makers | 10 | 12@18 |
| Machinists | 10@14 | 12@18 |
| Engineers | 9@12 | 18@25 |
| Plasterers | 9@10 | 27@30 |
| Masons | 9@10 | 27@30 |
| Ship carpenters | 12@15 | 21@24 |
| Laborers | 7 | 12@15 |
| Tin workers | 9@10 | 15 |
| Longshoremen | 25c. per hour. | 40c. do. |
| Tailors | 8@14 | 14@20 |
| Printers | 15@18 | 22@25 |
| Painters | 12@15 | 24 |
| Tin roofers | 12 | 24 |

Other rates might also be given, but the above are sufficsent to show the general average. It will be seen that while in some trades wages have more than doubled, in others they have remained almost stationary. The pay of bakers, machinists, and boiler makers, for example, is almost the same as before the war; while that of masons, plasterers, and others, is nearly three times what it then was. In the mean time, the cost of living has advanced immensely. Clothes and provisions have doubled in price, and board and lodging also. Before the war, a single man could get board for $2.50 to $4 per week, where he would now have to pay $5 to $7. In more costly premises the increase is not so great, as some allowance is made for the greater security and regularity of pay. A floor now renting for $16 per month, could have been leased in 1861 for $12. The mechanics, also, who occupy these places, are those whose compensation has most largely advanced, and therefore they suffer less than their poorer paid associates. It is to be hoped that employers will take the whole subject of wages promptly into consideration, and that as soon as business is fairly under way, some general movement will be made toward equalizing the pay of workmen with the increase of their expenses.—*N. Y. Sun.*

For the Scientific American.

### TWIN SCREWS.

The practice of propelling vessels by the combined action of two screws, placed one under each counter, has of late received considerable attention. Some of our monitors, and also a number of small vessels, have been fitted with this mode of propulsion, and in most cases the result has been satisfactory.

The twin screw possesses many advantages over the common screw. Steering is facilitated, as the rudder acts upon steadier water, and in cases where the rudder is damaged in such a way as to make it useless, the vessel is as capable as ever of continuing her voyage. So great is the power of the double screws, when working in opposite directions, that a vessel fitted with them is enabled to turn almost or quite within her own length. A great advantage is the recovery, in part, of the power expended by the screw in its centrifugal action upon the water. If two vessels be tied stern to stern, one propelled by a common screw, and the other by paddles, the screw vessel will in all cases tow the paddle vessel astern against the full power of her engines. This is explained by the fact that the screw, in its centrifugal action, heaps up a bank of water at the stern, which bank, acting against the vessel, pushes her forward. This shows that under certain conditions the power expended in raising the bank of water can in part be recovered. But when a screw vessel is going through the water at her usual rate, she runs away, as it were, from the bank of water at her stern, and its effects are but slightly felt. As fine pitches, and quick speeds of the propellers, are generally to be found in vessels having negative slip, it is natural that we should in part impute the existence of such slip to the centrifugal action of the propeller, for a fine pitch propeller acts so rapidly that the vessel is unable to run away from the wave.

From what I have stated, it is easy to see how part of the power of the screw lost by its centrifugal action, is recovered. Now, if this be the case, as it certainly is, the twin screw system is admirably adapted for the partial recovery of the power lost by the screw in this way. With a twin screw, the bank of water is raised forward, well under the counter, and is enabled to act with full force on the sloping surface of the run, and thus have a great effect in forcing the vessel forward. Great as the advantage is, it has one serious drawback, and that is, twin screw boats lack the power possessed by a common screw in backing. The only reason I can assign for this lies in the fact that the screw raises the same bank of water in backing as in going forward, and that this bank exerts a great force against the retrogressive motion of the ship. The water, as it is heaped up, meets the flare in the vessel's sides, which enables it to act against a more perpendicular surface. How much this disadvantage of twin screws is to influence their general adoption, remains to be seen. For many purposes, especially in light draft ships, the advantages of the double screw counterbalance the objections, and they are introduced with a good result. Many vessels, especially those not used for towing, are not called upon to exert a great force in backing, having only their own momentum to overcome.

ENGINEER.

OFFICIAL REPORT OF

# PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 26, 1868.

*Reported Officially for the Scientific American.*

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

| | |
|---|---|
| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $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.*

78,173.—CAR COUPLING.—J. W. Adams, Spring Creek, Wis.

I claim the arrangement of the lever, b, and rod, J, with the pin, C, and spring, D, when constructed as described and operated by the link, D, secured substantially as set forth and for the purposes specified.

78,174.—RAILROAD CAR VENTILATOR.—M. Christopher Andrews, Lawrence, Mass.

I claim the arrangement of the hinges of each two consecutive shutters of a series thereof, so that such two shutters shall open in opposite directions, as explained, and the combination therewith of mechanism as specified, or its equivalent, whereby such shutters may be operated in manner as set forth.

Also, the combination or mechanism for operating shutters, arranged as specified, such consisting of the slide bar, H, and its operative lever, I, or the equivalent thereof, a series of slotted and bent levers, F, and their connecting links, the whole being arranged together substantially as explained.

Also, the arrangement of my shutter-operating mechanism with the inner surface of the shutters and the side of the car, whereby such mechanism is all brought within the car when the shutters are closed.

78,175.—LOCK SNAP HOOK.—Wilber F. Arnold, New Britain, Conn.

I claim the lock thumb latch, d, with the latch, c, and hook, b, substantially as and for the purpose described.

78,176.—WRENCH.—Joshua B. Barnes, Fort Wayne, Ind.

I claim the combination of the jaws, A and B, straps, C C, and spiral spring, F, arranged and operating as and for the purposes set forth.

78,177.—TABLE LEAF SUPPORT.—Elwin E. Berry, Farmington, N. H.

I claim the combination of the lever catch D, or its mechanical equivalent, with the arm or strut, B, and the staple, C, so as to operate therewith as described, when they are applied to a table or other like article, substantially in manner as specified.

78,178.—CARPET-CLEANING MACHINE.—Geo. W. Bishop (assignor to Lafayette Farrington), Stamford, Conn. Antedated May 12, 1868.

I claim, 1st, In a carpet-cleaning machine, the arrangement on a divided shaft of the brooms, J J', operating substantially as herein specified.

2d, The weighted beaters, b c, attached to and in combination with the roller, H, when arranged spirally around said roller, substantially as herein specified.

3d, The arrangement and combination of the rollers, C F G E, for feeding, guiding, and winding up the carpet, in combination with the beaters, b c, and brooms, J J', substantially as herein specified.

78,179.—STEAM ENGINE PISTON.—Cornelius Bollinger, Harrisburg, Pa. Antedated May 14, 1868.

I claim the conical nut, H, constructed with a female screw on the inside, to fit the piston rod, and male screw on the outside, to fit the piston head, in combination with the piston head and rod, as described.

In combination with the conical nut, H, provided with lugs, I I, the corresponding lugs on the head of the cylinder.

78,180.—LANTERN.—Thomas H. Brady, New Britain, Conn.

I claim a lantern guard having the upper and lower rings, or either of them, made of cast metal, as described, as a new article of manufacture.

78,181.—HAY AND STRAW CUTTING MACHINE.—Chas. Brown, Buffalo, N. Y.

I claim, 1st, The combination of the cutting and crushing mechanism, substantially as described, and for the purpose set forth.

2d, The combination of the cutting and cleaning mechanism, substantially as described and for the purpose set forth.

3d, The vertical cleaning chambers, with air apertures in the front and back sides thereof, and exhausting fan combined therewith, substantially as described and for the purpose set forth.

4th, The dividing and separating plate, L, arranged in the manner and for the purpose set forth.

5th, The feed table, G, constructed and arranged as described, for the purpose set forth.

6th, The rotary feeder, K, arranged and operating as set forth.

78,182.—PROCESS FOR MAKING TRANSPARENT SOAP.—Morgan W. Brown, New York city.

I claim the means and mode of treating and settling a soluble hard soap, as herein described, to render the same transparent, substantially as specified and set forth.

78,183.—HARD DRILL.—Wm. C. Burch, Gloucester, N. J.

I claim the combination and arrangement of the helical brake with the drill shaft and the head of the operative lever, the whole being to operate substantially as described.

78,184.—BED BOTTOM.—Wm. A. Chamberlin, Alexander, N. Y.

I claim, 1st, The hinged levers, B B, supporting cross pieces, C C, india rubber blocks, s s, and slats, A A, arranged and operating substantially in the manner and for the purpose set forth.

2d, Hinging the ends of the levers to the cross piece by means of hook or eye bolts, f, and extended key rod, g, in the manner and for the purpose shown and described.

78,185.—GAS APPARATUS.—C. H. Childs, Cleveland, Ohio.

I claim, 1st, The perforated tubes, H, surrounded with textile or fibrous material, and chamber, C', in combination with the chamber, E, and annular space, F, substantially as and for the purpose specified.

2d, The pipes, M N, and chamber, C', in combination with the diaphragm, G, annular chambers, C, and cover, D, arranged as and for the purpose set forth.

78,186.—CULTIVATOR.—Charles A. Cogswell, Maquoketa, Iowa. Antedated May 13, 1868.

I claim the attachment of the curved rod, A, to the standard and beam of the ordinary shovel plow or cultivator, in the manner and for the purpose above specified.

78,187.—WASHING MACHINE.—Thomas Crane, Fort Atkinson, Wis.

I claim, 1st, The construction of the oscillating cradle with a bottom, c, which is independent of the tub, in combination with the stationary partition C, arranged with said cradle, substantially as described.

2d, The cradle, constructed with a bottom, and with its back board closed, and its front board perforated, in combination with a perforated removable partition, C, arranged within the cradle, but connected to the outer tub, substantially in the manner described.

3d, The cradle having a bottom and ends substantially as described, and a top which is hinged and fluted or roughened on its under surface, in combination with the board, A', of the tub, substantially as described.

78,188.—RAILROAD CAR.—Martin M. Crooker (assignor to himself and Alex. B. Allen), Rutland, Vt.

I claim a rail-car in which its doors are flexible, and are arranged to pass up under the roof and over one another, substantially in the manner and for the purpose described.

8,189.—LUBRICATING COMPOUND.—T. E. Curtiss, Titusville, Pa.

I claim the within described lubricating compound, composed of the materials and substantially in the proportions set forth.

78,190.—EYE GLASSES.—Albert H. Daniels, Hartford, Conn.

I claim, 1st, The spring, a constructed and applied to the frames of the eye glasses substantially as described.

2d, The studs, c c, made and applied to the frame of the eye glass, and the spring, substantially as described, for the purpose specified.

78,191.—CAR SPRING.—D. G. Daniels, Cincinnati, Ohio, assignor to himself and F. Mortimer Atkinson, Chicago, Ill.

I claim a spring which is composed of plates, A A, bent in the form of segments of a cylinder, and put together at right angles to each other, substantially as described.

78,192.—COMBINED ARM REST AND PAPER CUTTER.—Chas. H. Dickinson, Brooklyn, N. Y. Antedated May 18, 1868.

I claim the combined arm rest and paper cutter made substantially as and for the purposes set forth.

78,193.—SASH SUPPORTER.—C. F. Dodge, Williamsport, Pa.

I claim the combination and arrangement of the pivoted double inclined plane, B, roller, C, lever, A, and stop or cam, D, in a suitable box or casing, substantially as shown and described, for the purpose specified.

78,194.—REGULATING CANNON LUMBER WAGONS.—James W. Drew, Stockbridge, Mich.

I claim, 1st, The use and application of the wheel, B, to common team wagons, for obviating the knock and jerk of the tongue or draft pole, F, on rough roads, as substantially shown and described.

2d, The bar, D, pinion, C, combined and operating in the manner as herein shown and described.

78,195.—METHOD OF MOUNTING PHOTOGRAPHS AND ENGRAVINGS.—John L. Duffee, Washington city, D. C.

I claim the mode of mounting photographic or other pictures produced upon paper, substantially as herein described.

78,196.—MANUFACTURE OF FINGER BARS FOR HARVESTERS. Rufus Dutton, New York city.

I claim constructing the finger bars of harvesters substantially as described, that is, forming by suitable machinery or mechanism a metallic plate of the required thickness for a finger bar, and of a width sufficient for two bars, and having both of its edges or sides turned up or raised above the general surface or plane of the plate, and then dividing or cutting such plate obliquely lengthwise, so that when so divided there will be formed two separate plates, each suitable for a single bar of tapering form, and each having a raised or turned up edge, for the purpose set forth.

78,197.—METHOD OF CONSTRUCTING FINGER BARS OF HARVESTERS.—Rufus Dutton, New York city.

I claim constructing the finger bars of harvesters substantially as described, that is, forming a metallic plate of a breadth sufficient for two bars, such plate having its edges raised or turned up, and also having ribs or raised portions towards its center, and parallel with its edges, so that when such plate is divided diagonally lengthwise into two parts, it will form two bars, each having two parallel ribs or raised portions, substantially as set forth.

78,198.—DITCHING MACHINE.—T. B. Fagan, Mendon, Ohio.

I claim, 1st, in combination with the wheel, F, the arms or supports, D D, provided with adjustable holes, as and for the purpose described.

2d, In combination with wheel, F, and supports, D D, the chute, E, constructed and employed substantially as and for the purpose specified.

3d, The combination of the ditching wheel, F, chute, E, supports or arms, D D, and shaft, J, furnished with pinions, j j, arranged and operating substantially in the manner and for the purpose set forth.

78,199.—CHURN.—J. H. Fleming, Groton, Ohio.

I claim the dasher, D', constructed as set forth, in combination with the hinged cover, B, with the gearing arranged in connection therewith substantially as and for the purpose set forth.

78,200.—MACHINE FOR ROUNDING THE CORNERS OF SLATE FRAMES.—John Flory, Flicksville, Pa.

I claim in combination with the disk or arm, G, with its crank pin, the connecting rod, H, and the arm, I, on the shaft, J, for vibrating the frame, K, and cutter, V, substantially as described.

78,201.—DEVICE FOR UPSETTING TIRES.—A. H. Ford, Williamsfield, Ohio.

I claim the combination of levers, A A, pivoted together by an eccentric joint, with adjustable support, E, and screw, I, substantially as described.

78,202.—BRIDGE.—Edward Hamilton (assignor to himself and Matthew D. Rapp), Chicago, Ill. Antedated May 9, 1868.

I claim, 1st, In combination with the sheets, A, of metallic plates, placed edgewise to sustain the incumbent weight, a system of cross braces, B, to support the same, substantially in the manner set forth.

2d, In combination with the metallic plates, disposed as set forth, and wooden cross braces for supporting the same, plates for inclosing the spaces between the edges of the sheet, substantially as set forth.

78,203.—CULTIVATOR.—George D. Hart, Muncy, Pa. Antedated May 11, 1868.

I claim the above, as set forth, whether used in combination with this machine or separate in any other, reference being had to Letters Patent above referred to.

78,204.—LOUNGE.—Wm. C. Hart (assignor to himself and Charles S. Jones), Nantucket, Mass.

I claim the improved lounge, as made with the reversible back, and with the connections and supports thereof, applied to and arranged with the two extremes of the body of such lounge, substantially in manner as specified.

78,205.—STEAM ENGINE SLIDE VALVE.—James Hemphill, Pittsburg, Pa.

I claim the combination of the valve cover, c, with its stem, e', and the diaphragm, s, and plates, o o', arranged substantially as described, for the purpose set forth.

78,206.—RAILROAD CAR VENTILATOR.—Robert Heneage and F. W. Breed, Buffalo, N. Y.

We claim, 1st, The coupling, E, when constructed and operating substantially in the manner shown and described.

2d, The pivoted case, H, provided with wings, n n, and vane, I, in combination with the wind wheel, I, screw or fan, J, and register, p, the whole arranged and operating substantially as and for the purpose set forth.

3d, The combination of the two devices herein described, for supplying pure air and withdrawing the impure air from railroad coaches, substantially as set forth.

78,207.—PARLOR SKATE.—Robert Hewson, San Francisco, Cal.

I claim in a parlor skate the use of wheels, B, having their axles, D, turning upon the friction rollers, C C C, the whole constructed and arranged substantially as herein described.

78,208.—GRAIN REGISTER.—Sidney Hudson, Milford, Mich.

I claim, 1st, The construction of the striker, C, and its connections, working over the apertures, B, in the receiving box, A, substantially as described, for the purpose designed.

2d, The combination and arrangement of the striking and tallying machines, substantially as described, for the purposes indicated.

78,209.—APPARATUS FOR THE MANUFACTURE OF COAL GAS. David H. Irland, Fayette, N. Y.

I claim the interposed condensing cylinder, B, constructed with the elevated ash pan, D, and water chamber, G, and employed in connection with the retort, A, purifier, H, and gasometer, K, substantially as and for the purpose herein set forth.

78,210.—AXLE BOX FOR RAILROAD CARS.—David Jewett (assignor to himself and Albert Leach), Lynn, Mass.

I claim the construction and arrangement of an axle box, when composed of the parts, C C, A A, and combined with the rollers, D D and grooved axle, D, in the manner and for the purpose herein described.

78,211.—MACHINE FOR CUTTING HEEL SEATS.—Arza B. Keith, North Bridgewater, Mass.

I claim so combining, with a reciprocating or vibrating knife, d, a heel support, k, that relative adjustment may be made between the two, substantially as and for the purpose specified.

Also, pivoting the piece, k, to the slide, l, and combining therewith means for changing the angle of k, substantially as and for the purpose described.

Also, in combination with the piece, k, a side adjusting screw, substantially as set forth.

78,212.—MACHINE FOR MOLDING WOOL SCREWS.—Edwin H. Keith, Bridgewater Mass.

I claim, 1st, The combination, with the perforated table, C, of the screw patterns, g g g, and the mold board, E, provided with the perforations as described, substantially as and for the purpose set forth.

2d, The detachable spindles, b, provided with the pattern screws, g, and corresponding guide sbrews, i, substantially as and for the purpose specified.

3d, The perforated table or plate, C, provided with the adjusting strips or gages, e e' e'' e''', as and for the purpose described.

4th, So forming the molds of the runners, leaders, and sprues, and connecting them with the molds for the screws, that the breakage of the metal will be at or near the center of the screw heads, as set forth.

78,213.—METHOD OF FORMING CARRIAGE AXLES.—John Le Ferre, Charlestown, Mass.

I claim the method herein described of constructing a carriage axle, A, namely, by placing two or more steel or iron bars longitudinally, one upon the other, welding the same thoroughly together, then turning down the taper, b, with the shoulder, m, thereon, and then adjusting on said taper, b, and against the shoulder, m, a suitable collar, 6, and washer, 7, all in the manner substantially as set forth.

78,214.—SOAP.—David C. Lincoln, North Vassalboro, Me.

I claim the combination of nitrate of potash with a fat, or oil and an alkali combined, to form a soap, as set forth.

78,215.—MACHINE FOR POLISHING WOOD.—John S. Loomis, Brooklyn, N. Y.

I claim the sand block or rubber, B, cup, D', pipe, T, revolving brushes, W W, dusting brush, N, stationary rubber, F, emery cup, D, and adjustable bed, G, all combined and operating in the manner and for the purpose substantially as described.

78,216.—SKATE FASTENING.—Halsey B. Lucas, Middletown, Conn

I claim, 1st, The heel strap buckle for a skate, shaped to conform to the curve or instep of the foot, as shown at a a a a, and constructed with the loop, b b', and with a curved locking lever, c g, all substantially in the manner and for the purpose described.

2d, The two curved portions, a c, constructed as described, in combination with the curved loop, b, having a curved portion, b', and with the adjusting strap, B, substantially in the manner described, and for the purpose of facilitating the fastening of a skate upon the foot, as set forth.

3d, A curved self-locking skate buckle, such as described and shown, as a new article of manufacture.

78,217.—COOKING STOVE.—John Magee, Chelsea, Mass., assignor to the Magee Furnace Company.

I claim the auxiliary flue, L, placed below the bottom of the return flue, K, and provided with suitable perforations or openings, e, in combination with one or more tubes or conductors, M, and one or more perforated tranks, N O, or perforated plates, substantially as and for the purpose described.

78,218.—METALLIC DOORS AND SHUTTERS.—C. K. Marshall, New Orleans, La. Antedated May 14, 1868

I claim a double cased and double-panelled metallic door or shutter, when the same is constructed and arranged substantially as described.

78,219.—SOCKET BOARD FOR REED INSTRUMENTS.—David Marshall, Pittsburg, Pa.

I claim the board, i, placed immediately below and in contact with the socket board, b, and having an opening or openings, s s', under each reed, coinciding with but shorter than the openings or sockets, a, in the socket board, substantially as and for the purpose described.

78,220.—SCRAPER.—Norman Maybee and Abram Maybee, Monroe, Mich.

We claim the combination of the scraper, A, draft ball, C, and handle, B, all constructed and arranged substantially as described and for the purposes specified.

78,221.—BRICK MACHINE.—B. J. McAfee, Delphi, Ind.

I claim the combination of the frame, A, and table, C, with the molds, D D, spout, I, former, G, screw, H, plungers, E, and lever, F, all arranged and operating substantially as and for the purpose described.

78,222.—MACHINERY FOR PRINTING YARN.—William McAlister, Lawrence, Mass.

I claim the holder, D, made of wire netting, or its equivalent device, for holding skeins of yarn during the process of printing the same, substantially as set forth

78,223.—SPRING BED BOTTOM.—Stephen B. McCracken, Detroit, Mich. Antedated May 12, 1868.

I claim the button-headed half spring fastened to the webbing or other cover by the use of a common screw and convex washer, as shown in fig. 3, substantially as and for the purpose herein described.

78,224.—DEVICE FOR FEEDING BOILERS.—Henry McGann, Cleveland, Ohio.

I claim the arrangement of the pendulum, B, shaft, C, case, A, segmental arm, E, wheel, F, and cock, H, substantially as herein specified.

78,225.—PRESS SPINDLE ADJUSTMENT.—Alanson H. Merriman, New Britain, Conn.

I claim the combination of the tool stock or spindle, A A, with the sleeves, B and E, and collar, C, arranged and operating substantially as and for the purpose described.

78,226.—PORTABLE OVEN.—F. C. Miller, Evans Center, N. Y.

I claim the combination, with the chamber, B, provided with central heating space, I, and surrounded by jacket, A, of the pans, made up of two parts, C D, the latter being detached, and in skeleton or open form, for allowing a free passage of air or steam, and covered by slides, F, the whole operating in the manner and for the purpose herein set forth.

78,227.—PEG FLOAT.—William Miller, John J. Becker, and Abraham Simcox (assignors to themselves and Jacob Miller), Fort Wayne, Ind. Antedated May 15, 1868.

We claim the elbow lever, D, and connecting link, d, in combination with the reciprocating cutter, A, and guides, B, the whole being constructed and operated in the manner and for the purposes specified.

78,228.—CHEESE CUTTER.—Marshal Morse and P. W. Sawyer, Gray, Me.

We claim, 1st, The combination of the coil, b, rack, g, slide, k, and knife, l, as and for the purpose described.

2d, The slide stop, m, in combination with the self-retracting knife, l, as and for the purposes described.

78,229.—SHUTTLE.—Elias A. Paine, Sutton, Mass.

I claim the combination with the spindle head, formed between the points, 1 and 2, and the points, 1 and 3, in the manner specified, of the lever, b, and its cam, 4, and the spring for actuating said lever, with or without the bobbin-holding catch, the said parts being constructed and arranged for operation as herein shown and set forth.

78,230.—WELDING THE EARS OF ELLIPTIC SPRINGS.—Joseph Palmer, Concord, N. H.

I claim the combination of the wedges, F F, the drop, A, the upper and lower dies, C D, the slides, a b c d, and end pieces, i i, all constructed and arranged as shown, and by means of which vertical and lateral blows are given at the same time, for the purpose set forth.

78,231.—COMBINED OVEN AND BATH.—James Perry, Brooklyn, N. Y.

I claim, 1st, The method of utilizing the heat from the interior of a baking oven or furnace for the purpose of warming apartments, substantially as herein specified

2d, The spaces under or by the sides of bath rooms, with their pipes communicating with the open furnace or oven, when the arrangement of the several parts is substantially as and for the purpose of operating in the manner shown.

3d, The combination of the boilers, O O, located in an inclosed space, with one or more conductors of the waste heat from a baking oven, whereby the said waste heat is caused, without coming in direct contact with said boilers, to warm the water required for use in the manufacture of bread and the administration of baths, substantially as herein specified.

4th, The combination, with a system of radiating pipes located in an apartment, of a series of waste heat conducting pipes, and a series of steam conducting pipes, so that either the waste heat or the steam, or both together, may be employed at such time as may be required for warming the apartment, substantially as herein specified.

78,232.—APPARATUS FOR APPORTIONING, EXPANDING, AND SHAPING DOUGH FOR THE MANUFACTURE OF BREAD.—James Perry, Brooklyn, N. Y.

I claim, 1st, The combination, with a kneader, A, of the valve, I, and its chamber, substantially as herein specified, whereby the expansion of dough, prepared under pressure of gas, can be regulated as desired.

2d, The double-head valve, I, constructed and operating substantially as herein specified.

3d, The combination, with the kneader, A, of the perforated plate or strainer, a', substantially as herein specified, for preventing lumps of unmixed dough or other hard substances impeding the perfect operation of the valve, I.

4th, The combination of the hollow arm, D, with one or more chambers and pistons, substantially as herein specified, whereby the dough may be apportioned and shaped as desired.

5th, The movable cross head, F, in combination with the wheel, E, and rack bars, S S, substantially as described, whereby the capacity of the chambers, H H, may be increased or diminished, as desired.

6th, The combination, with the valve, I, of the balance lever, b, and its appendages, substantially as and for the purpose herein specified.

7th, The combination, with the arm, D, and table, J, of the arcs, e' e', substantially as specified, whereby the pans are brought under and away from the chambers, H H, for filling and discharging them.

78,233.—CULTIVATION OF THE COTTON AND OTHER PLANTS.—Pailip Pouilain, Greensboro, Ga.

I claim, 1st, The improved cup, having taper sides, and both ends open, when adapted and employed for germinating and transplanting cotton, and other small and tender plants, in the manner and for the purpose herein described.

2d, The improved method herein described for transplanting cotton and other plants by means of the device, in the manner and for the purpose herein set forth.

78,234.—WATER GAGE FOR STEAM BOILERS.—Charles Lowell Ridgway, Boston, Mass.

I claim the water gage, D, attached to a lever or bar, B, provided with passages, g l, and arranged in relation to the inlet passages or tubes through which the water and steam are admitted from the boiler, substantially as described.

Also, the passages, h n t o, in the bar, A, and lever, B, in combination with the adjustable stop, m, or its equivalent, so arranged as to allow the steam to be blown through the gage, substantially as set forth.

Also, the passage, l, in the lever, B, in combination with the passage, l, in the bar, A, and the stop pin, 6, arranged so as to allow the water in the glass tube, D, to escape when the connections with the boiler are cut off, substantially as described.

78,235.—AGRICULTURAL STEAM BOILER.—Louis S. Robbins, New York city.

I claim, 1st, The corrugated plates, H, in the fire box, substantially as and for the purposes described.

2d, The protecting sleeve, K, on the pipe, J, substantially as described.

3d, The supply pipe, J, provided with the cocks, n o and L, and connected with the water reservoir, m, substantially as described.

4th, The method of forming the joint between the cup, C, and the boiler, substantially as described.

5th, The combined vacuum and safety valve, constructed and operating substantially as shown and described for the purposes specified.

78,236.—HARVESTER.—Samuel Rockafellow, Muscatine, Iowa.

I claim the double hinge, G, constructed substantially as described, in combination with the frame, A, cutter bar, B, links, g', crank, g'', and levers, H and I, the said parts being arranged to operate substantially as and for the purpose described.

78,237.—CORN PLANTER.—Orestes Sampson, Petersburg, Ill., assignor to Sampson and Fracke ton.

I claim, 1st, A corn planter, consisting of an axle mounted on wheels, and having the inclined bars, B, attached thereto, with the rear ends provided with seed hoppers, H, shares, a, and covering wheels, b, or their equivalents, arranged to operate substantially as described.

2d, The levers, E, arranged as described, in combination with the frame carrying the seeding mechanism, and pivoted to the axis of front frame, for the purpose of elevating the seeding devices, as described.

3d, Providing the bars, B, with a flat surface on their under side, where they rest upon the ground, in front of the shares, a, for the purpose of pulverizing and smoothing down the earth to form a seed bed, as herein set forth.

78,238.—RATTAN MACHINE.—Sylvanus Sawyer, Fitchburg, Mass.

I claim, 1st, The combination of the series of revolving splitting cutters with the series of guides, substantially as described.

2d, Combining each revolving cutter and its guide with the other cutters and guides of the series, by means of the gears, I, so that they shall be made to simultaneously approach and recede from the center of the stick, substantially in the manner and for the purpose described.

3d, The combination of the series of revolving splitting cutters with the annular or tubular cutter, substantially as described.

4t, The combination of the revolving splitting cutters, the tubular cutcutter, and the guides, substantially as described.

5th, The combination of the splitting apparatus, before described, with a suitable feeding mechanism for carrying forward the stick, substantially as described.

78,239.—HORSE RAKE.—John Seely, North Java, N. Y.

I claim a revolving rake, formed of three ranges of tines, with their ends inclined or curved, as specified, so that the rake can be drawn along upon the points of two of the ranges of tines, and the forward range of tines pass at an inclination beneath the hay, as specified.

78,240.—MAIN BOLT OR GOOSE NECK STAY ON CARRIAGES.—Alfred B. Sheaffer, Kparata, Pa.

I claim the socket, a, in the enlarged curve, B, of the main bolt stay, A,

78,241.—IMPLEMENT FOR HARVESTING GRAPES.—J. F. Single, Painesville, Ohio (William Pettingell, administrator.)

I claim, 1st, Constructing the described implement in the manner of forceps or pliers, and providing the broad jaws thereof with correspondingly broad pads or cushions of an elastic nature, as india-rubber, so as to operate substantially in the manner and for the purposes herein specified.

2d, The shear-edged blade, d, and serrated blade, e, in combination with the jaws, b b, and handles, c c, operating so as to sever the stem of the cluster with certainty, as herein set forth.

3d, The combination of the several parts of the described implement, to wit, pads, a a, jaws, b b, shear-edged blade, d, serrated blade, e, slotted stop plate, f, and handles, c c, all arranged so as to effect the purposes herein set forth.

78,242.—MACHINE FOR MOLDING COLLARS.—George H. Spaulding, Norwich, Conn., assignor to American Molded Collar Company, Boston, Mass.

I claim the combination, with an expanding former, of an elastic bed or cushion, C, against which the collar is pressed, substantially as shown and for the purpose described.

78,243.—CULTIVATOR.—Orrin Stone, Ionia, Mich.

I claim the combination of the fixed and the yielding frames, when united together by flexible connections, and the under or yielding one is made capable of being raised and carried by the fixed one, in the manner and for the purpose herein described and represented.

78,244.—JOURNAL BOX FOR RAILROAD CARS.—Matthew Thornton, Macon, Ga.

I claim the packing of a journal box by means of the divided collar, the fibrous packing, and the gland, arranged to operate in conjunction with the axle, substantially in the manner and for the purpose described.

78,245.—HARVESTER.—Godfrey Weiland (assignor to himself and Ira R. Amsden), Buffalo, N. Y.

I claim the combination of the pinion, C, or the driving wheel hub, having a square shank, D, the movable part, E, fixed part, B, with covering rim, a,

and coiled spring, F, constructed, arranged, and operating in the manner and for the purpose described.

78,246.—MACHINE FOR BORING HUBS FOR WAGON WHEELS.—Joseph Wharff, Bangor, Me.

I claim my improved arrangement and application of the hooked bar, F', the screws, E', H, and the lever nut, c, with respect to each other.

78,247.—STILL.—H. Whisler and J. S. Berry, New Market, Ohio.

We claim the cap, C, when constructed with the spiral channel, e, pipe, E, and conduit, f, in the manner substantially as set forth.

78,248.—IMPLEMENT.—E. F. Wilder, Lowell, Mass.

I claim the belt punch, when constructed and arranged to operate as and for the purpose set forth.

78,249.—VENTILATING PORTABLE CHURN.—E. P. Williams, Yorkville, S. C., assignor to himself, W. L. Hopson, and A. R. Homesley.

I claim the beater arm, B, blades, C C and D, in combination with the driving wheel, F, and dasher or pinion wheel, E, when the whole is constructed and arranged so as to operate substantially as described and for the purpose specified.

78,250.—PENMEN'S ARM REST.—Jerome B. Withey, Lexington, Mich.

I claim the planes, A B, the adjustable supporting connections, C C, the supporting brace, D, the rack, E, the check brace, F, and the stop, G, when arranged substantially as described and for the purposes set forth.

78,251.—DRILL HOLDER.—Thomas K. Bacon (assignor to himself, George A. Pratt, William T. Norton, and Hiram B. Crosby), Norwich, Conn.

I claim the combination of the jaws, d, with the washer, a, the right and left thread screw, e, and the bar, x', the same being constructed and operating conjointly with and in the socket, b, in the manner and for the purpose herein set forth.

78,252.—BROOM HOLDER.—F. B. Batchelder, Prairie du Chien, Wis.

I claim the blocks, A B, each formed with a semi-circular recess in its inner face, and connected together by the spring, D, all constructed and arranged to operate in the manner and for the purpose substantially as set forth.

78,253.—BEEHIVE.—Henry Baughman, Columbus, Ohio.

I claim, 1st, The projecting entrance for the bees, surrounded by the false entrance to the air-chamber, as arranged and described.

2d, The feeding troughs with their connecting tubes and wire gauze covering, as shown and described.

3d, The combination of comb frames with the wire gauze covering, as arranged and shown.

78,254.—SIGN FOR TOBACCONISTS.—J. W. Boughton, Appleton, Wis.

I claim, 1st, The combination, with an image figure, of the mechanism for automatic smoking, substantially as and for the purposes set forth.

2d, The application of the air bellows, A, provided with the tubes, B C, and their valves, to an inanimate figure, for simulating the operation of smoking, substantially as shown and described.

3d, In combination with the air bellows, A, the reciprocating piston, k, bar, h, pitman, g, and crank, f, of the clock movement, D, arranged and operating in the manner and for the purpose described.

4th, As an improved tobacconist's sign, the mechanical or automatic smoking image herein described.

78,255.—SHEARS.—Alfred B. Buell and George W. Root, Pittsfield, Mass.

We claim the shears, consisting of blade, A, with its two cutting edges, o o' blade, A', with its jaws, a a', slot, e, and cutting edges, p p', constructed as described, as a new article of manufacture.

78,256.—PROCESS OF TANNING HIDES AND SKINS.—F. J. Burcham (assignor to himself and L. S. Blake), Racine, Wis.

I claim the herein described process for tanning hides and skins, substantially as and for the purpose described.

78,257.—POTATO DIGGER.—J. W. Burnham and Wilson Conlon, Middletown Point, N. J.

We claim, 1st, Connecting the oscillating frame, D, which carries the lower apron roller, F, and the scoop, H, by means of a rod and crank, with a lever, L, so that the position of the apron and scoop can be adjusted at once, as set forth.

2d, The arrangement and combination, with each other, of the roller, C, oscillating frame, D, roller, F, apron, G, scoop, H, rods, l m and r s, and levers, L and M, all made and operating substantially as herein shown and described.

3d, Providing the lower part of the frame, D, which carries the endless apron and the scoop, with curved projections, h h, moving in curved guides, E E, as set forth.

78,258.—COPYING INK.—A. G. Busby, Philadelphia, Pa.

I claim an ink, composed of water, galls, sulphate of iron, indigo, sugar, gum-arabic, or other well-known ink-making ingredients, in combination with glycerine or gelatine, or both, and bichloride of mercury, or its equivalent, the whole being combined in the proportions substantially as described for the purpose specified.

78,259.—FOLDING STOOL.—W. E. Cameron, Green Island, N. Y.

I claim the plate, A, constructed as described, and provided with the ears, a1 a2, to receive the arms, B D, whereby the arms, B, are adapted to be folded up beside the arms, D, when the latter are folded, substantially as described for the purpose specified.

78,260.—RUBBER AND GUTTA-PERCHA HOSE.—E. M. Chaffee, Providence, R. I.

I claim the rubber or gutta-percha hose, flattened between plane surfaces, under the heat of vulcanization, substantially as described for the purpose specified.

78,261.—APPARATUS FOR TREATING OFFAL.—James P. Chenoweth and Edwin P. Baugh (assignors to Baugh & Sons), Philadelphia, Pa.

We claim, 1st, Treating offal by subjecting it, in a revolving cylinder, or its equivalent, to the combined action of heat applied to the outside of the cylinder, and to a blast of heated air or products of combustion introduced into the cylinder, all substantially as and for the purpose herein set forth.

2d, The revolving cylinder, D, constructed substantially as described, in combination with a fireplace, C, oven, A, and pipes, passages, and fans, or equivalent devices, whereby the surface of the said cylinder is heated, and a hot blast forced through the interior of the same, in the manner and for the purpose herein set forth.

3d, The spiral rib, i, having a tendency to force the material through the cylinder in a direction opposite to the course of the hot blast, as described.

4th, The pipes, H and H', and the fan, F', arranged, in respect to the furnace, C, and compartment, b, of the oven, substantially as herein described for the purpose specified.

78,262.—CORN PLANTER.—Wm. R. Clark, Indianola, Ill.

I claim the hinged frame, A and B, with the seats, G and F, upon one part, and the plows and hoppers upon the other, substantially as shown and described and for the purpose specified.

78,263.—STAIR-CARPET FASTENER AND PROTECTOR.—J. Conner, Jr., Chicago, Ill.

I claim, 1st, A device, B, having axial extensions, c c, the same constituting a combined stair rod and protector, or stair-carpet fastener and protector, substantially as and for the purpose described.

2d, The combined stair rod and protector, B c, in combination with the ears or holders, e e, substantially as described.

3d, The depressed lip, a, on the front edge of the protecting cover, B, of the combined stair rod and protector, as described.

78,264.—MANUFACTURE OF PYROLIGNEOUS ACID.—Morton E. Converse, Rindge, N. H., and Abel T. Atherton, Lowell, Mass. Antedated May 13, 1868.

We claim the application and arrangement of the flue tubes, f f and g g, in one or more rows, to a kiln, in such a manner that they will conduct, carry off, and save, the products of destructive distillation of wood, substantially as described and set forth.

78,265.—SAFETY HATCH.—G. N. Creamer (assignor to himself and John B. Lalor), Trenton, N. J.

I claim, 1st, The construction and arrangement of hatchways, when operated in the manner and for the purpose herein described.

2d, The combination of the hatch carriages, A A, levers, J, weights, C, cords I, and pulleys, K, in the manner and for the purpose herein described.

3d, The locking device or levers, J, in combination with the truck or carriage, A A, in the manner and for the purpose herein described.

78,266.—FORGING MACHINE.—William H. Defrees, Andover, Mass.

I claim the combination, for the purpose specified, of two or more pairs of sliding hammers, d, and independent springs, j, to work each hammer, inclined ways for each slide or hammer, and an inclined rotative cam, operative on all of the slides or hammers, all arranged and operating substantially as set forth.

Also, for moving the blank bed from the hammers to the cutters, the combination of the cam, b, the hand-worked slide, d', and the several levers and connections between said slide and the blank bed, which cause the bed to be moved by the cam, b, substantially as described.

Also, for causing the cutters to operate upon the forged nail, to sever it from the nail rod when in position over the fixed cutter, the combination of the hand lever which moves slide, d', with the hooked rod, o, pendent from the cutter arm, v, to throw the hook of said rod into gear with the vibrating pin, u, worked from a motor, f, on the main shaft, substantially as described.

78,267.—REEFING FORE-AND-AFT SAILS.—R. C. Denham, Richmond, Me.

I claim combining with the diagonal re-enforced line of a fore-and-aft sail, and with the gaff of such a sail, gaff down hauls, and eyes or leaders, in the manner substantially as described, so as to secure the gaff to the aforesaid line in the act of reefing.

78,268.—BRICK MACHINE.—François Durand, Paris, France

I claim, 1st, The combination of the pin, b, pitman, B', pistons, P P', grooved bars, G, cams, c, yokes, C', and crank shaft, A, all arranged and operating as herein described for the purpose specified.

2d, The combination of the eccentric disk, D, connecting rod, J', gear wheels F F', ratchet, j', upon shaft, E, the catch, j, and the oscillating arm or disk, as herein described for the purpose specified.

78,269.—ROOFING COMPOUND.—D. W. Denton, Ithaca, N. Y.

I claim, 1st, Preparing my roofing material of the substances and substantially in the manner set forth.

2d, Its use with coal tar, as described.

3d, The use of coal ashes, in combination with the described material, and in the manner set forth.

78,270.—ICE CALK.—G. W. Farley (assignor to himself and W. H. Humphrey), Manchester, N. H.

I claim the button, C, with notches, i i, and provided with the spring, s, or its equivalent, in combination with the pins, c c, the tongue, d, and the plates A B, all constructed, arranged, and operating as and for the purpose herein described.

78,271.—PAPER CLIP.—A. H. Faizinger, Washington, N. J.

I claim the curved elastic clips, B, perforated, and attached to the strip or cleat, A, in combination with the spurs, a, in the latter, substantially in the manner as and for the purpose set forth.

78,272.—TAPE BOX.—A. J. Fellows, Meriden, Conn.

I claim the catch, G, in combination with the toothed drum, B, spindle, H, lever, I, coiled spring, case, A, and tape, C, substantially as described for the purpose set forth.

78,273.—MACHINERY FOR PRINTING YARN.—John Foster, Pawtucket, R. I.

I claim the combination, with a pair of fluted or grooved rollers, A A', in a machine for printing yarn, or other material, upon both sides, of an elastic apron, G, or its equivalent, substantially as described for the purposes specified.

78,274.—WINDOW-SASH FASTENER.—O. S. Garretson, Buffalo, N. Y.

I claim, 1st, The combination of the bolt, E, provided with the wedge head h, and the catch, C, provided with teeth, b, or a series of teeth, b, operating in the manner and for the purpose substantially as herein set forth.

2d, Securing the plate, G, to the case, D, by eyelets or hollow rivets, k, attaching in the ordinary screw holes, l, as herein set forth.

78,275.—LINK.—Alexander Goodhart, Newville, Pa.

I claim a link formed of the parts, A and B, the latter being provided with a curved shank, b1, and a tenon, b2, and operating in connection with the part, A, substantially in the manner and for the purpose specified.

78,276.—SOUNDING BOARD FOR PIANOS.—G. M. Guild, Boston, Mass.

I claim, in combination with a sounding board, and the main supporting ribs, c, thereof, the auxiliary ribs, e, crossing and secured to the ribs, c, substantially as shown and described.

78,277.—TRACE-LUG LOOP.—Michael Gumfory, West Middlesex, Pa.

I claim the tug loop, A, when arranged with shanks, B B, and attached to the trace by rivets, a a, substantially in the manner and for the purpose as herein shown and described.

78,278.—DOOR INDICATOR.—Amos Hadley, Washington, D.C. assignor to himself and Robert Clenighen, New York city.

I claim the rotating disk between the two stationary plates, all as shown and described and for the purposes specified.

78,279.—WOOD-CARVING MACHINE.—Isaac Hall, New York city.

I claim the combination of the parallel pivoted bars, D, pivoted connecting bars, F, double arms, G, adjustable arms, I, and centers, H and J, with each other, and with the frame, C, substantially as herein shown and described, and for the purpose set forth.

78,280.—SAFETY VALVE.—Frederick Harden, Conshohocken, Pa.

I claim the arrangement of the cap, F, and weighted ring, G, with relation to the stem, E, and the valves, C D, of different diameters, as herein described for the purpose specified.

78,281.—SEED PLANTER.—E. P. Harris, Conneautville, Pa.

I claim, 1st, The cut-off, F, with the spring, G, in connection with the aperture, a, in the slide bar, H, provided with the inclined rear end, b, all arranged substantially as and for the purpose specified.

2d, The slide, L, applied to the slide bar, H, in relation with the aperture, a, substantially as and for the purpose set forth.

78,282.—HARNESS.—J. K. Harris, Springfield, Ohio.

I claim, 1st, The provision, in a breast collar or hames strap, of the flexible, extensible, and elastic device, X x M, the same being provided with check pieces, b b', C D, substantially as and for the purposes herein explained.

2d, The arrangement of draft strap, B, open leather frame or breast strap, A, thongs, X, spiral springs, M, and check pieces, b b' C D, as and for the purpose specified.

78,283.—REVOLVING HARROW AND ROLLER.—E. K. Harvey, Quincy, Ohio.

I claim, 1st, the lever, h, arm, n, and spanner, e, in combination with the harrow, H, substantially as described.

2d, The harrow, H, housings, d, and spanner, e, combined and operating substantially as described.

78,284.—CONCRETE BRICK MACHINE.—Frederick Hawkins, Chicago, Ill.

I claim the mold, L L', provided with slotted flange, S, and lid, M, with its rack, T, and pinion, W, the follower, N, with its rack, Q', and pinion, P, levers, Q R I and H, chain, F, drum, E, and wheel, Z, all arranged and operated substantially as and for the purposes herein set forth.

78,285.—DRIER.—Henry Henley, Halbert's Bluff, Ind.

I claim, 1st, The construction and arrangement of the movable steam-heated pans, C, so as to apply a regular heat above and below the chambers, E.

2d, The combination of the boiler, B, removable pans, C, and flexible pipes C', when arranged and operating as and for the purpose set forth.

78,286.—CHURN.—Charles Hess (assignor to R. T. T. Spence), Lyons City, Iowa. Antedated May 14, 1868.

I claim the combination and arrangement of the friction pulleys, A D C C, with the peculiar ogee curved shaped arms or paddles, F F F F, when constructed and arranged for the purposes above set forth.

78,287.—SHOE.—Marie L. Hill, New York city.

I claim, as a new article of manufacture, a quilted cloth slipper or shoe, formed by interposing between the soft filling and the outer covering a textile lining of the same color as the outer covering, whereby, as the latter becomes worn through or torn, the slipper or shoe will not be destroyed, but present the same uniform color exteriorly, as herein shown and described.

78,288.—MACHINERY FOR PRINTING ON FABRICS.—Chas. Holliday, Huddersfield, England.

I claim, 1st, The within described process of ornamenting goods, by applying coloring or ornamenting material through tubes impressed against the material, with or without the aid of needless or leading wires, substantially as herein specified.

2d, The application of heat, in connection with the tubes in the above process, substantially as and for the purpose specified.

3d, In connection with printing through tubes, the enlargement of the tubes at and near the printing surfaces, so as to form cups, which tend to determine the depth in the tube from which coloring or other viscid matter is drawn at each impression, substantially as and for the purpose herein specified.

78,289.—SURCINGLE.—Stephen Hyde, New York city.

I claim, as a new article of manufacture, a surcingle, provided with two elastic joints, a a, when inclosed in leather cases, D, and secured to the buckle and tongue straps, b d, as herein shown and described, for the purpose specified.

78,290.—VEGETABLE SLICER.—George W. Jacobs, Quincy, Ohio.

I claim the combination of the plates, D D, the knives, d d, slots, b b, and slots, c c, in the table, A, and movable box, E, as and for the purpose specified.

78,291.—ADJUSTABLE HAMMER AND DROP.—Truman P. Keeler, Worcester, Mass.

I claim, 1st, The combination, with the hammer, of an adjustable stop block, F, and mechanism for operating the same, substantially as and for the purposes set forth.

2d, The combination, with the hammer, of the stop block, for checking its upward movement, the cams and cam shaft, for operating the hammer, and the lever, e, connected with and arranged to adjust both the cams and the stop block, substantially in the manner and for the purposes shown and set forth.

3d, The combination, with the adjusting lever, connected with the cam shaft and stop block, as specified, of the stop piece, G, or its equivalent, substantially as and for the purposes set forth.

4th, The stop jar, J, and treadle, or equivalent means for operating the same, in combination with the hammer actuating cams, under the arrangement and for operation as shown and set forth.

5th, The combination, with the hammer, and cams for operating the same, of the stops, p and J, connected with and actuated by the treadle, H, in the manner and for the purposes herein shown and specified.

6th, The combination and arrangement, with the hammer, its actuating cams, and the stop block for checking its upward movement, of the mechanisms herein described for adjusting said cams and stop block, and for arresting and holding the said cams and hammer, whereby the machine may be used either as a hammer or as a drop, and the stroke of the hammer, in either case, may be varied, substantially as shown and set forth.

78,292.—GRATE BAR.—Henry King, Waterbury, Conn., assignor to himself and Francis Stappers, New York city.

I claim a grate bar, formed in two longitudinal sections, or in one piece, having spaces, a, through the same, wider at the bottom, with apertures, a', opening into said spaces, a, substantially as shown and described, and for the purposes set forth.

78,293.—PLOW.—John Koffend, Appleton, Wis.

I claim the combination of a pivoted, adjustable, auxiliary land-side with the ordinary land-side of a plough, whether said auxiliary land-side be placed upon the outer or inner side of said ordinary land-side, substantially as herein shown and described, and for the purpose set forth.

78,294.—HORSE HAY FORK.—Hugh Laird, Mechanicsburg, Pa.

I claim the combination of the compressing and retaining bar or bow, D, with the elevating tines or prongs, C C, operating substantially as and for the purpose described.

78,295.—COMPOSITION TO BE APPLIED TO LEATHER.—William Lehman, Newville, Pa.

I claim the application of the composition herein described to boots, shoes, harness, straps, bellows, and leather manufactured articles generally, by which the same will become water-proof, and wear one hundred per cent longer.

78,296.—SYSTEM OF PRONOUNCING ORTHOGRAPHY.—Edwin Leigh, St. Louis, Mo. Antedated May 19, 1868.

I claim the use of a skeleton outline, or light form of an alphabetic letter, with a phonic sign included within it, or constituting a part of it, to indicate a particular sound of that letter.

Also, the use, in cases where several alphabetic letters must be employed for the same sound, of phonic signs closely resembling each other, so as to be substantially the same phonic sign, though used as the whole or parts of different letters.

Also, the employment of light faced letters, (as skeleton, hair line, outline, or in any way made of lighter color,) of otherwise the same general form, size, upright position, and character as the rest of the font, for silent letters, in combination with phonic letters, in order to indicate the pronunciation of words without changing the common orthography and familiar outline of the word or word picture.

Also, the employment of phonic vowel and consonant letters, (or peculiarly constructed forms of the alphabetic letters,) in combination with any peculiar class of letters, for the silent letters, in order to indicate the pronunciation of words without changing the common or established orthography, substantially as described.

78,297.—CONVERTING WROUGHT IRON INTO CAST IRON AND STEEL.—Alexander Lisk, Philadelphia, and Adam Woolever, Allentown, Pa.

We claim the process of manufacture, substantially as and for the purpose set forth.

78,298.—SAWING MACHINE.—James R. Logan, Rolla, Mo. Antedated May 18, 1868.

I claim moving a sawing machine in the manner described by means of the wheels, C C, attached to the axle, F, substantially as and for the purpose specified.

Also, the socket, I, attached to the cross bar, J, on the front part of the frame, A, and provided with the catch, K, substantially as and for the purposes specified.

78,299.—PIPE WRENCH.—Nardo F. Loi, New York city.

I claim, 1st, The fixed handle, A, when its head, a, is perforated at right angles to the handle, to receive the screw shank, of the adjustable jaw, c, which is placed above and parallel with the jaw, b, of the handle, C, as herein described, for the purpose specified.

2d, The construction, arrangement and operation of the handle, C, having the perforated jaw, b, the pivoted nut, B, screw threaded handle, A, head, a, and adjustable jaw, c, as herein described, for the purpose specified.

3d, The jaws, d e f, when adjusted in the arm, b, of the lever, C, by means of the notches and transverse pin, g, as herein described or the purpose specified.

78,300.—APPARATUS FOR ROLLING DOUGH.—Nelson Long, Watertown, N. Y.

I claim, 1st, The combination, with the board or receptacle for holding the dough or other material, of the dough roller, and the sliding or transverse frame for supporting the same, hinged or pivoted in the manner described, so as to be adjustable to different hights above the said board or receptacle, substantially in the manner and for the purposes shown and specified.

2d, In an apparatus, such as described, the combination, with the auxiliary roll and the elongated bearings formed for its reception in the sliding frame, of adjusting or set screws, or equivalent means for regulating the position of the journals of the roll in their bearings substantially in the manner and for the purposes shown and set forth.

3d, The combination, with the side boards, which form the bearings for the sliding frame, of the top plates provided with inclined projections, c, as described, and the correspondingly notched sliding bars, and its adjusting screws for raising and lowering said top plates, under the arrangement and for operation as herein shown and set forth.

78,301.—PADDLE WHEEL.—W. R. Manley, New York city.

I claim 1st, The combination of the controlling frame, E, of the paddles or the guard beam, F, and crank arm, G, substantially as hereinbefore set forth.

2d, The arrangement of the crank arm, G, diagonally to vertical and horizontal directions in which the guard beam may be moved by strains upon the vessel, substantially as hereinbefore set forth.

3d, The arrangement of the paddle crank arms, D, and the crank arm, G, at equal angles to a vertical line, substantially as hereinbefore set forth.

4th, The combination of the controlling frame, E, guard frame, F, crank arm, G, link, N, and main shaft, B, substantially as hereinbefore set forth.

78,302.—EXTENSION LADDER.—T. F. Mantey, New Orleans, La.

I claim, 1st, The winches, v, in combination with the extension lattice, A and chains, b, for the purpose of adjusting the lattice, when elevated by the screw, G, at any desired angle, as herein shown and described.

2d, The crank screw, J, and bar, K, in combination with the frame, T, and extension lattice, A, all substantially as and for the purpose shown and described.

3d, The combination of the pintle base, R, extension lattice, A, adjustable plate, Q, having the projection, q, bearing the pin, r, and tongue, M, all arranged and operating as described for the purpose specified.

78,303.—CORN AND SEED PLANTER.—Franklin W. Marriott, Richwood, Ohio.

I claim a seed planter, constructed and operated in the manner substantially as shown and described.

78,304.—RAILWAY CAR SEAT.—M. M. Martin, Cochran, Ind.

I claim, 1st, In combination with the seat body, A, hinged at, a, to the frame, B, the knuckle joint, E E', arranged and adapted to operate in the manner stated.

2d, The combination of the car seat, A B, leg supporting flap, J, and elastic thong, K, for the object explained.

3d, The combination of the foot rest, consisting of the wings, L L', inclined board, N, and hinged leaf, O, with the neck oar, R, and stud, S, for the purpose explained.

4th, The combination of the rail, D, hooks, d d', and flap, J, adapted to receive and enable the ready removal of the mattress, F, in the manner herein described and set forth.

78,305.—GAS REGULATOR.—S. F. Mathews, Mechanicsburg, Pa.

I claim, 1st, The nipple tube, B, and the thimble, E, constructed, arranged, and operating substantially as and for the purposes described, in combination with gas pipe.

2d, The body of the governor, A, the case, C, tube, B, thimble, E, and spring, b, in combination, forming a gas regulator, substantially as shown and described.

78,306.—ANIMAL TRAP.—John C. McClamrock, Edina, Mo.

I claim, 1st, The described arrangement of the bait hook, H, U-shaped lever, I, connecting rod, J, bell crank levers, K N, and adjustable spring catch, M, with relation to the pivoted trap door, C, all constructed and combined to operate in the manner and for the purpose substantially as set forth.

2d, The detachable receptacle, S, provided with partitions, s1, and slides, s1 s2, and having a grated top, when said receptacle is adapted to be connected with the box, A, by means of the adjustable passage, Q, in which the gate, R, is hinged, all constructed and arranged as and for the purpose set forth.

78,307.—GAS APPARATUS.—James McCleish, New York city, assignor to himself and E. V. Haughwout & Co.

I claim, 1st, The constructing of the gas holder, B, with rigid or inflexible top and bottom plates, a b, and flexible gas tight sides, the latter being folded or crimped, substantially in the manner as herein shown and described.

2d, The pressure arms, C D, arranged and applied substantially as set forth, and used in connection with springs or equivalent weights for the purpose of exerting a uniform pressure on the gas holder, substantially as set forth.

3d, The windlass drum, m, provided or arranged with a coil or barrel spring, and used in connection with suitable cords, for the purpose of raising or assisting in raising the gas holder during the process of the filling of the same, substantially as set forth.

4th, The elevating of the arms, C D, through the medium of the windlass, G, and cords, k k l, arranged and applied substantially as set forth.

5th, The drum, s, provided with an internal coil spring, t, and a fusee, w, on its exterior, in combination with the cords, a' a'' c' d'', arranged as shown, or in an equivalent way, for compressing the gas holder and exerting an equal or uniform pressure on the same.

6th, The cords, f k k and l, in combination with the windlass, H, all arranged to operate substantially as and for the purpose specified.

7th, The receiver, K, with the pipes, J L and M, communicating therewith, and provided with stop cocks, and all arranged substantially as shown and described.

8th, The rollers, h', on the top plate, a, of the gas holder, in combination with the vertical guide rods, i, arranged substantially as shown and described, for the purpose of retaining the holder in proper position.

9th, Bracing or staying the holder, B, by means of the straps, a x, extending around the interior of the holder and traversely across it, as shown and described.

78,308.—REFRIGERATOR.—Martin Meyers, Jr., Philadelphia, Pa.

I claim, in refrigerators, the construction of the sliding drawer shelves, E, with swinging doors, C, and with a space, D, between their backs and the inner wall of the case, and the tubes, g, communicating with the atmosphere, substantially as and for the purpose described.

78,309.—BENCH DRILL.—Charles C. Miller (assignor to S. M. Spencer & Co.), Brattleboro, Vt.

I claim, 1st, The sleeve, M, fixed slotted tube, I, screw shaft, J, pin, l, and right angular lever, N g, or its equivalent, when said parts are applied to and used in connection with a drill, substantially as shown and described.

2d, The movable bed, H, arranged and operated substantially as shown, the slotted tube, I, screw shaft, J, balance wheel, K, and the adjustable pin, l, operated as shown, or in an equivalent way, all combined and arranged for operating the drill, L, substantially as described.

78,310.—PERMUTATION LOCK.—D. K. Miller, Reading, Pa.

I claim, 1st, The disk, E, with its projection, p, and shoulder, c, and secured to a shaft, D, in combination with disks, F, or their equivalents, and with a tumbler, G, having a recess and a projection adapted to the projection and recess of the disk, E, the whole being constructed and arranged with a casing A, and operating substantially as and for the purpose described.

2d, The serrations of teeth upon the ends of the split ring, t, for the purpose described.

78,311.—CURTAIN FIXTURE.—John P. Miller, Somerset, Pa.

I claim the stirrup, C, and its cramp, F G, the cord, D, and the pulley, E, combined, arranged, and operating substantially as and for the purpose set forth.

78,312.—CIGAR HEADER.—George Moebs, Detroit Mich.

I claim the metal cup, A, for heading cigars, constructed and operating substantially as described.

78,313.—ARTICLE OF BLUEING.—Edward L. Molineux, New York city.

I claim packing laundry blueing, when in lump or pressed, for transportation and use, in perforated boxes, substantially as described.

78,314.—CORPSE PRESERVER.—Mary E. Mott, Rouse's Point, N. Y.

I claim the flat rubber sack, a, having a slit and lacing, as shown, and the discharge tube, b, all substantially as shown and described, and for the purpose set forth.

78,315.—COOKING STOVE.—B. Newbury, Coxsackie, N. Y.

I claim, 1st, The combination of a hinged shelf, E, with the rear part of the stove, whether said shelf is hinged directly to the stove or to a removable plate attached to said stove, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the removable plate, A, and removable yoke, B, with the hinged shelf, E, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the arm, C, and set screw, D, with the plate, A, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the pivoted brace arm, F, with the hinged shelf, E, substantially as herein shown and described, and for the purpose set forth.

78,316.—SHIPPING CASE.—Moses H. Nichols, Hancock, N. Y.

I claim the combination of the slides, B, octagonal cover, F, and elastic cushions, C, with each other, and with the case, A, and jar, D, substantially as herein shown and described, and for the purpose set forth.

78,317.—EXPLOSIVE COMPOUND.—Alfred Nobel, Hamburg, Germany, assignor to Julius Bandmann, San Francisco, Cal.

I claim the composition of matter, made substantially of the ingredients and in the manner and for the purposes set forth.

78,318.—PRESS.—B. S. Norris, Ripley, Ohio.

I claim the combination, with the frame, A, of the presser, B, hand lever, C, spring pawls, a and c, and the weight, D, substantially as and for the purpose described.

78,319.—DEVICE FOR CUTTING SHEET IRON.—John B. Osier, Ogdensburg, N. Y.

I claim the construction and arrangement of the frames, A A, with the perpendicular guides, C C, angular knife, and cross bars, D and E, with the spring, H, and sliding guide, F, and treadle, I, all arranged and connected for the purpose set forth.

78,320.—STARCH TRAY.—John A. Owens, Little Falls, N. Y.

I claim, 1st, Forming the bottoms of the trays of galvanized iron.

2d, Forming the connected ends of each pair of trays with a curve, substantially as described, and for the uses and purposes mentioned.

3d, The partitions, E and F, one or both, for the uses and purposes mentioned.

78,321.—CORN HUSKER.—Thomas Percival, Augusta, Me.

I claim, 1st, The use of the expanding stripper, I, composed of the several stripping tools, as described so arranged that the pressure of the ear will cause them to open to receive it, whether the closing of the same be effected by means of a single elastic rubber spring, or by other means, and whether their cutting edges be straight or toothed, the whole operating in the manner and for the purpose substantially as described.

2d, The butting knife, H, formed of a plate of steel, having through it a round or oval hole or holes, with beveled cutting edges, operating in the manner and for the purpose substantially as described.

3d, The hollow-ended plunger, C, constructed and operating in the manner and for the purpose substantially as described.

4th, The combination and arrangement of parts of a machine for husking corn, when constructed and operating in the manner substantially as described.

78,322.—IGNITING EXPLOSIVE PROJECTILES.—Eugene Pertuiset, Auguste Mundel, and Jean Etienne Armide de Flèron, Paris, France.

We claim, 1st, An explosive projectile composed of a tube, or equivalent hollow metallic body, filled with a detonating or fulminating compound, which will be ignited or inflamed by the action of the heat developed by the impact or penetration of the projectile, substantially as herein shown and set forth.

2d, The fulminating mixture or composition, substantially as herein specified.

3d, The percussion fuse, for containing the fulminating compound, made substantially as and for the purposes herein shown and set forth.

78,323.—WATCH.—Louis Victor Piguet, New York city.

I claim, 1st, The combination of the knob, h, spring plate, L, and lever, E, operating as herein described, whereby the pressure upon the knob, h, throws the setting mechanism in gear and the winding mechanism out of gear, substantially as herein shown and described.

2d, The arrangement in the watch case of the key, C, having pinion, b, wheel, D, spring lever, E, wheels, F G, shifter plate, L, knob, h, pinions, K J g H and I, all constructed and operating as described, for the purpose specified.

3d, The arrangement of the key, C, wheel, D, spring lever, E, pivoted upon the pin, c, of said wheel, and bearing the wheel, F, and the wheel, G, all operating as described, in such a manner that by turning the key, C, in one direction the wheel, F, is bound between the wheels, D G, to wind the watch, and turning the key in the opposite direction releases the wheel, F, and prevents the winding of the watch, as herein shown and described.

4th, The key, C, having the crown gear wheel, b, in combination with the wheels, D F G, spring lever, E, spring arm, L, pinion, K, wheels, J H g h I, as herein described, whereby the watch is wound and set by the same key, independently of each other, as herein shown and described.

78,324.—HORSE HAY FORK.—M. H. Pope, Susquehanna Depot, Pa.

I claim the slotted arm, h, lever, f, both pivoted to the cap, E, of the case B, of hay harpoon, all substantially as shown and described and for the purpose set forth.

78,325.—PATTERN FOR CUTTING OUT SHIRTS.—J. W. Rand, Charlestown, Mass.

I claim, 1st, My improved system of cutting shirts or shirt patterns, the same consisting in the employment or combination of a front plate or pattern, O, a series of yoke plates or patterns, A A1, etc., a back-side plate, S, a front-side plate, R, a sleeve pattern, Q, and a bosom pattern, H, the whole being constructed substantially in manner as set forth, and to be used together as and for the purpose described.

Also, the combination therewith of the series of plates, I I', etc., for cutting out the neck portion of a bosom, as set forth.

Also, the combination of the front plate, O, with one or more yoke plates, A, etc., each of such parts being provided with a scale of measurements or divisions so combined or arranged that the corresponding figures on each indicate the width, respectively for cutting the front and back parts of shirts or shirt patterns of any ordinary size.

Also, a yoke formed with a series of measurements or scale of divisions arranged near each end of it, in manner as set forth.

Also, the front plate, O, provided not only with a scale of divisions, arranged as set forth, but formed with a rectangular bosom space, A B C D, as explained.

78,326.—MANUFACTURE OF HOES.—L. T. Richardson, Clayville, N. Y.

I claim the cavities or recesses, d d, in the blank or pattern of the hoe, in the process of manufacture, substantially as and for the purposes described.

78,327.—MANUFACTURE OF ARTIFICIAL STONE.—James L. Rowland, Milwaukee, Wis.

I claim, 1st, The use of the various kinds of sands, rocks, scorias, and other hard mineral substances, crushed and otherwise treated, as described, and combined with a cement, or a cement and a salt, prepared substantially as set forth.

2d, The use of sand in its natural state, or when it is deprived of its coarser grains, in combination with the improved cement, and with water alone, or with a solution of one or more of the salts herein specified.

3d, The use of native earths, metallic oxides, or other like substances, prepared and combined substantially as described, for the purpose of coloring the stone.

4th, The methods of treating and preparing hydraulic cement for the manufacture of stone, substantially as described.

5th, The use of carbonic acid in the process of hardening manufactured stone, or other articles having lime for its base, substantially as described.

6th, The use of steam in combination with carbonic acid gas, substantially as described.

78,328.—CUTLERY.—Moses Rubel, Chicago, Ill.

I claim the beveled side pieces, B B, having notches in their ends and held in place by the cast metal, C C D D, having lugs, F, fitting in said notches, substantially as set forth.

78,329.—PORTABLE FENCE.—Richard Samuel, Walden, N. Y.

I claim the construction and arrangement of my hurdles, when used in connection with the tie bar, D D, slats, E E, tie bolt, F, and standards, H and I, with the bar, M, all as shown and set forth.

Also, the construction of my brace, having standards, H and I, of uneven length, when used, in connection with the hurdles and tie bar, arranged and constructed as shown and described.

78,330.—MITERING MACHINE.—J. J. Sanders, Jr., N. Y. city.

I claim, 1st, the block, C, attached to the saw, D, for the purpose of holding the planing knives, E, all constructed, arranged, and operating as described, for the purpose specified.

2d, The adjustment of the planing knives, E, in the block, C, by means of the inclined grooves, e, nut, F, and screw bolt, d, all constructed, arranged, and operating as described, for the purpose specified.

78,331.—MAIL CAR AND MAIL BAG RECEIVER.—William G. Sanford, Union City, N. Y.

I claim, 1st, In combination with a car, A, a sliding section, B, and trap door, C, for delivering the mail, when said door is disengaged by an arm, D, actuated by a post on the side of the track, and so arranged that in falling it shall form a chute, to direct the bags in falling away from the track, substantially as described.

2d, The combination and arrangement of the sliding section, B, the trap door, C, and slide, F, for simultaneously discharging and receiving the mail, substantially as described.

78,332.—STONE BREAKER.—Hiram H. Scoville, Chicago, Ill.

I claim the fixed central column, C, with its corrugated faces, in combination with the corrugated faces on the oscillating hopper, D, the arm, K, the shaft, H, with its eccentric or crank, all arranged and operating substantially as herein described.

78,333.—WINDMILL.—Hiram M. Shaw and Geo. G. Tindall, Fremont, Ohio.

We claim, 1st, The rods, f, when provided at their outer ends with the cross, h, in combination with the disk, B, and weighted arm, g, whereby, as the disk is raised, the cross, h, is changed from a vertical to a horizontal position, to render the sails inoperative, as herein shown and described.

2d, The combination of the pivoted trough, J, rod, m, disk, B, weighted arms, g, eye, F, rods, f, cross, h, and hinged sails, A, all arranged as described for the purpose specified.

78,334.—CLAMP FOR HOLDING LEATHER TO THE CURRIER'S BENCH.—John Skimer, Bronson, Mich.

I claim, 1st, The clamp pincers, B B, as constructed, having a spring catch, D, for holding them, and the hide or leather, on the bench, C, or block, for manipulating, substantially as herein described.

2d, The stirrup or rack bar, E, and lever pawl, f, when applied to clamps, for tanners' and curriers' use, substantially as set forth.

78,335.—HORSE HAY FORK.—A. B. Sprout, Hughesville, Pa.

I claim, 1st, A hay elevating fork provided with a penetrating point, and with rigid barbs, hooks, or spurs, operating substantially as described.

2d, A hay elevating fork having barbs, hooks, or spurs, which are thrust into and withdrawn from the hay, or equivalent material to be raised, by a lateral movement, relative to each other, of the bars to which said barbs or hooks are attached.

3d, A hay fork proved with rigid barbs or hooks, which are covered when the fork is to be inserted into or released from the hay, and uncovered after the fork has been inserted for raising the hay.

4th, A hay fork composed of bars having a lateral or shear-blade movement relative to each other, a penetrating point, barbs or hooks, and a mechanism or device for operating the bars or hooks, to cause them to seize and hold or release the load, as desired.

5th, Giving to the holding hooks or spurs a lateral and upward movement or thrust, by means of toggle links or levers connected therewith, for the purpose of operating said hooks, substantially as described.

78,336.—COMPOSITE PIPE.—A. P. Stephens, Brooklyn, N. Y.

I claim the combination of a thin, corrugated metallic sleeve with a non-metallic lining, substantially as before set forth.

Also, the combination of a thin, corrugated metallic sleeve with a non-metallic covering, substantially as before set forth.

Also, the combination of a thin, corrugated metallic sleeve with both a non-metallic lining and a non-metallic covering, substantially as before set forth.

78,337.—PRIMING METALLIC CARTRIDGES.—William Tibbals, South Coventry, Conn.

I claim securing the anvil, B, by drawing or forming the shell, A, drawn over it, in the manner shown and described.

78,338.—TAILORS' SQUARE.—Daniel Tierney, New York city.

I claim a tailors' T-square consisting of the cross piece, A, to which the bar or ruler, B, is pivoted, the bar having suitable graduated scales, a b c, and a pointer, d, or its equivalent, and the cross piece being provided with marks, e, or their equivalents, on its surface, and with marks, f, on its front edge, all arranged as set forth, for the purpose specified.

78,339.—PLOW.—Gabriel Utley, Chapel Hill, N. C.

I claim, 1st, Securing the mold board, E, to the plow by means of the dovetailed tongue, e', formed upon its inner side, fitting into a dovetailed groove formed in the forward side of the arm, G, cast solid upon the side of the standard, C, substantially as herein shown and described and for the purpose set forth.

2d, Securing the point, F, to the plow by means of the dovetailed tongue, b', formed upon its under side, and fitting into a dovetailed groove formed in the forward side of the arm, H, cast solid upon the side of the lower part of the standard, C, substantially as herein shown and described and for the purpose set forth.

3d, Connecting the mold board, E, and point, F, to each other by means of the pin, I, passing through the lower part of the said mold board, E, and through the extended end of the tongue, b', substantially as herein shown and described and for the purpose set forth.

4th, The combination of the tongued point, F, tongued mold board, E, grooved arms, H and G, and standard, C, with each other, substantially as herein shown and described and for the purpose set forth.

78,340.—CARRIAGE.—J. D. Van Hoevenbergh, Kingston, N. Y.

I claim the combination and arrangement of the notched side plates, D D, and inclined hooks, H H, for fastening movable seats, substantially as and for the purpose herein specified.

Also, the india-rubber straps, C C, under the springs, B B, secured thereto and arranged in combination therewith substantially as and for the purpose herein set forth.

Also, the brake blocks, P P, balanced by the counter-weights, R R, in combination with the double whiffletree brake bar, N, and sliding tongue, L, substantially as and for the purpose herein specified.

78,341.—WOOD TURNING LATHE.—A. J. Van Ornum, Hartford, Vt.

I claim the sleeve, B, having a square socket, B', and adapted to rotate with and be moved longitudinally upon the center, A, substantially as and for the purpose herein set forth.

78,342.—GLOBE VALVE.—J. B. T. Van Patten, Sing Sing, N. Y.

I claim the construction of valve, C, and hollow spindle, K, and their arrangement with reference to wheel, H, and spindle, E, substantially as described and set forth.

78,343.—BRICK MACHINE.—Lewis M. Van Sickle, Woodbridge, N. J.

I claim, 1st, The operating of the plungers, F, from the vertical shaft, C, through the medium of the slotted arms, J J, the reciprocating frame, H, bars, G F, connected with the bars, I, fitted in the framing, B, and having the the plungers, F, attached to them, substantially in the manner as and for the purpose specified.

2d, The gates, K K, operated as shown, in combination with the dischargers, m, and the plungers, F, all arranged so as to be operated from the shaft, C, in the manner substantially as and for the purpose specified.

78,344.—WOOD CLEAVER.—John Van Winkle, N. Y. city.

I claim a hatchet or cleaver, A, formed or provided with a dependent bar, D, at its forward end, said bar extending below the cutting edge of the tool, and guarding the same from injury when in use, substantially as described.

78,345.—POTATO DIGGER.—George Vowles, New Hudson, Mich.

I claim, 1st, The knife, C, constructed with fingers, C3, and bowed arms, C1, by which it is adjustably attached to the handles, B, and connected also therewith by the braces, F, substantially as described.

2d, In combination with the knife, the adjustable spring, E, for regulating the depth of the cut, substantially as described.

3d, In combination with the knife and fingers, the rake, D, substantially as described.

4th, The arrangement of the tongue, A, handles, B, and cross brace, B', and knife, C, substantially as set forth.

78,346.—FRUIT CAN.—John R. Williamson, Bethlehem, N. J.

I claim, 1st, The cam, D, having the handle, d, and working in grooves, b, that are provided in the sides of the can, when said cam is operating, substantially as described, to hold down the cover of a fruit can, as set forth.

2d, The combination of the cam, A, which has the flange, a, and grooves, b, with the cover, B, elastic, D, and cam, D, all made and operating substantially as herein shown and described.

78,347.—HORSE HAY FORK.—W. D. Wilson, Watertown, N. Y.

I claim, 1st, The levers, k l, in combination with the plug, e, as and for the purpose set forth.

2d, The levers, k l, in combination with the arm, l'', and screw, l''', in manner described.

78,348.—BRICK MACHINE.—John S. Wood, Hartford, assignor to himself and Elizabeth P. Seymour, West Hartford, Conn.

I claim, 1st, The notched bar, H, hinged to the loose arm, h, upon the shaft, G, and serving to connect said arm with the crank, f, substantially as described for the purpose specified.

2d, The lever, I, having lugs, l m, fitted loosely upon the rock shaft, G, and connected with the main driving shaft, in combination with the loose arm, h, crank, f, and hinged rack bar, H, for the purpose of giving motion to the rock shaft, G, substantially as described.

3d, The swinging grate, M, in combination with the sliding gate, N, and the pins, n, all made and operating substantially as herein shown and described.

78,349.—RAILROAD STATION INDICATOR.—J. F. Zacharias, Leesburg, Va.

I claim, 1st, The combination of the apron or band, E, rollers, F G', cord, G, and operating roller, L, substantially as described.

2d, In combination with the foregoing, the supplemental roller or shaft, R, substantially as described.

3d, The arrangement, with the elements in the foregoing first clause, of the pressure rollers, P P, substantially as described.

78,350.—HASSOCK MACHINE.—C. F. Anthony, Chicago, Ill., assignor to himself and John Charters.

I claim the three-part hoop, A B B, whose top, A, is removable, and the lower part, B B, hinged at the bottom, and having a rim, C C, with projecting brads, a a etc., for holding a hassock cover, substantially as and for the purpose set forth.

78,351.—CLOTHES DRYER.—William Arrouquier, Worcester, Mass.

I claim, 1st, The combination, with the side pieces, D D, and end pieces, E E, of the eyes, b b, endless bands or cords, m, pulley supporting pieces, F, and ear pieces, f, substantially as and for the purposes set forth.

2d, The combination, with the hinged and folding clothes-drying frame, of cords, B, or their equivalents, for supporting the same upon the exterior of the window, substantially as and for the purposes set forth.

3d, The combination, with the frame, C, ears, f, and eyes, b b, of the supporting wires or cords, B B, and the fastenings, h, substantially as and for the purposes set forth.

4th, The combination, with the frame, C, and ears f, of the buttons, n, substantially as and for the purposes set forth.

78,352.—APPARATUS FOR CONCENTRATING SULPHURIC ACID.—Daniel Ashworth and Robert B. Eaton, Woburn, Mass.

We claim, 1st, Conducting the steam or vapors from the retorts to the oil of vitriol chamber, for the purpose and in the manner substantially as described.

2d, Cooling the concentrated oil of vitriol and heating the vitriol before its concentration, by passing the same around or through a vessel, I, constructed as described.

3d, Constructing the pan, c, with tubes or flues, d, for the purpose specified.

4th, Conducting the acid from one retort to the other, by means of siphons or tubes, as described.

5th, Constructing the retorts of platinum, or partly of platinum and partly of glass, when the same are arranged in a series and communicate with each other, as set forth.

78,353.—ENVELOPE MACHINE.—James Ball New York city.

I claim, 1st, The arrangement of a revolving gummer, G, having a different velocity from the table which supports the blanks, in combination with the reciprocating table, C, substantially as and for the purpose described.

2d, Giving to the revolving gummer a positive compound rising and falling and revolving motion, substantially as and for the purpose described.

3d, The cam, u, stop, u1, and weight or spring, t3, in combination with the pinions, r r1, on the shaft of the gummer, G, substantially as and for the purpose set forth.

4th, The self-adjusting clamp, x, to act on the pile of blanks, substantially as and for the purpose described.

5th, Giving to the pile of blanks a motion under the gummer, G, and picker, H, substantially as and for the purpose set forth.

6th, The arrangement of an automatic stop motion, composed of the latch, d, and notch in the frame, A, in combination with the gummer and picker, and with the platform, D, supporting the blanks, substantially as and for the purpose described.

7th, The arrangement of distinct strips, N, catching over the edges of the lower creasing box, and attached thereto by set screws, substantially as and for the purpose set forth.

8th, The heels, w2, attached to the folding wings, v2 v3', by one or more set screws, substantially as and for the purpose described.

9th, The spiral carriers, O, to carry the envelopes along, and retain them free from pressure until the gum has dried, when arranged substantially as described.

10th, The combination of two or more sets of spiral carriers, O O', running in opposite directions, substantially as and for the purpose set forth.

11th, Increasing the pitch of the screw threads at the receiving ends of the spiral carriers, O O', substantially as and for the purpose described.

12th, The separator, c3, in combination with the spiral carriers, substantially as and for the purpose set forth.

13th, The reciprocating conveyor, d3, in combination with the spiral conveyors, O O', constructed and operating substantially as and for the purpose described.

14th, The arrangement of a transparent panel or pane, f3, in the receiving table, P, of the envelope machine, substantially as and for the purpose set forth.

78,354.—SELF-CLINCHING SPIKE.—James Balmer (assignor to himself and Wm. Greenleaf), Brooklyn, N. Y.

I claim a spike split or divided longitudinally, and having its split sides so beveled or inclined that when driven into the wood the portions on the opposite sides of the split or cleft will diverge in opposite directions, parallel with the spit or cleft, substantially as herein described.

78,355.—SPRING CATCH AND STOP FOR DOORS.—Charles W. Barnes, Janesville, Wis. Antedated May 19, 1868.

I claim knob, A, metallic springs, C, rubber seat, E, and staple, D, connected to a door, when the whole are constructed and used substantially as and for the purposes described.

78,356.—PERPETUAL CALENDER.—Simeon L. Barinds, St. Joseph, Mo.

I claim, 1st, The combination of the cardboard, E, and dials, D B, having letters and figures marked on them, substantially as and for the purpose set forth.

2d, The combination of screw wheels, F G, screws, H I, and dials, D B, substantially as set forth.

78,357.—SAW-SET.—Francis Bates, Niles, Mich.

I claim a saw-set consisting of the frame, A, provided with the jaws, B, and set screws, b, for holding the saw, and having the lever, E, arranged to operate therein, substantially as shown and described.

78,358.—INKING APPARATUS FOR PRINTING PRESSES.—Thos. L. Bayliss, Richmond, Ind.

I claim, 1st, The inking slats, e e' and e'', hinged and so arranged in sets as to occupy the same horizontal plane, and also to admit of their being separated and brought in contact with different colored inking rollers, substantially as described and for the purpose set forth.

2d, The grooves, t t' and t'', in the sides of the frames, in combination with the inking slat frames or their equivalents, by which said inking slats are directed against the surfaces of their respective inking rollers, substantially as described and for the purpose set forth.

78,359.—WINDOW BLIND.—Wm. Bellairs and Henry Demott, Atkinson, Ill.

We claim the arrangement of the slats, A A, and folding bar, B, in casing, C, arranged either outside or inside of the window, and operating by means of the cords, D and F, and loaded tassels, E and G, substantially as and for the purposes above set forth.

78,360.—MACHINE FOR GRANULATING AND FINISHING TOBACCO.—Nicholas H. Borgfeldt and Frederick W. Butterhoff, New York city.

We claim in a device for granulating and finishing tobacco, the arrangement of the spiral brushes, cylindrical sieve, B, conveyer screw, E, cylindrical sieve, D, and the discharges, F G, when constructed and operating as herein described.

78,361.—ALPHABET TOY.—Robert J. Clay, Flushing, N. Y.

I claim, 1st, A traveling alphabet, preferably of pictorial character, operated automatically, by means of clockwork, within a stand or case, by causing the same to wind and unwind intermittently on and off drums, and so as to expose but a letter at a time, substantially as specified.

2d, In combination with an intermittently traveling alphabet apron, operated automatically as described, the bell, R, struck to indicate the changes made in the exposure of the letters, essentially as herein set forth.

3d, The combination of the alphabet apron, C, drums, D E, spoke driving wheels, F G, bell, R, with its hammer, e, and clock or watch work, all arranged within a stand or case, having a partially transparent front, for operation as described.

78,362.—COTTON PICKER.—Robert F. Cooke, Newark, N. J.

I claim, 1st, Opening the bolls of cotton plants and disengaging the cotton from the bolls by means of knocking or shaking the cotton plant, as set forth and specified.

2d, The arrangement of flails, d, at the lower end of a revolving shaft operating the cotton plant, in the manner and for the purpose substantially as set forth.

3d, In combination with a shaking device which loosens the cotton from the boll, the use of a blast of air to blow the thus loosened cotton into a receiver, substantially as described.

4th, The blast opening, J, in combination with the screen or receiver, F, said opening and receiver extending nearly from the top to the bottom of the cotton plant, in the manner and for the purpose set forth.

5th, The trough, G, provided with an endless conveyer belt, L, to convey the cotton from the receiver, F, to the after part, or to any other desired part of the machine, constructed and operated substantially as set forth.

6th, The guides, V and W, or their equivalent, arranged and constructed so as to lift up the lower branches of the cotton plant, and to guide the plant, in the manner and for the purpose substantially as set forth and described.

78,363.—PARING KNIFE FOR BOOTS AND SHOES.—William De Camp (assignor to himself and A. R. E. Falck), Newark, N. J.

I claim the handle, A, guide piece, y, adjuster, V, wedge, C, knife, B, and the screw, S, all combined, constructed, and arranged substantially in the manner and for the purpose specified and shown.

78,364.—HARNESS BUCKLE.—P. S. Crawford, Rockford, Ill.

I claim as an article of manufacture the circular frame, A, having tongue, B, of tapering form, hinged to bars C C, D or D, substantially as shown and set forth.

78,365.—CHANDELIER.—John A. Evarts (assignor to Bradley & Hubbard), West Meriden, Conn.

I claim, 1st, The flange, A, combined with the parts, B and C, and constructed so as to receive and hold the arms, E, substantially in the manner described.

2d, The arrangement of the pulleys, b, upon their arms, G, when the said arms are secured in the base, F, substantially in the manner and for the purpose set forth.

3d, The weight, consisting of the two parts of the case, H and I, secured together by the bolt, L, and nut, N, and provided with adjustable weights, P, substantially in the manner herein set forth.

78,366.—COVERED DISH.—W. A. Fenn, West Meriden, Conn.

I claim the arrangement of the sleeve, d, upon the trunnion, C, and combined with a bearing, a, which said bearing is provided with an open slot, the whole constructed and arranged to operate in the manner set forth.

78,367.—WAIST BELT OR GIRDLE.—M. Isadora Findley, New York city. Antedated May 15, 1868.

I claim the detached buckle, B, with its knob or button-shaped projections, d, in combination with the perforated ends of the belt, for use substantially as shown and described.

78,368.—CHURN.—Isaac N. Frost, Peoria, Ill.

I claim, 1st, The dashers, G G, propelled by a crank, in connection with the sliding plate through which they pass, substantially as shown.

2d, The sliding plate, A A, to close the slot in the top, as shown.

3d, The slot covered with a movable plate, through which the dasher may pass, substantially as shown.

78,369.—HAY CUTTER.—Frederick Gerfen, West Hempfield Township, Pa.

I claim the hay cutter, constructed and arranged substantially as and for the purpose specified.

78,370.—COMBINATION OF A PUDDLING FURNACE WITH A STEAM GENERATOR.—George William Hawksley and Matthew Wild, Sheffield, Eng.

We claim the furnace, c, and boiler, a, constructed as described, the former being located within the latter, in such manner as to be wholly surrounded by water, the arrangement being such that the heat of the furnace generates the steam of the boiler, as shown and described.

78,371.—CAR BRAKE AND STARTER.—Michael Henderson, Detroit, Mich.

I claim the longitudinal bars, K, shafts, D and O, when connected with the bar, G, and operated by the lines or chains, L, secured by ratchets and pawls X, substantially as and for the purpose set forth.

Also, the combination of the above named parts with the parallel longitudinal rods, H, provided with spiral springs, 6, sleeves, J, and connecting bar, T, the line or chain, I, cylinder, E, and shifting bar, G, when arranged and operating substantially as herein set forth.

78,372.—POLISH FOR LEATHER.—John Herold and Mercer Brown, Frederick, Md.

We claim the within-described mixture, when compounded and used substantially as and for the purpose herein set forth.

78,373.—VEGETABLE AND FRUIT SLICER.—Elijah Holmes, Lynn, Mass.

I claim 1st, The combination of the knife, H, the bar, F, the arm, I, the nut, J, and the spring, d, or their mechanical equivalents.

2d, The combination of the several parts, as above described, so that several knives shall be controlled and adjusted by a single screw or nut, for the purposes and in the manner substantially as above set forth.

78,374.—SKIRT FORMER.—F. Hull, Birmingham, Conn.

I claim the arrangement of the adjusting bar, G, pivoted to the front arms, and provided with the bars, H, I and L, corresponding to the other arms of the form, the whole constructed so as to be adjusted by the raising or lowering of the bar G, substantially as and for the purpose specified.

78,375.—MANUFACTURE OF SODA AND POTASH.—A. G. Hunter, Flint, Great Britain.

I claim the process of converting silicate of soda or silicate of potash into the corresponding carbonate, by double decomposition with bicarbonate of lime, as substantially described herein.

78,376.—MACHINE FOR STRAIGHTENING TOBACCO.—Jerry A. Hunter, New London, Va.

I claim the funnel-shaped brush, and the upright, self-acting rollers attached.

78,377.—STEAM HEATER.—P. F. Kessler and John Carlisle, Dayton, Ohio.

I claim, 1st, The metallic plates, D, and the case, E, in combination with the shells, A, in radiators, as and for the purpose set forth.

2d, The arrangement of the shells, A A, pipes, b b, partitions, a a, nipples, B B, steam pipe, C, and case, E, when the several parts are constructed and operated substantially as and for the purposes set forth.

78,378.—LANTERN.—Thomas Langston (assignor to E. Miller & Co.), Meriden, Conn.

I claim the combination of the lamp socket, A, with the lower guard flange C, when the said guard flange is provided with one or more internal projections, f, and the set screw, G, so as to secure the said socket to the flange, substantially in the manner herein set forth.

78,379.—MACHINE FOR BEAMING HIDES.—Patrick Lennox, Lynn, Mass.

I claim, 1st, In a machine for beaming hides, or slecking or dressing leather, actuating the movements of the working tools by means of the connecting rod, g, and eccentric roll, h, the former being pivoted at one end to the sliding carriage, and the latter to the beaming-tool carrier, and both being connected with the balance wheel by the means above described, the whole being arranged and operating as before described.

2d, The application of the elastic apron to the revolving tablet, in manner and for the purposes as hereinbefore explained.

3d, Applying the revolving tablet to the car truck frame in such manner as to be enabled to adjust its vertical positions, essentially as herein shown and described.

4th, The means for accomplishing this vertical adjustment of the revolving tablet, the same consisting of the cross frame, o, and treadle, p, combined and arranged and operating as before explained.

5th, The inclination of the outer end of the horizontal beam or guide for elevating the beaming tool substantially as before explained.

78,380.—MACHINE FOR BEAMING HIDES.—Patrick Lennox, Hiram H. Robbins, and Edward Hayes, Lynn, Mass.

We claim, 1st, In a machine for beaming hides or dressing leather, a device so constructed and applied thereto as to automatically press upon or clamp the hide to its supporting table, and hold it in position under the action of the beaming tool, in order to manipulate the hide at one operation.

2d, As a device for accomplishing the above result, the combination and arrangement of the brake bar, g, with the vibrating levers, s s, such levers being pivoted to the guides, b b, and actuated by the wipers, u u, and operating in connection with the beaming tool, essentially in manner and for the purpose as herein shown and described.

3d, The mode of suspending the beaming tool from the sliding carriage, c, that is, by means of the plate or bracket, j, posts, i i, and springs, k, etc., substantially in manner and for the purpose as herein shown and described.

4th, The arrangement or disposition of the twin cranks, e e, as supported by the shafts, f f, and carrying between them the two rods, d and n, and the eccentric, p, essentially as herein set forth and explained.

78,381.—RUNNING CORNICE.—Alexander Leverty, Bridgeport, Conn.
I claim molds or forms for running stucco cornices, constructed in the manner herein described, so as to form complete the moldings into the internal angles, substantially as set forth.

78,382.—WATCH KEY.—Wm. Lindon, New Haven, Conn.
I claim a key provided with a sheath, B, the upper end of which is slitted so as to form springs to secure the sheath to the key, substantially as set forth.

78,383.—GRAIN CAR.—W. A. Long and J. E. Lavey, Plymouth, Ind.
We claim the arrangement of the boxes, A A, with the revolving gate, C, between, and rack bars, D D, shafts, g, and cog wheels operated by the levers, J, and placed at the outer ends of the boxes, substantially as and for the purposes specified.

78,384.—SHOE.—Robert O. Lowrey, Salem, N. Y.
I claim a waterproof shoe or covering for the foot, when manufactured of cloth, paper, or leather, made waterproof by my patented process herein mentioned, or of either of these materials, or of any combination of the same, substantially as herein described, as a new article of manufacture.

78,385.—BOOT AND SHOE.—Nicholas Lunsden, San Francisco, Cal.
I claim, 1st, The regulating guide, consisting of the sliding rod, L, and its adjustable nut, M, together with the screw plate, I, and the wire-holding clamp, the whole constructed and operating substantially as and for the purpose described.
2d, The adjustable last standard, constructed and operating substantially as and for the purpose described.
3d, The device consisting of the spring, W, rod, V, cylinder, E, and barrel, b, for obtaining a perpendicular motion of the last, and a pressure against the screw plate, substantially as and for the purpose described.

78,386.—COFFEE ROASTER.—Benj. K. Maltby (assignor to Thomas N. Drake), Cincinnati, Ohio.
I claim a coffee roaster provided with an axle or shaft, to which paddles, acting as inclined planes, and combined with elastic plates, are attached, and which revolves within a stationary semi-cylindrical bed, the whole being constructed, arranged and operated substantially in the manner and for the purpose described.

78,387.—HOLDER FOR LATHE PLANER.—Joseph P. Manton, Providence, R. I.
I claim a tool holder, constructed substantially as herein described.

78,388.—MACHINE FOR DRESSING BRICKS.—James McNamara, Buffalo, assignor to himself and C. D. Page, Rochester, N. Y. Antedated May 18, 1868.
I claim, 1st, Alternately arresting and releasing the endless carrier, B, by means of the lever, J, winch, and arm, q r, spring, u, and wedge, t, arranged and operating substantially as set forth.
2d, The hinged plates, g g, and springs, j j, in combination with a vertically sliding frame for operating them, substantially in the manner and for the purpose specified.
3d, In combination therewith, the end plates, m m, rods, n n, and springs, p p, arranged and operating substantially as and for the purpose set forth.
4th, The combination of the plates or platens, g g, m m and w, for dressing brick by simultaneously pressing it on all sides, when operated substantially in the manner specified.
5th, The machine, as a whole, constructed, arranged, and operating substantially as set forth.

78,389.—GATE.—Levi Miller, Johnsville, Ohio.
I claim the construction of a farm gate, in the manner as herein described and represented.

78,390.—PLOW.—H. Walker Neal, Sydney, Ohio.
I claim, 1st, The lever, E, pivoted upon the main axle, as set forth, for raising and lowering the wheel, A'.
2d, The combination of the levers, E and E', notched flange, e2, and spring, e3, for the purpose of holding the wheel, A', in desired position.
3d, The combination of the tongue, B, lever, G, clevis, H, and plowbeam, C, arranged and operating as and for the purpose set forth.

78,391.—BOILER FOR MAKING MAPLE SUGAR.—Gaius L. Parker, Coventryville, N. Y.
I claim the cast iron heads, B B, with narrow flanges extending outward, so that the sheet metal, A, may be bent or stamped to conform to the shape of the heads, and thereto be riveted to the flanges, all constructed and used as specified.

78,392.—SUN DIAL.—H. C. Pearsons, Ferrysburg, Mich.
I claim the combination of the polar dial, A, and the equatorial dial, B, with the semi-cylinder, C, when employed instead of a plane surface for the equitorial dial.

78,393.—FIRE PLUG.—John H. Rhodes, Brooklyn, N. Y.
I claim the hydrant, having its lower end working on a universal joint communicating with the water main, and its upper end sustained by suitable springs, substantially as and for the purpose specified.

78,394.—BAGGAGE CHECK.—H. Schuyler Ross, Buffalo, N. Y., assignor to Charles G. Ross, New York city.
I claim, 1st, The combination of a baggage check, containing many names and perforations, with a separate and detachable pointer or indicator, substantially as herein specified.
2d, A detachable metallic index or pointer, so constructed as to securely retain a given position upon a baggage check, containing many names and perforations, substantially as and for the purpose specified.

78,395.—STEAM WATER INJECTOR.—H. Schuyler Ross, New York city, assignor to Charles G. Ross and Henry B. Eells. Antedated May 14, 1868.
I claim, 1st, The arrangement of the water pipe or conductor, E, in such relation to the steam pipe or jet, C, that the discharge end of such water pipe shall open or discharge within the steam pipe or jet, substantially as herein specified.
2d, The arrangement of the water pipe or conductor, E, so that by a longitudinal movement of the said water pipe or conductor the flow of steam from the steam pipes or jet, C, may be entirely shut off or regulated, substantially as herein specified.

78,396.—HAND SEED SOWER.—E. W. Sanderson and W. A. Shatuck, Hillsboro county, N. H., assignors to themselves, Benj. Whiting and H. J. Miller.
We claim, 1st, The cylinder, A, with grooves and straps, D, made and arranged and operating with screw, F, substantially as and for the purposes set forth.
2d, The arrangement of the plow, G, with spring, H, arranged and operating substantially as and for the purposes above set forth.

78,397.—SPRING BED BOTTOM.—Alvah L. Sawyer and Wilson Baldwin, Detroit, Mich.
We claim the combination of the transverse bars, A A and F F, the longitudinal bars, B B and E E, with the fulcrum blocks, C C C C, the crotched, transverse spring, D, and the slats, H H H, etc., when constructed, arranged, and operating substantially as herein set forth and shown.

78,398.—CHURN.—Augustus Schuffert and George Cooper, Wyandotte, Mich.
We claim the combination and arrangement of the shafts, B and E, together with the wheels, C and D, and the dasher, operating as and for the purpose above described.

78,399.—APPARATUS FOR MEASURING CLOTH.—Caleb L. Shotwell, Allamuchy, N. J.
I claim, 1st, The combination with an apparatus constructed substantially as described, for measuring cloth in the roll or piece, of a dial or indicator, substantially as described.
2d, The combination with a cloth measuring device of a reel, cord and dial, substantially as described and for the purpose set forth.
3d, The measuring apparatus, constructed as described and shown by the drawings.

78,400.—METHOD OF MOUNTING THE CUTTERS OF ROTARY PLOWS.—Philander H. Standish, Martinez, Cal.
I claim, 1st, The revolving hubs, E E, and the supporters, F F, constructed and operating substantially as and for the purpose described.
3d, A flexible or yielding arm, having the spring, G, or its equivalent, together with the rotary cutter, substantially as and for the purpose described.

78,401.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Anson P. Thayer, Syracuse, N. Y.
I claim, 1st, A portable grinding mechanism for grinding the cutters of mowing machines, provided with a bench forming a seat for the operator, substantially as and for the purpose described.
2d, A mowing machine grinding wheel provided with means for pressing it upon the cutter blades with a yielding pressure, substantially as and for the purpose described.
3d, The combination of the vertical extensions, C1 and C3, of the frame, C, with the bench, substantially as and for the purpose described.
4th, The mechanism of a portable cutter grinding machine, constructed substantially as described, in combination with driving mechanism arranged for the application of both hands of the operator to the driving shaft, substantially as and for the purpose described.
5th, The combination with the frame, C, and the swinging frame, D, of the screwed sleeve, H, provided with a swivel joint, substantially as and for the purpose described.
6th, The combination of the oscillating frame, D, with the feeding screw, E, arranged within the frame, and serving as the axial support of the same, substantially as and for the purpose described.
7th, The rotating feed screw in combination with the sliding frame, grinding wheel, and its operative mechanism arranged with the screw, substantially as and for the purpose described.
8th, The combination of the frame, C, with the adjustable sleeves, a1 and a2, posts, B1 and B3, and the bench, A, substantially as and for the purpose described.
9th, The combination of the frame, C, with the sleeve, a2, post, B3, provided with the spiral spring, b2, and adjustable rings, b and b1, substantially as and for the purpose described.
10th, The combination with the frame, C, of the crank shaft, C2, vertical shaft, I, and screw shaft, E, provided with the connecting gear wheels, substantially as and for the purpose described.

78,402.—STUMP EXTRACTOR.—E. W. Tibbels, Chester, Pa.
I claim the combination of the wheeled draft axle, A, the drag bar, D, and the lever, E, with the chain and the dog attached thereto, for operation, substantially as and for the purposes specified.

78,403.—LOCK BAR FOR BRIDGES.—L. E. Truesdell, Chicago, Ill.
I claim the corrugated ends of two or more bars of iron, A and A2, B and B2, when firmly held together within the compressible sides of fluted clamp plates, C, D and E, as and for the purpose specified.

78,404.—RAILROAD RAIL.—Z. B. Wakeman, Rockford, Ill.
I claim the combination of the hollow shell rail, A, with its interior notches, and the block, B, when connected thereto by the wedge-shaped key, C, all constructed as specified.

78,405.—STAKE HOLDER FOR CARS.—Wm. P. Wentworth (assignor to himself and Thomas S. Sprague), Detroit, Mich. Antedated May 16, 1868.
I claim the combination and arrangement of the stake, A, the cap or socket, B, the strap, C, the hinge joint, E, the button, F, the slot, G, the pins, H and I, and the bevel, K, arranged and described, or any other substantially the same, for the purpose designed.

78,406.—DUST PAN.—L. F. Wheaton, Madison, Conn.
I claim a dust pan having the pans, a, arranged near its handle edge, so as to elevate and hold the pan, substantially in the manner and for the purpose described.

78,407.—WOOL BOX.—Carmi Wightman, Batavia, Ill.
I claim the leaves, C C, D D, bed, t, frame, A B, guides, F F, cross piece, N, in combination with lever, K, pulley, P, and cord, M, the whole being constructed and arranged to raise and lower said leaves, substantially as set forth.

78,408.—PHOTOGRAPHIC CAMERA.—Simon Wing, Boston, Mass.
I claim, 1st, The self-adjusting partition, C, so acting as to be in contact with the diaphragm in all positions of the lenses, without interfering with the adjustment of the latter, substantially in the manner and for the purpose described.
2d, In combination with a sliding shut-off, the handle, G, constructed and operated in the manner and for the purpose set forth.

78,409.—OINTMENT.—Mrs. H. T. Wood, San Francisco, Cal.
I claim the above-described composition for ointment, made of the ingredients enumerated, mixed or compounded in about the proportions specified.

## REISSUES.

2,943.—NECK TIE.—Herman Bendix (assignee of Herman Bendix and J. H. Fleisch), New York city. Dated March 13, 1866.
I claim a fastening device for neck tie, consisting of a hook, a, elastically secured to its holder or retainer, substantially as described.

2,944.—MELODEON.—La Fayette Louis, Providence, R. I.—Dated Nov. 18, 1856. Reissue 2,498, dated Feb. 26, 1867.
I claim in combination with the reeds of a melodeon (or that class of instruments in which the air is drawn through the reeds by the exhaust action of a bellows), a tremolo valve or valves, so arranged that when vibrated it or they shall interrupt the passage of air through the reeds, and thereby produce the tremolo sound, at the will of the performer.
Also, in combination with the reeds of a melodeon, a tremolo valve, actuated by a rotary fan or blade wheel, substantially as described.
Also, in combination with the reeds of a melodeon, a tremolo valve or valves, having a positive connection with the valve actuating mechanism, substantially as described.

2,945.—FENCE POST.—Robert Ramsey, New Wilmington, Pa. Dated Dec. 10, 1867.
I claim, 1st, The compensating features of the posts, whether effected by the formation of the gains or by keys, substantially as and for the purpose set forth.
2d, The combination of posts, P P' P'', when provided with square or dovetail gains, with sills, A A', and keys, e e e e, substantially as and for the purpose specified.

2,946.—SKIRT HOOP.—E. Wooster and Company, and F. Hull and Company, Birmingham, Conn., assignees of John R. Latin. Dated April 30, 1867.
We claim the bottom hoop for hoop skirts, formed by combining one or more springs in a single cover, the upper edge of which is formed as described, so as to be secured to the tapes of a skirt, as and for the purpose set forth.

2,947.—COMPOUND FOR TREATING HIDES AND SKINS.—L. F. Robertson, West Farms, N. Y. Dated April 21, 1868.
I claim a compound for treating hides and skins, made of the materials herein described.

2,948.—STEERING APPARATUS.—Charles H. Sawyer, Buxton, Me. March 31, 1868.
I claim the apparatus as herein described, having the wheel shaft, B, with its right and left screw, d, the two small double gears, a b, and larger gear, D, with the teeth on the inner periphery thereof, substantially as and for the described purposes.

2,949.—PUMP.—Wm. Shoup, Saltsburg, Pa. Dated Dec. 27, 1864. Antedated April 26, 1862.
I claim, 1st, The combination with the pump tube, B, of the outer tube, C, and seed bag, F, placed around outside of it, irrespective of the gate or valve, D, substantially as and for the purpose hereinbefore described.
2d, The gate or valve, D, in combination with the tube, C, and pump tube, A, arranged as described, for the purpose set forth.

2,950.—INVALID BEDSTEAD.—Wm. Heath, Bath, Me. Dated March 10, 1868.
I claim the combination of the recesses, K K, L L, or their equivalents, with the frame, A, the two frames, D E, and mechanism for moving and depressing, or operating the back frame, E, substantially as described.
Also, the combination of the folding legs, M M, with the arms, h h, or their equivalent, the toothed sectors, their arms, f f, the frame, A, and the parts, B C D E, arranged and connected substantially as described.

2,951.—COMBINED RAKE AND REEL FOR HARVESTER.—Sam'l Johnston, Buffalo, N. Y., assignee by mesne assignments of himself.—Dated Feb. 7, 1865.
I claim, 1st, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, so constructing and arranging a camway as to cause all the heads or beaters to descend to the same gathering level in front of the cutters, and then to elevate those which do not discharge above the cut grain on the platform, and above the level pursued by the discharging head or rake.
2d, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, a cam so arranged as to cause all the heads or beaters to descend to the same gathering level in front of the cutters, and a device for throwing those heads or the teeth thereof, which do not discharge, above the cut grain while passing the platform, and above the level pursued by the heads, or the teeth thereof, which so discharge the grain.
3d, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, and a cam so arranged as to cause all the heads or beaters to descend to the same gathering level in front of the cutters, and then to rise above the cut grain on the platform, and the level pursued by the discharging head, making said cam, or a part thereof, movable, so as to permit any one of said rakes or heads to descend while passing the platform, and become a discharging rake or head.
4th, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, a cam so arranged as to cause all the heads or beaters to descend to the same gathering level in front of the cutters, and a device for throwing those heads, or the teeth thereof, which do not discharge, above the cut grain while passing the platform and above the level pursued by the heads, or the teeth thereof, which do discharge the grain, making the said last mentioned device movable, so as to permit any one or more of said heads, or the teeth thereof, to descend to the level of the platform and discharge the grain.
5th, In combination with the movable device set forth in the last claim, a cord, or equivalent connection, extending to the driver's seat, for operating the said device, so as to regulate the size of the gavel at the will of the driver.
6th, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, and a cam way so constructed and arranged as to cause all the heads or beaters to descend to the same gathering level in front of the cutter, and then to elevate those which do not discharge above the cut grain on the platform and above the level pursued by the discharging head or rake, an auxiliary cam way for guiding and controlling the arm or the rake or head which discharges the grain while said arm is passing the platform.
7th, In combination with a series of revolving arms carrying heads or rakes which all gather the grain, and a part only of which discharge the grain, and a cam so arranged as to cause all the heads or beaters to descend to the same gathering level in front of the cutters, and a device for throwing those heads, or the teeth thereof, which do not discharge, above the cut grain while passing the platform, and above the level pursued by the heads, or the teeth thereof, which so discharged the grain, an auxiliary cam way opposite to the platform guiding and controling the arm of the rake or head which also discharges the grain.
8th, The overhanging extension attachment to the heads or beaters, in combination with the outer divider and rim of the platform.
9th, The combination of the elbow of the rake arm with the roller and the outer and inner tracks or ways, constructed substantially as described and for the purposes set forth.

2,952.—MODE OF PRINTING PHOTOGRAPHIC PICTURES.—Isaac Rehn, Philadelphia, Pa. Dated April 14, 1868.
I claim the combination of the silver, the albumen, and the salt, with a pigmentary substance, to give increased sensitiveness and consistency to the photographic compound, substantially as described.

2,953.—WATCH.—O. F. Stedman, Ravenna, Ohio. Dated Jan. 28, 1868.
I claim the ring or band, C, bevelled or made thin at one edge or side, said band being made narrower than the movement, and wide enough to cover the space between the plates, a and b, substantially as and for the purposes herein set forth.

2,954.—FIRE ENGINE.—The Gould Machine Co. (assignees by mesne assignments of John N. Dennisson), Newark, N. J. Dated Feb. 7, 1865.
We claim, 1st, A force pump, which may be adapted to throw a larger or smaller quantity of water at each stroke, by varying the effective area of its piston surface, by means substantially as herein set forth.
2d, A force pump, provided with one or more ports or passages, the opening of which will relieve a part of the piston surface from labor or pressure on the water, so that the whole power of the motor can be applied to the water delivered from the pump by the operative part of the piston, substantially as described.
3d, Increasing or diminishing the effective area of the pump or pumps by means of a valve placed in the partition between them, so that the quantity of water discharged at a stroke can be increased or diminished at pleasure, without altering the speed or stroke, substantially as described.

2,755.—BUCKLE.—The West Haven Buckle Co., West Haven, assignees of Sheldon S. Hartshorn, Orange, Conn. Dated November 7, 1854.
We claim, 1st, A buckle, in which the tongues are formed from a single piece of metal, and constructed so as to clasp the divided side, and turn freely thereon, substantially in the manner herein set forth.
2d, The combination of the two parts or loops, one side of one of which is divided and the two parts or loops hinged together, as described, and the tongue clasped and hinged upon the divided side substantially as set forth.

## DESIGNS.

3,049.—CUPBOARD LATCH.—S. D. Arnold (assignor to P. and F. Corbin), New Britain, Conn.

3,050.—COOK'S STOVE PLATE.—D. S. Colby and Robert Scorer, Troy, N. Y.

3,051.—PARLOR STOVE PLATE.—D. S. Colby and Robert Scorer, Troy, N. Y.

3,052.—TRADE MARK.—G. P. Farmer, Philadelphia, Pa.

3,053.—SPOON OR FORK HANDLE.—Alonzo Hebbard (assignor to Edward Corning), New York city.

3,054.—TRADE MARK.—G. W. Waitt, Philadelphia, Pa.

3,055.—COOKS' STOVE.—J. J. Anderson, Rochester, Pa.

3,056.—COOKS' STOVE.—T. S. Mitchell, Pittsburgh, Pa.

3,057.—FRAME OF A SCHOOL DESK AND SEAT.—H. M. Sherwood, Chicago, Ill.

3,058.—PLATES OF A COOK'S STOVE.—Garrettson Smith and Henry Brown (assignors to Abbott & Noble), Philadelphia, Pa. Antedated May 5, 1868.

3,059.—ILLUMINATING RING FOR GAS STOVES.—Garretson Smith and Henry Brown (assignors to Abbott & Noble), Philadelphia, Pa. Antedated May 5, 1868.

3,060.—WATER-CLOSET RECEIVER.—Wm. Smith, San Francisco, Cal.

## Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,257.—SECURING TUBES IN STEAM BOILERS, ETC.—Geo. P. Hunt, New York city. April 17, 1868.

1,266.—MANUFACTURE OF HATS AND BONNETS.—Chauncey O. Crosby, New Haven, Conn. April 18, 1868.

1,270.—MACHINE FOR TURNING OFF CROSS-HEAD WRIST PINS, CRANK PINS ETC.—Theodore A. Goff, San Francisco, Cal. April 18, 1868.

1,288.—CONSTRUCTION OF RINGS FOR RING SPINNING.—Cyrus B. Morse, Rhinebeck, N. Y. April 20, 1868.

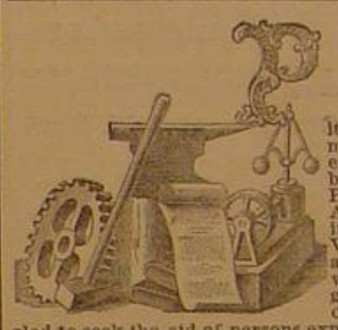
1,307.—APPARATUS FOR STAMPING, DATING, INDICATING, AND CANCELING MARKS OR DESIGNS.—Edward Chamberlain, New York city. April 22, 1868.

1,315.—MACHINERY FOR MANUFATURING SMALL ARTICLES FROM SHEET METAL.—Lauriston Towne, Providence, R. I. April 22, 1868.

1,316.—CARPET LININGS, AND MACHINERY FOR MANUFACTURING THE SAME.—Geo. W. Chipman, Boston, Mass. April 22, 1868.

1,318.—PADDLE WHEEL FOR VESSELS.—Donald L. McDonell, Detroit, Mich. April 22, 1868.

1,339.—CARTRIDGE BOX OR HOLDER.—Paul F. Schneider, Hartford, Conn. April 23, 1868.

# PATENTS.

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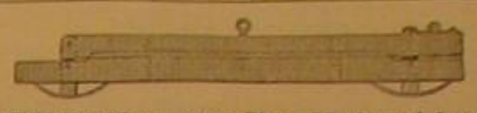

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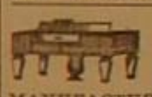

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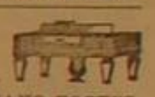

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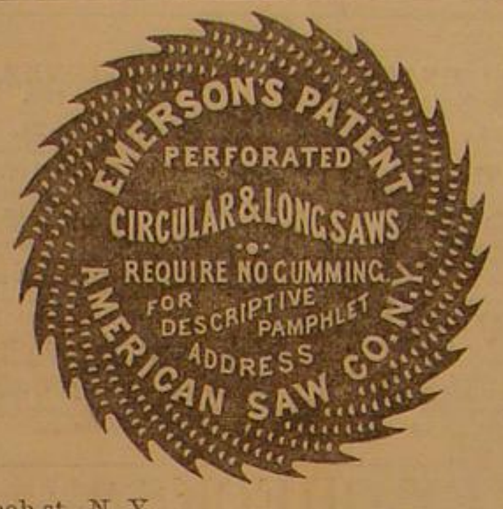


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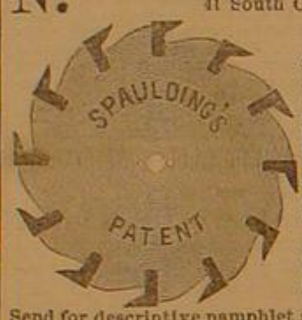


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Vol. XVIII.—No. 25. [NEW SERIES.]

NEW YORK, JUNE 20, 1868.

$3 per Annum [IN ADVANCE.]

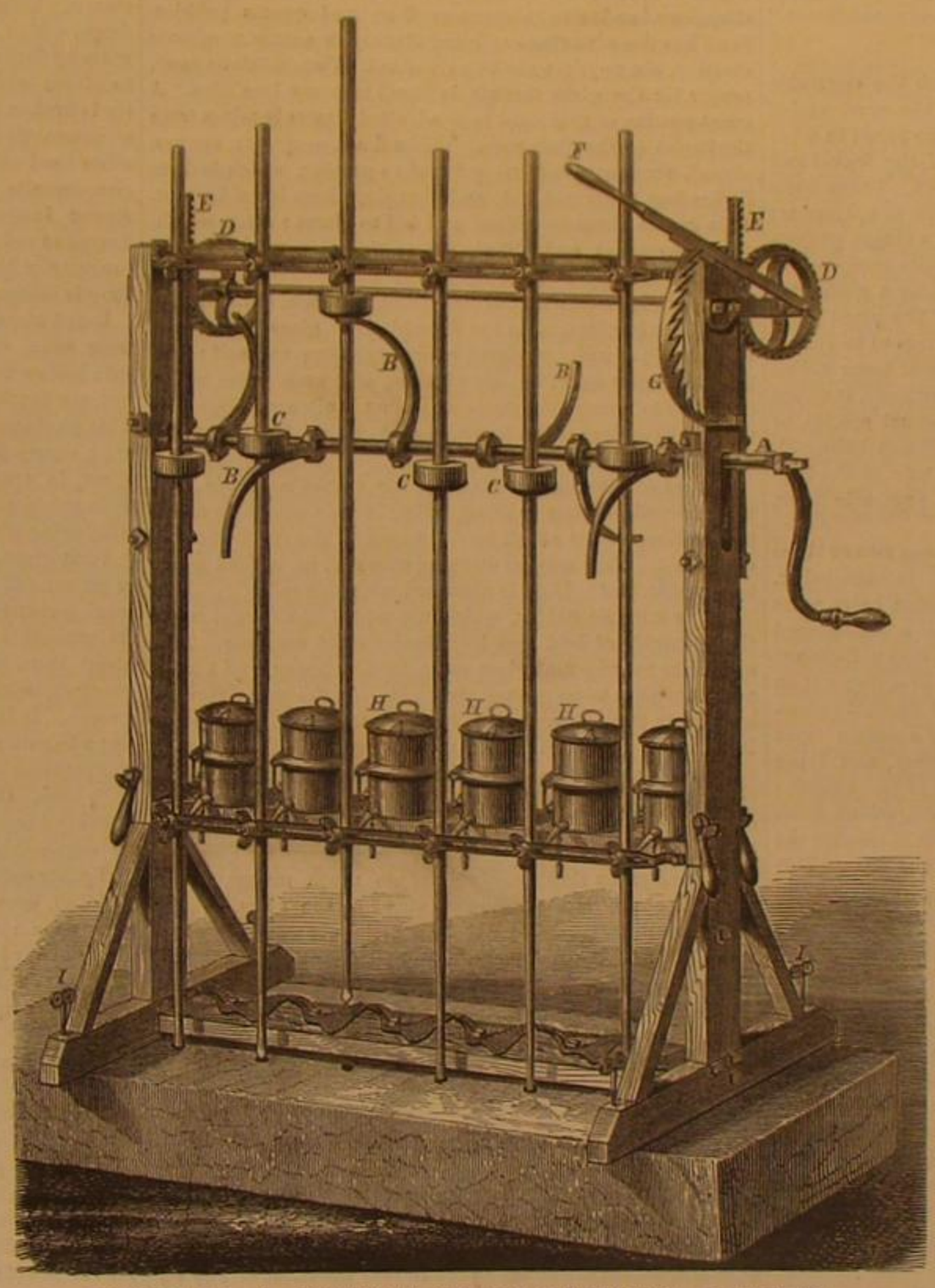

### Improved Machine for Drilling Stone.

The object of the machine represented in the engraving is to facilitate the drilling and quarrying of stone, the splitting of blocks, and the blasting of rocks. It is, in fact, the ordinary stone drill, improved and extended in arrangement and management. A light frame holds a series of drills of any number required, the drills being so arranged and connected that they may be instantly removed from the frame for transportation from place to place. The drills are all raised by one complete revolution of the lifting shaft, A, but only one at a time, so that the power, whether manual, horse, steam, or water, has the weight of but one to lift at once. The drills are turned as well as raised by the curved arms, B, which, impinging on the convex under side of the disks, C, give the drills a partial rotary motion as they are lifted, similar to that by the hand in the single ordinary stone drill. The drills can be set at any required distance, one from the other, by means of adjustable eyes, set in the parallel or slotted bars at the top and near the bottom of the frame. As the drills work down into stone, the shaft, A, is lowered by the cog wheels, D, on a shaft passing across the frame, working in the sliding racks, E, to which the lifting shaft boxes are attached, and is held in position by the catch lever, F, and curved rack, G.

The holes are moistened by the water cans, H, which have their spouts adjusted so that the water strikes the sides of the drills and runs down into the holes. The curved lifting arms are adjusted by set screws working in longitudinal grooves in the shaft on which they are fixed, and the water cans are secured at any distance apart by bolts passing through a slot in the cross bar on which they stand. The screws, I, through the feet of the frame are for leveling the frame when standing on rough or uneven surfaces.

The machine is portable, durable, and cheap. The inventor says that each drill will bore an inch a minute in very hard stone, working by man power at ordinary speed, and make a much smoother hole than can be made by hand. It is the subject of patents by A. M. Southard and W. J. Hobson, dated Sept. 3, 1867, and April 28, 1868.

All orders for machines and letters for further information should be addressed to Southard & Hobson, care of the Holske Machine Co., No. 528 Water street, New York city.




SOUTHARD & HOBSON'S STONE DRILLING MACHINE.

### New Manganese Battery.

A battery, composed essentially of peroxide of manganese and a single liquid, chloride of ammonium, has been recently constructed by M. Leclanchè, and, according to *Les Mondes*, has been already somewhat extensively adopted, or, at least, taken on trial by several telegraph companies on the Continent. It has been long known that peroxide of manganese possesses an electric conductivity similar to that of metals. The author only uses the natural crystalline peroxide of the purest quality. This is broken up and placed in a porous vessel, where it surrounds a carbon plate, forming the positive pole of the battery, the negative plate outside the porous vessel is simply a thick rod of zinc; the liquid which bathes both plates is a concentrated solution of sal-ammoniac. It appears to be a very constant form of battery, and exceedingly economical.

### The Utilization of Town Sewage.

The sewage question is one which has lately attracted considerable attention in Paris; the problem, of course, has been to remove the polluted waters from the town in the most advantageous manner. The volume of these waters is now 100,000 cubic meters a day, soon it will be double this amount, and in a few years probably 500,000 to 600,000 cubic meters. We have three solutions of the difficulty. The first and most obvious is to carry the sewage into the Seine; this scheme has been well tested already, and the disadvantages seem generally more striking than the advantages. The advocates of a second plan would employ the sewage, which they would first raise by machinery to a considerable hight, in the irrigation of the fields. The fertilization of the sands at the mouth of the Thames by this means is cited in favor of the plan. The third scheme recommends itself as being the most scientific, and it is, perhaps, the best; experiments have been made with this scheme since the commencement of the spring. The sewage waters, collected in large basins, are mixed with a certain amount of sulphate of alumina—about one per cent to the cubic meter. Organic matters contained are rapidly precipitated, each cubic meter yielding about three klgrms. of solid manure. The decanted fluid, termed clear water, can be employed in the irrigation of soils, upon which it has a very fertilizing action; it contains, in fact, small quantities of mineral matters in suspension, a little nitrogenous and organic matter, and the whole of the alkaline salts. The deposit obtained in the clarification is abundant and compact; it contains the whole of the phosphoric acid and nine tenths of the nitrogenous and organic matter, and the mineral matters dissolved or in suspension; it constitutes an excellent manure, very fertilizing, and easily transportable. Towns would thus be considered as manure factories, and it is believed that the value of the manure may be made to defray the expense of supplying the town with pure water.

### THE REYNOLDS AIR-TIGHT HEATER.

These engravings represent the mode of construction and some of the important features of a very popular heating apparatus that has, in Philadelphia and other portions of Pennsylvania, made a radical change in heaters for warming and ventilating dwellings, etc. We have been informed that its sales are large and very rapidly increasing on account of its perfection, durability, simplicity, and economy. It is from well-established evidence the original air-tight heater, and from which the others have been taken.

FIG. 1.




FIG. 2.

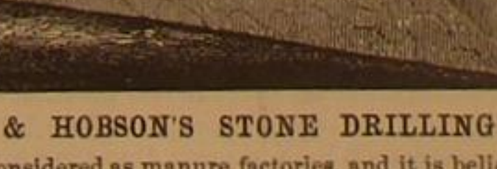
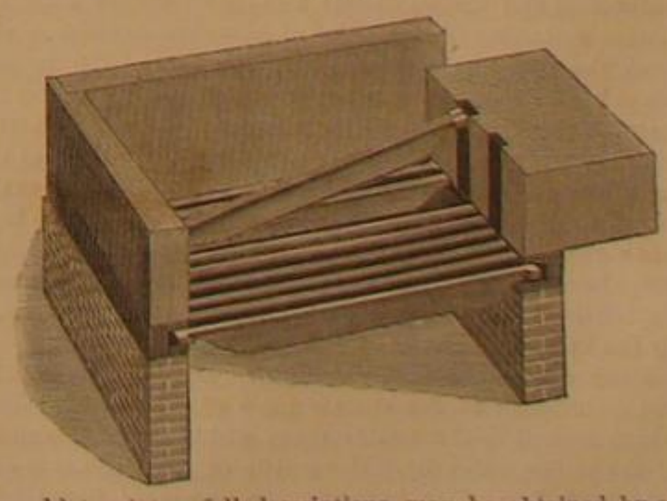


Fig. 1 represents the heater as set up in brickwork, with the top covering and a portion of the front wall removed. The pyramidal radiator is made of heavy plate iron, well riveted together, the same as a steam boiler, and bolted upon heavy wrought-iron side plates running down into the brick-work, preventing any possibility of the escape of gas or dust into the hot-air chamber. By the insertion of tubes in the hollow brick walls for the admission of cold air, and the keeping of the fire pot below and away from the sides of the radiator, it never becomes red hot, thereby diffusing a summer-like heated air through the apartments. Its most important feature are the air-tight draft door, the dust door or screen, the novel grate bar rests, and its perfect management without dampers of any kind. The draft door, it will be perceived, is circular in form, and is provided with a planed close-fitting brass slide, for regulating the heater. The edges of both the door and frame are beveled, turned, and ground, making a water-tight joint and preventing the risk of breaking the frame by expansion. The door of itself is a most important and valuable improvement. The dust screen for carrying off the ashes and dust made by raking, is simply a box-shaped door opened at the bottom, and placed on the left hand side of the feed door. It is long enough to entirely cover the upper and part of the lower doors. When the fire needs raking, the upper and lower doors are opened and this screen shut over their openings, making a flue from beneath the grate bars, up over the fire through the upper door, for the escape of the dust which is drawn into it by the draft of the chimney or smoke flue. The grate bar rests are the latest improvement, and a very important one. In all heaters, when separate bars are used to form the grate, the rests or bearing bars upon which they are placed are put within the fire pot as shown in Fig 2, causing the coals to lie on the ends of the bars unconsumed, and obstructing the thorough raking and cleaning necessary; but by this improvement the rests or bearing bars are put under the front and back lining or tile forming the fire pot, the grate bars are then inserted in a recess in the bearing bars as shown in Fig. 3. By this arrangement, the bars can be as readily removed and replaced as by the old method, while there is no obstruction to the draft reaching every portion of the fire pot, insuring as complete combustion of its contents as is possible, at the same time allowing of its thorough cleaning without difficulty. It would occupy much space to give all the advantages to be found in this celebrated heater, but any further information needed and pamphlets giving full descriptions may be obtained by addressing the patentees and sole manufacturers, J. Reynolds & Son, cor. 13th and Filbert streets, Philadelphia, Pa.

FIG. 3.



### The Phenomena of Light.

A number of experiments, as illustrating the phenomena of light, were performed the other night in the Philadelphia Academy of Music, by Professor Henry Morton of that city. The following, among others, were specially interesting:

"The professor placed himself and apparatus on a platform secured to one of the stage traps, and then was raised to a great hight above the floor, at which elevation he burned in the compound blowpipe a piece of thick steel wire rope.

The fountain of scintillating sparks and drops of melted steel —which, descending in a broad sheet some fifteen feet in hight, poured upon the stage and rolled in a torrent of fiery hail toward the foot lights—was a sight never to be forgotten. A wheel five feet in diameter, supporting electrical tubes, was rotated, while flashes of electric fire from the largest induction coil in the world, belonging to the University of Pennsylvania, were passed through, producing a dazzling star of constantly changing colored rays.

"The drop curtain, descending for a few moments, rose again, displaying a beautiful palace scene, illuminated by numerous lime lights, judiciously placed. There then marched in a great number of masked figures, in costumes representing the colors of the rainbow, and bearing banners with brilliant devices. These taking positions, formed a tableau equal in brilliancy and beauty of general effect to anything we have ever seen upon the stage. At a signal the white light was extinguished and its place supplied by pure yellow light, equally bright, when every trace of color disappeared, and the entire phalanx became a ghastly company of spectres bearing banners of white and black. The means for producing this yellow light is a device of Professor Morton's, entirely new and eminently efficient—in fact, the entire house was illuminated with it from the stage, so that the same wonderful change was manifest in the faces and costumes of the audience."

### Vegetable Hairs.

Among the many objects of interest which the vegetable kingdom offers to the microscopist, one of the most varied and the most universally distributed is to be found in what are called hairs, which clothe the surface of the leaves and flowers of a vast number of plants and trees. These hairs are appendages of, and arising from, the skin or epidermis; and although their simplest form is that of a single projecting and elongated cell, they are more generally composed of a series of cells, often bearing at the extremity a glandular protuberance containing the essential oil of the plant; and the variety of shapes which they assume appears to be almost unlimited, while the characteristics of many of them are so definitely marked, that, in the vast majority of cases, it would be quite possible to determine, if not the actual species, at least the order or family to which any specimen belonged, from the observation of a single hair. The hair of the hop-plant, for instance, is so unlike most other vegetable hairs, that it would be impossible to mistake it.

The leaves and flowers of some plants possess two or three varieties of hairs, often in close proximity to each other. The flower of the snapdragon has single celled hairs, some terminating in a globular gland, others in a cone-shaped gland. The garden verbena has some hairs like a flattened rosette on the top of a tall stalk, and others breaking out on all sides of their entire length in curiously knotted excrescences. The hair of the marigold consists of a double layer of elongated cells, built up one upon another, and lying closely side by side. The base of the hair of the common stinging-nettle contains an irritating secretion, which flows through the straight tubular elongation until it reaches the little bulb-like swelling at the extremity of the hair. This is easily broken off when touched by any object, and the acrid fluid then escapes, and produces the well known sting.

Some hairs are forked or branched, like those of the dandelion and the plane tree; others consist of a single elongated cell, like that of the cabbage. In the hair of the marvel of Peru the elongation is formed by a chain of cells placed end to end, and connected by slender threads. In the thistle and the ground sel, the last cell of the hair is lengthened out to a bristle-like extremity. On the leaves of some geraniums may be found two kinds of hairs, the one formed of a series of three elongated cells, the other a flattened disk-like form terminating a short stem of three or four cells. The branched hairs of the lavender are also intermingled with others terminating in a glandular appendage which contains the essential oil that gives to this plant its peculiar odor. On the petal of the heartsease may be found three varieties of hairs. The hairs or spires of some of the cactus tribe are like a series of spear heads placed one upon another. The southernwood hair is composed of a chain of cells, of which the three lower form the stem of the hair while the two upper are lengthened into lateral branches. The leaves of chrysanthemum and the wallflower also bear T-shaped hairs, the former springing from a series of cells that decrease in size from the root to the extremity. The hair of the tobacco plant has a two-celled gland at the extremity, containing the narcotic secretion. The hair of the lobelia is like a knotted club; others assume a star-like appearance, like those of the hollyhock and the ivy. In the geum we have another example of a club-shaped two-celled hair; while that of the bean has a crook-shaped appearance. The flower of the dead-nettle bears two-celled hairs, remarkable for the number of knobs scattered over the surface; a similar appearance is presented by the hairs of the wallflower and chrysanthemum.

Many connecting links present themselves between hairs and scales, such as the stellate hairs of the *Deutzia scabra*, which a good deal resemble those within the air-chambers of the yellow water lily. The cuticle of the iceplant is covered with hairs that have the appearance of frozen dew-drops, and consist of very large oval-shaped cells, which lie detached from one another upon the surface of the cuticle.

As we have probably said enough to draw the attention of young microscopists to this interesting branch of research, we need only add that vegetable hairs are easily preserved in weak spirit, while some retain their natural appearance very fairly in Canada Balsam.—*Hardwicke's Science Gossip.*

As an experiment, several streets in the city of Edinburgh are being illuminated at night by means of the lime light.

## Science Familiarly Illustrated.

### Glass---Its Material and Manufacture.

A great number of earths, and other mineral bodies, after being fused, do not resume their original character, upon cooling, but pass into a dense, hard, shining, and brittle state, having the character of glass; and are thus said to be vitrified. Most of these substances do not immediately become hard, upon the reduction of their temperature, but go through an intermediate, or ductile, state, in which a combintion of of softness with tenacity, enables them to be wrought into articles of use and ornament. Of these, common glass is the most important, while enamels, artificial gems, etc., belong to the same species of manufacture.

Glass is a compound substance, artificially produced, by the combination of silicious earth with alkalies, and, in some cases, with other metallic oxides. These substances, being melted together at a high temperature, unite, lose their opacity, and are fused into a homogeneous mass, which, on cooling, has the properties of hardness, transparency, and brittleness.

The most important ingredient, and, in fact, the basis, of transparent glass, is silica, or oxide of silicium. This earth, nearly in a state of purity, is found in the sand of certain situations. and also in common flint, and quartz pebbles. Sand has the advantage of being already in a state of minute division, not requiring to be pulverized. Pure silicious sand, proper for the glass furnace, is found in many localities. A great portion of that used in the United States is taken from the banks of the Delaware. When flints, or quartz, are employed, they must be first reduced to powder, which is done by heating them red hot, and plunging them in cold water. This causes them to whiten and fall to pieces; after which, they are ground and sifted, before they are ready for the furnace.

An alkaline substance, either potash or soda, is the second ingredient in glass. For the finer kinds of glass, pure pearlash is used, or soda, procured by decomposing sea salt; but, for the inferior sorts, impure alkalies, and even wood ashes, are made to answer the purpose. Lime is often employed, in small quantities; also borax, a salt which facilitates the fusion of the silica.

Instead of the common alkalies, the sulphate of soda may be employed in glass making. But, in this case, it is necessary to liberate the alkali by decomposing the sulphuric acid of the salt. This may be done by charcoal, or, in flint glass, by metallic lead. Lime is also used with this salt.

Of the metallic oxides, which are added in different cases, the deutoxide of lead (red lead) is the most common. This substance renders flint glass more fusible, heavy, and tough, and more easy to be ground and cut. At the same time, it imparts to it a greater brilliancy, and refractive power. Black oxide of manganese, in small quantities, has the effect of cleansing the glass, or of rendering it more colorless and transparent. This effect it seems to produce by imparting oxygen to the carbonaceous impurities, thus forming with them carbonic acid, which subsequently escapes. Common niter produces a similar effect. If too much manganese be added, it communicates a purple tinge to the glass, which, however, may be destroyed by a little charcoal or wood. Arsenious acid (white arsenic) in small quantities, promotes the clearness of glass; but, if too much be used, it communicates a milky whiteness. Its use, in drinking vessels, is not free from danger, when the glass contains so much alkali as to render any part of it soluble in acids.

Glass is of various kinds, which are named, not only from the character of their ingredients, but from the mode in which they are wrought. The name of crown glass is given to the best kind of window glass, that which is hardest, and most free from color. It is made almost entirely of sand and alkali, and a little lime, without lead, or any other metallic oxide, except a minute quantity of manganese, and sometimes of cobalt, which are added to counteract the effect of any impurities, in giving color to the glass. Crown glass requires a greater heat to melt its ingredients, than those kinds which contain a larger quantity of metallic oxide, especially of lead.

After the materials have been intimately mixed, they are subjected to the operation called fritting. This consists in exposing them to a dull, red heat, which is not sufficient to produce their fusion. The use of this process is to drive off the carbonic acid, and other gaseous and volatile matters, which would otherwise prove troublesome, by causing the materials to swell up in the glass pots. The heat is gradually increased, and the materials constantly stirred for some hours until they unite into a soft, adhesive mass; the alkali having gradually combined with the silicious earth. The reason why the fritting is conducted at a low heat is that, if a high temperature were applied at once, the alkali would be driven off, before it had time to combine with the silica.

The homogeneous mass, or frit, is next transferred to the glass pots of the melting furnace. These are crucibles, made of the most refractory clays and sand. A quantity of old glass is commonly placed upon the top of the frit, and the heat of the furnace is raised to its greatest hight, at which state it is continued for thirty or forty hours. During this time the materials become perfectly united, and form a transparent, uniform mass, free from specks and bubbles. The whole is then suffered to cool a little by slackening the heat of the furnace until it acquires sufficient tenacity to be wrought.

The formation of window glasss is effected by blowing the melted matter, or metal, as it is called, into hollow spheres, which are afterward made to expand into circular sheets. The workman is provided with a long, iron tube, one end of which he thrusts into the melted glass, turning it round until a certain quantity, sufficient for the purpose, is gathered or adheres to the extremity. The tube is then withdrawn from the furnace, the lump of glass which adheres is rolled upon a smooth iron table, and the workman blows strongly with his mouth through the tube. The glass, in consequence of its ductility, is gradually inflated like a bladder, and is prevented from falling off by a rotary motion constantly communicated to the tube. The inflation is assisted by the heat, which causes the air and moisture of the breath to expand with great power. Whenever the glass becomes so stiff, from cooling, as to render the inflation difficult, it is again held over the fire to soften it, and the blowing is repeated, until the globe is expanded to the requisite thinness. It is then received by another workman upon an iron rod, while the blowing iron is detached. It is now opened at its extremity, and, by means of the centrifugal force, acquired from its rapid whirling, it spreads into a smooth, uniform sheet of equal thickness throughout, excepting a prominence at the center where the iron rod was attached.

After the glass has received the shape which it is to retain, it is transferred to a hot chamber, or annealing furnace, in which its temperature is gradually reduced, until it becomes cold. This process is indispensable to the durability of glass; for, if it is cooled too suddenly, it becomes extremely brittle, and flies to pieces upon the slightest touch of any hard substance. This effect is shown in the substances called Rupert's drops, which are made by suddenly cooling drops of green glass by letting them fall into cold water These drops fly to pieces with an explosion whenever their smaller extremity is broken off. The Bologna phials, and some other vessels of unannealed glass, break into a thousand pieces if a flint, or other hard and angular substance is dropped into them. This phenomenon seems to depend upon some permanent and strong inequality of pressure; for when these drops are heated so red as so be soft, and left to cool gradually, the property of bursting is lost, and the specific gravity of the drop is increased.

Broad glass is a coarser kind of window glass, and is made from sand, with kelp and soap boilers' waste. It is blown into hollow cones, about a foot in diameter, and these, while hot, are touched on one side with a cold iron, dipped in water. This produces a crack, which runs through the length of the cone, nearly in a right line. The glass then expands into a sheet, in its form resembling somewhat the shape of a fan. This appears to have been one of the oldest methods of manufacturing glass.

Flint glass, so called from its having been originally made of pulverized flints, differs from window glass in containing a large quantity of the red oxide of lead. The proportions of its materials differ; but, in round numbers, it consists of about three parts of fine sand, two of red lead, and one of pearlash, with small quantities of niter, arsenic, and manganese. It fuses at a lower temperature than crown glass, has a beautiful transparency, a great refractive power, and a comparative softness which enables it to be cut and polished with ease. On this account it is much used for glass vessels of every description, as especially those which are intended to be ornamented by cutting. It is also employed for lenses and other optical glasses. Flint glass is worked by blowing, molding, pressing, and grinding. Articles of complex form, such as lamps and wine glasses, are formed in pieces, which are afterward joined by simple contact, while the glass is hot. It appears that the red lead used in the manufacture of flint glass gives up a part of its oxygen and passes to the state of a protoxide.

Common green glass, of which bottles are made, is the cheapest kind, and formed of the most ordinary materials. It is composed of sand, with lime, and sometimes clay, and alkaline ashes of any kind, such as kelp, barilla, or even wood ashes. The green color is owing to the impurities in the ashes, but chiefly to oxide of iron. This glass is hard, strong, and well vitrified. It is less subject to corrosion by strong acids than flint glass, and is superior to any cheap material for the purposes to which it is ordinarily applied.

The plates of crown glass which are obtained in the common manner, by blowing them in circular plates, afford the common material for window glass, being cut into squares by first marking the surface deeply with a diamond and then breaking the glass in the same directions, the crack always following the exact course of the incision made by the diamond. But there is always a loss or waste in cutting squares from a circular plate, besides which they can never be very large, owing to the protuberance, or *bull's eye*, which fills the center of the plate, so that a square can never be larger than can be described within less than half the circle. To remedy this disadvantage, plates for looking glasses, and others of large size, are executed in a different way, either by blowing them in cylinders or by casting them in plates at first.

Cylinder glass is blown at first in spheres, like window glass. These are elongated into spheroids by a swinging motion which the workman gives to his rod. The ends of this spheroid are successively perforated, thus converting it into an irregular cylinder. One side of this cylinder is cut through with shears, and the glass is laid upon a flat surface, where it expands into a uniform plate, without any protuberance. It is then annealed, by diminishing the heat, in the common way. When the plates are intended for looking glasses, the finest materials are used, and the heat kept at its greatest hight for a long time, to dissipate all impurities and remove any specks or bubbles.

Looking-glass plates may be blown in cylinders, when they do not exceed about four feet in length. But they cannot well be blown of a larger size than this, from such a quantity of glass as the rod will take up, without becoming too thin to bear polishing. Plates, however, may be made of more than double this size by another process, which is called *casting*, the only mode by which very large plates are produced.

When glass is to be cast it is melted in great quantities, in large pots or reservoirs, until it is in a state of perfect fusion, in which state it is kept for a long time. It is then drawn out by means of iron cisterns of considerable size, which are lowered into the furnace, filled, and raised out by machinery. The glass is poured out from these cisterns upon tables of polished copper, of a large size, having a rim elevated as high as the intended thickness of the plate. In order to spread it perfectly, and to make the two surfaces parallel, a heavy roller of polished copper, weighing five hundred pounds or more, is rolled over the plate, resting upon the rim at the edges. The glass, which is beginning to grow stiff, is pressed down and spread equally, the excess being driven before the roller till it falls off at the extremity of the table. The plate is then ready to be annealed.

As the plates which are cast for looking-glasses are always uneven and dull at their surface, it is necessary to grind and polish them before they are fit for use. The process employed for producing a perfectly even and smooth surface is very similar to that employed in polishing marble, except that the glass, being the harder substance, requires more labor and nicety in the operation. The plate to be polished is first cemented to a table of wood or stone, with plaster of Paris. A quantity of wet sand or emery is spread upon it, and another glass plate, similarly cemented to another wooden surface, is brought in contact with it. The two plates are then rubbed together until the surfaces have become mutually smooth and plane. The emery which is first used is succeeded by emery of a finer grain, and the last polish is given by colcothar or putty. When one surface has become perfectly polished the cement is removed, the plate turned, and the opposite side polished in the same manner.

As the grinding of glass causes an expenditure of a considerable portion of its substance, a great waste of glass takes place when foreign materials are employed in the manner which has been described. To prevent this loss a more economical mode has been introduced, in which the glass is ground with pure flint, reduced to powder. The mixture of glass and flint which is left after the operation is valuable for forming fresh glass.

A variety of ornamental forms are produced upon the surface of glass vessels by impressions given to them with a metallic mold while the glass is in a hot state. Flint glass is the kind which is used for articles intended to possess much brilliancy, but coarser kinds, even of colored glass, are also subjected to the same process. The simplest manner in which the operation is conducted consists in blowing the glass into the mold till it receives the impression on its outside. For this purpose a quantity of glass sufficient to form the intended vessel is taken up on the end of a pipe and inserted at the top of the mold. The workman then blows with his mouth till a hollow portion of glass is driven into the mold, and expands so as to fill every part, and receive an impression on its outside. The mold is usually made of copper, with the figure cut on its inside, and opens with hinges, to permit the glass to be inserted and taken out. As the mold is of necessity much colder than the glass, the latter substance is chilled at its surface as soon as it comes in contact with the copper; hence its ductility is impaired, and the impression given is never so sharp as that which is obtained with substances which are nearly at the same temperatures. Molded bottles, vials, decanters, etc., are made in this way.

An improvement has been made in the process of molding glass, by subjecting the material to pressure, on the inside and outside at the same time, by different parts of a mold, which are brought suddenly together by mechanical power. This process has been carried to great perfection in several of the manufactories in this country, and produces specimens which compare with cut glass in the accuracy and beauty of the workmanship. It is applied only to solid articles, and to vessels which are not contracted at top. The hot glass being dropped into the mold, a part, called the follower, answering to the inside or top of the vessel, or other article, is immediately pressed down upon it, by a lever, and the glass is thus stamped with a very distinct impression of the figure on both sides at once. The glass vessel is sometimes transferred from the mold to another receptacle, called the receiver, in order to preserve its shape, till it is cool enough to stand.

The name of cut-glass is given, in commerce, to glass which is ground and polished, in figures, with smooth surfaces, appearing as if cut by incisions of a sharp instrument. This operation is chiefly confined to flint-glass, which, being more tough, soft, and brilliant, than the other kinds, is more easily wrought, and produces specimens of greater luster. An establishment for cutting glass, contains a great number of small wheels, of stone metal, and wood, which are made to revolve rapidly, by a steam engine or other power. The cutting of the glass consists entirely, in grinding away successive portions, by holding them upon the surface of these wheels. The first or rough cutting, is sometimes given by wheels of stone, resembling grindstones. Afterward, wheels of iron are used, having their edges covered with sharp sand, or with emery, in different states of fineness. The last polish is given by brush wheels, covered with putty, which is an oxide of tin and lead. To prevent the friction from exciting so much heat as to endanger the glass, a small stream of water continually drops upon the surface of the wheel.

The name of staining has been applied to the process, by which painting, with vitrifiable colors, is executed upon the surface of glass. The pigments used are, chiefly, metallic oxides, which do not exhibit their full color, until they have been exposed to the heat of the furnace. This art has been repeatedly described, as being no longer known; but this is not the fact, except in respect to some particular colors, which are found in the windows of ancient cathedrals.

The metallic oxides, used in staining glass, are difficult of fusion; on which account, it is necessary to mix them with a flux, composed of glass with lead or borax. This renders the oxide fusible, at a temperature which does not injure its color; also by enveloping the particles, it causes them to adhere to the glass, and afterwards protects them from the atmosphere.

A very beautiful violet but liable to turn blue, is made from a flux, composed of borax and flint-glass, colored with one sixth part of the purple of Cassius, precipitated from muriate of gold by protomuriate of tin.

A fine red is made from red oxide of iron, prepared by nitric acid and heat, mixed with a flux of borax, and a small proportion of red lead.

A yellow, equal in beauty to that produced by the ancients, may be made from muriate of silver, oxide of zinc, white clay, and the yellow oxide of iron, mixed together, without any flux. A powder remains on the surface after the glass has been baked, but this is easily cleaned off.

Blue is produced by oxide of cobalt, with a flux composed of fine sand, purified pearlash, and red lead.

Black is produced by mixing the composition for blue with the oxides of manganese and iron.

To stain glass green, it may be painted blue on one side and yellow on the other.

The colors, ground with water, being laid upon the glass, must be exposed to heat under a muffle, so as to be heated equally, until the color is melted upon the surface. To prevent the panes of glass from bending, they are placed upon a bed of bone ashes, of quicklime, or of unglazed porcelain. A bed of gypsum has been recommended, but the sulphuric acid exhaling from it is apt to injure the glass.

Among the ancient specimens of painted glass, some pieces have been found in which the colors penetrate through the glass, so that the figure appears in any section made parallel to the surface. It is supposed that such pieces can only have been made in the manner of mosaic, by accumulating transverse filaments of glass, of different colors, and uniting them by heat, the process being one of great labor. They are described by Winckelmann and Caylus, from some specimens brought from Rome.

The great ductility of glass is one of its most remarkable properties. When heated to a sufficient degree it may not only be molded into any possible form with the utmost facility, but it can be drawn out into the finest fibers. The method of spinning glass is very simple. The operator holds a piece of glass over the flame of a lamp with one hand; he then fixes a hook to the melted mass, and, by withdrawing it, obtains a thread of glass attached to the hook. The hook is then fixed in the circumference of a cylindrical drum, which can be turned round by the hand, and a rapid rotary motion being given to the drum, the glass is drawn in the finest threads, from the fluid mass, and coiled round the cylindrical circumference. M. Reaumur supposed, with great reason, that the flexibility of glass increased with the fineness of the threads, and he therefore conjectured that, if they were drawn to a sufficient degree of fineness, they might be used in the fabrication of stuffs. He succeeded in making them as fine as a spider's web, but he was never able to obtain them of a sufficient length, when their diameter was so much reduced. The circumference of these threads is generally a flat oval, about three or four times as broad as it is thick. By using opaque and transparent glass of different colors, artists have been able to produce many beautiful ornaments. M. Bonnet and others have succeeded in obtaining glass fibers of such fineness and flexibility as to admit of being woven into cloth of a very brilliant, silvery appearance.

### When and Where the Stars and Stripes were First Displayed.

Captain G. H. Preble, of the United States Navy, says the New York *Nation*, is collecting material for a history of the American flag, and has succeeded, he says, in getting together a good deal of anecdote, incident, and evidence concerning its origin, its transmigration (?), and its first appearance in various parts of the world. He informs the "Historical Magazine" that he has now no doubt that the stars and stripes were first displayed on the Thames by the ship *Bedford* of Nantucket. The *Bedford* was a whaler which left Nantucket under a pass from Admiral Digby, and arrived out on the third of February, 1783, twelve days before proclamation of peace was made, and only a week after the London newspapers had got hold of the terms of the treaty. In the London "Political Magazine" of February 7th, of the year above mentioned, is a passage which reads as follows:—

"THE THIRTEEN STRIPS ARE IN THE RIVER.—Mr. Hammet begged leave to inform the House of a very recent and extraordinary event. There was, he said, at the time he was speakings an American ship in the Thames with the thirteen stripes flying on board. This ship had offered to enter at the custom house, but the officers were at a loss how to behave. His motive for mentioning the subject was that ministers might take such steps with the American Commissioners as would secure free intercourse between this country and America."

It is a curious fact that the *Maria*, a vessel that has been named by some writers as a contestant for the honor due the *Bedford*, and which certainly was in the Thames in the course of the year 1783, is still afloat and in use. The Confederate States cruisers forced the old ship to take refuge under the Chilian flag, and she now sails from Talcahuana as a whaler. But the first display of the thirteen stripes in England was not from the masthead of a vessel. When the king, on the 5th of December, 1782, in his speech from the throne, recognized the existence of the United States as a nation, Mr. Copley, the painter, who was among his hearers, went home and put the new ensign into the background of a portrait, that of Elkanah Watson—which he had upon his easel at the time. He had kept the background unfinished, reserving it as a place "to represent a ship bearing to America the intelligence of the acknowledgment of American Independence, with the rising sun of the new born nation streaming from her gaff."

### Interesting Facts.

A legal stone is fourteen pounds in England, sixteen pounds in Holland. A fathom, six feet, is derived from the hight of a full grown man. A hand, in horse measure, is four inches. An Irish mile is 2,240 yards; a Scotch mile is 1,984; a German, 1,806; a Turkish, 1,626. An acre is 1,840 square yards, 1 foot, and 3½ inches, each way. A square mile, 1,760 yards each way, contains 640 acres. The human body consists of 240 bones, 9 kinds of articulations or joinings, 100 cartilages or ligaments, 400 muscles or tendons, and 100 nerves, besides blood, arteries, veins, etc. Potatoes planted below three feet do not vegetate; at one foot they grow thickest, and at two feet they are retarded two or three months. There are no solid rocks in the arctic regions, owing to the severe frosts. The surface of the sea is estimated at 150,000,000 square miles, taking the whole surface of the globe at 190,000,000 square miles. Its greatest depth is supposed to be equal to the hight of the highest mountain, or four miles.

### Transparent Soap.

A patent has just been issued to Morgan W. Brown of New York city, for the following method of making transparent soap:—

Dissolve or melt any settled curd or grained soaps in any suitable vessel to which heat can conveniantly be applied. As soon as the soap is melted and hot, pour into it from twenty-five to thirty pounds of sal-soda, previously melted without water, to every hundred pounds of soap while hot. Agitate the soap and sal-soda and very thoroughly incorporate the paste at a low degree of heat, as it mixes much better than at a high degree. Now pour slowly from 100 to 125 pounds of concentrated glycerin to every 100 pounds of the soap. Keep up a very moderate heat, and agitate the whole until it is a liquid, and thin as a sirup, and as soon as it forms a thin transparent fluid, let it settle well under cover, and draw off the settled fluid into the cooling molds or soap frames, when, as soon as it is cold and hard, it is cut into bars or cakes, in the usual manner, or cast in molds, press, etc.

### Sulphuric Acid and Platinum.

One of the most valuable attributes of platinum, according to the text books, is that it is unacted upon by acids, yet M. Scheurer Kestner, of Thaun, has shown that not only are the platinum alembics acted upon when used in the manufacture of sulphuric acid, but he has also determined the amount of waste. In an apparatus yielding 8,800 pounds of concentrated acid daily, this production, he found, was attended with a loss of one-quarter ounce of platinum, even when the acid was nearly free from nitrous vapors, and as much as two or three times this amount when the acid was no freer from these vapors than it ordinarily is. New alembics suffer less than those which have been in use for a long time, because of the superior compactness of the metal when freshly hammered. For a remedy, he recommends adding sulphate of ammonia to the acid in the platinum vessel, that salt being decomposed by the nitrous vapors, and its base combining, thereby renders them inert. A still better remedy lies in the discovery that platinum containing iridium is much more durable than the former metal alone, and with a knowledge of this fact, all the platinum worked into alembics on the Continent, is now alloyed with a small portion of iridium.

### Apparent Vegetable Growth from Paper.

Take a sheet or piece of ordinary writing paper, say commercial note, and saturate it in a solution of bi-chromate of potassium, 1 oz., with water 3 oz., and dry it in the sun. Cut the paper into squares of about three inches and double them back and forth until the form—a zigzag section—will stand on a table, and ignite the top of the slip. The result will be a slow combustion, the products of the combustion growing out of the edge of the paper like spears of grass and curling over to represent very faithfully the curving and depending leaves of the palm and cane. If the process is carried on without drafts of air the final result will be a bunch of beautiful blue-green filaments, while the process of combustion itself will prove a means of pleasant recreation.

PROCESS FOR COVERING IRON AND STEEL WITH COPPER WITHOUT A BATTERY.—This process, due to Herr Graeger, is described in a recent number of the *Polytechnisches Notizblatt*. The objects are first well cleaned, and then painted over with a solution of protochloride of tin, and immediately afterward with an ammoniacal solution of sulphate of copper. The layer of copper thus produced adheres so firmly to the iron or steel, that the different objects can be rubbed and polished with fine chalk without injuring the deposit. The tin solution is prepared with 1 part of crystallized chloride of tin, 2 parts of water, and 2 parts of hydrochloric acid. The copper solution, with 1 part sulphate of copper, 16 parts of water, ammonia sufficient to redissolve the precipitate formed when it is added. Zinc and galvanized iron can be treated, according to Boettger, directly by the copper solution, without using the tin salt. The above process may be found useful by gilders, and for various ornamental purposes.

M. Blondlot asserts that when phosphorus produces ozone by its slow combustion in presence of water, phosphoric acid is produced, which, in contact with excess of phosphorus, is partly transformed into phosphorus acid.

## PROTECTION OF BUILDINGS AGAINST FIRES.

The guarding of buildings against the destructive agency of fire, is a subject worthy the attention of builders and property owners, and, in fact, important to all, especially those who dwell in thickly settled neighborhoods. Confining the fire to the floor or floors in which it originates, will frequently prevent an extensive destruction of property and the danger to life so often experienced in our crowded cities. The well known firm of R. Hoe & Co., manufacturers of printing presses and materials, in New York city, have been lately experimenting on a new plan of constructing ceilings and floors, intended primarily to ascertain the best method of preventing conflagration in the new building now in course of erection by the company, and calculated also to be of value to future builders.

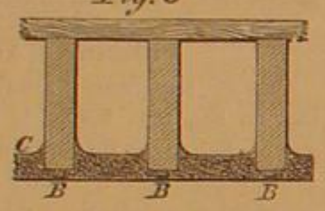
*Fig. 1*

One of the firm says: "Many years since, I saw a store on fire in the Rue Vivienne, Paris, and was not a little surprised to see persons looking out of the windows in the story above the fire, quietly observing the labors of the firemen engaged in extinguishing the flames. Knowing that fires were rare in Paris, I was interested in examining the method of construction of buildings which inspired such confidence. I found that the floors were filled in solid with plaster of Paris.

"About ten years ago," he says, "our firm had occasion to enlarge our iron foundery, and it could be done only by carrying the extension under our carpenter and pattern shop. I caused the ceiling to be covered with sheet iron, and as each sheet was nailed up, it was covered between the beams with lime and sand mortar from three quarters to one inch in thickness. This was considered quite a security by our fire

*Fig. 2*

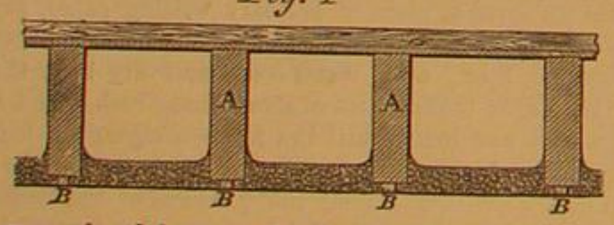
*Fig. 3*




insurance surveyors; but it was never quite satisfactory to me as a perfect protection. Last year, our firm had determined to erect a fireproof addition to our factory, and I was considering how we could, at a moderate expense, make the old portion of our works comparatively fireproof. In conversation with Mr. R. G. Hatfield, architect, he suggested that to reduce the weight it would be well to put in iron pipes between the beams, and fill in with plaster of Paris; this made the basis of my first experiment, seen in Fig. 1. Other experiments have been made, as shown by the remaining figures."

Fig. 1 is a representation of the construction of floors for the experiment referred to above. Upon the under side and across the beams were nailed strips of pine half an inch thick, and dovetail in section, serving to retain a ceiling of plaster of Paris, spread under the beams on the strips to the thickness of one quarter of an inch, and on their tops, between the beams, to a thickness of one half an inch. Upon

*Fig. 4*




this were placed, between the beams, tubes, A, of thin sheet iron, in this case of a circular section, or they may be made oval or rectangular, according to the spaces between the beams. The remaining space was filled in with plaster of Paris, completely enveloping the tubes. After the plaster had set, the flooring boards were fixed, and the plaster allowed to become perfectly dry and hard. A fierce fire was then lighted, within four feet of the ceiling, and kept up for four and a half hours. The result was, the plaster had cracked off in places, and the dovetailed strips were charred, but the beams were not injured, the fire having scarcely blackened them, and the floor above was never so heated but that a person could have stood on it barefoot without discomfort.

Fig. 2 represents a second experiment. Upon the under side of the beams, A, were nailed sheets of thin iron, crimped in a form to present dovetails, B, with the large parts downward. This was plastered with a "scratch" coat of sand and lime, and on this was placed a coat of one quarter of an inch of plaster of Paris. When dry and hard, a fire was lighted and kept up for two and a half hours, when the plaster cracked off and the beams began to burn.

In Fig. 3, strips of pine, B, one half inch square, were secured to the center of the beam, throughout their length. Plates of sheet iron, No. 21 wire gage, were nailed upon the strips, which kept the iron half an inch from the beams. Plaster of Paris was poured on the sheet iron to the depth of one and a quarter inches, and the sides and tops of the beams smeared with it, and rounded up at C, to some two inches on the sides. After the plaster had set, the floor boards were fixed, the fire lighted and kept burning for four and a half hours. The result was, in a few places a smoked appearance of the beams, but no other indications of fire.

Fig. 4 is a modification of Fig. 3, with the addition of thin sheets of iron on the tops of the beams, coated with plaster of Paris one quarter of an inch thick, on which the flooring was laid. The experiment with this device we witnessed a short time since, and for three hours a raging fire was kept burning under the ceiling, and for three hours more a fire was kept burning on the floor itself. The result was that no damage was done, and the floor proved to be entirely fireproof.

The following figures show the cost of this improvement: Cost of 10x10 ft. of fireproof flooring, prepared as per experiment, over and above the cost of ordinary flooring: Average thickness of plaster Paris, 1¼ ins.—equal to 12½ cubic feet for the square of 10x10 ft., equal to three barrels of plaster, at $2 85—$8 55. Sheet iron on top and bottom, 200 square feet, No. 21 wire gage, 280 lbs. at 6c., $16 80; mason's and carpenter's time, five hours each, $4 75; total cost for square 10x10 feet, $30 10. The cost for a fireproof floor 100x25 feet, less walls, would be $678 45 more than the cost of the common combustible flooring. The cost of a brick and iron beam fireproof building is more than double the cost of a brick and wood structure.

## HOW TO TEST THE PURITY OF WATER.

It is of importance to be able to test the quality of water, not only when for special purposes absolutely pure water is required, but even in cases where such purity is not requisite, it may be of great interest to ascertain of what the impurities consist. The following short notice of the tests for the most commonly occuring impurities, will be welcome and useful to many of our readers.

PURE WATER MUST SATISFY THE FOLLOWING CONDITIONS.

1. It must have no residue whatever when evaporated in a clear porcelain or platina dish.
2. It must form no precipitate with a solution of nitrate of silver, which would indicate common salt, some other chloride, or hydrochloric acid.
3. It must not precipitate with a solution of chloride of barium, which would indicate a sulphate or sulphuric acid.
4. It must form no precipitate with oxalate of ammonia, as this would indicate some soluble salt of lime.
5. It must not assume any dark or other shade of color when passing sulphureted hydrogen gas through it, or mixing it with the solution of a sulphide salt, as this would indicate the presence of lead, iron, or some other metal.
6. It must not become milky by the addition of lime water, or a clear solution of sugar of lead, as this would indicate carbonic acid.
7. It must not discolor by adding solutions of corrosive sublimate, or chloride of gold, or sulphate of zinc, which discoloring would indicate the presence of organic substances. When boiling water with chloride of gold, the least trace of organic matter will reduce the gold, and color the water brown.

RESULTS OF THESE TESTS.

1. Almost all spring waters are found to leave a residue upon evaporation.
2. Common salt is not only found in most springs and rivers, but even in rain water, many miles inland, when the wind blows from the ocean.
3. Sulphuric acid and sulphates are found in many springs, the Oak Orchard Spring, N. Y., for instance, is very rich in the free acid.
4. Waters from lime regions all contain lime in large quantities, and, in fact, this is the most common impurity of spring waters.
5. Iron is contained in large quantity in the so-called chalybeate springs; also copper and other metals are encountered; lead incidentally, by the lead tubes through which it often is made to pass.
6. Carbonic acid is the most common impurity, even distilled water is not always free from it. Water will naturally absorb carbonic acid gas from the atmosphere, which latter always contains it; its principal source of supply being derived from the exhalations of man and animals.
7. Organic substances are often found in the water of running brooks streams and rivers, and are of course obtained from the vegetation and animal life in the water itself, and from the shores along which it floats.

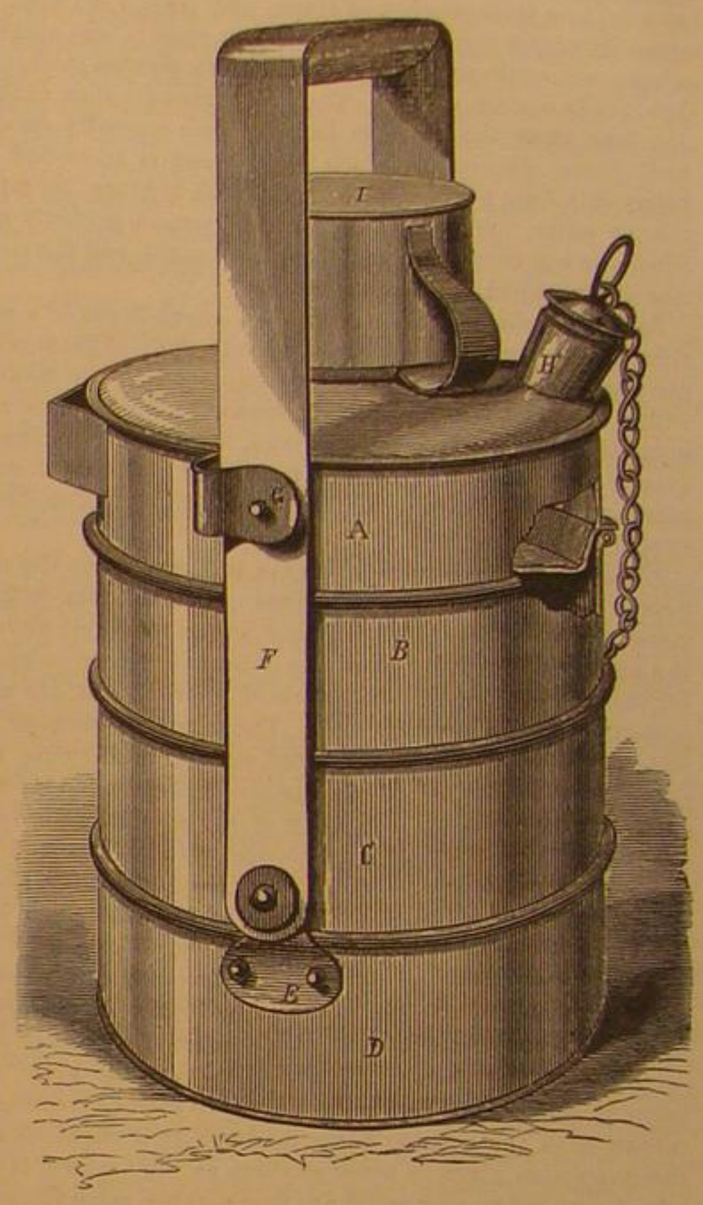
REMARKS.

1. The healthfulness of water depends on the nature of the residue left after evaporation; for many chemical and other operations, where absolutely pure water is required, the leaving of residue at once proves the water unfit for use.
2. The existence of small quantities of common salt in the water is not objectionable, it being not injurious to health.
3. Sulphuric acid and sulphates may be objectionable for daily use; however, such waters are used medically to stop diarrhea and excessive tendency to perspiration.
4. Lime waters do not agree with some constitutions, producing diarrhea and diverse disturbances; very small quantities of lime, however, are not injurious.
5. Iron is healthy, and is a tonic; in fact, this metal and manganese are the only ones which may be used in large doses, not only with impunity, but even with benefit: however, there is also a limit. Over doses of iron may produce diarrhea and slight eruptions of the skin, or pimples.
6. Carbonic acid is not objectionable when drinking the water; on the contrary, it makes it more palatable, and most mineral waters owe their reputation to this substance.
7. Organic substances are perhaps the most objectionable, principally when decaying; such waters may even propagate diseases, and require careful filtering or boiling, or both, to make them fit for internal consumption.

There are a great number of mineral waters of diverse celebrated springs, which contain many other substances, but usually in very minute quantities; only it is beyond our present intention to go into details about substances not commonly encountered.

## WAGNER'S IMPROVED DINNER PAIL.

The extent of the "tin pail brigade" which any early riser in our cities and manufacturing towns may see, comprising the honorable guild of the country's wealth producers, proves the value and importance of such a device as that shown in the accompanying engraving. The object is to furnish a handy and convenient receptacle for food, designed for workmen and tourists, and it is so constructed that the aroma of one kind of food will not affect the flavor of another. The cups, A, B, C, D, sit one upon and partly within each other, being supported in position by flanges near the bottom and projections at the top. The lower one, D, has ears, E, to which is pivoted a bail or handle, F, held in an upright position by means of a pin on each side engaging with a corresponding hole in the springs, G, secured to the upper cup, A. Thus all the compartments are firmly locked together. This top cup is designed for holding coffee, tea, milk, or other beverages, and has a spout, H, fitted with a cork, and a receptacle on the top for salt or other condiment, covered with a drinking cup, I. A clasp on the side serves to hold a knife and fork, or spoon.




With this device a dinner of several kinds of food may be carried safely, the vessels holding each sort serving as dishes from which the food may be eaten.

Patented through the Scientific American Patent Agency, March 31, 1868, by John Wagner, who may be addressed for purchase of rights at Cumberland, Md., care of S. J. Edwards

### An Air-tight Galvanic Battery.

Mr. Chester, electrical instrument maker, of this city, describes in the pages of a contemporary a new form of galvanic battery, the beauties of which are cleanliness, portability, and power, besides entirely dispensing with acids, preventing evaporation and the generation of gas, and obviating the removal of the exciting fluid when the battery is not in use.

The battery is made up of glass cells three inches long and one inch in diameter, inserted in a wooden block; a zinc cover is provided for each glass, and a projection from this zinc cover, running down into the glass, forms the zinc element The other element is carbon, carefully connected with platinum, and well insulated from the zinc cover. This cover has a plate of soft rubber interposed between it and the glass top, and the packing is made completely air-tight and water-tight by the pressure of two rubber springs pulling the cover firmly down. Connection from one cell to the next is quickly made by short pieces of spiral springs. The battery is charged by filling the glasses half full of water, adding some bisulphate of mercury, and a little shred of cloth is interposed between the plates so as to retain moisture. To use this battery it is necessary to invert it, and thus allow the fluid to flow over the plates and saturate the piece of cloth. Restoring the battery, the fluid leaves the plates, though a drop remains in the cloth shred, and in this state, simply from these drops of moisture, powerful intensity currents, producing violent muscular contractions, are given off, and this is the case even forty-eight hours after the immersion of the plates. It is evident that if we can employ these currents, resulting from the simple expenditure of one drop of the fluid, usefully, that we have exhausted a very small portion of the force in reserve, and it is also evident that we

can, after use, place the battery out of use for an indefinite time, ready, by the expenditure of another drop of fluid, to give off the desired currents. Properly constructed, we cannot see any reason why the arrangement should not last in good power a year or more for occasional effects; and it can be completely renewed at the rate of fifty cells in one hour. One hundred and fifty cells exceed in intensity one hundred cells of Grove. The parts are all quickly replaced, no acid is used, and no gas generated.

A modification of the construction is made use of when it is wished to employ a fluid of greater energy, but which in decomposition produces gas from which the tight cell must be relieved. Insert a tube through the cover, the opening being just half way down the cell, and the surface of the fluid below. Care being used in inverting the battery, this tube orifice is always in the air space of the cell, whether upright or inverted. When, for convenience, a battery of large quantity is desired to be used occasionally, large glasses and elements are employed; but bolts are substituted for the rubber bands to bind down the zinc covers. An exceedingly convenient battery is thus formed for electric cauterization, where the operation is not too extended. The use of rubber bands, however, in batteries of high tension, is far preferable to bolts, or their equivalents. The very high insulation of this packed battery is evident from the retention of its power for forty-eight hours and more, where the exciting power is derived from a mere drop of fluid.

## POSSIBILITY OF SPEECH BY THOSE HITHERTO CONSIDERED MUTES.

The majority of the unfortunate class who are deprived of speech are so, doubtless, not because their vocal organs are defective, but because from early infancy they have been devoid of hearing. To consciously imitate sounds which they cannot hear is, of course, impossible to them, yet it has been proved possible for them to acquire the vowel and consonant sounds of spoken language, by the attempt to imitate with exactness the appearance of speech in those having perfect organs. The *Cornhill Magazine* for January, of the current volume, gives a very interesting account of an institution in Brussels where the dumb are taught to speak in the manner alluded to. Of course, such persons must substitute the eye for the ear in conversation.

In the case of those in whom the vocal organs are defective, no amount of effort will suffice to produce perfect speech. Trivial defects may, perhaps, be overcome by resort to artificial means; the inordinate length of the tongue, or the loss of the front teeth, or even a portion of the palate, are examples. But the loss of the communication between the lungs and the other organs of speech, the supply of air to the larynx and the vocal chords, would seem to be so radical a defect that speech would from the time of its occurrence become utterly impossible.

In 1862, a case was reported to the Medical Society of the State of New York, of which we give a brief extract.

A young woman, aged twenty-three, attempted to take her life, while temporarily deranged, by cutting her throat with a razor. The crico-thyroidean membrane, the cricoid cartilage, and the upper ring of trachea, were wounded. No large-sized blood vessel being severed, the wound was dressed in the usual way, and at the end of three weeks had entirely healed, with the exception of a small opening in the windpipe just below the cricoid cartilage. Attempts being made to close this opening, and strong symptoms of suffocation immediately manifesting themselves, it was found imperative to insert a silver tube, known to surgeons as the tracheotomy tube, into the reöpened tracheal wound, and to keep it there for several days, when a second attempt was made to close it, with the same results. This time several weeks were permitted to elapse, when a third attempt to heal the opening was made, which caused such immediate and urgent difficulty in breathing that it was abandoned altogether. From that time until she died from other causes, a period of some nineteen months, she wore and breathed through the tracheotomy tube. Upon her death, a post mortem examination revealed the fact that the windpipe was completely closed at the upper portion of the lower third of the cricoid cartilage, by a perfectly-organized and firmly-attached dense white fibrous tissue.

The circumstance which renders this case remarkable, and applicable to the subject under consideration, is the fact contained in the following paragraph, which we copy verbatim from the report referred to:

"Closing the opening in the trachea with the fingers or handkerchief, would immediately cause suffocation, proving that no air could pass through the larynx, yet she could speak in an audible whisper; she improved much in articulation, and this improvement continued during life; was able to sound all the letters, and by placing the ear near her mouth, she could converse and readily convey her ideas in an audible whisper. She enjoyed excellent health up to about four days before her death."

This case was regarded as so remarkable that some subsequent experiments were made upon the possibility of speech without a supply of air to the vocal organs through the trachea from the lungs. The conclusions drawn from them have never before been made public so far as our knowledge extends, but they corroborated the account which we have given above. Upon trial it will be found quite possible to articulate in strong whispers short combinations of syllables, while the air is being drawn into the lungs through the nasal tubes. The air contained in the cavities of the mouth anterior to the arch of the palate being sufficient for the purpose. Those accustomed to the use of the blowpipe will readily understand this, as it is customary for them to keep up a continuous blast, both while inhaling and exhaling the breath through the nasal tubes. In speech, upon this principle, the air is forced out in the same way as in the use of the blowpipe, by the contraction of the muscles which surround the mouth (principally the buccinator), and great exertion of these muscles is required, giving an appearance of violent contortion and great effort, an appearance strikingly characteristic of the case above described. The air, as it is expelled, is, by the proper shaping of the articulating organs, formed into vowel and consonant sounds.

One of the glories of the present age is the amelioration of the condition of such as are born without sight, speech, or hearing, and any thing that aids in the remotest manner such a benevolent work, cannot fail to be of interest and profit.

### New Views of Ozone.

That able and energetic chemist, M. Houzeau, has classed the conditions in which oxygen exists in the atmosphere under three heads: First, inactive oxygen, which produced not the slightest perceptible action upon moist iodureted paper; secondly, oxygen directly active, which immediately imparts a bluish tint to the above description of paper, developing at the same time a peculiar and characteristic odor; thirdly, oxygen indirectly active, possessing no perceptible odor and requiring the aid of another body to affect the test paper. The invigorating nature of country air is presumed to be due to the presence of of the second of these modifications of oxygen, which may be regarded as identical with the substance ozone. It cannot be caused by the first description of gas, since inactive oxygen does not affect iodine or its preparation, nor to the third class, since oxygen, indirectly active, requires the aid of an acid to affect the test paper. But the air of the country, although it imparts a bluish tint to slightly iodureted litmus paper after the lapse of a short time, does not redden the most sensitive litmus, even after it has been submitted to its action for many hours. It effects its complete discoloration, but does not redden it. Having demonstrated that the first and third of the presumed modifications of the gas oxygen do not bestow upon country air its peculiar properties, it is but natural, and moreover reasonable, to attribute them to the presence of the second, or ozone proper. Granting this assumption, it is manifest that the odor which invariably betrays the existence of ozone should also be present in the air, and unquestionably so it is. Whenever pure air is respired in the mass, it has not only a distinct smell, but also a distinct color. It would be in vain to seek for this air in the crowded streets of a metropolis, but in the open country the lungs can appreciate the vital energy they inhale. All sceptics who doubt the accuracy of these statements, are advised to first of all familiarize themselves with the smell of diluted ozone or vitiated air, a thing easily accomplished, and then, after sleeping in a close room, to inhale the fresh morning air immediately after rising. They will find that the more the air in the chamber has been contaminated and infected, the stronger and more palpable will be the difference in the odor of the two currents.

In support of his theory, M. Houzeau carried out an experiment, which is at once curious, interesting, and conclusive. Being well aware of the property that flannel and other stuffs possess of condensing in their pores diluted ozone or oxygen, he caused two linen cushions to be prepared of precisely the same material and size, and placed one in the open air, and the other in a room badly ventilated and well filled with company. After the expiration of a certain time he had them both brought to him, and ascertained that the first emitted a distinct odor similar to that of ozone, while the second was completely inodorous. Fresh air in its normal state is endowed with decided powers of decoloration. Litmus and turmeric paper, exposed to its influence and sheltered from the effects of rain, dew, and sunlight, are blanched in a short time, demonstrating that ozone acts energetically as a decolorizing agent. It has long been known as a powerful disinfectant, and could means be devised for procuring it in a free state it would be of the greatest advantage in purifying vitiated atmospheres.

### Japanese Coal Mining.

Coal has within the last ten or twelve years been discovered among the hills about four miles from Hiogo. I had an opportunity while there (says Mr. Locock in his report) of visiting the works, if indeed they deserve the name, which have been undertaken for procuring the coal. Here and there, wherever the coal or shale which lay over it had been seen cropping out from the hill's side, a horizontal passage had been run in, never more than twenty-five feet, and often only ten or twelve feet. In some of these burrows two or three men, crouched to the ground, were at work icking away at the sides with pointed hammers, and sorting each little piece of coal with their hands before throwing it into one heap or another, according to its quality. A few coolies, in the last stage but one of nudity, collect the coal at the mouths of these burrows, and carry it to where the road admits of its being transferred to the backs of bullocks, or to three-wheeled carts, holding about half a ton each, and drawn by one beast. In this way it is brought to the Hiogo market. A great portion of it is of a very inferior quality. Here and there, however, good specimens of a kind of anthracite are brought out from the hill's side. The seam which has been discovered is about two feet thick, and runs down toward the plain at an angle of about 15 degrees, or very nearly that of the hills themselves. There is, therefore, good reason to believe that by boring in the plain below, the same, if not a better seam might be discovered. The Japanese government are not insensible to the advantages to be derived from a more scientific working of the coal of Hiogo, and it is not impossible we may, ere long, see a regular coal mine opened, worked by European machinery.

### A New London Omnibus.

The English Parliament has refused to grant the petition of Messrs. Noble & Co., praying for a permit to lay rails and run city cars in the streets of London. The scheme, to which we have before referred at length, was killed by the omnibus companies, who, fearing the advent of so formidable a rival for public patronage, were enabled to command a powerful and successful opposition. Horse-cars being, temporarily at least, proscribed, a species of concession has been made in the adoption of a new vehicle, which promises well for the public convenience and comfort. By direction of the Home Secretary, a trial was recently made of this curious style of conveyance—which, from the description, would seem to be a cross between an omnibus and a Hansom cab or doctor's gig—and an official report will soon be forthcoming.

The chief peculiarity of the omnibus consists in its having only two wheels, and in being drawn by three horses, attached to the coach by the means of four shafts. For the purpose of preventing noise, the shafting and framework of the running frame are put together as one piece, and are composed entirely of angle and bar iron. The carriage body rests on the top of the iron frame on four india-rubber cylindrical buffer springs, and swings entirely free of the axle; the construction preventing the ordinary sharp rattle experienced in omnibuses, and allowing conversation to be carried on freely between passengers. For the latter, sixteen inside and twenty outside seats are provided. These are arranged like the teeth of a saw, each presenting a corner to the one on the opposite side, so that the occupants sit at an angle of about 60° with the side of the omnibus, and are not obliged to make such extended observations of vacancy or each other's faces during a prolonged journey. The new vehicle is pronounced, as a public carriage, superior in every respect to any conveyance now in use. We have not seen engravings of this novel carriage, but hope to obtain some for publication if it is approved.

### Vitrified Surface on Cast Metal.

An invention has recently been patented by Messrs. Horsley, of London, and which has for its object improvements in the production of a glazed or vitrified surface on cast metal. In producing castings of iron or other metal, they coat the mold and core with powdered glass, furnace cinder, or enamel, or other material capable of being vitrified by the heat of the melted metal when it is poured into the mould, so as to form a glaze or enamel on the surface of the casting. The operation is as follows: Prepare a mold in the usual manner, either of common sand or red loam sand, and either with or without cores, as the case may require. When the mold is finished, paint it over with a paint-like composition prepared by grinding together gas tar and common black lead, in the proportion of about two pounds of black lead to a gallon of tar. Immediately dust over it finely-ground window-glass, or green bottle glass, or slag from a blast furnace may be used, as may also other vitreous materials or enamel compositions, such as are used for enameling articles of wrought and cast iron; but when casting iron, ground glass is preferred. Any excess of the powder is dusted or blown off, and the mold is allowed to dry, or is dried by artificial heat, until the composition on its surface is set and hard, so that it will not rub off. The metal is then run into the mold in the usual way, the heat fuses the vitreous material with which the mold is lined, and causes it to form a glaze on the surface of the casting. The paint-like composition by which the powder was made to adhere to the mold also serves as a separation when the fusion takes place, and so a smooth face is ensured. This process is more especially applicable when casting iron, but it may also be applied advantageously in some cases when casting brass and copper, the vitreous material employed being such as fuses readily with the heat of the melted metal.

### The Flying Man.

At the recent meeting of the Aeronautical Society, it was announced by Mr. Wenham, that one of the members of the society, Mr. Spencer, had already constructed an apparatus, by the aid of which he had accomplished the feat of raising himself from the ground level and performing a horizontal flight of 60 feet; and it was further stated by Mr. Wenham that Mr. Spencer expected to fly the length of the Crystal Palace during the meeting of the Aeronautical Society to be held there next month. Since the above announcement was made, we have received from Mr. Spencer some particulars of the apparatus employed by him. It consists of a pair of wings of rather small size, arranged so that they can be worked by the arms, and a large fan-shaped tail of very light construction, connected to the body by basket work, so that it stands at an angle of about 3° with the horizontal. Mr. Spencer does not profess to fly in the ordinary sense of the term. He uses his apparatus by taking a short, quick run, this run being continued until, by pressure of the air against the under surface of the tail, he is raised from the ground. He then, by using the wings, maintains the momentum which he has acquired as long as possible, and is thus enabled to skim along at a short distance above the ground. Mr. Spencer commenced his operations by practicing long jumps without the aid of apparatus, and he then commenced using the wings, and finally added the tail. By continued practice, and from time to time making alterations in his apparatus, Mr. Spencer has been enabled to extend considerably his early flights or "skims," and we were informed by him a few days ago that he had lately accomplished a flight of 180 feet, starting and alighting at the ground level. Mr. Spencer is now engaged in completing a new apparatus, which he hopes to finish in time for the exhibition of the Aeronautical Society at the Crystal Palace, and we look forward with some interest to witnessing its performance.—*Engineering.*

## THE UNITED STATES ASSAY OFFICE IN NEW YORK.

We condense from one of our city cotemporaries the following in relation to the United Assay office, in this city:—

Adjoining the sub-treasury in Wall street is a granite building of modest appearance, bearing over its entrance the words "Assay office." It is fitted up in the same style as a broker's office, and three or four clerks appear to be quite able to transact all the business pertaining to this Bureau without over-exerting themselves. In fact, it would not appear at a first glance that much business is ever transacted there; yet there from $14,000,000 to $15,000,000 of the precious metals are received and accounted for during the year. The larger portion of this is in the form of gold dust from California, Nevada, Montana, and Idaho. Much the larger portion of all the bullion received is either in the form of dust, grains, bars, or amalgam. A comparatively small quantity comes in the shape of gold and silver plate, watch cases, foreign coin and ornaments. These are sent in by jewelers or private parties to be remelted, for plate, watch cases, and ornaments change their fashion like other things of less value, and have to be remodeled to be salable.

Few persons are aware of the actual quantity of gold produced by our mines since their first discovery. In a recent official report this amount is placed, in round numbers, at $1,000,000,000. Since 1849 California has produced $900,000,000. Her productive powers, however, for the last thirteen years have steadily decreased, and for 1869 the estimate is only $25,000,000. Montana has produced $65,000,000; Idaho, $45,000,000; Colorado, $25,000,000. The estimated production of Nevada in 1869 is placed at $20,000,000; of Montana, $12,000,000. It is believed that not more than 50,000 persons are now engaged in mining in this country—a considerable falling off from the numbers of previous years.

The deposits received having been carefully weighed and a certificate given, are numbered and sent at once to the melting room, a spacious apartment provided with furnaces, tanks, etc., and floored with iron tiles. Each deposit, or as much of it as can be conveniently handled at once, is placed in a crucible, and as soon as melted is poured into iron molds. If the deposit is of gold, two pieces are cut from the lump and set aside for the Assayer. If of silver, a small portion of the fluid metal is dropped into water, which granulates it, and these granules are used by the Assayer. The crucibles are carefully scraped after being used, so that not a particle of the metal is lost, for the Assayer, it must be understood, has to account for every grain of the metal received.

About 7½ grains of gold are used it each assay. This small quantity, with the right proportion of silver, which is estimated by the Assayer with an accuracy attained by incessant practice, is placed in a cupel—a cup of calcined bone—and deposited in a small furnace heated to redness. A strong current of air passes over the contents of the cupel, oxydizing the lead. The oxide dissolves the oxides of the other base metals, which are absorbed by the cupel, and the result is a button of pure silver and gold. This button, after being hammered and rolled, is placed in a bottle partly filled with nitric acid, which is set in a sand bath. This acid dissolves the silver, leaving the gold untouched. When the process is finished, the pure gold left in the cupel resembles tinder. It is then annealed, rendered into a compact coil, called the "cornet," and weighed. The weight gives the exact amount of pure gold.

Two pieces were, it will be remembered, taken from the metal after it had been melted. Each of these pieces is assayed separately, and the results must, of course, agree. If they should not do so, it is evident that a mistake must have occurred somewhere,and the whole process has to be repeated.

As soon as the assays are completed the Assayer reports to the Assistant Treasurer of the United States, and, on this report, the depositor is paid. If he desires to receive gold coin, one-half of one per cent is charged. For gold bars, which are handier for shipment, he has to pay six cents for $100. For every ounce of pure gold which his deposit has yielded, he receives $20·672, less the charges stated above. Depositors of silver receive its full value, less what is called the "parting charge," which is about five cents per ounce. Brittle metal has, however, to be toughened, for which there is an extra charge. The private assayers of California, before the establishment of a Government Assay Office there, used to make no charge for the assay, taking their pay out of the drippings from the crucibles. The Government Assayers account for the entire weight of the deposit.

The depositor having received the full value of his deposit, the latter of course becomes the property of the Government, and it now has to undergo a process called "parting" before it is sent to the Mint, or used in any way for commercial purposes. In parting gold, silver is added in the proportion of about two parts in weight of silver to one of gold. Formerly no account was taken of the silver already in the gold, but Mr. Mason, in charge of the melting and refining department, found that a great saving might be effected if it was first ascertained how much silver the gold bullion already contained. This practice is now carried out, and instead of invariably adding two parts of silver to one of gold, only sufficient silver is added to make the proportions above stated. There is thus a saving, by Mr. Mason's method, of about 30 per cent in the material, and in one year the sum of $22,000 was saved. The mixture of gold and silver is next melted, thoroughly mixed, and poured into water, by which it is granulated. The granules are placed in porcelain jars containing nitric acid. Heat is then applied, and as the acid boils, the yellow fumes which our readers have doubtless so often seen proceeding from the chimney of the Assay Office, are given off. This process goes on for about twenty-four hours, when the jars are emptied, and in the bottom is found a brown substance resembling mud or anything else upon earth rather than "gold—glittering gold." It is in fact, however, pure gold, or at least, very nearly so. The silver has been dissolved by the nitric acid, and is in solution. It is carefully put aside for future treatment, for in the Assay Office nothing must be lost or wasted. The brown substance found at the bottom of the jars is placed in large wooden tubs and washed by percolation in warm water until all traces of acid have disappeared, and it is said to be "sweet."

The gold is then of ·940 fineness. Formerly it was subjected to a second boiling in nitric acid, which left it about ·993 fineness, but by the process at present in vogue it is treated with sulphuric acid, by which a fineness of ·998 is attained. This is termed pure gold, although it is not actually so, but to deprive it of the two parts of alloy it now contains would involve an expenditure of time, money, and trouble altogether useless. After its treatment with sulphuric acid, the gold, which still looks more like red mud than a precious metal, is again washed until "sweet." It has now a redish yellow hue. After being dried, it is taken to a hydraulic press, where it is made into "cheeses," so called from the color and shape. The cheese made in the Assay Office is richer far than the most fertile vales of Gloster ever produced. Each "cheese" is but thirteen inches in diameter, but it is worth about $20,000. These cheeses are baked in an oven heated by steam until all remaining moisture is expelled, when they are remelted, cast into bars or bricks, assayed and stamped with the weight, fineness, and value. And now they look like gold indeed.

The reader will remember that the nitric acid poured over the gold and silver granules, in the porcelain jars, and now containing a large quantity of silver in solution, has yet to be disposed of. A solution of chloride of sodium—common salt—is first added to the solution, and a deposit of white powder is the result. This powder is chloride of silver. The next process is to free the chlorine from the silver, and this is done by placing it in vats with granules of zinc. The chlorine and zinc readily combine, and the silver is set free in the form of a light gray powder. This like the gold, is washed, pressed, and formed into "cheeses" worth $800 each. These are melted, weighed, stamped, and ready to be disposed of as occasion may require. The silver obtained by the above process contains but one part of alloy in 1,000. Some silver is so pure that it requires no "parting," and, after being assayed, is sent at once to the mint.

The Assay Office was established in this city in October, 1854, and since that time over $160,000,000 have passed through the hands of its officers.

## BAROMETERS AS INDICATORS OF THE WEATHER.

As indicators of weather, barometers have fallen somewhat into disrepute; and yet, when used in connection with other instruments, they are very useful in foretelling what the probable state of the weather will be within reasonable limits. In many cases they are to be found hanging by themselves, and scarcely ever referred to, on account of their supposed liability to error. The usual weather marks upon the dial of a wheel barometer very often deceive the superficial observer.

A barometer indicates only two of the conditions upon which weather changes depend, viz., weight of the air dependent upon moisture, and disturbances in the atmosphere more or less remote, according to their violence.

In certain latitudes, a sudden fluctuation of the mercury is always to be regarded as an indication of foul weather; but it is not necessarily an indication of rain, although a violent disturbance of the atmosphere is generally attended with more or less condensation of the moisture which it holds in suspension.

If a barometer were sufficiently delicate in its operation to show the disturbances which take place at a great distance from its location, and which take place in rapid succession, at from twelve to twenty-four hours previous to heavy storms, it would be far more reliable than the ordinary instruments, which, although they are sensitive to remote disturbances, do not show them with sufficient plainness to be easily observed in the ordinary method of reading the instrument. It is also so inconvenient to make such observations with sufficient frequency to take account of the rapid and slight variations dependent upon such remote causes, that they usually elude observation. Recent experiments, however, go to show that they are most important in their relations to weather phenomena.

It is frequently the case that when air is in the same hygrometrical condition, that the mercury in the barometer will move in different directions within an interval of three hours, proving that weight, or, more properly, pressure of the atmosphere, does not depend upon the moisture held in suspension solely, but also upon the waves produced at a distance and communicated through air, very much as winds at sea produce heavy swells very far from the place where they acting directly upon the water.

Changes in weather depend upon atmospheric disturbances, and the nature of the change depends upon the temperature, and the hygrometical condition of the atmosphere. A barometer used together with a thermometer and a hygrometer, and the indications of change shown by the barometer, interpreted by the indications of the two latter instruments, will be found more reliable than is at present currently believed.

DRILLED VS. PUNCHED HOLES.—A large number of specimens of steel plates were recently tested at Chatham Dockyard, to determine the difference in strength between steel plates with punched and drilled holes. Although the pieces were so prepared that they should break at the smallest part, they all, without exception, fractured at a place where two small holes had been punched. But when the holes were drilled, and in the largest sectional area of the steel, they as uniformly broke in the smallest part, exactly the reverse of the previous trial. From this and other experiments the advantage in tensile strain, gained when the holes are drilled rather than punched, was calculated to be 22·5 per cent.

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

During the construction of a mountain tunnel for the Don Pedro II. railway, of Brazil, a temporary road of five feet three inches gage was laid over the mountains, having the extraordinarily short curves of 230 feet radius, on gradients 296 feet to a mile, or a little steeper than one in eighteen. The line was regularly and successfully worked for three years, with six-coupled and eight-coupled engines. The former were provided with trucks under the leading ends, the others with an arrangement for permitting the end wheels to traverse laterally.

The town of Winchendon, Mass., claims to manufacture more wooden ware than any other town in the world. Two of the largest firms turn out $500,000 and $400,000 worth per year, respectively, and the smaller establishments of the place make the aggregate annual product of the wooden ware interest mount up to over $1,000,000. In addition to these factories, Winchendon contains two cotton mills, two bobbin factories, two machine shops, and two sewing machine manufactories.

The dimensions of the heavy express engines, on the Great Northern railway of England, referred to in our last week's issue, are as follows:—Driving and trailing wheels, 7 ft. in diameter, and coupled together; leading and tender wheels, 4 ft. 3 in. in diameter throughout; barrel of boiler, 10 ft. 1 in. long by 3 ft. 10 in. in diameter inside, in the smallest part; fire-box casing, 6 ft. 4 in. long by 4 ft. wide outside; cylinders, 17 in. in diameter, with a stroke of 24 in.; heating surface in box, 114¼ square feet, and in the tubes 907 square feet, making a total heating surface of 1,021¼ square feet, with a grate surface of 19¾ square feet. The tenders hold 2,500 gallons of water, and two tuns of fuel. The propelling power of each engine is equal to 12,000 lbs., and the adhesion on the rails may be taken at 11,700 lbs.

Gold prospecting in Siberia is carried on after a somewhat singular plan. The mines are an object of much attention on the part of the Russian government, and while it is opened free for any one to search for gold deposits in any part of the territory, the successful discoverer is obliged to report to the nearest government official, who apportions him a space of about four square miles, on condition that all the precious metal he obtains is to be carried to a government depot, where it is coined into money, the proceeds, less fifteen per cent for expenses, being then paid to the discoverer.

The bridge over Dale Creek, upon the highest summit of the mountains where the Union Pacific railroad crosses, is a pine timber bridge, 650 feet in length and 135 feet above the creek. The structure was all built, ready for the transit trains, in the short space of thirty-five days.

The recent report of the directors of the Pittsburg, Fort Wayne and Chicago railway, shows that the deterioration of iron rails necessitates the relaying of their whole road with new iron every four years, and that the cross ties for the entire line must be replaced every four and two thirds years. The great wear of rails is attributed to the increased weight of locomotives and cars that of late years have gradually and almost imperceptibly come into use. When steam power was first applied on railroads, the engines weighed eight, ten, or twelve tuns each; now they weigh from forty to fifty tuns each. As the locomotives cannot well be made lighter, the only apparent remedy is the employment of steel rails.

Work on the West Shore Hudson river railway is to commence immediately, the contract for building the road as far up as Newburgh—which point can be reached without tunneling—having been awarded some weeks ago. The capital stock of the road is $750,000, a large portion of which has been subscribed.

The Lebanon Springs railroad, connecting the Harlem with the Bennington and Rutland road, it is expected will be completed and in running order in the month of August. The road, when finished, will constitute an important connecting link, so that passengers and freight will go directly through from New York to Montreal without change of cars.

The California Legislature has offered a premium of five dollars per ton for the first thousand tuns of blast or pig iron produced in that State from native ore.

Quite a new feature in the geology of Berlin, Prussia, has lately been developed in the discovery in the immediate neighborhood of the city, of an inexhaustible bed of salt. Government having undertaken to work this deposit, a solid bed, struck at a depth of 277 feet, has proved to be an uninterrupted stratum of five hundred feet thickness. How much deeper it goes is not yet known, but orders have been given to continue the borings until the thickness of the bed is determined. This discovery is of great national importance, for it opens a supply of this article of every-day consumption sufficient to supply all of Prussia, and make the country independent of the imported article.

## Recent American and Foreign Patents.

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

OYSTER DREDGE.—C. T. Belbin, Baltimore, Md.—This invention relates to the old-fashioned oyster dredge, and consists in a new method of attaching the lower draft rods to the head, whereby the instrument is made to operate to better advantage, while its cost of construction is not increased.

CIDER AND WINE MILL.—James Walton, Sunfish, Ohio.—This invention relates to that class of mills in which an endless apron carrier is employed, and consists in a new arrangement of gear for running the apron, a new adjustable bearing for the grinding rolls, another for the apron rolls, and a new arrangement of hoppers for feeding either apples or grapes.

COMPOSITION FOR DEPILATING HIDES.—Peter G. Schlosser, Middletown, Md.—The object of this invention is to produce a composition by which hides whether green or dry, can be depilated in an easy and expeditious manner, without destroying or injuring the material of the hide, and so as to produce a greater percentage, in weight, of leather, than is possible by any other process.

CARRIER FOR BRAIDING MACHINES.—Dexter Avery, Westfield, Mass.—This invention relates to a carrier for braiding machines, the object of which is to produce the required tension of the threads to protect the spring, which keeps the thread tense, from wear, and to obtain a complete and effective carrier in the simplest and least expensive manner.

VENT FOR BARRELS.—Richard C. Fleming, Philadelphia, Pa.—This invention relates to a device for preserving beer, ale, and other liquids, and consists in a novel manner of inserting in the barrel, and of inflating an expansible bag, which is to be filled with air, and which, as the liquid is being gradually withdrawn, is becoming filled, and fills the vacuum which is created in the barrel by the discharge of the contents.

TAILORS' SEAT.—Friedrich Neuhaus, Belleville, Ill.—This invention relates to a new seat for tailors, which is so arranged that it will allow its occupant to assume a convenient position, and that it will not prevent the proper circulation of the blood.

GAS MACHINE.—H. S. Maxim and John F. Lockwood, New York city.—This invention relates to a new gas-making device, which is more particularly intended for use on railroad cars. The invention chiefly consists in heating the hydrocarbon in the reservoir by a flame produced from the contents of the reservoir, the gas thus produced operating a valve, which, when closed, prevents further escape of liquid to the flame.

APPARATUS FOR CONVEYING AND DUMPING COAL, ETC.—Henry C. Clark and Robert B. Little, Providence, R. I.—This invention consists in providing the bucket or vehicle in which the coal is transported, with a hinged gate, which, when closed, forms an inclined wall of the vehicle so as to be held

closed by the weight of the contents, and which is provided with an upward projecting lug or pin; when this pin strikes against an obstacle the gate will swing open and the load will be discharged from the vehicle.

HOP BOX.—Wm. R. Crandall, Deansville, N. Y.—The object of this invention is to facilitate the sacking of hops from the hop boxes commonly employed in hop yards during the picking season.

UTERINE SUPPORTER.—S. P. Cole, Janesville, Wis.—This invention consists in forming the pad or point of support for the neck of the uterus of a cup having stretched across its edges a thin diaphragm of soft rubber, which is perforated to permit the escape of discharges. The form of the cup is elliptical, and it is also perforated like the diaphragm.

STUMP EXTRACTOR.—Alfred Goodrich, Burnt Prairie, Ill.—This improvement consists in placing the extracting machinery upon runners and so arranging the said machinery that it shall be easily operated, simple in construction, and capable of developing much power for the purpose intended.

ORE SEPARATOR.—Robert C. Morton, West Lubeck, Me.—The nature of this invention relates to the separation of metallic ores by the pulsation or undulation of water, and consists of a series of plunger levers vibrating above a series of water cells, the plunger levers and cells being arranged to pulsate the water with different degrees of force. Other devices perfecting the whole render this separator more perfect in its action and economical in its construction than the separators heretofore made and used.

HORSESHOE.—James M. Cuykendall, Metomen, Wis.—This invention consists in the manner of securing the calks to the shoe, which is done by securing a wedge-shaped dovetail to the upper surface of the calks, said dovetails fitting into grooves, arranged on the under side of the shoe, which extend entirely across that portion of the shoe which is occupied by the calk.

BOOT CRIMPING MACHINE.—R. H. Dorn, Port Henry, N. Y.—This invention consists in the arrangement upon a suitable bench of a slide, made to move back and forth by a pinion gearing into a rack on the under side of the same, on which rack a series of right-angled formers are carried on its upper side. These formers are caused to pass between two clamping or pressing pins, which are moved in an opposite direction by gearing, in a similar manner, and are provided with smoothing rollers, which bear against that part of the leather which is crimped in the angle of the formers, and turns in a direction so that the surfaces of the said rollers, that come in contact with the leather, move opposite to that in which the leather is being carried by the formers, so as to produce a smoothing or rubbing action. The said clamping pins are provided on the inner sides of the same with iron plates having rectangular grooves in ridges formed within them, and arranged with reference to the formers in a direction opposite to the inclination of the said formers, so that their action on the leather will be to smooth it from the angle outward in either direction.

CATAMENIAL SACK.—Andrew F. Baum, New York city.—This invention relates to an improvement in india-rubber catamenial sacks, and consists in forming the edges by rolling up the material into a solid bead or rib, and then covering it with soluble rubber to make a strong and elastic binding.

THRUST BEARING.—A. W. Case, South Manchester, Conn.—This invention has for its object to furnish an improved thrust bearing for vertical and horizontal shafts, such as water wheel shafts, propeller shafts, etc., which shall be simple in construction, and at the same time reliable and effective in operation, diminishing friction and resisting the thrust of the shaft.

CAR STOVE.—Richard O'Brien, Dalton, Ohio.—This invention has for its object to furnish an improved railroad car stove, which shall be so constructed and arranged that the stove will be always kept in a vertical position, even should the car be overturned, so that there may be no danger of fire from the stove being overturned.

FASTENING FOR GARMENTS.—Wendell Wright, Bloomfield, N. J.—This invention relates to a fastening for shirts, shawls, and other garments, and is more especially designed as a substitute for studs, buttons, shawl pins, etc. The object of the invention is to obtain a secure, economical, and neat fastening of the kind specified, and one which may be readily applied to and detached from the garment, and will not require buttonholes or perforations in the garment in order to apply or use it.

CORN CULTIVATOR.—Alexander Campbell, Oxford, Ind.—This invention relates to a corn cultivator, and it consists in a new manner of attaching the shovel standards to the frame of the machine, whereby any desired pitch may be given the standards as required. The invention also consists in a novel manner of securing the shares to the standards, whereby they may be reversed, that is to say, changed from one standard to another and also adjusted in a straight position so as to face the line of draft or be placed more or less obliquely therewith either to toe right or left, as may be desired.

SPRING FOR VEHICLES.—George Douglas, Bridgeport, Conn.—This invention relates to an improvement in springs for vehicles, and more especially refers to an improvement on a spring for which Letters Patent were granted to this inventor, bearing date May 26, 1863. The present invention consists in dispensing with the usual ribs and slots which are now used to prevent the leaves from shifting laterally, and substituting for said ribs and slots taper longitudinal ribs, swaged in the leaves in such a manner that the under projecting surfaces of the ribs of one leaf will fit into the concave formed by the ribs of the leaf underneath, by which arrangement the lateral and longitudinal shifting of the leaves are entirely prevented. The invention further consists in the application of india-rubber bearings to the cast-metal seat of the spring, whereby jars and concussions are in a great measure prevented from being transmitted from the seat to the spring, and a greater yielding movement or play allowed the latter.

GANG PLOW.—Don Carlos Matteson, Stockton, Cal.—This invention relates to an improvement in gang plows; it consists in a peculiar construction of the same, whereby the difficulty hitherto attending the springing and warping of the frame is avoided. The invention also consists in a novel arrangement of the draft attachment, whereby the same may be placed at a sufficiently low point without curving the frame of the machine downward at its front part as is now required. It consists also in a novel arrangement of the caster gage wheel, whereby the same is prevented from becoming choked or clogged with weeds and trash.

MACHINE FOR BENDING CARRIAGE CIRCLES.—William Boyd, Hartford, N. Y.—The object of this invention is to perform the bending of the iron generally known as carriage circles. It consists of a bending beam pivoted in the center of a bending circle and provided with rollers to impinge on the iron rod and bend it around the circle. Other devices for adjusting the machine to different work render it effective and generally available for bending carriage circles and all other analogous work.

GATE.—Wm. C. Hooker, Abingdon, Ill.—This invention consists in arranging a farm gate between the uprights, a vertically-vibrating frame, whereby the gate is lifted from the roadway and swung in between the posts to which the vibrating frame is connected by suitable rope gearing.

NAIL AND SPIKE DRAWER.—Isaac A. Pinnell, Boonville, Mo.—The object of this invention is to draw nails or spikes in a convenient and easy manner.

CONSTRUCTION OF WHEELS FOR VEHICLES.—Henry Poth, Pittsburgh, Pa.—The nature of this invention relates to the construction of metallic hubs. It consists in forming the hub flanges with correspondent wedge-shaped feathers or projections which, when the plates are wrought together, slide upon each other and form the mortises of the hub and provide the means by which the tenons of the spokes are wedged or clamped firmly in place. It consists also in the employment of a differential threaded box by which the flanges are drawn together upon the spoke tenons with great power.

FILLING FOR BEDS, CUSHIONS, ETC.—George C. Barney, Chicago, Ill.—This invention relates to a new and useful material for filling beds, cushions, and other articles requiring a light, elastic substance for the purpose. This improved filling for beds, mattresses, pillows, cushions, etc., consists in small pieces or scraps of paper cut or otherwise formed in any desired shape and possessing that elastic nature which will keep the pieces apart, when laid together in a mass and inclosed in a bed tick, pillow case, or sack covering of any suitable material for these or similar articles of domestic use.

BRIDLE BIT.—P. J. McGuiness, New York city.—This bit consists of two pieces hinged or pivoted together in the middle, one end of each piece being connected with the reins, while the other end carries a stop, which is near to the end of the other bar, and which, when on the rear side of the other bar, prevents the two bars from turning independently around their pivot, while, when the stop is in front of the other bar, the two bars will be turned when pulled by the reins, and will act as a curb-bit in the horse's mouth.

SEAMING TOOL.—Wm. Serviss, Sidney, Ohio.—This invention relates to a method of constructing tools for grooving the seams of stovepipes, sheet iron stoves, sheet metal conductors, and for all like purposes for which grooving tools are used, whereby the seam is formed more rapidly, and upon the inside instead of the outside, as is now commonly the case.

SAW MILL.—Augustus B. Ehlers, Tannersville, Pa.—This invention relates to an improvement in the construction of machinery for driving a straight saw for sawing lumber, and consists in hanging the saw in connection with an oscillating guide and slide, in such a manner that the saw shall advance and increase the bite of the teeth in the down stroke, and recede and withdraw the teeth from the log in the up stroke, thereby working with much less power, less wear, greater steadiness, and more rapidity.

TRANSVERSE LOCK.—James E. A. Gibbs, Steel's Tavern, Va.—This invention has for its object to furnish an improved lock provided with two bars or bolts extending out upon each side so as to reach entirely across the door or shutter to be secured, and cross bar it, and which shall, at the same time, be easily operated by the proper key, but impossible to be picked or operated by any other key.

DISTILLING.—Alexander Webster, Seneca Falls, N. Y.—This invention relates to improvements in the process of distilling, and it consists in combining a perforated steam pipe with a perforated cylinder, through which the steam or vapor passes in its course from the still to the coil, and, in connection therewith, a cap by which the lighter and more volatile portion of the vapor is collected, whereby the process is greatly improved, and whereby two qualities of liquor are obtained.

BUTTER WORKER.—Hosea Willard, Vergennes, Vt.—This invention relates to a machine for working butter.

ELECTRO-PLATING FRAME OR HOLDER.—W. H. Watrous, Hartford, Conn.—This invention relates to an implement or frame for holding spoons or forks, or articles of a similar nature, suspended in the electro plating liquid.

FLOATING WATER POWER.—Albert B. Shepard, Sand Bank, N. Y.—This invention relates to a method of constructing apparatus for utilizing and economizing the power of running water upon rivers or streams which are liable to great and sudden changes in depth.

SUSPENDERS.—Wm. P. Towles, Baltimore, Md.—This invention has reference to a method of forming suspenders for gentlemen's pantaloons, whereby the stress or strain is balanced and equalized, and a free and unrestricted motion of the body allowed.

WATER WHEELS.—Joseph H. Bodine, Mount Morris, N. Y.—The object of this invention is to so construct a water wheel, and the parts connected therewith, that the greatest percentage of power may be obtained and the flow of water properly controlled, without employing any complicated or expensive apparatus.

SPARK ARRESTER.—N. L. Carpenter, Natchez, Miss.—This invention relates to a method of arresting sparks from steam-engine boiler furnaces, either locomotive or stationary, and the invention consists in sinking vertical wells or recesses in the brick or mason work beneath the boiler.

## Answers to Correspondents.

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

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

☞ *All reference to back numbers should be by volume and page.*

J. P. G., of Vt.—Steel is successfully alloyed with other metals, improving its qualities for some purposes. One five hundredth part of silver adds immensely to the hardness of steel and yet increases its tenacity. One hundredth part of platinum, though not forming so hard an alloy as the silver and steel, gives a very great degree of toughness. Rhodium, palladium, irridium, and osmium make steel very hard, but their use, from their cost, is confined mainly to the experimental laboratory.

P. J., of Wis.—Practical men disagree as to the best time to fell timber to preserve it longest from decay; but as moisture, especially sap, is the first cause of the decay of wood, it would seem that the season is best for felling timber which produces the least sap. Therefore probably the hight of summer and the middle of winter are the best periods for cutting timber. Girdling trees in early spring and felling them in the fall or winter is recommended by many as an excellent method.

C. B., of Iowa.—"How many square feet of sail or fan set at the best angle will it take to develope one horse power in a twenty-mile breeze? What is the best angle with the course of the wind to set a sail to develope the most power? Will distance from the center of rotation make any difference in the actual force per square foot?" This correspondent, in asking these questions, says he has searched in vain in many mechanical works for authority on this subject. It is one that appears to have received but little attention at the hands of our mechanical writers. We know of no authority we can recommend. Possibly some of our practical correspondents can reply.

A. B., of N. Y., says: "In your 'Answers,' page 327 current volume, you say, the cause of the appearance of solidity so strikingly exhibited by the stereoscope is to a certain degree shown by a single photograph, etc. Would it not be well to say that it is mostly due to double vision, or a repetition of sight, as we see nature with two eyes, whereas all other pictures are but representations of nature as seen with one eye, only. The two pictures of a stereoscopic view are the one picture as seen with the right eye and the other as seen with the left eye. The lenses through which the pictures are seen in a stereoscope represent the two pictures as being on the same spot, therefore we see nature as it appears in our double vision of two eyes, or as seen from two points simultaneously."

A. W., of Ind.—"Will it require more power to revolve a circular metallic disk in a vessel (air tight) containing highly compressed air, than in one containing air at the ordinary conditions found in the atmosphere?" Certainly. Compressed air presents more resistance to motion than free air.

F. W. D., of Ky.—A cement peculiarly adapted to stand petroleum or any of its distillates is made by boiling three parts of resin with one of caustic soda and five of water. This forms a resin soap which is afterward mixed with half its weight of plaster of Paris, zinc white, white lead, or precipitated chalk. The plaster hardens in about forty minutes.

B. H. K., of Pa.—Liquid glass would probably not answer your purpose for a cement, but the so-called artificial denture of the dentists may. It is made by thoroughly mixing nine parts calcined oxide of lime, one part borax, and two parts of well-ground quartz; this is mixed with a saturated solution of zinc in hydrochloric acid. It sets very rapidly.

H. H. H., of Pa.—Shellac makes a very good cement to attach glass to metal, but both must be heated or it will not stick. If too brittle, mix a little wax in it. It stands warm water, acids, petroleum, but neither alcohol nor heat.

J. N., of R. I.—Steam is not decomposed by heat even at fifty atmospheres pressure. At 1,000° Fah., it will be decomposed in contact with iron, the iron oxidizing and the hydrogen being set free; only at a very high temperature, at least 3,000°, it is supposed to separate in free oxygen and hydrogen.

A. B., of Mass.—The frosted appearance of sheet tin and galvanized iron is given by a wash of bichloride of tin.

D. T., of Mass.—Prussian blue is no compound of the oxide of iron nor does it contain oxygen. It is not found as a mineral, nor is it a chemical product obtained from minerals. Notwithstanding its containing iron, it is altogether an organic substance, and exclusively prepared from old leather, blood or animal matter of any kind, fused at a red heat, with caustic potash in an iron vessel, the carbon and nitrogen of the animal substance combining with cyanogen and this with the potash to cyanide of potassium. The presence of iron changes it into the ferrocyanide, and a solution of this salt brought in contact with a solution of certain salts of iron forms different shades of blue precipitates, of which Prussian blue is the richest in color. Its formula is

$$C_{18}\ N_9\ Fe_7$$

F. W. P., of Ky.—A camera obscura for tracing pictures with a pencil is best made by placing a convex spectacle glass of some two or three feet focal distance on the top of a dark conical box at that hight, and above this a piece of looking glass inclined at an angle of about 45°; the box is placed on a table and the paper placed on its bottom; one hole is made in the side of the box to pass the hand in, and another to look through at its bottom.

## Business and Personal.

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

A master mechanic writes:—"I look upon Olmsted's improved oiler as a perfect article, and consider it the best and most durable oiler made." Sold everywhere.

A. C. N. Schulze, Bellville, Austin Co., Texas, wants a first-class machine for making brooms from broom corn, also, one for removing the seeds from the corn, and one for rounding the sawed handles. Send description and price.

The book on the watch can be obtained complete, neatly bound, of the author, H. F. Piaget, 119 Fulton st. Sent by mail for 60 cents.

N. B.—Most manufacturers of first-class steam engines are using Broughton's lubricators and oil cups. They cannot leak nor waste oil, and are in every respect the best in use. Send to Broughton & Moore, 41 Center st., for circulars.

For sale cheap—Bedell's patent adjustable heel trimmer. Inquire of John Charlton, No. 9 Gold st., New York.

I want a partner to work an invention for perfectly non-explosive boilers. No tubes or globes; of wrought iron, light and portable, and good circulation of water. Address W. Bye, Western House, Broadway, St. Louis, Mo.

We understand that the "Star Shuttle Sewing Machine Co." are manufacturing one hundred of their celebrated machines per day, at their works in Cleveland, Ohio.

To patentees and others.—Brass, tin, and iron small wares of all description made to order. Dies and tools made for metal cutting, stamping, spinning, and drawing. Tools on hand for the manufacture of kerosene burners, stationers' hardware, oilers, toys, etc., etc. J. H. White, Newark, N. J.

Wanted—the address of manufacturers of brass and malleable iron castings who have facilities for manufacturing small articles. Address Bisbee & Hearn, Yreka, California.

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

Rare chance for limited capital.—State or the entire right for sale of the "weighing and measuring cup," and the "combination funnel," six distinct uses. Two of the best patents out. Address Goodes & Co., 658 Franklin st., Philadelphia, Pa.

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

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

For sale—Road or State rights to make and use Blythe & Hayes' patent machine for turning off locomotive crank pins in the wheel. Address W. Blythe and N. Hayes, Alexandria, Va.

The surest detective of low and high water, and high steam in boilers yet invented. Springer, Hess & Co., Philadelphia, Pa.

Winans' Boiler Powder (11 Wall st., N. Y.) A positively uninjurious remedy for incrustations. 12 years' references. Beware of frauds.

## EXTENSION NOTICES.

Clark Alvord, of Courtland, Wis., having petitioned for the extension of a patent granted to him the 21st day of November, 1854, for an improvement in hand brick molds, for seven years from the expiration of said patent, which takes place on the 21st day of November, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 26th day of October next.

Horace W. Peaslee, of Malden Bridge, N. Y., having petitioned for the extension of a patent granted to him the 23d day of January, 1855, antedated September 24, 1854, reissued January 8, 1856, and again reissued March 19, 1867, for an improvement in machines for washing paper stock, for seven years from the expiration of said patent, which takes place on the 24th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 31st day of August next.

## NEW PUBLICATIONS.

### COWDIN'S REPORT TO THE STATE DEPARTMENT.

We have before us the official report of Elliot C. Cowdin, United States Commissioner to the Paris Exposition. The subject is silk and silk manufactures, and it embodies, beside a succinct history of the rise and progress of the silk culture, a large amount of useful information to the silk grower and manufacturer of to-day. The subject is one which is of growing importance to the interests of this country, parts of which are excellently well adapted to this manufacture. We shall take occasion hereafter to quote from Mr. Cowdin's report.

### AMERICAN ANNUAL CYCLOPEDIA FOR 1867. Vol. XII.

From the publishers, D. Appleton & Co. 90 Grand street, New York city, we have received the Annual Cyclopedia for 1867, a compendium of important events for that year, embracing every department of the sciences, arts, politics, biography, literature, geography, etc. This volume is embellished with fine steel portraits of Peabody, Burlingame, and Chase, and an engraving of the Paris Exposition building. Among the hundreds of other subjects of interest reported is Abyssinia, illustrated by a map. The value of these annuals can hardly be overestimated. The facts collated, which before could be gathered only from periodicals, are arranged and embodied in a succinct form, available for reference and equally valuable to the student and the general reader. The paper and printing are of the first quality, and the volume in its make up, as well as its contents, is creditable to the publishers.

### THE CARPENTER AND JOINER, and Elements of Hand-railing; thirty-two plates. By Robert Riddell. Philadelphia: Claxton, Remsen & Haffelfinger, 819 Market street.

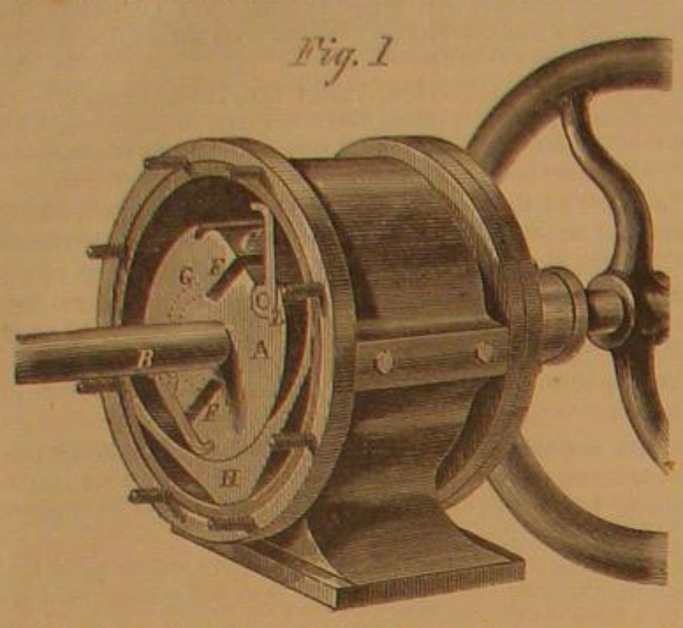
The name of the author of this treatise is a sufficient guaranty of its value. The text is mainly a description of the plates, and is remarkably clear and explicit. The book seems to be well adapted to the use of the apprentice and beginner, and also valuable to the master workman. The principles of stair building—that most difficult art to acquire—appear to be so plainly explained and illustrated that the student can hardly fail to master them by the aid of this treatise.

## TURNER'S ROTARY STEAM ENGINE.

Judging from the statements of the inventor and patentee of the engine illustrated in the accompanying engravings and an examination of his claims and model, it would seem that he has succeeded in improving upon other rotaries, in diminishing friction and using his steam to the greatest advantage and with the least possible waste. He is the publisher of the Grand Rapids (Mich.,) *Daily Eagle*, and he says: "We are running one of these engines in our press room and it works admirably. This engine is twelve inches diameter and eight inches between heads; it has a steam opening one and a half inches wide, and drives, with sixty revolutions, two Hoe cylinder presses and a Gordon Franklin with ease."

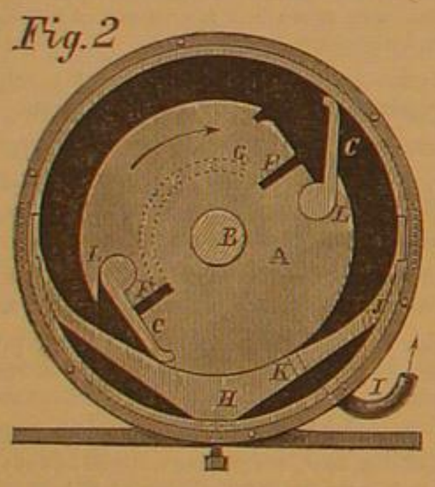
The engine with one head removed is seen in perspective in Fig. 1. It has a light balance wheel attached, which, however, it is not believed is absolutely necessary, as a regular and even rotation is kept up without it. The figures 2 and 3 present transverse and longitudinal sections of the machine. In the description the same letters refer to similar parts.

*Fig. 1*




Inside the cylinder is a cylindrical piston, A, secured to the shaft, B, its ends fitting closely the inside of the cylinder heads. In the periphery of this revolving piston are hinged or pivoted wing valves or arms, C, which when closed form a portion of the periphery of the piston, and when opened impinge against the inner surface of the cylinder. Steam is admitted at the point, D, Fig. 3, to a chamber in one of the heads, shown by the parallel curved dotted lines in Figs. 1 and 2 and the opening, E, in Fig. 3. This steam chamber, being always filled with steam, supplies the annular space between the outside of the revolving piston and the inside of

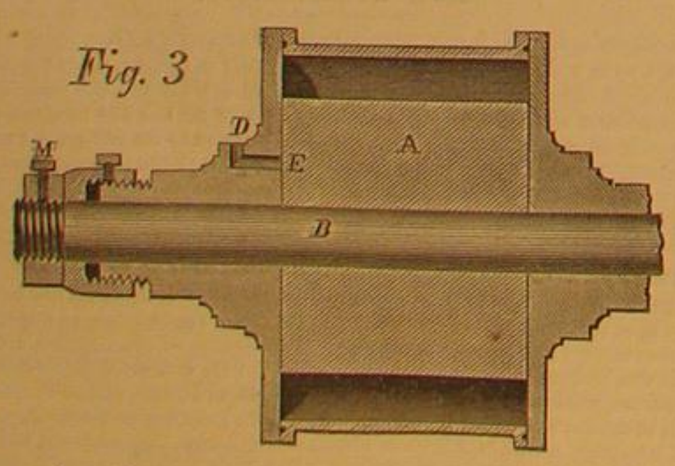
*Fig. 2*




the cylinder, and passes under the wing valves through the passages, F, in the piston, which extend across its length. The steam thus admitted acts on the valves and is cut off at G, which cut-off may be increased to any desired extent by filling a portion of the steam chamber in the head between G and the induction pipe.

The double cam block, H, to save weight and material, is made hollow, leaving spaces between it and the inside of the cylinder. From one of these spaces the exhaust pipe, I, carries off the steam which is received from the steam space at

*Fig. 3*

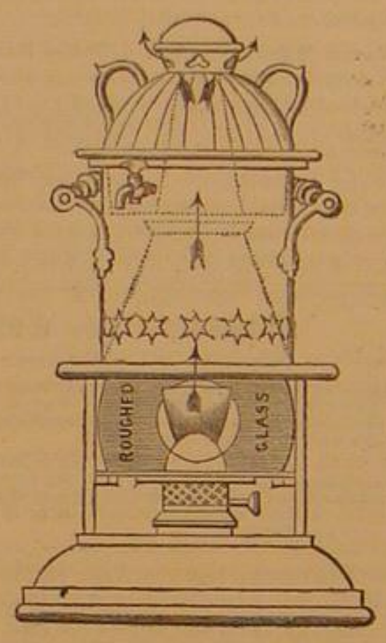



two points (Fig. 2), J and K, the first being a small opening to relieve the pressure upon the valve in closing, thus preventing any clicking noise and any unnecessary wear of the valve; the exhaust through the main opening, K, not taking place until the valve is entirely shut to place. As the acting steam passes under and acts upon the valve at the precise point at which it begins to open, it keeps out the point of the valve so as to follow the elliptical surface of the cam until it finds its proper bearing on the shoulder, L, at the same time the point of the valve forming a steam tight joint on the inside of the cylinder. As the steam has not exhausted in front of the valve until it finds its proper bearing, very little friction is produced by the opening of the valve. The direction of motion of the engine is shown by the arrow in Fig. 2. In Fig. 3 is seen a collar, M, screwed on the end of the shaft to prevent the pressure of the steam, which is admitted at that end, from forcing the piston against the opposite end of the cylinder. This collar forms a joint with the stuffing box.

From the foregoing, together with the examination of the engravings, the engineer or mechanic will readily understand the operation of the engine. Further information may be obtained by addressing Turner & Company, Publishers *Daily Eagle*, Grand Rapids, Mich.

## ORNAMENTAL PETROLEUM STOVE.

Though we have freely expressed our disapproval of chimneyless stoves in general, we must admit that the essential defect of such heat generators is almost inappreciable in the portable petroleum stoves which Messrs. James Hinks and Son are now manufacturing under letters patent. Wherever an ordinary petroleum lamp can be kept burning without inconvenience, one of these stoves may be safely used, for the source of heat is simply a petroleum flame from a flat one-inch burner. As the fuel is hydrocarbon, free from sulphur, no offensive and corrosive sulphur compounds are produced by its combustion. Moreover, the bright, white heat of the flame insures the full oxidation of the carbon, and prevents the formation of that lower poisonous oxide which is produced by the slow combustion of coke and charcoal. According to theory, therefore, petroleum is better adapted as a fuel for portable stoves than either coal gas or solid carbon, and we do not fear a conflict between experience and theory. Our own experience, as far as it goes, justifies us in recommending this new petroleum stove as an effective and inoffensive source of heat in halls, shops, warehouses, conservatories, ships' cabins, etc. For warming small conservatories they are admirably adapted, as the flame of petroleum produces what is called a "moist heat"; in other words, a large amount of aqueous vapor results from the combustion of the hydrogen contained in the hydrocarbon. The annexed engraving represents a stove in which the portion surrounding the flame is formed of ground glass, in order that the stove may be at once a source of light and heat. The base of the stove is the reservoir for the petroleum, and is capable of holding three pints, or sufficient for a week's average consumption. Upon this is fitted a flat one-inch burner, above which rises a cone of metal, communicating with a conical chimney. The draft produced by this arrangement obviates the necessity of employing a glass chimney, which would, of course, intercept a considerable amount of heat. The outer case of the stove, which is made of planished copper, is provided with handles, by which it may be lifted, and a small oval window, through which the flame may be seen. On the top of the outer case is fitted an ornamental hot-water reservoir, or boiler, capable of holding three pints, and provided with a draw-off tap. The heat, passing through the centre of this reservoir, maintains the water at the boiling temperature, and the steam escapes with the heated air, by openings in the spherical ornament covering the chimney. The hight of the stove is twenty inches; its diameter six and a half inches.—*Ironmonger*.




### Formation of Dendrites.

Dr. Emerson Reynolds read a paper before the Royal Geological Society of Ireland on the formation of dendrites. He had some years since noticed that, when solutions of salts were placed upon a plate of clean glass, and the glass placed between the poles of a Ruhmkorff coil, the salts gradually worked over the surface of the glass in beautiful moss-like forms, which in many cases were characteristic of the compound contained in solution; the state of dilution at the same time, having some considerable influence. The author proposed to call these "electric cohesion figures." To produce them we will say that a drop of a solution of cyanide of potassium is put in the center of a plate of glsss, which is then placed upon a sheet of tin foil. One pole of the coil (it is immaterial which) is then brought into contact with the foil and the other pole is placed in the center of the drop; immediately on passing the current the solution begins to creep over the surface of the glass in moss-like convolutions.

The dendritic markings on minerals the author believed were formed under a similar condition. He exhibited a beautiful manganeseous dendrite taken out of the museum. It was a conchoidal limestone slab, and in Dr. Reynold's opinion illustrated his electrical explanation conclusively. There was originally a flaw in the limestone which was exactly at right angles with the plain of cleavage. Through these flaws, as was evident by the marks, the manganeseous solution had percolated, and had perhaps ultimately been the means of making the stone part in two, not however in the direction of the flaws, but in the plain of cleavage. The dendrites which were formed upon the surface in this case were produced from the well-known fact that two surfaces at the instant of their separation are in opposite electrical conditions.

This phenomenon may be illustrated to a certain extent by inserting a drop of the fluid into the interstice of a plate of mica, and then on suddenly parting the plate the dentritic forms are shown. To fix them the author dusts some finely dried pigment over the surface of the still moist plate, and then fixes this by some transparent varnish.

### Ascendency of Machinery over the Power of Sinew and Muscle.

Our age is characterized by the grandest development of mechanical power ever known in the history of the human race. The machine power of England and Wales is competent to perform the labor of nearly six hundred millions of men; and is probably greater in productive capacity than the labor power of all the world besides. The machine power of the United States, through growing with amazing rapidity, does not more than equal the labor power of two hundred millions of men. It is owned, of course, almost exclusively by the North.

This mechanical power, wherever developed and wherever possessed, is placing the communities employing it far in advance of others in wealth, population, and political and financial power. This form of industrial energy began to take growth in England about one century ago, when that country was yet almost exclusively agricultural; when it exported largely of grain, and imported largely of manufactures; when its industrial interests were all in a languishing condition; and when, consequently, it was too feeble to suppress a "rebellion" represented by fifteen or twenty thousand soldiers under the command of George Washington. Abundant statistics are available to show that the agricultural communities of England have advanced since that time very slowly and inconsiderably, except so far as they have been stimulated by the presence of manufactures; and that the wonderful development of the island in the intervening period has occurred exclusively in its mining and manufacturing population. So vast is the present capacity of Great Britain for protection and for the execution of labor, that it can underbid the whole world in the sale of merchandize; and even the enterprizing and boastful Northern States of America, notwithstanding the aid derived from the highest tariff ever enforced, are about to experience a financial collapse, in consequence of an excess of imports over exports in their foreign trade; an excess amounting to several hundred millions of dollars per annum. So completely does this tremendous machinery power secure to Great Britain the command of trade and the tribute of the world, that other countries will have to reverse their previously received axioms of political economy, in order to protect their industrial interests from the crushing competition of so colossal a power.—*Hunt's Merchants' Magazine*.

## THE "OSCILLATING OR VARIABLE ECCENTRIC MOTION."

This invention is designed to further develope the great mechanical lever called the eccentric, and adapt it to a greater field of usefulness by attaching oscillation to it, thus making it, as it were, flexible, still rigid, but at the same time allowing the eccentric rod to oscillate, swing, or vary from the eccentric, in its true line of motion.

*Fig. 1*

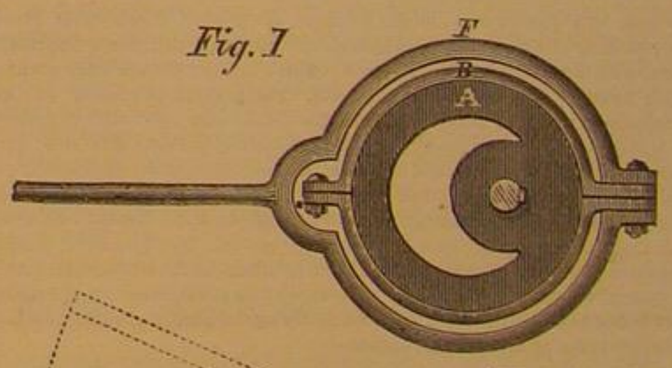
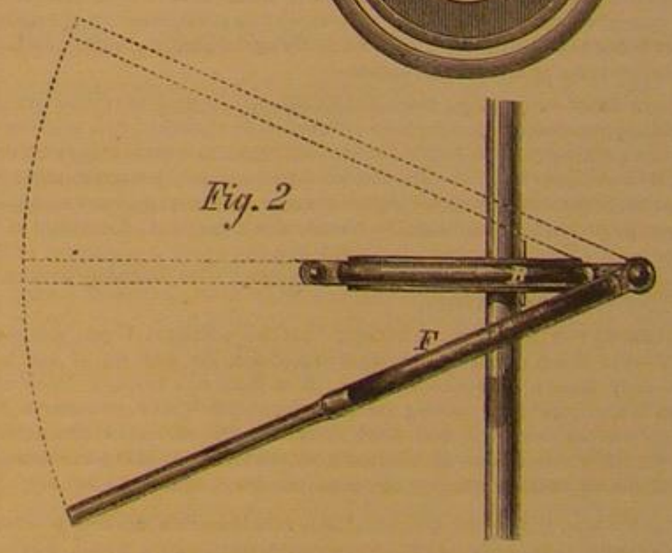



*Fig. 2*




By reference to the accompanying engravings, Figs. 1 and 2, it will be seen that by the attachment of the exterior band, F, in the manner shown, the eccentric rod has perfect freedom to swing, while the eccentric block, A, is keyed firmly to the shaft, and revolves in its true line of motion. Also, by this arrangement, the eccentric rod may be set, if required, at almost any angle to the line of eccentric motion, and still work freely. By this means, marble, wood, etc., may be sawed or cut, of a tapering or angular form, without changing or moving the body being cut; or angular or irregular grooves in iron, etc., may be cut or planed with facility. Also, by this arrangement, two or more eccentric rods, B, may be attached to the same eccentric, for driving two or more pumps, or independent lathes, etc. In fact, this invention is applicable to a great variety of purposes and uses, too numerous to mention.

The device herewith illustrated was patented through the Scientific American Agency, by Timothy Keeler and Geo. S. Avery, of Danbury, Conn., April 28, 1868. All communications regarding it should be addressed to Keeler & Avery, Danbury, Conn

# Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

☞ Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents of the SCIENTIFIC AMERICAN.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XVIII., No. 25....[NEW SERIES.].. *Twenty-third Year.*

NEW YORK, SATURDAY, JUNE 20, 1868.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## UNIFORMITY.

The only thing in nature or art that can be said to be perfectly uniform is the action of the physical laws which underlie and maintain the universe. Yet the results of these laws, the phenomena of nature, are endlessly various, and scarcely any two of her productions are exactly similar. A comparison between two plants, or animals, or minerals, of the same kind, always shows some point of difference. Even chemical elements, which if really elements cannot exhibit characters dependent upon combination, are found to vary in their color, the form of their crystals, etc., when different specimens of the same element are contrasted.

Why is it that invariable laws admit of variable results? The answer is that although any one of nature's laws acting alone would produce perfectly uniform results, that when they act in concert the effect produced is a resultant, and varies according to the accordant or discordant action of these laws. In fact, these laws may be so exactly and equally antagonistic that their resultant is nothing.

As in nature so in art that deals with her productions. The variable nature of the materials which are used in the arts, variations in size caused by variations in temperature, variations in appearance caused by optical phenomena, variations in judgment caused by differences in the power of sensation at different times, and variations in measurements which are the result of the above mentioned variations, all conspire to impede uniform production.

It is a well known fact that violins made by celebrated makers after the same model, and in each of which perfection was aimed at, differ widely from each other in power and quality of tone.

Chronometers have their individual characteristics also. Though they may be as uniformly made as human skill will permit, they will vary more or less from the true sidereal time. A knowledge of the ratio in which one of these instruments "gains or loses" is essential to its use in navigation.

It were an easy task to enumerate instance upon instance to show the utter impossibility of entire uniformity in production, although in many cases very close approximations to it have been made. Nature seems to disapprove of individual likeness, and this tendency to specific differences in individuals has been considered by Darwin and others to be sufficient to account for the origin of species.

By a selection of pigeons having certain peculiarities, and again selecting from their progeny such as had the same features as strongly marked as possible, Darwin obtained birds from the pigeon stock which had hooked beaks, talons like hawks, and that fed upon meat. In fact, so far as general appearance and habits are concerned, they were hawks.

The necessity of obtaining an approximate uniformity in the productions of the arts, and the impossibility of obtaining uniform materials and operating them under similar circumstances, are reasons why skill and experience are essential to success.

Could perfect uniformity in nature be depended upon, every thing might be reduced to formula, and exact results be relied upon. Chemical manufacture would become the easiest of conceivable occupations. No need then to take into account specific gravity, or to watch the thermometer. The photographer would no longer complain of failures depending upon the character of his materials; the child of ten would compound as good bread as the experienced matron of forty. In short, we should all be on a level, and a monotony would pervade the entire range of production. The word excellence would become obsolete, and ambition, the stimulus to all great enterprises, would share the same fate. There is as much truth and philosophy as poetry in the couplet

"Variety 's the spice of life,
That gives it all its savor."

## WHY A LONG SCREWDRIVER IMPELS A SCREW MORE EASILY THAN A SHORT ONE.

In most cases, where there is an apparent conflict between theory and fact, people, who are not familiar with the facts involved, are too much inclined to give undue weight to theory, and too little credit to evidence which goes to support the facts. In such cases, however, it is well to be cautious in forming opinions, because it often happens that some point in theory has escaped notice and has led to wrong inferences and conclusions.

Perhaps nothing illustrates better the importance of giving attention to the opinions of practical men, in matters upon which they have a knowledge based upon experience, than the difference of opinion which is common upon the question, whether a long screwdriver impels a screw with more ease than a short one. A mechanic accustomed to the use of this implement will almost always answer the question in the affirmative; while a man whose knowledge of mechanical subjects is merely theoretical, generally conceives it to be impossible. For ourselves, we are assured that the opinions of mechanics upon this point are correct, and we obtained the assurance by means of a series of experiments, which not only convinced us of the truth of the statement, but also satisfactorily explained the phenomenon.

We experimented in the following manner:—We selected a piece of very thoroughly seasoned cherry timber: a portion of a frame of some old machine which had been lying in the shop for a very long time,and after having selected the screws to be used in the experiment, we drilled holes in the timber of a suitable size, and, by means of a reamer, gave them a very gradual taper. The screws selected were 4-inch, gimlet points, with very strong heads, and about ⅛ of an inch diameter. The screwdrivers compared were, respectively, 8 inches and 20 inches in length, including the handle. The holes were tapered so that it would be impossible to drive the screws home, and were made as nearly of uniform size as possible. The wood was very homogeneous, and the screws were calipered to ascertain and obtain those of uniform size. Eight holes were prepared, and the eight screws selected, oiled, and laid in order. The screws were put in alternately by the long and the short screwdriver, and driven as far as strength would permit in each case. The result was a pretty uniform variation. Nos. 2, 4, 6, and 8,which were driven by the short screwdriver standing about ¼ of an inch higher than the rest. Applying the long screwdriver to these screws they were driven down to a pretty uniform level with the others. With the short screwdriver it was found impossible to start back any of the screws, but with the long one, we were enabled to take them all out.

Being thus satisfied that the long screwdriver had the more power in impelling the screw, we set ourselves to discover in what the secret of advantage consisted, and were enabled by a repetition of the experiment above described, but with slightly varied conditions, to refer it to the principle of the lever. If both screw drivers be held in such a position that the axis of each shall form a continuous line with the axis of the screw to be impelled, no advantage in favor of either will be discovered. But the long screwdriver admits of considerable play from side to side without releasing the screw, while the short one admits of very little. It is easy to verify this by the application of screwdrivers of different lengths to screw heads. In the effort to put in a screw where much exertion is necessary, this play and the consequent purchase are always obtained.

To prove such to be the facts, we arranged a guide or rest over the holes prepared for the reception of the screws so that by placing a suitable adjustment upon the blades of the screwdrivers we kept them in line with the axis of each screw. In this experiment no variation which could be attributed to the screwdrivers was apparent.

Repeating the experiment, a third time with the short screwdriver ground so as to incline it out of line, about as much as the estimated inclination of the longer one without causing it to lose its hold, we found, if any variation existed at all, it was in favor of the short one.

Undoubtedly, however, something in favor of long screwdrivers must be attributed to the fact, that they have larger handles than short ones, and thus present a greater leverage to the action of the hand.

Thus it is seen how statements apparently incongruous, may, by proper examination, often be proved to be in accordance with sound science.

## GRINDSTONES---THEIR ACTUAL AND POSSIBLE USES.

The grindstone is of so ancient and common use that for the one the "memory of man runneth not to the contrary," and for the other its employment is already considered circumscribed. Yet the grindstone is capable of doing a much larger share of the work in the manufactory and machine shop than is usually accorded to it. On the farm its sole use is the sharpening of implements, from the carving knife down to the hoe and plowshare, but in the shop it is employed for grading the surfaces of metals—cast and wrought iron, steel, and some other of the obdurate metals. It is used either dry or wet, revolving swiftly or slowly.

Stones for grinding purposes are found in England, Scotland, Sweden, France, Nova Scotia, Ohio, and Michigan. Most of those, however, used in the East are from Nova Scotio and Ohio. From a practice of many years we prefer those of Nova Scotia to the Ohio stones because of their more even composition and genial grit. We are told, however, by one of the first saw manufacturers in the country that the artificial stones made by the Ransome process in Trenton, N. J., are superior to either in homogeneousness of texture and good grit. He uses them in preference to the others, although their first cost is somewhat greater.

One great trouble with the natural stones is the presence of spiculae, of hard, flinty substances standing out toward the circumference and resisting every legitimate effort for their removal. When a stone is found to contain these spikes of flint or obsidian the cheapest way is to discard it—roll it out of the shop,—for so long as it remains it will be a perpetual torment. Chipping off the obdurate spike, by the cold chisel is only a temporary expedient, as it will be sure to show itself again. A stone containing these hard spots is not fit for use in the shop; it will prevent any good work and be a permanent annoyance.

Much of the time and the cost of tools spent on the dressing, and even finishing of castings and forgings, which are now expended at the vice and by the use of cold chisel and file might be saved by a judicious use of the grindstone. It is singular that this ready means of abrading surfaces of metals and preparing them for after processes should occupy the very lowest place among the tools of a shop. Yet it is the fact that the grindstone, even when used only to give an edge to tools, is the worst kept appliance. The reason, we believe, is that its capabilities and possible uses are unknown. Why it should be so we are at a loss to conjecture. It may be made capable of saving much time now employed by skilled and costly labor and much waste of files and similar expensive tools. Many jobs generally submitted to the slow action of the planer might, by the more rapid action of the grindstone, be fitted for the after processes of the filer's art, with just as perfect satisfaction in the finished work.

## TO ADVERTISING CORRESPONDENTS.---AXES TO GRIND.

We receive daily a great amount of very voluminous correspondence, upon subjects of great importance in the eye of the writer, but of no interest whatsoever to the readers of the SCIENTIFIC AMERICAN, and such articles are, of course, cast into the waste basket. In many cases, however, the subjects are important enough, but the writers have such a roundabout style that several pages are written in order to convey ideas that could easily be expressed in half a page, or even in a few lines. Correspondents should keep in view that the space in a journal of the circulation of this one is very valuable, and that the chance of having articles published is considerably increased by condensing them as much as possible.

We commend to the consideration of such correspondents the advice given by the editor of the London *Times* to a correspondent, who furnished him a very verbose article on an interesting subject. Said the editor, "You must reduce this one half." He did so, and reappeared with the article. "Reduce it one half," said the editor again. The abridgment was made, but not yet proving entirely satisfactory, a third condensation was ordered, when, in the editorial judgment the article had assumed reasonable shape, and shorn of every thing non important to the subject, and in this condition made its appearance.

Often the whole purpose of the article, although sometimes ingeniously sugar-coated, is to recommend something the writer manufactures, or vends. To such correspondents we respectfully suggest that we are seldom deceived, and they are usually referred to our advertising columns to offer their wares. A Dr. Chase, of Ohio, for instance, sent us a long article on the non-explosiveness of all hydrocarbon oils, provided a certain kind of lamp burner was used, in which he has, no doubt, an interest, as also probably in making the combustible fluid, and offers to subscribe for our paper when we insert it. Now the extent of his article—entirely written in promotion of his private interests—is such, that at our regular published rates one insertion would cost $150; this will explain to him one reason for refusing to publish his communication, the other being that we by no means can endorse his assertion that the government test of kerosene oil is all nonsense; that only the lamp should be tested, and that gasoline, benzine, and other combustibles, are just as safe as kerosene. He should keep in view that the cause of the kerosene explosions is not the deficiency of the government inspection, but the adulteration of pure kerosene oil with cheaper benzine, made by men of his stamp, who have some new kind of lamp or oil for sale.

## THE COOPER UNION IN NEW YORK.

During the last three days of May, this institution was in a blaze of glory, the occasion being the so-called yearly reception of the pupils, which, however, is nothing more than an exhibition of the work of the classes for drawing, painting, and sculpture. The exhibition was indeed very creditable, and it is doubtful if anywhere in the world a similar institution exists where several hundred pupils, receiving gratuitous instruction, at the end of the winter session are able to exhibit not only so many specimens of their industry, but so large a number of creditable productions, evincing a high degree of application and intelligence on the part of the pupils, as well as good thorough instruction on that of the teachers.

The department of mechanical and architectural drawing did not show any thing particularly noticeable above former years; but in that of free hand drawing, a decided progress was apparent. There were not so many copies of those familiar drawing-class lithographs, of which we have seen too much in former years. It must not be forgotten that copying a drawing is no art, in the higher sense of the word. True art is only attained by drawing from natural, or, at least, material objects; it is the only road to artistic power, and it was in this specialty that in former years the ladies' classes in the Cooper Union were far ahead of those for the young men. That this state of affairs existed, was the fault of the system of instruction, and the professors of male department appear to have at last waked up to its realization, as the exhi

bition of a great number of drawings from nature very creditably testify.

The modeling in the female department was so admirable as to astonish those able to appreciate this most difficult and most charming of artistic efforts. In painting, also, there were among the pictures some more worthy to be exhibited at our Academy than certain more pretentious specimens of so-called professional artists now on exhibition on its walls.

We, of course, fully appreciate the great importance of drawing to the mechanic and artisan, but we fear that the scientific department of the Cooper Union does not keep pace with the artistic. If the institute were conceived solely for a school of design and cognate branches for male and female pupils, it could be said that it is fully on the road to ultimate perfection; but it was founded "for the advancement of science and art," and the time and accommodation devoted to art far outstrip those devoted to science; this will become evident by the following statement, which at the same time will give our readers at a distance some idea of the extent of the building.

The fourth floor contains two lecture rooms, each about sixty feet square; a mineralogical cabinet, laboratory and apparatus room, each sixty by twenty feet; six or eight class rooms for mathematics, and rooms for the professor of natural sciences. On this one floor are taught the evening classes in mathematics, mechanics, natural philosophy, chemistry, elocution and music. The entire fifth story is devoted to the evening drawing classes for young men. The school of design for women occupies the whole third floor during the day, and the third floor contains the free reading room and library.

We must, however, in order to be just, remark that the scientific course requires more preparation than the artistic. A person may successfully follow a course of instruction in drawing, even if he is deficient in the common branches of education, though he cannot, of course, ever become a real artist, as for this a cultivated and well-trained mind is required. In the scientific course, however, a person deficient in arithmetic, for instance, can proceed slowly, if at all. This remark is verified by the statement of the secretary of the institute on the night of graduation, that of 1,200 pupils inscribed on the rolls, only about one third were able to continue the course, two thirds being deficient chiefly in arithmetic, and thus not prepared to follow the mathematical course, which, we are happy to say, is in this institution made the base of all further scientific instruction.

The aim of this institute is to give gratuitously a technical education to all, the instruction beginning at that point where the highest branches of the common school education ends. Several hundreds have availed themselves of the advantages the institute so liberally offers during the nine years of its existence, and thousands more may reap its benefits, as the institute is self supporting. The institute, as our readers must all know, was a free gift of Mr. Peter Cooper to the city. The original cost was about $700,000, while its actual value, according to the present valuation of real estate in that locality, is now one and a half million of dollars.

## NEW ENGRAVING LATHE.

A very ingenious and effective lathe for engraving upon copper, steel, wood, and other substances is now in operation at 207 Pearl street, New York city, which is worthy the attention of all who are interested in the reproduction of art. The machine is the invention of Messrs. Guerrant and Field, of North Carolina, who have come North seeking for the necessary business talent and pecuniary aid to put their invention into extensive use. To engrave by means of this machine the operator sits with a copy of the drawing, photograph, or whatever design is to be engraved, directly in front of him. A small pointer rests upon the drawing, and the whole operation consists in moving the pointer over the several lines of the copy. The pointer is operated by two small cranks, one of which produces a vertical and the other a lateral movement; the simultaneous operation of both cranks producing a circular, inclined, or any desired irregular motion of the pointer, which is thus made to "follow copy." All the movements of the pointer are imparted by means of a very simple arrangement of levers to a graver which cuts or engraves the design upon the surface of a copper plate or block. Thus in a rapid manner even an unskilled person having a drawing before him, may engrave the same in superior style. The swelled lines as well as hair lines of copper plate writing may be produced with the utmost freedom, and there seems to be no limit to the execution of the finest and most difficult as well as the simplest kinds of work. It makes no difference whether the surface to be engraved is flat, circular, or irregular. We have seen the whole of the Lord's Prayer engraved by this machine upon the interior of an ordinary finger ring, every letter being perfectly formed and legible under a magnifying glass, but too small to be read by the unassisted eye. For jewelry work, the ornamentation of metals, the production of copper, steel, and wood engravings for letter press, and many other purposes, this invention seems to be well adapted.

## MAGNIFIED PHOTOGRAPHIC PICTURES.

If it were possible to take a photograph, say of the moon, and then to take a second one of a portion of the first, and of the same size as the first, and to repeat the process as often as required, a picture might at last be obtained that would show the minute details in the structure of that body; and in the same way the minutest details in the structure of other bodies, now beyond the reach of the most powerful microscopes, might be shown and examined at leisure. In the present state of science it is not possible to accomplish this, for several reasons.

First, the photographic picture is painted by the deposit of metallic silver, which, in a minute state of subdivision, gives a general gray tone to the picture when it is not magnified; but when the entire picture, or a small portion of it, is inspected by means of lenses, the white luster of the silver appears more and more plainly as lenses of higher power are used, and the picture assumes a frosted and crystalline appearance, which obscures the finer details beyond a certain limit. The limit is reached by a lens of quite low power, and photographic pictures when viewed in stereoscopes show more or less of the silvery frosted-looking surface texture. To obviate this difficulty a substance must be discovered as sensitive to light as the salts of silver now in general use for photographic purposes, and that will in its decomposition leave a perfectly amorphous coating upon the paper, where the light acts, and in proportion to the strength of its action from the lightest gray tint to the deepest black.

A second difficulty is the roughness of all surfaces upon which pictures can at present be taken. If we attempt to magnify a photograph, all the roughness of the paper or collodion which is imperceptible to unaided vision becomes apparent, and mingles its own images with that of the finer details, in such a way as to make complete confusion. The remedy is the discovery of new materials capable of receiving a polish so fine as to show a perfectly smooth surface under the highest magnifying powers.

The third and the greatest difficulty is the fact that in enlarging small pictures the amount of light reflected by them is constantly diminished, each picture becoming more indistinct than the one of which it is a copy, until finally the original image is completely extinguished. Formidable as this difficulty appears, it is within the range of possibility that it may be completely overcome. The reinforcement of the galvanic current obviates a similar difficulty which at one time threatened to interfere greatly with telegraphic communication. The reinforcement of a sound can make it audible through a large space where it apparently had totally ceased to exist. It remains to discover a means for the reinforcement of light. We believe that in time to come all the obstacles we have mentioned will be surmounted, and the photographic art will become the means of revealing the yet hidden mysteries of nature's grand laboratory.

Another difficulty, that relating to the imperfection of lenses, we will hereafter discuss.

## CONSTRUCTION OF FIRE-PROOF BUILDINGS.

We present on another page several illustrations of experments made by Messrs. Hoe & Co., of this city, which, with the details of the trials we consider of the greatest importance to builders and others. We accordingly invite the attention of our readers to the subject.

The insecurity of our buildings generally, especially their lack of resistance to the ravages of fire, is well known. The aggregate of the sums of money yearly expended for premiums for policies of insurance, would surprise, if it were known, every person. When real defense against fire is undertaken the cost of the erection of buildings is immensely enhanced. The walls must be of great thickness, of fire-proof materials, and laid with great care. The floors must be of similar materials, arched to sustain their superincumbent weight, and supported at intervals by strong columns. All the passages from one floor to another must be defended and guarded by proper devices. This mode of construction and these appliances are too costly for general use; what is needed is some cheaper mode of construction which shall not be less effective in confining fire to the floor in which it originates, without the necessity of constructing a perfectly fire-proof and costly building in the style now considered necessary. It would seem that this result has been partially, if not fully attained by the satisfactory experiments of the Messrs. Hoe.

In addition to their method of rendering floors fire-proof, a patent was obtained in 1860 by J B. Cornell, of this city, for the protection of iron columns in case of fire, which, in connection with the plan of Messrs. Hoe, would seem to render increased security to buildings attacked by fire. The plan is to inclose the supporting columns with a casing, the space between which and the column is filled with plaster of Paris or any other non-conducting material. The object is to prevent the disintegration of the metal composing the supporting column by heat.

The subject of erecting fire-proof buildings is of vast and growing importance, and we hope experiments will be made all over the country with a view of improving the mode of their construction.

PHOSPHATE DEPOSITS.—The discovery of immense deposits of bone phosphates in South Carolina, which, more than a year ago, was heralded by the press of the country, is again brought before the public. The entire coast and Sea Island regions of the Palmetto State are now supposed to be underlaid by the osseous remains of extinct land and marine creatures of past ages. The statement is also made that human bones as well as stone implements have been recognized. An analysis, made by the State Geologist of Massachusetts, of a sample from th Ashley river, shows in 100 parts of bone; moisture and organic matter, .80; bone phosphate of lime, 81.60; sulphate of lime, .65; salt, .15; sand, etc,, 16.80.

FRANCE is well provided with lawyers and judges, governmental statistics showing that there is in the empire at least one man connected with the administration of justice for every 500 of the inhabitants, without counting the agents of external justice and city and rural police forces.

## Editorial Summary.

A NEW PYROMETER of English make, designed by Mr. Wood of the Tees Iron Works, consists of a metallic tube connected at one of its extremities to a pillar of porcelain, and at the other with an index on a dial, upon which the degrees of heat are measured. When used, the instrument is held over the aperture of a blast furnace, and the heated air passing through expands the tube longitudinally, and the difference in length as compared with the porcelain standard is indicated on the dial. In a recent experiment, the temperature was registered from 66° to 1,200° Fah. in less than a minute.

PHYSIOLOGICAL experiment has arrived at a close approximation to the average diurnal gain and loss in a man of one hundred and forty pounds weight. The daily gain is as follows:—

| | | |
|---|---|---|
| Oxygen | lbs. 2·192 | Inorganic gain, lbs., 6·301 |
| Water | lbs. 4·104 | |
| Dry vegetable food | lbs. 1·687 | Organic gain, lbs., 2·250 |
| Dry animal food | lbs. ·563 | |
| Total daily gain | | 8·551 |

The total daily loss in a healthy body will be exactly equal to the gain.

A LARGE collection of fossils from the green sand beds of the Squankum Marl Company, near Farmingdale, N J., has been presented to the Peabody Museum of Yale College, by O. B. Kinne, of New York. This important acquisition consists of several thousand specimens, many of them new to science. Among the new vertebrate fossils, which will soon be described by Professor Marsh, are the remains of a huge swine-like animal, larger than a rhinoceros, and several others not previously discovered in this part of America.

IN AN important paper communicated to the Academy of Science, by M. A. Mallet, he stated that between 200° and 400° Fah., and in presence of steam, protochloride of copper absorbs oxygen from the air almost instantaneously to form an oxychloride, which parts with its one atom of chlorine at a higher temperature. So that oxygen gas, or chlorine gas, can be prepared at will, and in as large proportions as we wish, the same protochloride of copper serving over and over again.

BORAX AS A DETERGENT.—As a means of cleansing the hair, nothing is better than a solution of borax in water. It leaves the scalp in a most cleanly condition, and the hair just sufficiently stiffened to retain its place. This stiffness, however, can be readily removed, if objectionable, by washing with water. Borax is also an excellent dentrifice. Dissolved in water, it is one of the best of tooth washes.

THE use of raw meat in the treatment of debility and consumption is in the ascendant in France; but that it may be served in a style the least objectionable to the patient's delicate sensibilities, it is prepared under the name of musculine tablets, and is made of raw fillets of beef covered with fruit jelly and candied sugar.

A CANDIDATE for death honors proposes to shoot Niagara Falls in an india-rubber boat, oblong in shape, and with a mean diameter of eight feet, and six inches thick at the top and sides and three feet thickness at the bottom.

THE wire of a telegraph line just put up between Dover, N. H., and Lake Winnipiseogee is made of a steel core surrounded by copper. By this construction, it is claimed, the following advantages are secured: superior conducting power with less weight of metal, durability, and a less number of poles on the line.

OUT of the thirty-one days of the month of May, the residents of this latitude enjoyed twenty-three rainy days, amounting in the aggregate to a steady shower of 150 hours and 18 minutes, or 6 days, 6 hours, and 18 minutes duration. The depth of water that fell during that time, as measured by the hydrometer, was 6·98 inches, against 5·791 inches which fell during May of last year.

IN the town of Arkwright, N. Y., is a little lake which has no apparent inlet, but two outlets; through the one its waters flow into the Conewango river, thence through the Alleghany, Ohio, and Mississippi rivers to the Gulf of Mexico; the other outlet forms a branch of Silver Creek, which empties into Lake Erie, and its waters thus find their way into the ocean through the St. Lawrence.

NEARLY two acres of land on a farm in Hamilton county, Fla., lately disappeared from mortal view, the pasture land now being occupied by a lake of at least fifty feet in depth This sink is said to be the largest and deepest ever known in the State.

AN INTERESTING ELECTRICAL EXPERIMENT.—M. Becquerel, in making some researches into the subject of the dialysis of the electrical currents, lately found that in passing discharges from an induction coil, between the upper surface of a saline solution, contained in a glass tube, and the extremity of a platinum wire fixed at a short distance, the spark was surrounded with a cloud colored, according to the sort of salt used in the experiment.

HERSCHEL AND ARAGO found that the greater the number of spots on the sun during any year, the higher was the cost of breadstuffs. For the reason that the existence of these blots on the solar disk reduces the heat of the sun very materially. The experiments which led to this assertion were continued during a period of twenty-five years.

OFFICIAL REPORT OF

# PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 2, 1868.

*Reported Officially for the Scientific American.*

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

| | |
|---|---|
| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $15 |
| 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.*

78,410.—GOVERNOR VALVE.—Robert Andrews and Edward Armstrong, Allegheny, Pa. Antedated May 12, 1868.

We claim the arrangement of the valve, B, stem, C, spring, D, adjustable suspension bar, g, and columns, f, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

78,411.—CARRIER FOR BRAIDING MACHINE.—Dexter Avery, Westfield, Mass.

I claim the hollow spindle, A, spring, D, and hook rod, C, in combination with the rod, e, sleeve, E, and arm, h, all made and operating substantially as and for the purpose herein shown and described.

78,412.—FILLING FOR BEDS, CUSHIONS, ETC.—Geo. C. Barney, Chicago, Ill.

I claim, 1st, As a new article of manufacture, a bed or mattress filled with paper cut in to small pieces, as herein shown and described.

2d, The use of paper cut into small pieces, for filling beds, mattresses, cushions, etc., as herein shown and described.

78,413.—LAMP SHADE.—D. W. Bashore, Palmyra, Pa. Antedated May 22, 1868.

I claim an adjustable shade, or lamp shade, constructed and arranged substantially as described.

2d, In combination with a lamp shade constructed as described, the openings in the same, at or near where it comes in contact with the chimney, substantially as described and for the purposes set forth.

78,414.—CATAMENIAL SACK.—Andrew F. Baum, New York city, assignor to L. H. Rockwell. Antedated May 22, 1868.

I claim an India rubber catamenial sack, formed with rolled edges, a a, substantially as described.

78,415.—FEATHERING PADDLE WHEEL.—Robert Bell, East Saginaw, Mich.

I claim, 1st, The combination of the circular plate, F, eccentric, E, rim, G, eccentric, H, eyes, I, and double buckets, D, all constructed and arranged as described, for the purpose specified.

2d, Constructing the buckets with two pieces or faces, a a, and fitting the same loosely on fixed axles, C, substantially as and for the purpose herein set forth.

3d, The eccentrics, H, of the double buckets, D, connected with the feathering rim, G, by means of eyes, I, fitted upon the eccentrics, and bolted to the sides of the rim, the latter being firmly secured to the plate, F, as herein described for the purpose specified.

4th, Having the end plates, b b, of the bucket slotted from their centers outward, with plates, 1x, bolted to the inner surfaces of the end plates, over the slots, substantially as and for the purpose set forth.

78,416.—THILL AND POLE FOR CARRIAGES.—James W. Bicknell, New York city.

I claim thills, or shafts, or poles of vehicles, made in whole or in part of tubular metal, substantially as herein specified.

78,417.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Besch, Independence, Iowa.

We claim, 1st, The footpiece, M, arranged as described, for pressing the teeth in the ground, substantially as specified.

2d, The seed box, F, furnished with diamond-shaped holes, in combination with slide, e, likewise furnished with diamond-shaped holes, and arranged to operate as and for the purpose set forth.

3d, In combination with the above the cam lever, I, footpiece, M, and arms G G, to which are secured the teeth, J J, all arranged as and for the purpose set forth.

78,418.—MACHINE FOR BENDING CIRCLES.—William Boyd, Hartford, N. Y.

I claim the wheels, H I L, table, A, and jointed lever, C B E, set screws, b b, and circular faces, a a a, all constructed and operating substantially as and for the purpose shown and described.

78,419.—CART BODY.—Wesley Bradley, Vienna, Me.

I claim the bent rod, C, provided with the handle in combination with the pin for fastening, as shown, for the purpose herein described and set forth.

76,420.—TIRE BINDING AND PUNCHING MACHINE.—James M. Bryan, Pennington ville, Pa.

I claim, 1st, The arrangement herein described and shown of the levers, B and C, supports, B' and D', and stirrups, C' and d, for the purposes as set forth.

2d, The arrangement herein described of the rest, E, rollers, F F, adjustable die, d2 and mandrel, D, for the purposes set forth.

78,421.—MACHINE FOR CLEANING AND RENOVATING FEATHERS.—Daniel Budd, Valatia, N. Y.

I claim, 1st, An apparatus for cleansing and drying feathers, consisting of a feather holding vessel heated by means of steam admitted either into the vessel or into a jacket or jackets applied thereto, and combided with beaters or agitators for stirring the feathers within said vessel, substantially as and for the purposes shown and set forth.

2d, The combination with the feather holding vessel of the steam jackets or chambers upon the exterior of the same, one of said chambers being perforated so as to allow steam to pass into the interior of said vessel, and the branch pipes and cock for supplying the steam to said chambers, under the arrangement and for operation as set forth.

3d, The combination with the jacketed feather holding vessel, as described, of the rotary beaters or arms, and spindle and crank with which they are connected, mounted in the said vessel, substantially in the manner and for the purposes herein shown and set forth.

78,422.—RAILROAD RAIL.—A. G. Buzby, Philadelphia, Pa.

I claim a clip composed of a thin flexible plate of steel or tough iron, bent and applied to a rail or rails, substantially as and for the purpose herein set forth.

78,423.—MACHINE FOR SOWING FERTILIZERS AND SEEDS.—Daniel Caine, Battle Creek, Mich.

I claim the hopper, A, in combination with the stirrer, E, clearer, F, and feeding roller, H, arranged relatively with each other and with an axle, D, and wheels, W, and constructed and operated in the manner and for the purpose as set forth.

78,424.—CORN CULTIVATOR.—Alexander Campbell, Oxford, Ind.

I claim the attaching of the upper ends of the standards, B, to the frame, A, by pivoting the former in mortises, b, in the latter, in connection with the rods, C, and the adjustable bar, e, attached to the draft pole, all arranged substantially as and for the purpose set forth.

78,425.—ROTARY STEAM ENGINE.—Wesley B. Campbell (assignor to himself and Harrison Smith), Abingdon, Iowa.

I claim, 1st, The arrangement of the wheel, B, floats, B', the ends, b, flanges, c, side plates, C, and steam chest, A, whereby to relieve the hub from the pressure of the steam, substantially as set forth.

2d, The arrangement of the wheel, B, the valves, F, arms, G, rods, H, and cams, I, substantially as set forth.

78,426.—STEAM BOILER FURNACE.—N. L. Carpenter, Natchez, Miss.

I claim, 1st, In combination with a steam boiler, the wells or recesses, D, E and F (more or less in number), and the deflecting plates, G, arranged substantially as and for the purposes herein shown and described.

2d, In combination with the wells, D E and F, and plates, G, the perforated air tube, H, substantially as and for the purposes described.

78,427.—RINGS FOR SPINNING MACHINES.—Wm. T. Carroll, Medway, Mass.

I claim the combination as well as arrangement of the flange, c, or the posts, f, and the adjusting screws, e, with the ring, A, and the supporter, B, thereof, to be placed on and within the ring rail, as specified.

78,428.—THRUST BEARING.—A. W. Case, South Manchester, Conn.

I claim, 1st, An improved thrust bearing, formed by the combination of the wheels, E, one or both, and friction wheel, D, with each other and with the shaft, B, substantially as herein shown and described and for the purpose set forth.

2d, The oiling device formed by passing a piece of candle wick or other suitable fibrous conductor, through holes in the blocks, C, and along grooves in the under side of the journals of the friction wheels, D, substantially as herein shown and described and for the purpose set forth.

78,429.—RAILROAD FROG.—Henry S. Chapin, Delhi, Ohio.

I claim the chairs, A, constructed substantially as set forth in the described combination, with the sections or pieces of rails, B C D E, arranged as described and for the purpose set forth.

78,430.—APPARATUS FOR CONVEYING AND DUMPING COAL.—Henry C. Clark and Robert B. Little, Providence, R. I.

We claim, 1st, The construction of a conveying and dumping apparatus or bucket, A, with a hinged front gate, B, and stop, a, attached thereto, and operating substantially as herein shown and described.

2d, The clasp, F, for securing the rope, C, to the truck, D, said clasp consisting of two plates, c and d, hinged and locked together, substantially as herein shown and described.

3d, The adjustable carriage, G, running on the outer edge of the track, E, and holding the dumping ball, H, suspended by a chain or cord, n, the said carriage being free to be moved upward on the track, substantially as and for the purpose herein shown and described.

4th, A coal conveying and dumping apparatus, consisting of the bucket, A, having the hinged front, B, with the stop, a, of the rope, C, clasp, F, truck, D, carriage, G, and ball, H, all combined with each other, and made and operating substantially as herein shown and described.

78,431.—UTERINE SUPPORTER.—S. P. Cole, Janesville, Wis.

I claim the uterine supporter, formed by the combination of the soft rubber cushion, A, of elliptical form, the cup, B, soft rubber ring, B, and soft rubber diaphragm, d, substantially as herein shown and described, for the purpose specified.

78,432.—SAND THROWING MACHINE.—W. H. Cox, Portland, Me.

I claim the sand throwing machine or device, constructed as herein set forth and for the purposes specified.

78,433.—HOP BOX.—Wm. B. Crandell, Deansville, N. Y.

I claim the hop boxes, a a a a, and bottomless compartment boxes, d d d d, substantially as shown and described, constructed and employed together, all as and for the purpose set forth.

78,434.—PRESS FOR FINISHING BRICK.—Lyman B. Crittenden, Pittsburg, Pa.

I claim, 1st, In a machine for pressing brick, the construction and use, either singly or in gangs, of a plunger, m, chambered on its under face, and fitted with a sub plunger, of any elastic or non-elastic material, such subplunger being supported by or resting against a spring or a cushion of condensed air, or other equivalent device, substantially as and for the purposes hereinbefore set forth.

2d, The use of wedge shaped guides, i, in connection with a cross bar, h, or its equivalent, for regulating the position of the bricks on each platen or tray, F, so that they shall be fed directly under the pressing devices, substantially as above set forth.

3d, The boxes, l, and plungers, m, with suitable devices for imparting to them the motions described, in combination with a feeding device, consisting of a sliding frame, D, cross bar, h, and guides, i, the whole being constructed and operated substantially in the manner and for the purposes hereinbefore set forth.

78,435.—FILE.—G. B. Cubberley, Milwaukee, Wis. Antedated May 20, 1868.

I claim stock, A, end blocks, B, side key, C, and teeth, D, in combination, substantially as and for the purpose described.

79,436.—HORSESHOE.—J. M. Cuykendall, Metomen, Wis.

I claim, 1st, Inserting the screws, D, into the side of the shoe, directly beneath the calks, in such a manner that the heads of the screws bind upon the calks and secure them in place, substantially as herein shown and described.

2d, The groove, c, in the center of the tenon, a', of the toe calk, C, in combination with the tenon, d, in the groove, b', and with the screw, D, all made and arranged substantially as and for the purposes herein shown and described.

78,437.—FRUIT PRESERVING BOX.—O. E. Doolittle, Boston, Mass.

I claim, 1st, The combination and arrangement of two or more boxes, the inner one being the containing box, and the space between filled with air and communicating with the inside of the containing box by the help of slats or apertures, when the same is used in combination with a moisture-absorbing substance contained within the limits of the inner box for the purpose of preserving fruit, all substantially as described.

2d, In boxes for preserving or containing fruit, the placing of a moisture-absorbing substance or substances in communication with the atmosphere around the fruit, all substantially as and for the purpose described.

78,438.—BOOT CRIMPING MACHINE.—R. H. Dorn (assignor to himself and I. G. Greene), Port Henry, N. Y.

I claim, 1st, The slide, B, provided with the crimping formers, b', in combination with the clamping sliding jaws, c c, substantially as and for the purpose described.

2d, The slide, B, provided with the crimping forms, b', in combination with the clamping sliding jaws, c c, provided with the ridged plates, D, substantially as and for the purpose described.

3d, The combination with the plates, c c, slide, B, and crimping forms, of the smoothing rollers, substantially as and for the purpose described.

78,439.—CARRIAGE SPRING.—George Douglass, Bridgeport, Conn.

I claim the insertion of India rubber strips, b b, in chambers or recesses, a a, in the cast metal socket or seat, A, of the spring, substantially in the manner as and for the purpose herein set forth.

78,440.—WASHING MACHINE.—Noah Drew, Howell, Mich.

I claim a connecting rod constructed in two parts, r1 r2, in combination with the tube, t, spiral or equivalent spring, s, and adjustable plunger heads, p, substantially as and for the purpose herein described.

78,441.—TEMPLE FOR LOOMS.—Warren W. Dutcher, Hopedale, Mass.

I claim the temple constructed substantially as described, the trough standard and the inner end of the overhanging cap being provided with sockets closed at their outer ends, such sockets being to receive and hold the roller spindle in place, in manner as set forth.

78,442.—COMBINED CULTIVATOR AND HOE.—Harmon P. Eckles, Catskill, N. Y.

I claim, 1st, The fans or paddles, f f, when attached to shafts, K K, and operated substantially as and for the purpose specified.

2d, The combination of the shafts, A and K K, gear wheels, I I, and H H, and frame, S, when arranged substantially as described, and for the purpose of operating the paddles or plates, f f, as herein specified.

3d, The combination of the cultivator frame, L, with its teeth, M M, secured to the frame, C, as described, with the shafts, K K, frame, S, and paddles, f f, for the purpose of cultivating or pulverizing the earth, and ridging or hilling the same at one and the same time, as set forth.

78,443.—SAW MILL.—Augustus R. Ehlers, Tannersville, Pa.

I claim the combination and arrangement of the oscillating slide, c, the oscillating guide rods, e e, the rock shafts, g g, and the eccentric, k, on the driving shaft, B, for producing a forward and backward movement of the saw below its upper end, which moves in the same vertical plane, as herein shown and described.

78,444.—MOP HEAD.—Lucius H. Emmons, Noblesville, Ind.

I claim the piece, A, furnished with the hooks, D, and the piece, E, arranged in relation thereto, and operated by means of the screw, B, substantially as and for the purpose set forth.

78,445.—ADJUSTMENT OF GEARING FOR HORSE-POWER.—John S. Everitt, Oshkosh, Wis.

I claim the clutch, with inclined faces, for the purpose of adjusting the gearing of the horse-power, as set forth.

78,446.—HAND STAMP.—August Fessler, Vienna, Austria, assignor to Joseph R. Von Wessely, New York City.

I claim, 1st, The large air tight tubular reservoir, constructed and arranged as and for the purposes set forth.

2d, The combination of the open frame, the tubular reservoir, the tubular handle, the yoke, the stamp, and the reversing devices, these parts being arranged as described for joint operation.

78,447.—VENT FOR BARREL.—Richard C. Fleming, Philadelphia, Pa.

I claim 1st, The combination of the screw ring, A, with the tube, C, tubular rod, E, and bag, D, all made and operating substantially as herein shown and described.

2d, The bellows, F, in combination with the device set forth in the foregoing clause.

78,448.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Andrew French, Philadelphia, Pa.

I claim, 1st, The swinging or vibrating frame, G, hinged at the end opposite the grindstone or emery wheel, consisting of the post, l, arm, k, and continuation, V, of the said arm, k, in combination with the lowering and raising adjustments, made in the manner and for the purpose described.

2d, The guide plate, B, made in the manner and for the purpose described.

3d, The slide, D, and set screw, e, in combination with the guide plate, B, swinging or vibrating frame, G, and sliding slot, U, as described, and made in the manner and for the purpose indicated.

4th, The wheels or pulleys, M and N, swinging or vibrating frame, G, slide, D, set screw, e, and emery wheel or grindstone, C, in combination with the guide plate, B, made in the manner and for the purpose described.

78,449.—DOOR LOCK.—J. E. A. Gibbs, Steele's Tavern, Va.

I claim, 1st, The combination of the series of guards or wards, N, with the slotted cylinder, E, substantially as herein shown and described and for the purpose set forth.

2d, Forming the key, K, in such a manner that it may fill up the slot in the cylinder, E, and so that its face may correspond with the face of said cylinder, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the tumbler, L, with the slotted cylinder, E, and with the guards or wards, N, substantially as herein shown and described and for the purpose set forth.

78,450.—STUMP EXTRACTOR.—Alfred Goodrich, Burnt Prairie, Ill.

I claim the construction and arrangement of the pyramidal frame, P, upon the runners, R, shaft, S, ratchet wheels, u w, of unequal diameters, pawl, b, standard, s', pivoted lever, L, and link, l, as herein described for the purpose specified.

78,451.—REFLECTING GAS BURNER.—Thomas Grist, Philadelphia, Pa. Antedated May 19, 1868.

I claim, 1st, The arrangement of the burner, e, on the top of the reflector, F, as and for the purpose set forth.

2d, The combination of the distributer, B, pipe, E, passing through the reflector, and the burner, e.

3d, The perforated washers, h and l, in combination with the pipe, F, the reflector, F, and the openings in the latter.

78,452.—GATE.—William C. Hooker, Abington, Ill.

I claim the gate, B B B, swung between the swinging frames, D D, substantially in combination with cords, E E, or their equivalent, the uprights, A A, and weights, J J, all as and for the purpose set forth.

78,453.—WARPING FRAME.—C. H. Howard (assignor by mesne assignment to himself and Horace N. Jordan), Lewiston, Me.

I claim the combination with the stationary guide, guide rolls or rods, o, of the weighted reeling rod, bar, or roll, so arranged as, in its ascent, to take up the slack, substantially as set forth.

78,454.—VALVE GEAR FOR STEAM HEATING APPARATUS.—Henry Howard, Springfield, Mass.

I claim, 1st, The double case, F, in combination with valves, g g', substantially as herein set forth.

2d, The partitioned pipe, G, formed on the double valve case, F, as herein specified.

3d, The prolongation, I, formed on pipe, G, as herein specified.

4th, The valve, g, and stem, r, in combination with the valve, g', and stem, e', bar, D, screw, E, and case, F, substantially as herein specified.

78,455.—PAVEMENT FOR STREETS AND WALKS.—Asa Hoyt, Chicago, Ill.

I claim, 1st, The use of gas house lime in compounding street pavements when mixed and applied, substantially as specified and for the purposes set forth.

2d, A pavement compounded as specified, that is, of small stone and gravel, coal or pine tar, sand, cement, and gas house lime.

3d, The use of alum water at the time of laying, as specified.

78,456.—FURNACE FOR ROASTING ORES.—Edward P. Hudson, New York city.

I claim forcing heated air or oxygen, in addition to the products of combustion, through ores, for the purpose of removing sulphur, phosphorus, and similar injurious substances therefrom, substantially as herein specified.

Also, the chamber or reservoir, a, below the bottom of the fire chambers or flues, with a passage or passages, h, at or near the base thereof, through which air is forced and heated by the roasted ores therein, and in turn cools the said ores ready for withdrawal, substantially as herein specified.

Also, introducing air, in excess of that required for combustion, but regulated in quantity, into the ores, through the fire chambers, over the fires, so as to be heated thereby, before passing through the ores, substantially as herein specified.

Also, the arrangement of one fire chamber higher than the other, substantially as and for the purpose herein specified.

78,457.—PLOW.—Samuel Hulbert, Ogdensburg, N. Y.

I claim the improved manner of fastening the plow and cultivator together, separately and connectedly, in manner and for the purposes as herein described and constructed.

78,458.—VENEER CUTTING MACHINE.—Edward Jewett, Rindge, N. H. Antedated May 18, 1868.

I claim attaching and securing the "bolt" to the carriage, A, by means of dove-tailed ribs, D D, substantially as and for the purpose set forth.

The adjustable ribs, D D, moving in grooves cut in the carriage A, and secured by set screws, or their equivalent, substantially as and for the purpose set forth.

The vertically-adjustable clamping rib (fig. 7), substantially as and for the purpose set forth.

78,459.—LIGHTNING ROD.—George Kirtland (assignor to S. Smith), New Haven, Conn.

I claim, 1st, The internal connection for tubular lightning rods, constructed substantially in the manner herein set forth.

2d, The socket, L, provided with an India-rubber packing, in combination with the rod, E, so as to operate substantially as specified.

78,460.—HARVESTER CUTTER.—Moses Lewis, Odell, Ill.

I claim the removable bars, D F, adapted to be substituted, one for the other, in the same finger bar, for reaping or mowing, as herein shown and described.

78,461.—TIGHTENING WHEEL TIRES.—Thomas R. Markillie, Winchester, Ill. Antedated May 27, 1868.

I claim the cap, E, with side walls thickened at e, for the purpose described, the plates, c c, the shoe, F, and bolts, d, arranged as described, combined with the tire, B, and fellies, A, substantially as and for the purpose set forth.

78,462.—RAILWAY.—Carlo Margutti, Milan, Italy.

I claim, 1st, A locomotive, provided with the eccentric segments, F, which act upon a corrugated or wave-shaped rail, M, in the manner substantially as shown and described.

2d, Operating the eccentric segments, F', by means of the reciprocating bars, D D', and the attached bearings, E, of the same, substantially as shown and described and for the purposes set forth.

3d, The combination of the reciprocating bars, D D', with the steam driving cylinders, P, substantially as shown and described and for the purposes set forth.

4th, The arrangement of the bars, D D', connected together substantially in the manner shown and described, so that the movements of the bars, D D', on one side, and its attachments, will produce a movement in the opposite direction of the other bars D D', and their attachments.

5th, The combination of the reversing pulleys, F, with the eccentric segments, F', substantially as herein shown and described.

6th, The springs, s, in combination with the eccentric segments, F', substantially as shown and described and for the purposes set forth.

7th, The slots, s2, in the eccentric segments, F', as and for the purposes shown and described.

8th, In combination with the eccentric segments, F', and pulleys, F, the buttons, e, for holding said segments, F', against the pulleys, F, substantially as shown and described.

9th, In combination with the eccentric segments, F', the rail, M, constructed and arranged substantially as described for the purpose specified.

10th, The propulsion of railway cars by means of corrugated or worm-shaped rails, M, and a locomotive mechanism in conjunction with said rails substantially as shown and described and for the purposes set forth.

78,463.—MOUNTING PICKER STAFFS.—William Mason, Taunton, Mass.

I claim the bed, formed with a V-shaped groove, and the rocker, with its under surface of the corresponding form, in combination with the open link, by which the rocker is kept in place on the bed, substantially as and for the purpose set forth.

78,464.—GANG PLOW.—Don Carlos Matteson, Stockton, Cal.

I claim, 1st, The bars, E F, attached to the front ends of the beams, A B, with the perforated draft bar, G, attached thereto, substantially as and for the purpose specified.

2d, The attaching of the caster wheel, J, to a single arbor, K, provided with a scraper, f, substantially as and for the purpose set forth.

78,465.—GAS MACHINE.—Hiram S. Maxim and John F. Lockwood, New York city.

We claim, 1st, In an apparatus for making carbureted air, controlling the heat used for evaporating the hydrocarbon liquid by the pressure of the contents of the vessel in which the said liquid is held, as set forth.

2d, Constructing the tank, A, with an elastic head, side, or bottom, b, by which the position of the valve, B, is controlled, as set forth.

3d, Drawing the air to be carbureted into the pipes through which the hydrocarbon vapor is conducted by means of the escaping force of the vapor, as set forth.

4th, The manner herein described of heating or boiling hydrocarbon liquid with a flame of its own gas, said flame being increased or diminished by the pressure of the vapor so generated, as set forth.

5th, The tank, A, valve, B, pipes, c d f and g, arranged and operating as set forth, to cause the heating of the contents of the tank, as set forth.

6th, The above, in combination with the elastic head, b, made as set forth.

7th, Arranging an independent burner, l, in the pipe, D, substantially as set forth, for the purpose of igniting the burners, g g, as specified.

8th, The jet pipe, j, arranged in the tube, E, for the purpose of causing the escaping vapors to draw air into the tube, E, and to have such air carbureted, as set forth.

9th, The outer case, G, in combination with the gas apparatus, as set forth, said case being provided with apertures or valves.

10th, A gas machine, made and operating substantially as herein shown and described, and consisting of the tank, A, elastic head, b, valve rod, C, valve, B, pipes, c d f and g, discharge pipes, D and E, jets, h and j, burner l, and splashing board, n, all made as set forth.

78,466.—BRIDLE BIT.—Patrick J. McGuiness, New York city.

I claim as a new article of manufacture, a curb and driving bit, consisting of the bars, A B, provided with rings, b, straps, c, and sliding cheek pieces d, when said bars are each curved in opposite directions from the center, all constructed, arranged, and operating as set forth.

78,467.—CAR AXLE AND WHEEL.—James Montgomery, Croton, N. Y. Antedated May 16, 1868.

I claim, 1st, In reversely conical-shaped axles, made up of segmental bars, as described, the insertion, between the latter, and welding with them at their ends, of I-shaped bars, substantially as specified.

2d, The combination, with a reversely conical-shaped axle, composed of segmental or separate bars, arranged as specified, of the outer ring and interior central brace, B, cast in one piece, and through which the bars are run or passed, as herein set forth.

3d, The combination, with the axle made of wrought metal, of the wheel hubs or central portions cast thereon, together with their bearings or journals, essentially as specified.

78,468.—ORE SEPARATOR.—R. C. Morton, West Lubeck, Me.

I claim, 1st, The series of lever or hinged plungers, C C' C'' C''', etc., acting upon the series of cells, D D' D'' D''', substantially as shown and described in combination with the corresponding compartment tray, H, all as and for the purpose set forth.

2d, The adjustable bars, s, substantially as shown and described, in combination with the rollers, d, and cams, c, of the shaft, h, all as and for the purpose set forth.

3d, The lever cocks, k, substantially as shown and described, in combination with the box, G, slide, E and plungers, all substantially as shown and described and for the purpose set forth.

4th, The bar, A, rubber springs, j, plates, f, and lever plungers, all constructed and operating substantially as shown and described and for the purpose set forth.

5th, Tray, H, having partitions, u u u, substantially as shown and described, in combination with a series of plungers and a series of cells, D D' D'' D''', all as and for the purpose set forth.

78,469.—STUMP EXTRACTOR.—Crawford Munns, N. Y. city.

I claim, 1st, The pintle, d, in combination with a stump extractor and its base or platform, substantially as described for the purpose specified.

2d, The triangular frames, A A, of a stump extractor, arranged substantially as shown and described, and secured to the base B, by means of the pintle bolt, d, or its equivalent, for the purpose set forth.

3d, The hinged leaves, B' B', and base, B, in combination with a stump extractor, all constructed, arranged, and operating substantially as shown and described for the purpose set forth.

4th, The platform, B, substantially as shown and described, when combined with the pintle bolt, d, of a stump extracting machine, all as set forth.

78,470.—MACHINE FOR CROZING AND CHAMFERING BARRELS.—Charles Murdock, Ellenville, N. Y. Antedated May 18, 1868.

I claim, 1st, The combination of the sliding frames, E E, upon each side of the main frame, and bearing the crozing and chamfering cutters, J K, with the barrel holding frame, g, all operating as described, whereby both ends of the barrel are chamfered and crozed at the same time, as herein shown and described.

2d, The arrangement of the sliding frames, E E, in which the cutter head shafts are hung and turn, connecting rods, V V, and lever arm, T, in combination with the sector shaped arm, R, all arranged together and operating as and for the purpose specified.

3d, The arrangement of the sliding sleeve, Y, having wedge shaped arms, of the cutter head shafts, connecting levers, W W, lever arm, U, and sector shaped arm, S, all connected together and operating as and for the purpose specified.

4th, The barrel-holding frame, g, having spring jaws, for grasping and holding the barrel while being operated upon by the crozer and chamfer cutters, arranged so as to be raised or lowered, substantially in the manner described and for the purpose specified.

78,471.—TWEER—William H. Myers (assignor to Sylvester Matthias), Baltimore, Md.

I claim an escape pipe, D, or its equivalent, independent of the duct which conveys the blast to the fire, descending from the center of the tweer, to convey away ashes, dust, etc., from bottom of the fire, and to admit a direct draft when the bellows is not in operation, substantially as set forth.

A tweer, constructed with the air chamber, B, outlets, C C, and the escape pipe, B, substantially as described.

78,472.—TAILOR'S SEAT.—Friedrich Neuhaus, Belleville, Ill.

I claim, 1st, A tailor's seat, provided with a back, B, and an adjustable knee support, E, substantially as herein shown and described.

2d, The devices herein shown and described of attaching the cushion, F, to the seat, A, said devices consisting of the eye, a, rods, C D and E, all made as described, and operating so as to allow the backward and forward, up and down, and lateral adjustment of the cushion, as set forth.

78,473.—POTATO DIGGER.—H. B. Norton, Rochester, N. Y.

I claim, 1st, The combination of the loose frame, C, carrying the operating apparatus, with the axle and driving wheels, when said frame is capable of being elevated by the joint action of the team and operator, as herein set forth.

2d, The combination of the folding bars, L L, with the lever, K, and frame, C, in the manner and for the purpose specified.

3d, The arched axle, B, when employed in combination with the driving wheels, A, and endless apron, I, whereby the edge of the wheels may be reduced to the minimum, and a free passage for vines is left over the apron, as herein set forth.

4th, The shares, D D, set angularly, and with the land sides inward, in combination with the scraper, H, whereby the sides of the row are first plowed off, and then scooped up, as herein set forth.

5th, Adjusting the shares, D D, centrally, irrespective of the scraper, both at the top and bottom, by the slots, b b', as herein described.

6th, The construction and arrangement of the bearings, t, rollers, s s', and angular caps, u, as herein specified.

7th, The combination of the inclosed and alternating agitator, W, with the endless apron, I, as herein set forth.

8th, The combination of the side guards, E E, with the endless apron, I, as herein specified.

9th, The construction and arrangement of the endless apron, the same consisting of the flexible sides, v v, the A-shaped or half-circular slats, w, and the stay pieces, w', united by rivets, the whole operating in the manner and for the purpose specified.

10th, The combination of the tension rods, e, with the plow standards, a, and endless apron, I, whereby the plows, scraper, and apron are drawn forward at pleasure, to make them taut, as herein set forth.

11th, The combination and arrangement of the offsets or notches, b', and the springs, z, with the curved slots, h, in the manner and for the purpose specified.

12th, The combination of the door, r, and lever, q, with the open receptacle, M, arranged and operating as herein set forth.

13th, The employment of two bearing rollers, s s, on opposite sides, for sustaining the front end of the apron without a connecting shaft, as herein set forth.

78,474.—FRUIT JAR.—H. B. Norton, Rochester, N. Y.

I claim in combination with the concentric rims, b b', projecting vertically from the cover, B, the externally beveled mouth, d, of the jar, for compressing the packing substance against the outer flange, to prevent its entering and commingling with the contents of the jar, substantially as set forth.

78,475.—RAILROAD CAR STOVE.—R. O'Brien, Dalton, Ohio.

I claim, 1st, The combination of the arm, H, and weight, I, with the spindle, D, of the pivoted frame, C, substantially as herein shown and described and for the purpose set forth.

2d, The detachable bed plate, M, in combination with the pivoted frame, C, and swinging stove, A, substantially as herein shown and described and for the purpose set forth.

3d, An improved railroad car stove formed by the combination of the swinging stove, A, pivoted frame, C, supporting frame, E, weighted arm, H I, and detachable bed plate, M, with each other, said parts being constructed and arranged substantially as herein shown and described and for the purpose set forth.

78,476.—EXTENSION STEP LADDER.—G. W. Packer, Toulon, Ill.

I claim an extension step ladder consisting of the hinged parts, B C, truss, E, and chains, G, constructed and arranged substantially as herein described.

78,477.—MANUFACTURE OF PLATES OF COMBINED STEEL AND IRON.—James Park, Jr., Pittsburg, Pa.

I claim giving a welding heat to the iron or fibrous metal side only of the ingots, in the manner hereinbefore described, and then uniting these surfaces by welding them together, either with or without an interposed layer of wrought iron or other fibrous and malleable metal, substantially as hereinbefore set forth.

78,478.—TABLE AND QUILTING FRAME.—Milton E. Phillips (assignor to himself, Paul Wetzel, and George Wetzel), Lena, Ill.

I claim the combination, substantially as set forth, with a centrally-divided leg, a centrally divided hinged table top, pivoted supports, and spring detents, of horizontal frame pieces, ratchets, and a horizontal brace, for the purposes specified.

78,479.—NAIL EXTRACTOR.—I. A. Pinnell, Boonville, Mo.

I claim the lever handle, A, fulcrum bar, C, having the curved fulcrum, b, the claw levers, D and E, having the claws, a a, all pivoted together, constructed to operate substantially as shown and described and for the purpose set forth.

78,480.—WHEEL.—Henry Poth, Pittsburg, Pa.

I claim the hub flanges, a a, provided with corresponding wedge feathers, b b, when adapted to be drawn together by means of the differential screw box, d e, on which the screw caps, g, are fitted, the tenons of the spokes being protected by elastic material, k, all constructed and arranged as and for the purpose described.

78,481.—LOW WATER INDICATOR.—John C. Raymond and Francis T. Allyn, Brooklyn, N. Y., assignors to F. T. Allyn.

We claim the stop, q, in combination with the lever, k, rod, o, nut, p, expanding tube, c, and with the valve stem, l, of the whistle, all as shown and described.

78,482.—HARVESTER.—George Rector, Sodus, Mich.

I claim, 1st, the arrangement of the rock shaft, a, and the two sickle bars, d and h, the latter being located in line with the tread of the wheels, and hinged to the adjustable yoke, D, substantially as described.

2d, The U-shaped frame, D, with the horizontally projecting arm to which the finger bar is hinged, and having the projecting brace bar, G, arranged to bear against the rear side of the finger bar, said frame, D, being adjustable vertically, all constructed and arranged to operate as herein described.

3d, The combination of the driving gear, L, crank shaft, t, with its sliding gear, m, pitman, n, and rock shaft, s, when said parts are constructed and arranged to operate as and for the purpose set forth.

4th, The combination of the two sickle bars, d and h, pitman, t, and rock shaft, s, provided with its two arms, and crank, r, having a series of holes for adjusting the stroke, as herein set forth.

78,483.—VALVE FOR STEAM ENGINES.—Alex. K. Rider, Nazareth, Pa., assignor to himself, C. H. Delamater, and G. H. Reynolds.

I claim the master valves, D1 D2, operated by and controlling in turn the action of the steam in throwing the main valve, G, substantially as and for the purposes herein set forth.

78,484.—ELEVATOR FOR CULTIVATOR BARS.—J. S. Rowell and Ira Rowell, Beaver Dam, Wis.

We claim, 1st, The roller stands or bearings constructed and arranged as and for the purpose set forth.

2d, The sheaves, D D', provided with the inclined catch, d, and lop, c, in combination with the ratchet, b.

3d, Pivoting the jaw, as described, out of line with the groove in the sheave, so as to form an automatic locking and unlocking device, as set forth.

4th, The combination of the sheaves, D D', bearings, B B', and roller, C, as arranged, and operating in the manner and for the purposes set forth.

78,485.—APPARATUS FOR CURING HOPS.—J. S. Sandt, St. Joseph, Mo.

I claim, 1st, The ventilators H H', lever, S, ropes, e e' and g, pulley, p, and wheel, P, of a hop-curing house, all arranged in relation to each other substantially as and for the purpose specified.

2d, The racks, b b', shaft, B, with its pinions, c c1, driving wheel, C, with its radial arms, d d1 d2, etc., b b1 b2, etc., pulley, D, wheel, E, and endless rope, m, of a hop-curing house, all arranged relatively to each other substantially as and for the purpose specified.

3d, A hop-curing house combining the above specified devices, all arranged substantially as and for the purpose specified.

78,486.—MACHINE FOR GROOVING SHEET METAL.—William Servis, Sidney, Ohio, assignor to Jason McVay and Jason S. Carey.

I claim, 1st, The offset, F, substantially as shown and described, in combination with rack, D, wheel, G, and arm, B, as and for the purpose set forth.

2d, The gage, E, constructed and operating substantially as and for the purpose shown and described, in combination with the arms, C and B, and wheel, G, all as set forth.

78,487.—VINE TRELLIS.—Carl Seyler, Cleveland, Ohio.

I claim the plug or shaft, D, studs, a', and ring, F, as arranged, in combination with the arms, A, for the purpose and in the manner substantially as set forth.

78,488.—FLOATING WATER POWER.—Albert B. Shepard, Sand Bank, N. Y.

I claim the arrangement upon the floats, A A A, of the wheels, C, keyed upon the shaft, D, having the gear wheel, E, the shaft, F, having the beveled pinion, G, and pulley, K, the hinged frame, B, supporting the pulley shaft, g, and attached to the shore by the shaft, H', as herein described, for the purpose specified.

78,489.—FLIER FOR SPINNING MACHINES.—Harvey Silver, Lowell, Mass. Antedated May 23, 1868.

I claim, 1st, The spring portion, shown and described, when combined with the saddle and constructed and arranged for the removal and replacing of the guide pin, e, for the purpose and substantially as described.

2d, The guide pin, e, when constructed as described, and applied to the spring portion and the saddle, c, as and for the purpose described.

3d, The combination of the saddle, spring portion, and pin with the flier arm or arms, for the purpose and substantially as described.

78,490.—HARVESTER.—Lorenzo D. Snook, Barrington, N. Y.

I claim, 1st, The construction and arrangement of the lever, provided with the anti-friction wheels and arm, with the plate, F, and forked wedge-shaped lever, G, when applied and actuated as and for the purpose set forth.

2d, The laterally adjustable coupling, H, in combination with the connection, H, when made and used as and for the purpose specified.

3d, The hook, L, when made and applied to keep the cutter bar in place, substantially as specified.

78,491.—SELF-FASTENING BUCKLE.—William W. Spencer, Pittsburg, Pa.

I claim a buckle provided at each end with two transverse bars, c c, arranged as described, for facilitating the casting process, in combination with transverse bars, F and G, as and for the purpose set forth.

78,492.—PLOW.—C. Ph. Steinmetz, Madison, Wis.

I claim, 1st, The swivel clevis, a, as constructed, arranged, and fully described and shown.

2d, The combination of the reversible plowshare, A, or cultivator share, E, with the vibrating upright shaft, B, lever, D, and stop, C, as shown and described.

3d, The swivel clevis, a, reversible plowshare, A, or cultivator share, E, vibrating shaft, B, lever, D, and stop, C, notched bar or standard, e, with wheel, key, ', and plates, F, all constructed and arranged in combination with a plow frame, as shown and described.

78,493.—EAR TRUMPET.—Thos. H. Stilwell, M.D., New York city. Antedated May 18, 1868.

I claim the tubular trumpets, A A, connected by means of a wire rod, B, and having vibrating wires, C, arranged within them, substantially as and for the purpose specified.

78,494.—SUSPENDER.—Wm. P. Towles, Baltimore, Md.

I claim the combination and arrangement of the adjustable non-elastic shoulder straps, C, center, A, elastic strap, D, rings, E, and buttonhole straps B, substantially as and for the purpose herein shown and described.

78,495.—TELEGRAPHING.—C. F. Varley, London, England.

I claim, 1st, So arranging telegraphic apparatus as to work by the variation of the increment and decrement of electric potential, and not by the direct action of the electric current itself, as and for the purposes set forth.

2d, The use of an induction coil at the receiving end of the cable, one of its wires being connected between the cable and the ground, and the other or secondary wire connected with the receiving instrument, as and for the purposes set forth.

3d, The use of a condenser or condensers between the receiving end of the cable and the earth, with or without resistance coils between the cable and the earth, as and for the purposes set forth.

4th, The use of a condenser at the sending end of the cable, with or without resistance coils connecting its two armatures, as and for the purposes set forth.

5th, The use of a condenser at each end of the cable, the cable being connected with the ground through a resistance coil and a battery, so as to keep the cable always negatively electrified, as and for the purposes set forth.

78,496.—CAP FOR MARINE STOVE PIPES.—George Warner, Cleveland, Ohio.

I claim the top shield, C, and the two flexible side shields, B B, in combination with the cap, A, as described, and when used in the manner and for the purposes set forth.

78,497.—ELECTRO-PLATING FRAME.—William H. Watrous, Hartford, Conn.

I claim the holding frame, A, constructed substantially as and for the purposes herein shown and described.

78,498.—APPARATUS FOR DISTILLING.—Alexander Webster, Seneca Falls, N. Y.

I claim the cap, combined with the cylinder, A, and the tube, B, substantially as and for the purposes described, separating the lighter and more refined portion of the vapor which rises from a still in the process of distillation from the heavier portions, for the purpose of obtaining two or more qualities of liquor, substantially as described.

78,499.—SELF-BORING STOP COCK.—Alfred Weed, Boston, Mass.

I claim a faucet provided with a screw thread, f, on its barrel, for the purpose set forth, its entering end provided with a closed boring tool, d, and the blank or smooth surface, o, between the screw thread and the boring tool, in which blank surface are the inlets, c, communicating with the passage through the faucet, and also provided with handles, e, by which the borer is turned, the smooth surface pushed into the tap hole, and the faucet turned as it is screwed into the tap hole.

78,500.—RAILWAY SWITCH.—Wm. Wharton, Jr., Philadelphia, Pa.

I claim switch rails arranged to move laterally from a fixed point, in combination with a shaft having two or more graduated cranks, or their equivalents, for serving the twofold purpose of operating and laterally steadying at different points the said switch rails, substantially as set forth.

78,501.—PLOW.—Wm. Whiteley, Springfield, Ohio.

I claim, 1st, The construction and use of plows, when the shapes of those parts which cut and invert the furrow slice are determined and obtained by the herein described rule, substantially as set forth.

2d, The method of obtaining modified forms of the plow shape, substantially as herein described.

3d, In combination with the draft bolt, J, the stirrup, G, or its equivalent, which surrounds both bolt and beam and binds them firmly together, without perforating or otherwise weakening the beam.

4th, In combination with the post to which the mold board is connected, the bolt, J, or its equivalent, for the purpose of connecting the draft rod at a rigid point in front of the plow post.

5th, In combination with the post, C, and beam, D, the notched flange, E, for the purpose of shifting the position of the said beam in relation to the post, C, so that a team of two or three horses may be used at pleasure.

6th, In combination with the clevis, L, or its equivalent, the eye bolt, M, and washers, N, substantially as and for the purpose set forth.

7th, In combination with the front projection at the top of the plow post and the land side of share, the coulter, Q', or its equivalent, secured to said projection or its equivalent, in front of the clamping stirrup, in order to equalize the upward pressure, substantially as set forth.

8th, The brace, S, in combination with the post, C, and stirrup, G, substantially as and for the purpose set forth.

9th, The stirrup, G, constructed with the horizontal portion, h, to enable the beam to be adjusted sideways, as described and for the purpose set forth.

10th, The share, B, constructed with the land side bar, R, substantially in the manner shown.

78,502.—BUTTER WORKER.—Hosea Willard, Vergennes, Vt.

I claim the rod or spindle, B, with the wings, C and D, connected therewith, in combination with a tray or trough, and operating substantially as and for the purposes herein shown and described.

78,503.—MACHINE FOR FASTENING LACING HOOKS TO GAITERS.—Lewis S. Wiswell, Utica, N. Y.

I claim, 1st, The slides, G and H, constructed substantially as described.

2d, The punch, D, with recess for holding the hooks, constructed substantially as described, in combination with the said slides.

3d, The arms, L, pin, F3, and spring, L', constructed and operating in combination, substantially as described.

4th, The cam, F, lever, C, and punch, D, in combination, substantially as described.

5th, The agitator, constructed and operating substantially as described.

6th, The ways, K K', constructed and operating substantially as described, in combination with the arms, L.

78,504.—HORSE HAY FORK.—Jonathan Wolfrom, York, Pa.

I claim the tines, A, and frame, D, substantially as shown and described, in combination with the points, E, middle time, G, latch lever, d, and slot, l, or the equivalent thereof, all as and for the purpose set forth.

78,505.—CLASP FOR FASTENING GARMENTS.—Wendell Wright, Bloomfield, N. J.

I claim the plates, A B B, connected together by joints or hinges, provided with springs, b b, the plates, B, being provided with spurs or points, all constructed and arranged substantially in the manner as and for the purpose set forth.

78,506.—NEEDLE FOR KNITTING MACHINES.—Walter Aiken, Franklyn, N. H.

I claim the improved knitting machine needle, made with a series of flexures or corrugations, a a a, in its shank, substantially as represented in fig. 1 of the aforesaid drawings, and as hereinbefore specified.

78,507.—ICE HOUSE FOR BREWERS AND BUTCHERS.—Adam Baierle, Fredereck Hartmann, and Friedrich Reese, Chicago, Ill.

We claim a building for preserving meats, beer, and similar articles, consisting of the ice chamber, B, and cooling vault, A, provided with one or more ventilators, I, all constructed and arranged substantially as shown and described.

78,508.—SHINGLE MACHINE.—David H. Ball, Sinnamahoning, Pa.

I claim, 1st, The plates, o o, when arranged in relation to the head block, p, and dog, p' p', said dogs being constructed to rest or slide on the plates, as and for the purpose specified.

2d, The block, s, and spring, s', constructed and arranged to operate as and for the purpose set forth.

78,509.—OYSTER DREDGE.—C. T. Belbin, Baltimore, Md.

I claim the combination of the two bolts, m and n, with the lug, o, the rods, A and B, and the head, C, when all said parts are combined and arranged so as to operate together, substantially in the manner and for the purpose set forth.

78,510.—DEVICE FOR OPERATING WATER WHEEL GATES.—Joseph H. Bodine and Truman A. Hill, Mount Morris, N. Y.

We claim the arrangement of the pivoted sector, m, pinion, P, and hand wheel, S, and pivoted connecting rod, u, with relation to the circular register gate, G, whereby said gate is operated horizontally to open and close all the water ways at once, as herein shown and described.

78,511.—CHURN DASHER.—A. H. Brainerd, Rome, N. Y.

I claim, 1st, The head, B, pivoted upon the reciprocating staff, A, and provided with spiral flanges, F, substantially as described.

2d, In combination with the above, the beveled floats, E E', substantially as and for the purpose specified.

78,512.—MACHINE FOR SHAVING SCREWS.—James Burns, New York city, assignor to himself, Richard McCullough, and John Fanning.

I claim, 1st, In combination with the stationary tool, b, and spring guide, Y, the forked lever, U, cam, M, and griping holders, R R, for taking the screw blank from the spring guide, holding, bringing up, and rotating the same against the stationary tool during the operation of shaving the blank-head, and discharging the blank without the aid of a punch, for either feed or discharge of the screw blank, substantially as described.

3d, The combination of the oscillating and reciprocating griping holder carriage, J, cams, K K' N, and spring, O, arranged substantially as and for the purposes set forth and described.

78,513.—CORK EXTRACTOR.—Elijah Button, Annapolis, Md

I claim the cork extractor consisting of springs having their lower ends adapted to turn on the ring, h, all operating as described, whereby the cork is caged lengthwise in the bottle, without turning the latter upside down, as herein shown and described.

78,514.—PRESERVING WOOD.—James Calkins, New York city.

I claim, 1st, The employment of steam, in combination with the gases of combustion generated as described, admitted together into the treating chamber, for the drying of wood and other materials, substantially as set forth.

2d, The process of preparing and treating wood or other material by means of steam and of superheated steam and carbonic oxide, or the gases of combustion, and subsequently treating with the hot oleaginous vapors under pressure while in a highly heated condition from the previous treatment, substantially as described.

3d, The described apparatus, consisting essentially of the generator, A, and its appurtenances, the treating chamber or chambers, Y and K2, tanks, M and L, with their several systems of pipes and cocks, arranged, combined, and operating substantially in the manner and for the purposes set forth.

4th, In combination with the treating chamber or chambers and the generator, the water gage or regulator contained within the dome, M2, or its equivalent, for regulating the pressure of the steam or vapors employed, operating substantially as set forth.

5th, The combination of the pipe, U, with the fire chamber, D, and generating chamber, C, whereby the gases of combustion may be directly admitted into the steam space, substantially as set forth.

78,515.—HARVESTER CUTTER.—Thomas J. Christy, Olney, Ill. Antedated May 25, 1868.

I claim the combination of the chain sections, b, formed with projecting heels, b', for both driving and guiding the blades, a, and links, c, bolted to the sections, b; the pinion, d, driving the chain, through the medium of the projecting heels, b'; the central bar, g, with ledges, g' g', forming guide ways for the heels, b; the finger beam, e, with upturned flanges, e', and the cap plate, f, when the said parts are constructed, arranged, and employed in the manner and for the purpose specified.

78,516.—HALTER BUCKLE.—Francis Ditton, Auburn, N. Y.

I claim, 1st, In combination with three tongued buckle, the loop, S, for securing the ends of the straps, substantially as described.

2d, The application and use of the said buckle in the manufacture of halters, when the same is constructed and used in the manner above specified.

78,517.—COOKING STOVE.—Wm. Doyle, Albany, N. Y.

I claim, 1st, The construction and arrangement of extension flue, C, in combination with a reversible or return flue, F, under the oven of a cooking stove, substantially as shown and described.

2d, Flue stopper, B', in combination with flue plates, a, of extension flue C, when constructed as and for the purpose set forth.

3d, The construction and arrangement of front descending flues, A A, in combination with extension flue, C, substantially as set forth.

4th, The arrangement and combination of front descending flues, A A, cross or connecting flue, H, extension flue, C, and revertible flue, F, substantially as shown and described.

5th, The construction and arrangement of a front descending and direct flue or flues, A A, and cross flue, H, united by extension flue, C, with a revertible flue, F, under the oven of a cooking stove, when all of said flues are operated and controlled by one damper, P, substantially as set forth.

78,518.—VALVE FOR STEAM ENGINE.—Gustav L. Enggren, Brooklyn, N. Y. Antedated May 27, 1868.

I claim, 1st, The combination with the valve or piston, D, having a passage, h, through it, and aperture, s, in communication with the exhaust passage, H, or its equivalent, of a valve or slide, L, constructed and operating by the throw of said piston, to effect or regulate the cushioning of the piston at or towards the close of its stroke, but allowing of a free escape for vapor or air on the forward side of said piston, in the early portion of its action, in either direction, essentially as herein set forth.

2d, The combination of the piston, D, with its independent valve or slide, L, operating in connection with exhaust passages as described, and valves, J J', constructed and arranged for action together, substantially as shown and described.

78,519.—BREECH-LOADING FIRE-ARM.—Francis H. Escherich, Baltimore, Md.

I claim, 1st, The construction of the angular pins, g g', of the forwardly projecting part, g, and the downwardly projecting part, g', and operated by the hook, l, of the lever, F, substantially as herein described and for the purpose specified.

2d, The cam, E, provided with projections, g h i, and bulging part, j, in combination with the lever, F, provided with hook, l, and arm, k, substantially as and for the purposes described.

3d, The cam, E, and lever, F, constructed as described, in combination with the hook, n, provided with recess, o, and the hollowed recess, m, substantially as and for the purposes set forth.

4th, The cam, E, lever, F, and hook, n, constructed as described, in combination with the pin, q, provided with a downward projection, q', and secured to the spring, r, and with the hold, p, in the breech, substantially as and for the purposes set forth.

78,520.—LATHE TOOL HOLDER.—C. H. Fowler, Roxbury, Mass.

I claim as an improved tool holding device for metal-turning lathes, etc., the combination and arrangement of the bar, a, screw sleeve or hollow nut, c, and double tapering tube, d, the whole being arranged and operating as herein shown and described.

78,521.—DOOR AND WINDOW CATCH.—S. W. Gear, Whitestone, N. Y.

I claim the two springs, b c, constructed to lock one within the other, as shown and described, and arranged in relation with each other upon the door and frame, substantially as and for the purpose specified.

78,522.—ATTACHMENT TO COOKING STOVE FIRE CHAMBER.—Job Harrison (assignor to himself, George W. Esterly, and C. C. Lewis), Whitewater, Wis.

I claim, 1st, So applying the arch, D, to the fire chamber of the stove that the air chambers, s t, are formed, one between the arch and oven, and the other both back of and above said arch, all in the manner substantially as herein described and shown.

2d, The arch, D, or its equivalent, constructed substantially as described, and applied to a stove for the purpose set forth.

78,523.—CLOTH AND CLOTHES PIN.—Richmond Hathaway, Chicopee, Mass., assignor to himself and Levi O. Allen, Gardiner, Me.

I claim as an article of manufacture, the clothes pin constructed as described, viz., with the central coil, a, the levers, d d, the central depressions to admit the line, and the pointed and ring jaws, all as set forth.

78,524.—FILTER.—Lawrence Holms, Paterson, N. J.

I claim the arrangement of the valves, G H, passages, c d e f, openings, a b a' b', water spaces, l k, and filtering beds, m x, as and for the purposes described.

78,525.—BARBERS' CHAIR.—Charles Kaestner (assignor to himself and Jacob Becker), Chicago, Ill.

I claim a reversible hollow spring seat, provided with the locking bolts, d, levers, G, and handle, D, when constructed and arranged to operate substantially as described.

78,526.—CHURN.—Joseph Kepler, Crawfordsville, Ind.

I claim the device of a single concave breast, with metal points, the convex-concave bottom, B, descending from the elevated breast C, through the openings, F F, figs. 1 and 2, in combination with perforated top, M, in fig. 4, dash, fig. 3, and scroll top, fig. 6, enclosed in a box, substantially as herein set forth.

78,527.—ARCH OF FURNACE FOR EVAPORATING KETTLE, ETC. Emil Laass, Syracuse, N. Y.

I claim the arch made in section, A A, jointed at the crown by the cylindrical keystone, B, and resting at the spring loosely upon the ways, a a, the whole so arranged that the arch, or either section thereof, can be adjusted bodily in or out, without elevating, and can be readily taken apart, as herein set forth.

78,528.—LAMP CHIMNEY CLEANER.—James Lee, New York city. Antedated May 22, 1868.

I claim the lamp chimney cleaner constructed as described, consisting of the elastic disks, B, secured to the end of the handle A, at right angles to its axis, by means of the screw, C, and provided with the flexible washer, D, as herein shown and described.

78,529.—SHAFT COUPLING.—J. F. Light, Worcester, Mass.

I claim, 1st, The combination of the ends of the shafts, when shaped or cut away and applied to each other, substantially as shown in figs. 2 and 3 of the drawings, so as to prevent the independent longitudinal movement of the one shaft with respect to the other, with holding nuts for encircling and coupling said shafts in the manner herein shown and specified.

2d, The combination with the clasps, B B, of the guide pieces or pins, 2 2, or either, substantially as and for the purposes set forth.

78,530.—SOAP.—O. E. Loomis, Ellenburg, N. Y.

I claim a soap compounded of the ingredients and in the manner herein set forth.

78,531.—SEAT FOR HARVESTER.—W. J. Ludlow, Cleveland, O.

I claim a seat for harvesters, mowing machines, and horse rakes, suspended so as to swing laterally, constructed and arranged substantially as and for the purpose herein set forth.

78,532.—BALANCE.—Louis A. Matos, Philadelphia, Pa.

I claim the adjusting or sliding balance weight, E, in combination with the vernier or graduated arc, and the vibrating weight, which is suspended on an arm which is pivoted to the chord of the arc, substantially as shown and described.

78,533.—SAFETY BRIDLE.—John McKillop (assignor to Andrew Mackey and John Ward, Jr.), Brooklyn, N. Y.

I claim, 1st, The choking apparatus composed of the two lever jaws, constructed and combined for operation, substantially as and for the purpose specified.

2d, The combination of the spring, f, with the two lever jaws, A, of the choking apparatus, substantially as and for the purpose specified.

78,534.—GALVANIC SPECTACLE.—Judah Moses, Hartford, Conn.

I claim the combination with the temples or front of a pair of spectacles, of an electric battery or batteries, so arranged and connected therewith that an electrical current may be caused to pass through the same, substantially as and for the purposes herein specified.

78,535.—BUTTON.—Charles Mudler, Cleveland, Ohio. Antedated May 22, 1868.

I claim the button constructed of two plates or disks, A B, having a rigid connection by means of the shank or pin, C, and the lower disk being shouldered or grooved out so as to form a circular depression, in which the thread used in sewing on the button is buried below the plane of said disk, the whole combined in the manner as and for the purpose set forth, as a new article of manufacture.

78,536.—REED MUSICAL INSTRUMENT.—E. P. Needham, New York city.

I claim the flexible front, c, of the exhaust chamber, A, in combination with the movable reed boards, whereby the requisite movement of the said reed boards is allowed, substantially as herein set forth.

78,537.—RAILWAY TRACK SCRAPER.—S. A. Otis, Boston, Mass.

I claim, 1st, The combination and arrangement of the shoes, B B, sleeves, Q Q, rod, M, and fork, O O, substantially as described and for the purpose set forth.

2d, The combination with the lever, G, in a track-scraping machine, of the foot lever, G' G'', substantially as described and for the purpose set forth.

3d, The combination and arrangement of the lever, L, the link, E, and the rocker shaft, D, made substantially as described and for the purpose set forth.

78,538.—SEED SOWING MACHINE.—John B. Perkins and Ai Colburn, Hollis, N. H.

We claim, 1st, The vibrating plow beam, C, held by the spring, E, in combination with the coverer, V, arranged substantially as described and for the purpose set forth.

2d, The agitator, K', arranged and operated substantially as described and for the purpose set forth.

78,539.—LAMP BURNER.—Wm. Robinson, Brooklyn, N. Y.

I claim, 1st, The trough, f, arranged in relation with the openings, b, at the sides of the wick tube, substantially as and for the purpose specified.

2d, The annular trough, D, made detachable, and constructed with the internal flange, whereby it may be fitted between the burner and the lamp substantially as and for the purpose specified.

78,540.—LUBRICATOR FOR STEAM ENGINES.—James Ross, North Cambridge, Mass., assignor to himself and Ferdinand Fairbanks, New York.

I claim the construction in a lubricator of the character herein specified, of the cock, C, and its seat, D, with their openings arranged substantially as described, whereby provision is made for varying the extent of steam condensing surface in the oil cup or reservoir of the lubricator, and thereby regulating the flow of oil or greash, essentially as herein set forth.

78,541.—FEED REGULATOR FOR MILLS.—John Ross, Brooklyn, N. Y. Antedated May 25, 1868.

I claim the use of the feed regulator, A B and J, to close partially or wholly the throat of a conical mill, in the manner described.

2d, The combination of the cone J, with its wings, I, to direct the grain into the throat of the mill.

78,542.—PLOW CLEVIS.—Roger Sandiford, Joliet, Ill.

I claim, 1st, The double segmental clevis, a, when constructed, operating, and arranged substantially as and for the purposes set forth.

2d, The transverse oscillating clevis, e, when constructed and arranged as and for the purposes described.

3d, The combination and arrangement of the segmental clevis, a, and transverse oscilisting clevis, e, when arranged, constructed, and operating as and for the purposes set forth.

78,543.—COMPOSITION FOR DEPILATING HIDES.—Peter G. Schlosser, Middletown, assignor to himself and A. P. Baer, Baltimore, Md.

I claim, 1st, the composition, substantially as above described, for depilating dry hides.

2d, The composition, substantially as above described, for depilating green hides.

78,544.—COMPOSITION FOR COVERING ROOFS, PAVEMENTS, WALKS, ETC.—John See, Philadelphia, Pa.

I claim a composition of ingredients herein named, substantially as and for the purposes as specified.

78,545.—PROCESS OF TREATING PETROLEUM FOR THE MANUFACTURE OF LUBRICATING OILS.—Gideon O. Spence (assignor to himself, A. R. Williams, and J. S. Lathrop), Titusville, Pa.

I claim, 1st, The use of the first chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

2d, The use of the second chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

3d, The use of the third chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum and coal oil, or their products, for the purpose specified.

4th, The use of the fourth chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

5th, The use of the fifth chemical ingredient herein specified, in the manufacture of lubricating oil from petroleum or coal oil, or their products, for the purpose specified.

6th, The use of the second and third chemical ingredients herein specified in combination, in the manufacture of lubricating oil from petroleum or coal oil, or their products, substantially as and for the purposes specified.

7th, The use of the five chemical ingredients, herein specified, in combination, in the manufacture of lubricating oil from petroleum or coal oil, or their products, substantially as and for the purposes specified.

78,546.—FISHERMAN'S NIPPER.—Eli F. Stacy, Gloucester, Mass.

I claim, as a new article of manufacture, a moulded elastic gum "nipper," as described, and for the purpose set forth.

78,547.—TELEGRAPH APPARATUS.—Joseph B. Stearns, Boston, Mass.

I claim, 1st, In an electro magnet coil, constructed of two opposing or neutralizing conductors, making each of the conductors of the same length, and giving them each an equal number of turns, as and for the purpose set forth.

2d, A key or other circuit breaker, the back stop of which is connected with the ground by a wire, in which is placed a rheostat or other resistance, and for the purpose set forth.

3d, Combining an electro-magnet constructed as described, or in any other manner, to produce either complete or partial neutralization of its cores, with a key or circuit breaker having a connection between the back stop, or its equivalent, and the ground, through a rheostat or other resistance, as and for the purpose described.

4th, Combining an electro-magnet constructed as described, or in any other manner by which either a complete or partial neutralization of its cores is produced, with a key or circuit breaker having no connection between its back stop and the ground, as specified.

5th, In combination with an electro-magnet constructed substantially as described, the key, A, the key or circuit breaker, C, local battery, B, and rheostat, F, all constructed and operating substantially as and for the purpose set forth.

78,548.—TELEGRAPH APPARATUS.—J. B. Stearns, Boston, Mass.

I claim, 1st, The combination of a relay consisting of two electro-magnets, so arranged as to act upon the same armature post, in opposite directions, with a key that shall close one circuit before or at the same time that it opens another, when the same are constructed and made to operate substantially as described.

2d, The combination of the relay constructed substantially as described, the rheostat, S, and rheostat, F, when the whole are connected and made to operate substantially in the manner and for the purpose set forth.

3d, In combination with the rheostat, R', the double relay, when the latter is so constructed as to effect the finer adjustments of the forces acting upon the armature or armatures, as set forth.

4th, So arranging the several parts of the apparatus that the resistance offered to the current from the battery at either end of the line is always the same, whatever may be the position of the key at the opposite end.

5th, In combination with the key, S, constructed as described, the rheostat R', inserted between the key and the ground, substantially as and for the purpose described.

78,549.—FRUIT DRYER.—Alden S. Stevens, Attica, N. Y.

I claim the combination of the hollow cylinder, A, open at both ends, and provided with cutting teeth, a1, at its upper edge, with the conducting bag, F, attached to its lower edge, and manipulating rod or pole, C, connected to its side, as and for the purpose set forth.

78,550.—AX HANDLE.—Benj. D. Stevens, Decorah, Iowa. Antedated May 18, 1868.

I claim, 1st, Inserting india rubber or similar elastic substance in the eye of axes, hammers, and analogous tools, when placed in the position for the purpose substantially as described.

2d, The wedge, C, when constructed and used as and for the purpose set forth.

78,551.—LIQUID METER.—James Sutherland, Brooklyn, N. Y.

I claim, 1st A liquid meter composed of two or more cylinders fitted with independent pistons, when these latter are controlled by valves operated so that either one piston or connected pair or set of pistons is or are made to actuate the valve which controls the other piston or connected pair or set of pistons, substantially as specified.

2d, The combination of the cylinders, C C' and D D', with their pistons and valves, so arranged and operating as that either one set of pistons to said cylinders are reversed in their action by the motion of the valves which control them, when the other set of pistons are midway of their stroke, or thereabouts, essentially as herein set forth.

3d, The combination of the cylinders, C C' and D D', with their pistons, yokes, H H', tappets, L L', arms, M M', and valves, J J', for operation together, and in connection with suitable inlet and outlet passages, substantially as shown and described.

78,552.—WAGON FOR ADVERTISING.—George W. Thompson, New York city. Antedated May 25, 1868.

I claim, 1st, The employment of the vertically arranged revolving drum of advertisements or signs, substantially as and for the purposes herein shown.

2d, The arrangement of the pulley, J, with the guide pulleys, L L, and the pulley, I, for transmitting motion to the axle, F, substantially as and for the purpose stated.

78,553.—TURN TABLE.—James K. Thompson (assignor to himself and Wm. B. Howard), Chicago, Ill.

I claim the bearing frame, G, consisting of bearing circle, H, cross beams, k k, and trussed bearing beams, M M, each of the above said parts constructed as described, and the whole arranged and operating substantially as and in the manner herein set forth and specified.

78,554.—MACHINE FOR MAKING TREENAIL.—Nathaniel L. Tomlinson, New York city.

I claim the combination of the slotted slide, b, holding the adjustable knife a, the movable gage rest, g, its connecting rods, l l, sliding screw, h, the two screw wheels, c and s, with the gage disk, k, constructed and arranged substantially as hereinbefore described.

78,555.—SAUSAGE STUFFER.—John P. Troxell (assignor to himself and Samuel H. Davis), Hancock, Md.

I claim the single discharge opening for the cylinders, A A, valve, E, and hollow journals, a a, combined and operating substantially as and for the purpose set forth.

78,556.—VALVE AND STEAM PASSAGE.—George Verry (assignor to himself and O. G. Graves), Norwich, Conn.

I claim, 1st, The arrangement of the receiving and exhaust ports B B' C C', and cut-off plugs, E E, substantially as herein described.

2d, The recesses, A A', in combination with the ports, B B' C C', substantially as and for the purpose described.

78,557.—TIDE MOTOR.—Wm. W. Virdin, Baltimore, Md.

I claim, 1st, A floating vessel or buoy, B, constructed with water passages through it, and provided with a cut-off, B', and a water wheel, D, said buoy being arranged in a suitable passage way for water, in such manner that the wheel will be caused to turn both by the ebb and flow of the tide, substantially as described.

2d, The buoy, B B', constructed with bulkhead apartments, substantially in the manner and for the purposes described.

3d, The chamber or chambers, J', in combination with a boy, B, having an aperture or apertures, i i, and constructed substantially as described, for the purpose of receiving water to be raised by the elevator, J, substantially as described.

4th, The endless chain of double chambered buckets, in combination with a perforated drum, G h i, substantially in the manner and for the purposes described.

78,558.—CIDER AND WINE MILL.—James Walton, Sunfish, Ohio.

I claim the arrangement of the hoppers, P Q, grinding rolls, B B', apron, F, rolls, G G' G'' I I', incline, M, concaves, N and O, and receiver, R, substantially as and for the purpose set forth.

78,559.—APPARATUS FOR DYEING.—Miles Waterhouse, Passaic, N. J.

I claim the combination and arrangement of the several parts, substantially as and for the purposes shown and described.

78,560.—ICE CREEPER.—William C. Wells, Philadelphia, Pa.

I claim a "creeper" composed of a piece of leather or other soft material, with metal "spurs" fastened thereon, by means of metal "washers," and by riveting, when said piece of leather, with spurs thereon, is constructed separate from the shoe, and is intended to be worn beneath the sole of the shoe, and is attachable to and detachable from the shoe, substantially as shown and described.

78,561.—HOE.—Isaac N. Wood, Fall River, Mass.

I claim the improved hoe as made with the short, open, tubular blade, combined or provided with an angular nose, arranged with respect to such blade and its shank, substantially as specified.

78,562.—MANUFACTURE OF TABLE WARE.—Howell W. Wright (assignor to Reed & Barton), Taunton, Mass.

I claim, 1st, The within-described alloy of nickel and copper, or any other substantially the same, all as and for the purposes set forth.

2d, The improved table ware, made substantially as described.

78,563.—CARRIAGE SEAT.—John H. Adams, Portland, Me.

I claim, 1st, The swinging hinged or pivoted bar, b, either with or without the studs, h, in combination with the projection, e, the said bar, b, being attached, as set forth, to the carriage sides, and capable of being fastened thereto, as set forth, and the projection, e, to the carriage seat, as and for the purposes described.

2d, The clamp, l, in combination with the projection, e, on the seat, as and for the purposes described, the said clamp, l, being secured as herein set forth.

78,564.—CONSTRUCTION OF SHEET METAL CONDUCTOR PIPE.—William Austin (assignor to himself and William Opdyke), Philadelphia, Pa.

I claim a water conductor or pipe, made of corrugated sheets of metal, so as to yield to the internal pressure caused by the freezing of the water therein, substantially as described.

78,565.—VISE.—Quimby S. Backus, Winchendon, Mass

I claim the method of protecting the screw shafts of vises with the sectional tubes, h i and k, arranged and operating substantially as described.

78,566.—HAY LOADER.—Addison Barker, Camanche, Iowa.

I claim the drum, F, arranged outside of the wheel, G, in combination with the sheaves, C and O, and stop, L, for taking in the slack of the rope, B, essentially as shown and described.

78,567.—TOY.—John H. Barnes, Troy, N. Y.

I claim the combination, in a toy whistle, of the flanges, a' and a'', with a cord and ring fastened by a loop, or equivalent, substantially as described and for the purpose specified.

78,568.—HARNESS BUCKLE.—Alma Bedford, Coldwater, Mich.

I claim a harness buckle, provided with the cross bar, E, and loop, D, when constructed as herein described, as a new article of manufacture.

78,569.—COMPOSITION FOR DESTROYING INSECTS IN FRUIT TREES.—Benjamin Best, Dayton, Ohio.

I claim the mode of protecting trees, by the application of the hereinbefore described composition to bands of fibrous material surrounding the trees, substantially as described.

78,570.—CAR SEAT AND CHAIR.—William N. Bragg (assignor to himself, W. H. Trainham and J. B. Winston), Richmond, Va.

I claim, 1st, The combination of the arm, A, with the bars, A1 and A2, and rock shaft, a3, and the bell crank, C1 and rod, c, to operate the pawl, C, substantially as and for the purpose specified.

2d, The combination of the above parts, A A1 A2 a3 C1 c and C, with the hook, b, of the leg, with the notched plates, d1, for the purpose specified and as substantially described.

78,571.—SHAFT COUPLING.—Levi Bronson (assignor to himself and James Brayley), Buffalo, N. Y.

I claim the guard flanges, C C, of the ring, A, in combination with the forked shafting, E, headless bolts, D D, held by keys, p p, the whole arranged as described and operating in the manner and for the purpose set forth.

78,572.—MODE OF CONSTRUCTING IRON POSTS FOR RAIL FENCES.—Henry S. Brooks and Jacob S. Lehmen, Martinsville, Pa.

We claim the intervening rail supports, c, with their perforated flanges, x, in combination with the two round iron sides, A A', top and bottom plates, d d', and bed plate, B, all arranged and applied in the manner and for the purpose specified.

78,573.—TELEGRAPHIC REPEATER.—W. G. Bronson, Wellsville, Ohio.

I claim, 1st, So combining the local circuit, influencing and operating a registering, repeating, or signal instrument in an electro-magnetic telegraph system, with a receiving or relay instrument on a main circuit in said system as that said local circuit shall stand open when the main circuit is closed, and *vice versa*, all substantially in the manner and for the purpose herein set forth.

2d, An electro-magnetic telegraph relay or receiving instrument, so constructed as that the contact of its armature lever with a suitable connecting conducting point to close a local circuit, shall be broken, and the local circuit thereby opened when the receiving magnet becomes excited, all substantially in the manner and for the purpose herein set forth.

3d, The combination and arrangement of the armature lever of a telegraphic repeating instrument with the wires of the local circuit, and a connecting and conducting post in said circuit, so as that the local circuit shall be closed through said lever and post when the magnet attracting said lever is inactive, all substantially in the manner and for the purpose herein set forth.

4th, So combining the connecting device in a repeating instrument, whereby the main circuit is closed, with an insulated pin upon the armature lever thereof, as that said main circuit shall be opened when the magnet of the instrument is excited, all substantially in the manner and for the purpose herein set forth.

5th, The improved connecting and conducting post, M, in my repeating instrument, when constructed with a horizontal arm, s, carrying an adjusting screw and connecting pin, r, and combined with an elastic metallic strip, p, from a second conducting post, L, to open and close an electrical circuit, all substantially in the manner and for the purpose herein set forth.

6th, The telegraphic switch, P, constructed of an insulated pivoted plate, provided with metallic strips, each so disposed thereon as that, by a proper alignment thereof, a connection may be formed thereby between any two detached pins or points beneath the plate communicating with the wires of electro-magnetic batteries, to be broken by turning the plate upon its pivot, so as to change the alignment, all substantially in the manner and for the purpose herein set forth.

7th, My improved key or circuit breaker, so constructed as that, when at rest, the main circuit connected therewith shall be closed thereby through its lever, its base plate, and an insulated anvil, substantially in the manner and for the purpose herein set forth.

78,574.—PADDLE WHEEL.—James Burson, Yates, Ill. Antedated May 23, 1868.

I claim, 1st, The plates or carriers, h, for holding the guide rods, D F, in four angular positions, in combination with the ways, L N U W and J K Y M, all arranged and operating substantially as shown and described.

2d, The combination of four guide rods to either bucket, with separate rails or tracks to either pair of said rods, for operation together, substantially as and for the purpose or purposes herein set forth.

78,575.—CLOTHES DRYER.—J. M. Butters, North Fryeburg, Me.

I claim the combination of the bars, D D', with brackets, A and A', pivots, d d, and projections, a a, and back, B, the whole constructed as described and operating as set forth.

78,576.—DIE FOR MAKING AXLE NUTS.—A. B. Candee, Hamden, and L. S. Taylor, Southington, Conn., assignors to Ætna Nut Company.

We claim the combination of the cut-off block, K, griping dies, F and H, die, L, and punch, a, all constructed, arranged, and operating in the manner substantially as described.

78,577.—SPOOL GUARD.—W. C. Cleveland, Cambridge, Mass.

I claim the spool guard, C, provided with projections, a, so constructed as to clamp the spool between them, and to serve as axles for the spool to rotate upon, substantially as herein set forth.

78,578.—GAS BURNER.—Seth L. Cole, Brooklyn, N. Y.

I claim adjusting the cap, A, upon the jet or burner by means of the cogged bar, c, and ratchet wheel, d, or a section thereof, or by any device that will cause the cap to move up or down, by simply turning the stop cock, B, which regulates the flow of gas to the jet or burner, for the purpose substantially as described and shown in the drawings.

78,579.—THILL COUPLING FOR CARRIAGES.—Monroe M. Copp, Albion, N. Y.

I claim the convex-headed cap, C, provided with the square shoulder, b, and screw nut, k, said head being recessed to receive one half of the draw bolt, h, and form, with the recess of the bar, A, a complete eye, and a shield to exclude dust from the same, in combination with the forked thill iron, B, and jack, A, arranged and operating substantially as and for the purposes set forth.

78,580.—FOOT LIGHT FOR THEATERS.—Coleman Defries, London, Great Britain.

I claim the exclusive use of an improved foot light, constructed and arranged substantially as herein described, and shown on the accompanying sheet of drawing, whether the mechanism for raising and lowering colored mediums be or be not applied thereto.

78,581.—MANUFACTURE OF TOE CALK AND BLANK FOR THE SAME.—Thomas Dooley, South Boston, Mass.

I claim a calk or calk blank having a relative disposition of iron and steel, produced and shaped substantially as described.

78,582.—SIDE GEAR FOR THRASHING MACHINE.—John Duchesne, Lacon, Ill.

I claim, 1st, The swiveling post, k, for the purpose of rendering the connection between a horse-power and separator adjustable, substantially as described.

2d, The combination of the swiveling post, k, spring arm, m, and notched foot plate, h, as and for the purpose set forth.

3d, The combination of the swiveling post, k, with the gearing, l l c d and shaft, e, as and for the purpose set forth.

4th, The cap, n, in combination with the gearing, c d, as and for the purpose set forth.

5th, The slotted case, o, in combination with the gearing, l l, and swiveling post, k, as and for the purpose set forth.

78,583.—STREET SCRAPER.—Abraham Dyson, St. Louis, Mo.

I claim, 1st, The wheels, f f' and N, blocks, e e' e'' e''', shafts, d d', and frame, D, with their connecting coords, x x', and elastic bands, i i' i'' i''', of a street scraping machine, all arranged relatively to each other and the rest of the machine, substantially as and for the purpose shown and specified.

2d, The lever, O, with its arm, v, link, s, frame, D, and cam, r, of a street-scraping machine, all arranged relatively to each other and the remaining parts of the machine, substantially as and for the purpose shown and specified.

3d, The combination of the scrapers, 1 2 3 4 etc., and h h', with the frames, D E and F, all constructed, arranged, and operating substantially as and for the purpose shown and specified.

4th, A street-scraping machine, combining the devices above mentioned, when constructed, arranged, and operating substantially as and for the purpose shown and specified.

78,584.—CHIMNEY CLASP.—C. F. Espick, Plymouth, Ind.

I claim the sections, A and B, constructed substantially in the manner specified, of any required size, and bound together around the upper end of a chimney, as and for the purpose set forth.

78,585.—DIE FOR CUTTING THE TEETH OF METALLIC COMBS.—Caleb Foster (assignor to Elias Brown), Wappinger's Falls, N. Y.

I claim the combination of the male and female dies, A B, follower or plunger, D, spring, E, or its equivalent, and the cutting lips, b b, on the male die, all arranged for joint operation substantially in the manner as and for the purpose specified.

78,586.—BREAD KNIFE.—John Frisch, Albany, N. Y.

I claim, 1st, The employment of roller, B, when arranged to regulate the thickness of the slice, and also to yield to the pressure of the knife, substantially as and for the purposes described.

2d, In combination with the above, spring, m, bars, B C, slides, g g, and roller, h, all arranged substantially in the manner and for the purpose set forth.

78,587.—CULINARY VESSEL.—Chauncey W. Fuller, Earlville, Ill.

I claim, in combination with the boiler, A, diaphragm, B, and cover, D, the vessels, C C, and perforated plate, E, when so constructed and arranged that the drip from the condensed steam shall fall outside of and not into the vessels, substantially as described.

78,588.—COOKING APPARATUS.—J. M. Gale and I. M. Avery, New York city.

We claim, 1st, The construction of the diaphragm, C, consisting of the concave and conical disks, e f, alternately perforated, and connected as described substantially as set forth.

2d, The combination of the removable diaphragm or diaphragms, C, with the cylinder, A, and lugs, l l, substantially as and for the purposes set forth

78,589.—CHURN.—A. E. Gillilan, Marian, Iowa.

I claim the dashers, E E, and adjustable slotted board, B, as constructed in combination with arms, f f g g, and crank shaft, D, when all are arranged and operated as and for the purpose set forth.

78,590.—WAGON SEAT.—Lewis Graham, Plymouth, Ill.

I claim the levers, B B, slotted and hinged at their inner ends to the wagon seat, A, with the stationary headed bolts, E E, and tubular rubber springs, D D, arranged and used as and for the purposes set forth.

78,591.—COMBINED SQUARE AND CALIPER.—C. W. Guerrant, Leakville, N. C.

I claim the combination of the bars, A and B, and slotted arm, C, arranged and operating as described for the purposes set forth.

78,592.—CEMENT FOR FASTENING DOOR KNOBS, AND FOR other Purposes.—N. B. Hall and Herbert Jones, (assignors to Thomas Kennedy), Branford, Conn.

We claim the cement, produced by the combination of materials and in the proportions herein fully set forth and described.

78,593.—WASHING MACHINE.—Sanford V. Hall, McGrawville, N. Y.

I claim the spiral springs, g g, the grooved side gages, h h, and the cap piece, f, in combination with the fluted roller, e, and rub board, a, all constructed and operated substantially as described.

78,594.—LUBRICATOR.—Timothy Holland and J. T. Cody, Cincinnati, Ohio.

We claim the combination and arrangement, substantially as described, of the globe, A a, socket, B, tubular stem, C c I D, chamber, H h, and valve F G g, as and for the purpose set forth.

78,595.—OVER SHOE.—H. L. Hotchkiss (assignor to L. Candee & Co.), New Haven, Conn.

I claim the application of the binding, a, to the shoe, and so as to protect the edge of the fabric, in the manner and for the purpose substantially as specified.

78,596.—STILL FOR SPIRITS.—Gottlob Kaiser (assignor to himself and Vossnack & Steins), New York city.

I claim, 1st, The within-described combination of two stills with the mash heater, and rectifier, and column, and defecator, and a condenser, connected and arranged for joint operation, substantially as and for the purposes herein set forth.

2d, In connection with the above, introducing the mash into the mash heater gradually or by small increments so as to maintain a uniform or nearly uniform temperature in the heating vessel, substantially as and for the purpose herein specified.

3d, In a mash heating vessel, B, constructed and arranged substantially as herein specified, the within described provision for agitating the contents, by the injection of steam into the same, in the manner and with the advantages herein set forth.

4th, Cooling the dephlegmator with water from the condenser, by means of connections and cocks, arranged as shown, so that the cold water is economized, and the cooling of the dephlegmator is gradual and uniform, all as and for the purposes herein set forth.

78,597.—SHOE FOR SEPARATOR.—Michael Laufenburge, Two Rocks, Cal.

I claim the combination of the screw, I with the two inclined sieves, C and C', vibrating in alternation, substantially in the manner and for the purposes herein described.

78,598.—GATE.—John Lee, Massillon, Ohio. Antedated May 27, 1868.

I claim, 1st, The blocks or revolving fulcra, d' d', and hinged fulcrum, b, attached to top rail, B, of gate, and hand levers, d d, when used in combination with the

2d, The sliding latch, F, and inclined plane, l, and rope, a, for locking and unlocking the gate, constructed as described, and operating as set forth.

3d, The weight box attached to rail, B, and operating in slot, f, on pivot bolt, e, constructed as described and operating as set forth.

4th, The sliding pivot and guide blocks, i i, for keeping the gate in a vertical line while being operated, constructed as described and for the purposes set forth.

5th, The levers, a' a', with slots, m, and concave or convex ends, and convex or concave in post, A, to correspond, constructed and operating as described and for the purposes set forth.

78,599.—TOOTH BRUSH.—Thos. Maitland, Williamsport, Pa.

I claim the hollow head, B, and its bristles, made of india rubber, and combined with the handle, A, having a tenon on its end, all constructed and used substantially as specified.

78,600.—APPARATUS FOR GENERATING GAS.—R. J. Malcolm, Cincinnati, Ohio.

I claim, 1st, Carbureting air by reversing the vessels or chambers, x and z, substantially as described.

2d, The combination of vessels or chambers, x and z, so that as the compound vessel is revolved or reversed, air is drawn in and forced out alternately, as described.

3d, The valves, f f' g g' h h' i i', in combination with their respective pipes when used as set forth.

4th, The floats, d d', and cross bar, C', or its equivalent, as specified.

5th, The combination of the cylinder, A, frame, B, and floats, d d', when operating as and for the purpose specified.

78,601.—COMPOSITION TILE OR SLAB FOR FLOORS, ETC.—I. Marsh, Jr., Milton, Pa.

I claim a composition tile or slab for pavements, etc., consisting of the composition surrounding and supported or strengthened by an interior platform or framework, substantially as described.

78,602.—PUMP.—C. S. McMahan, Centerville, Ind.

I claim the piston, P, in combination with valves, C and d, when the latter are provided with hoisting appendages, as described, and the whole arranged and operating substantially as and for the purpose set forth.

78,603.—BREECH-LOADING FIRE-ARM.—Samuel Norris, Springfield, Mass., and Wilhelm Mauser and Paul Mauser, Oberndorf, Wurtemburg, assignors to Samuel Norris.

We claim, 1st, The combination of a main spring, k, formed substantially as herein described, with the handle of the breech block, C, and arranged to propel the firing pin or other striking device of a breech-loading fire-arm substantially as and for the purpose herein set forth.

2d, The sliding block, C, handle, j, spring, k, and catch, m, of a breech-loading gun, constructed, combined, and operating in such manner that the piece is cocked by turning the said handle, substantially as herein set forth.

3d, Securing the breech block, C, by means of the recess, k3, and catch, m, substantially as and for the purpose herein set forth.

78,604.—WEIGHING SCOOP.—J. K. O'Neil, Kingston, N. Y.

1 claim, 1st, The hollow handle, B, to the scoop, for the purpose of receiving the balance, D, substantially as herein set forth.

2d, Securing the balance to the handle when not in use for weighing, substantially as specified.

3d, So shaping the balance that it will form a counterpart to the handle, and compose part of it when brought down thereto, substantially as described.

4th, The arrangement of the notches, c c, or their equivalent, upon the scoop, in relation to the bail and balance, substantially as and for the purpose set forth.

5th, Attaching the balance to the scoop bail by the extension of the balance spring itself, as herein specified.

6th, The combination and arrangement of the weighing rack, t, swivel shaft r, pin, s, and the balance spring, substantially as and for the purpose herein set forth.

7th, The elastic washer, n, around the index pivot, and pressing upon the index, substantially as and for the purpose herein specified.

7th, The elastic washer, n, around the index pivot, and pressing upon the index, substantially as and for the purpose herein specified.

8th, The combination of the adjustable dial and adjustable index to be used together for making double or successive adjustments, as specified.

78,605.—MANUFACTURING FRUIT-CAN BODIES.—Jacob Pfau, Cincinnati, Ohio.

I claim, 1st, The mode of manufacture of a creased and open-mouthed fruit can body in one piece, substantially as described.

2d, An open-mouthed and creased fruit can, whose body and the shoulder for receiving the wax are formed of one piece, in the manner set forth.

78,606.—REFRIGERATOR.—Enoch Piper, Camden, Me.

I claim, 1st, A refrigeratory apparatus, one or more of the inner walls of which are deep, narrow vessels of thin metal, to receive the freezing mixture, substantially as described.

2d, The employment, in a refrigeratory apparatus, of one or more receptacles, B D, for the freezing mixture, constructed of thin metal, in the form and proportions substantially as shown and described, to serve as partitions between the sides, as constructed.

3d, The combination of the reservoirs, F F, open at the sides and top, and having a bar across the top, substantially as described, with a refrigeratory chamber, C, formed substantially as described.

78,607.—LAMP BURNER.—A. H. Platt, Philadelphia, Pa.

I claim the combination and arrangement of the concentric wick tubes or plates, 2, 3, with open spaces, b b, therein, the movable wick regulator, 4, perforated plate, k, and apron, a substantially as and for the purposes herein specified.

78,608.—HANGER FOR SHAFTING.—John Richards, Cincinnati, Ohio.

I claim, 1st, The stem, C, formed to receive the lugs, d, substantially as shown.

2d, The combination of the adjusting screws, h h, and eye bolt, E, when used substantially as herein shown and for the purposes specified.

3d, The cylindrical screw piece, c, for adjusting the box, when formed to receive the bolt, E, in the manner and for the purposes described.
4th, The screws, h h, in combination with the stem piece, C, for adjusting the box, S, as herein shown and for the purposes specified.
5th, The stem piece, C, screw piece, c, eye bolt, E, and screws, h h, combined and operating substantially in the manner and for the purpose specified.

78,609.—CARRIAGE THILL.—Benjamin Robinson, Thomaston, Me.

I claim the arrangement of the cap, e, upon the projection, s, the said cap being secured by bolts, 1 and 2, in conjunction with the rubber piece, f, the rigid bolt of the shaft, the sides, 3, of the forked end of the shaft, the projection, h, and either with the elastic strip for the two purposes, of rendering the shaft holder adjustable and the shaft self-supporting, as described.

78,610.—COMPOSITION FOR PREPARING PAPER FOR TRANSFERRING STAMPS AND OTHER PRINTED MATTER.—Max Rosenthal, Philadelphia, Pa.

I claim a chemical compound, composed of the ingredients mixed in the proportions and quantities, and applied to unsized paper, as herein described and for the purpose set forth.

78,611.—HOE.—C. W. Saladee, Newark, Ohio, and J. S. Hall, Pittsburgh, Pa.

We claim the lips, w x and y, when formed substantially as described, as part of the hoe blade, in combination with the brace, B, substantially as and for the purposes set forth.

78,612.—GRATER AND SLICER.—C. W. Saladee, Newark, Ohio, and J. S. Hall, Pittsburgh, Pa.

We claim, 1st, The frame, A, table, B, and crank, D, substantially as described, in combination with the grater, G, substantially as and for the purposes set forth.
2d, The frame, A, table, B, and crank, D, substantially as described, in combination with the slicer, S, substantially as and for the purposes set forth.
The hollow plug, e, in combination with the holder, E, in the manner and for the purpose substantially as shown and described.

78,613.—COMPOSITION FOR FILLING THE PORES OF WOOD FOR VARNISHING.—Jacob Sheller, Wilmington, Del.

I claim the combination of the within-named ingredients, when mixed in the several quantities and proportions as herein described and for the purpose set forth.

78,614.—COTTON-SEED PLANTER.—Bryan Smith, Falkland, N. C.

I claim, 1st, The cylinder, B, constructed with arms, C, and pins, E, substantially as and for the purposes set forth.
2d, In combination with the cylinder, B, the coverer, K, constructed and operating substantially as specified.
3d, A cotton planter, having cylinder, B, cover, K, and plow, G, constructed and operating substantially as and for the purposes described.

78,615.—PRUNING SHEARS AND KNIFE.—John Spear and J. A. Hull, Carbondale, Ill.

We claim, 1st, The shears, consisting of the double curved blade, C, the blade, B, with the projecting thrust cutting edge or chisel, G, and the curved edge, D, arranged as described.
2d, In combination with the pruning shears herein described, the clasp, figs. 3 and 4, constructed and operating substantially as specified.

78,616.—CUTTER HEAD FOR PLANING MACHINES.—Albert T. Stearns, Dorchester, Mass.

I claim the combination of the slotted screw bolt with the cutter head and side cutters, constructed and arranged substantially as set forth.
Also, the cutter-head, constructed with the side cutters, arranged relatively to the center cutters, substantially in the manner and for the purpose set forth.

78,617.—EAVES TROUGH.—Wm. Stine, Elmore, Ohio.

I claim, 1st, The construction and arrangement of the bars, e and f, and cross bar, a, for holding an eaves trough, substantially as described.
2d, In combination with the above, the wire, b b, as and for the purpose set forth.

78,618.—MOP WRINGER.—D. J. Stone, Warwick, R. I.

I claim, 1st, The combination of the rolls, apron, and rod for operating the same, when arranged as herein set forth and for the purpose specified.
2d, The combination of the rolls, C F, and plates, x, as herein set forth and for the purpose specified.

78,619.—ELECTRO MAGNETIC ENGINE.—L. C. Stuart, New York city.

I claim, 1st, In the employment of a series of rotary magnets, arranged in pairs, and so connected that the magnetization of one set of magnets is effected before the demagnetization of the other, substantially as and for the purpose as described, in combination with a series of stationary magnets, when arranged and operating in the manner substantially as hereinbefore described for the purpose set forth
2d, Alternately energizing and demagnetizing the electro magnets, without breaking the connection between the poles of the battery, in the manner hereinbefore described.
3d, Conveying the induced or secondary current from the magnets as they are demagnetized, along with the current running to supply another set of magnets, substantially in the manner herein described for the purpose set forth.
4th, The employment of a series of adjustable conductors, substantially as described, whereby the speed and draft of the engine may be governed at pleasure, as hereinbefore set forth.
5th, The combination of the disks, a and b, and the conductors, e f g and h, when arranged and operating substantially as described.

78,620.—BENCH HOOK FOR CARPENTERS' BENCH.—Samuel Swan, New York city.

I claim the bed plate, E, constructed substantially as described and fitted with a hinged tongue, actuated by a spring, as set forth,

78,621.—BEEHIVE.—Homer Tuller, Ash Grove, Ill.

I claim, 1st, The box, or hive, A, constructed substantially as described, when used in combination with the honey boxes, B, as and for the purpose specified.
2d, The honey boxes, B, having the top side made of glass, and a series of slats at the bottom and one end, hinged in the manner substantially as and for the purpose set forth.

78,622.—MODE OF CONSTRUCTING LOOSE PRAIRIE FENCES.—Izaak Van Kersen, Kalamazoo, Mich.

I claim constructing a fence with wheels and axles permanently attached to one end of each panel, while the other end is connected by hooks and eyes, and the panels supported by braces, D D, the whole constructed, arranged, and operated substantially as and for the purpose set forth.

78,623.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Smith D. Wickman, Auburn, N. Y.

I claim, 1st, The combination, substantially as set forth, with a grindstone, of an oscillating adjustable clamping frame, suspended from overhanging arms, for the purposes set forth.
3d, The combination, substantially as set forth, with the frame, A, of the vertical detachable turning posts, G, the overhanging slotted brackets, H, the journals, the swiveling suspension rods, and the clamp bar, for the purposes specified.
3d, The combination, substantially as set forth, of a supporting frame, a bed plate turning on a pivot on said frame, a grindstone mounted on and turning with said bed plate, an adjustable overhead supporting frame, and a suspended oscillating clamping frame, for the purposes specified.

78,624.—GRINDING MILL.—A. H. Wagner, Staunton, Va.

I claim the spider, V, the rollers, U W, the inclines, X X, the rod, Y, and nut, a, when arranged and operating in the manner and for the purposes specified.

78,625.—WATER ELEVATOR.—Alvah Walker, Oswego, N. Y.

I claim the curb, C, pulley, G, pulley or pulleys, H, and cord, F, arranged horizontally, with the fastening, I, all combined and arranged substantially as and for the purposes described and shown.

78,626.—CULTIVATOR.—William Walton, East Palestine, O.

I claim attaching the handles, D, directly to the wings, B, and providing an adjustable brace in the curved bars, H, in the manner and for the purpose substantially as herein set forth.

78,627.—COUNTER SHAFTING.—H. C. Weihe, Philadelphia, Pa.

I claim, 1st, The parallel counter shaft B B', sliding spur wheel, H, fixed pinion, I, and the loose cone pulley, E, when combined and arranged substantially as shown and described.
2d, The parallel counter shaft, B B', fixed pulley, G, loose pulley, F, sliding feather, a, collar, b, shifting lever, K, and the loose cone pulley, E, when combined and arranged substantially as shown and described.
3d, The parallel counter shafting, B B', loose pulley, F, fixed pulley, G, sliding feather, a, loose cone pulley, E, feather, c, sliding gear, H, and the pinion, I, when combined and arranged substantially as shown and described.
4th, The main shafting, A, parallel counter shafting, B B' pulley, C, pulley, D, loose cone pulley, E, feather, a, loose pulley, F, and the fixed pulley, G, when combined and arranged as herein shown and described.

78,628.—CURTAIN FIXTURE.—George M. White and Charles S. Mecker, New Haven, Conn.

We claim the lever, K, constructed so as to receive the cord, and permit its free passage therethrough while in a depressed position, or hold the cord, as the case may be, substantially as herein set forth.

78,629.—ELECTRO-MAGNETIC ENGINE.—William Wickersham, Boston, Mass.

I claim, 1st, In electro-magnetic engines, the arrangement of the magnetic bars in an endless chain, having alternate magnetic bars and links of non-magnetic metal, the chain being so arranged in the engine that all the magnetic bars can pass successively through the same helix or column of helices substantially as described, and for the purpose set forth.
2d, In electro-magnetic engines, the construction of two chain gears on parallel shafts, of suitable form and distance apart to receive the electro-magnetic chain, all arranged in such manner that the gears and chain can revolve together, substantially as described.
3d, In electro-magnetic engines, the arrangement of two or any desirable number of chain gears on the same shaft, with the corresponding number of electro-magnetic chains, all working concurrently together and communicating their power to the same shafts, substantially as described, and for the purpose set forth.
4th, In electro-magnetic engines, out of a thin ribbon shaped strip of metal, the formation of two or more helices, as described, and so arranging them in the engine, in columns or otherwise, that each shall receive a different series of magnetic bars through it, and so further arranging them that when the circuit is closed through one helix, it shall be closed through all of the series thus formed of said strip, substantially as described.
5th, The circuit cylinder, with its spiral conductors so formed and in such connection with the helices, that it shall continue the same relation between the closed circuits and the position of the magnetic bar, or as near as may be, as it advances through the column of helices.
6th, Such disposition of these spiral conductors around said circuit cylinder that one of them will perform the same function for each magnetic bar as it enters a column of helices, or for all the magnetic bars of a series which enter a series of said columns at the same time, substantially as described and for the purpose set forth.
7th, Such an arrangement of the spiral conductors, e e e, on the sides of the cylinder, in combination with its movable arrangement on its shaft, as will close the circuits in such manner in its middle position that there will be no tendency of the magnetic bars to move in either direction, and will open the circuits in such manner in its upper and lower positions as will give motion to the magnetic bars, but in diverse directions, the upper position in one direction, and the lower position in the opposite direction, substantially as described and for the purpose set forth.
8th, In combination with the cylinder, the device, consisting of the sliding bar, o, and the spring, q, for moving the circuit cylinder to and holding it in any position needful to stop the engine or running it in either direction, as described.
9th, Making each alternate helix, of those formed of the same strip of metal, coil around in a diverse direction from the others, in such manner that when an electric current passing through a line of helices, so formed of the same strip of metal, produces a north polarity in one end of a magnetic bar, placed in any one of said helices, a south polarity will be produced in the same end of a magnetic bar placed in either of the adjoining helices of the same line, the electric current flowing in the same direction through all the helices in the same column, substantially as and for the purpose described.
10th, Such an arrangement of the columns of helices on the opposite sides of the engine that through any two columns, one on the back and the other on the front of the engine, through which the same electro-magnetic chain passes, the electric current shall flow in diverse directions, giving north polarity to the upper end of a magnetic bar in one, while it gives south polarity to the upper end of the magnetic bars in the other, and *vice versa*, all substantially as described and for the purpose set forth.

78,630.—RAILWAY RAIL CHAIR.—William Wickersham, Boston, Mass.

I claim, 1st, In a railway rail chair, the screw cylinders, a a, when constructed to work or operate automatically, substantially for the purpose set forth.
2d, In combination with the screw cylinders, the springs, d d, as described, and for the purpose set forth.
3d, The construction of the screw cylinders, a' a', with the spaces, f, and wedge, g, in combination with the chair, substantially as described and for the purpose set forth.
4th, In combination with the screw cylinders, the metallic strips, i i, as described and for the purpose set forth.

78,631.—HERDING AND SECURING CATTLE.—Jesse Wilkinson (assignor to Horace Ballard Wilkinson), Urbana, Ill

I claim the combination of the windlass for stretching the rope, D, the said rope, the post, C, and trusses, B B, resting upon the ground, together with the traversing block and pulley, E, and adjustable stops, G, substantially as and for the purpose set forth.

78,632.—BRICK MACHINE.—C. A. Winn, Lock Haven, Pa.

I claim, 1st, A complete and portable brick machine, composed of the steam boiler, A, cylinder, C, clay mill, D, constructed as described, combined and arranged in one portable apparatus in the manner and for the purpose herein set forth.
2d, The formation of the annular chamber, e, of the clay mill, D, with the elevated chambers, g g, the spiral steam tube, G, as connected with the boiler, and arranged in the annular chamber E, and the stationary perforated steam pipes, H H, passing directly from the boiler through the clay mill, horizontally, all combined in the manner and for the purpose herein set forth and described.

78,633.—FLOOD FENCE.—Valentine Wood, Richmond, Ind.

I claim the fence panel, A, the lower bar, B, of which is pivoted to posts, C, and which is supported in an inclined position by braces, D, when arranged in relation to the embankment, E, to operate substantially as described.

78,634.—BRICK MACHINE.—Charles D. Wrightington, Fair Haven, and Benjamin P. Rider, Chelsea, Mass.

We claim the secondary motion given to the screws by the cam ledge, H, and the arm, K, in addition to the primary motion for feeding down the clay into the forming tube by the gear wheels, for the purpose of smoothing the clay and finishing out the filling of the tube, substantially as described.
Also, in combination with the mold wheel, P, and pressing followers, 9 10 11 12, the rising and falling table, Y, under the molding wheel, and the delivering apparatus, s t u v, when arranged and timed in their motions and periods of rest, to operate together substantially as described.

78,635.—PAVEMENT.—Arcalous Wyckoff, Elmira, N. Y.

I claim, 1st, A pavement, formed of blocks of wood of irregular forms and uniform length, resting upon a plank floor, and having the intermediate spaces filled with a fibrous material and gravel or sand and coal tar, substantially as set forth.
2d, The arrangement and method of forming foundations between the blocks of wooden pavements, by forming a base of saw dust, tan bark, or analogous fibrous material, and placing thereupon gravel or sand, to fill up such spaces, in the manner and for the purpose herein described

78,636.—APPARATUS FOR EXTINGUISHING FIRES.—William Mullally, Boston, Mass.

I claim, 1st, An apparatus for extinguishing fires, composed of the vessel, A, the foraminous shelf, e, or its equivalent, and the escape cock, f, the vessel A, being provided with a filling aperture, and the whole being constructed, adjusted, and operating essentially in manner and for the purpose as herein shown and described.
2d, The employment of the foraminous shelf or its equivalent, as before set forth and explained.

## REISSUES.

2,956.—MACHINE FOR PUNCHING LEATHER.—James M. Bent, Wayland, Mass. Patented October 16, 1866.

I claim, 1st, The combination of a die with a punch, substantially as and for the purposes described.
2d, The punch and die, when made to revolve in combination, substantially as described.
3d, The mechanically revolving punch, substantially as described.
4th, In combination with a cutting punch, a clearing pin, substantially as described.
5th, So constructing the parts so as to cause the die to adapt itself to different or varying thicknesses of leather, substantially as described.

2,957.—MOP HEAD.—Colby Brothers and Company, Waterbury, Vt., assignees, by mesne assignments, of Harvey Murch. Division A. Patented June 14, 1853.

I claim, 1st, The combination of a socketed cross head with a binder, having the two ends thereof united directly to each other, the combination being substantially such as described.
2d, The combination of a socketed cross head with a binder, having the two ends thereof united directly to or with each other, and a single fastening for holding the whole binder directly to the handle itself, in such position as to clamp rags, etc., the combination being substantially as described.
3d, The combination of a socketed cross head with a handle and a binder, having the two ends thereof united to or with the handle itself, the combination being substantially such as described.
4th, The combination of a cross head with a handle and a binder, having the two ends thereof united directly together, and secured in clamping position on the handle proper, so as to sustain or aid in sustaining the cross head, the combination being substantially such as set forth.

2,958.—MOP HEAD.—Colby Brothers and Company, Waterbury, Vt., assignees, by mesne assignments, of Harvey Murch. Division B. Extended seven years. Patented June 14, 1853.

I claim, 1st, The combination, with a cross head and binder of a ratchet fastening, the combination being substantially as described.
2d, The combination of a ratchet fastening, handle, binder, and cross head the combination being substantially such as set forth.

2,959.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Dated May 14, 1867. Division A.

I claim, 1st, A movable head or carrier, in combination with the punch and set, or either of them, constructed, arranged, and operating substantially as described.
2d, A head or carrier, so constructed and operated as to allow the punch and set to be alternately depressed by the same lever, substantially as described.
3d, So constructing the mechanism that the punching table and setting bed shall reciprocate laterally, and alternately occupy the same place, substantially as and for the purposes described.
4th, The reciprocating punching table, in combination with a stationary work supporting table, when constructed, arranged, and operated as described, so as to be moved to and from the punch, and under the material, substantially as set forth.
5th, The striking lever, so constructed and arranged as to cause the set to pick up the eyelet while the punch is making the hole for its reception, substantially as described.
6th, The setting die, so constructed and operating as to pick up the eyelets from the chute, and present them to the place of insertion, substantially as described.
7th, The reciprocating setting bed, constructed, arranged, and operating substantially as described.
8th, Feeding the material forward by means of the setting bed or holding point, substantially as described.

2,960.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division B.

I claim 1st, A feeding instrument which engages with the work feeds forward, disengages, retracts, and engages again, in combination with a punch or set, or both, substantially as described.
2d, A presser foot for holding the work to the table, in combination with a punch, or set, or both, substantially as described.
3d, The spring presser foot, in combination with the feeding mechanism, arranged and operating with an eyeleting mechanism, substantially as described.
4th, An adjustable work feeding mechanism, in combination with the mechanism for punching and eyeleting, substantially as described.
5th, Punching the holes, supplying, inserting, and setting the eyelets, adjustably spacing the distances, holding and feeding forward the work, by means of devices so combined as to effect this object automatically, substantially as described.

2,961.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division, C.

I claim, 1st, A hopper for holding the eyelets, in combination with agitating devices, substantially as described, and a chute, provided with an enlarged receptacle or dish at its lower end, substantially as and for the purposes set forth.
2d, A hopper and chute, constructed and arranged substantially as described, so that the eyelets shall be delivered from the hopper, flaring end down, and presented to the set, flaring end up, substantially set forth.
3d, A hopper and chute, arranged substantially as set forth, in combination with a set and work feeding device, substantially as described.

2,962.—EYELETING MACHINE.—William N. Ely, Stratford, Conn., assignee, by mesne assignments, of Luther Hall. Patented May 14, 1867. Division D

I claim, 1st, The combination of movable carrier, D, with both punch, E, and set, F, or either of them with lever, K, constructed, arranged, and operating substantially as described.
2d, The combination of movable carrier, D, with both punch, E, and set, F, or either of them, lever, K, and cam, L, constructed, arranged, and operating substantially as described.
3d, The combination of movable carrier, D, set, F, and setting bed, S, substantially as described.
4th, The combination of movable carrier, D, punch, E, and sliding plate, Q, substantially as described.
5th, The combination of movable carrier, D, punch, E, set, F, sliding plate Q, and bed, S, substantially as described.
6th, The movable carrier, D, constructed, arranged, and operated, substantially as described.
7th, The combination of levers, V and T, and pin, S, substantially as and for the purposes described.
8th, The combination of plates, Q and L, arranged and operated substantially as described.
9th, The combination of levers, V and T, pin, S, and screw, w, substantially as and for the purpose described.
10th, The combination of lever, T, block, U, lever, V, and eccentric wheel, X, constructed, arranged, and operating substantially as described.
11th, The combination of hopper, B', chute, A', disk, h', and set, F, substantially as described.
12th, The combination of presser foot, N, spring, O, with both punch, E, and set, F, or either of them, and table, A, substantially as described.

2,963.—MACHINE FOR GRINDING PLOW CASTINGS.—Joshua Gibbs, Canton, Ohio. Patented October 4, 1853. Extended seven years.

I claim, 1st, A frame or carriage, beneath a grindstone or polishing wheel, supported at one end by any suitable device, and at the other by the hands of the operator; said frame being capable of a lateral, longitudinal, and oscillating adjustment during the process of grinding, for the purpose of adapting the stone to uneven, irregular, or plane surfaces of articles to be ground or polished, as herein set forth.
2d, In combination with a carriage, supported and operated as above described, beneath a grindstone or polishing wheel, a cord or rope, or its equivalent, for relieving a portion of the weight of the frame in the hands of the operator, as herein set forth.

2,964.—LUBRICATING DEVICE.—Barton H. Jenks, Bridesburg, assignee of Mathew Senior, Frankford, Pa. Patented March 17, 1868.

I claim, 1st, Lubricating a shaft which is required to receive endwise motion also motion about its axis by means substantially as described.
2d, The device for lubricating the feathered shaft, C D, from each side of the feather, through holes in the tubular journal, B, and the hole, f, in the hollow cap, g, as herein described.
3d, The combination of the lubricating device with a shaft which moves longitudinally independent of its sleeve, and turns with said sleeve, substantially as described.

2,965.—WELL TUBE.—F. A. Mack, Niles, Mich. Patented Sept. 11, 1866.

I claim a well tube in which the openings or incisions, e e, are cut or formed from the inside, so as to leave a diminishing external projection from the inside, in the manner and for the purpose substantially as specified.

2,766.—MACHINE FOR GRINDING SCALE PIVOTS.—Frederick Meyer, Newark, N. J. Patented May 14, 1867.

I claim, 1st, The combination of the two adjustable revolving grinding wheels, G, with the reciprocating carriage, E, provided with head blocks, I, notched rests, p, and clamping device, M, for holding the scale beam, arranged substantially as described, whereby the knife edges or pivots of scale beams are ground to great accuracy of adjustment, as set forth.
2d, The construction and arrangement of the longitudinally sliding carriage C, reciprocating carriage, D, and carriage, E, as herein set forth for the purpose specified; and
3d, Adjusting the scale pivots to be ground upon both sides by means of the set screws or pins, k l, secured to the arm, l, of the sliding carriage, E, and bar, H, upon the frame, A, substantially as herein set forth.

2,767.—MODE OF ATTACHING ORNAMENTAL HEADS TO NAILS. Turner, Seymour, & Judd (assignees of F. J. Seymour), Wolcottville, Conn. Patented June 26, 1866.

We claim an ornamental picture-nail head, made with a sheet metal body or back, having within it a screw thread for the nail, substantially as specified.

## DESIGNS.

3,061.—FLOOR-CLOTH PATTERN.—Hugh Christie, Morrisania, assignor to D. Powers & Sons, Lansingburg, N. Y.

3,062.—KNITTED FABRICS.—J. P. Delahenty, Cohoes, N. Y.

3,063.—BURIAL CASKET.—J. M. Hall, Philadelphia, Pa.

3,064.—B.—CLOCK CASE.—G. B. Owen, Winsted, Conn.

3,065.—STREET-LAMP POST.—R. H. Smith, Pittsburgh, Pa.

3,066.—PERFUME BOTTLE.—Henry Whitney, East Cambridge, Mass.

3,067.—TOILET BOTTLE.—Henry Whitney, East Cambridge, Mass.

3,068.—LAMP FOOT.—Henry Whitney, East Cambridge, Mass.

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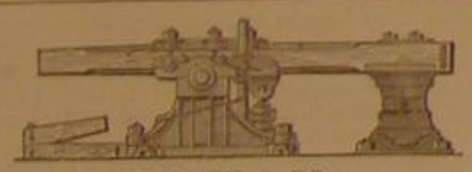

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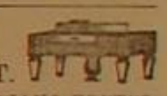

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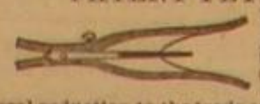

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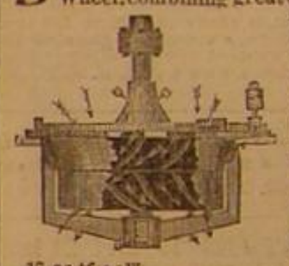

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# SCIENTIFIC AMERICAN

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

Vol. XVIII.—No. 26. [NEW SERIES.] NEW YORK, JUNE 27, 1868. $3 per Annum [IN ADVANCE.]


### The Novelty Works, New York City.

THE accompanying engraving presents an interior view of a portion of the celebrated Novelty Iron Works of Stillman, Allen & Co., at the foot of Twelfth street, East river.

The position selected by our artist shows one end of the erecting shop, in which the various parts of engines and other machinery in process of construction, are assembled after having been cast, turned, and finished in the different shops composing this immense establishment. Here the final adjustment, and fitting of the several parts to each other are effected, and each member of the future machine adapted to perform perfectly and harmoniously its appointed function.

This shaft is to carry the working parts of Mr. Allen's adjustable cut-off now applied by this firm to all their marine engines with the most gratifying success. It is indeed a marvel of ingenuity and must challenge the admiration of all lovers of mechanical beauty and perfection. In front of the side pipe stands the main crank pin strap for the connecting rod. It is 4 ft. 6 inches long and grasps a crank-pin having 14 inches diameter.

Immediately to the right of, and behind the side pipe, are seen the piston and piston-rod, for the same engine. The former is 105 inches in diameter, while the piston-rod is 11 inches diameter and 19 ft. 4 in. long. The rod is firmly seated in the piston by a conical expansion and large nut on the end of the former.

Just behind these may be seen the air pump and reservoir, with a ladder standing against it. This pump has a diameter of 62 inches and 6 feet stroke, the whole casting weighing 9 tons. In the central background and over the tramway stands the condenser, an immense and complicated casting weighing 21 tons. It is of the tubular kind and is to be fitted with Mr. Allen's wooden packing. On its top flange, where the workman is seen with a sledge hammer, the cylinder bottom will rest with a weight of 8 tons. Upon this again comes the main cylinder weighing 19 tons with its cover, weighing 7 tons. These are all supported by the condenser, which in its turn is to be securely fastened on the bed plate which is seen just to the right of the three central figures with a workman seated upon it, engaged with hammer and chisel. This foundation plate of the whole superstructure weighs 20 tons. To the right, and resting on the bed plate are shown the bed plates for a large 40 ft. lathe. Over these again, in the background, appears a portion of the tool gallery where the hand tools are kept ready for the workman's hand, but out of the way, and in place, when not in use.

The large casting in the foreground, right hand corner, is a jet condenser for a smaller 62 inch engine, and weighs 4 tons.

The shifting and placing in position of these heavy masses are effected by the use of the ponderous crane shown in the central part of the engraving, and by immense chains and pulleys to which steam power is applied.

The cylinder which is to form a part of the *America's* engine, is now being excavated from the sand pit in which it was cast, and has yet to go through the boring mill and finishing shop. Of the other parts not appearing in the engraving, the working-beam deserves mention. It weighs 24 tons without its centre pin, which alone weighs 4 tons.

The main shafts are 2 feet in diameter, and are probably the largest ever made entirely of charcoal iron, they having a weight of 24 tons.

Beside the large marine engine, we noticed a stationary engine of beautiful design and improved valve gear, in process of construction. This firm is also manufacturing Stephenson's & Luther's turbines, and Messrs. Stillman, Allen & Co., have recently added to their extensive works an architectural

VIEW OF SHOPS FOR THE MANUFACTURE OF LARGE ENGINES.

That the reader may have an intelligent idea of the nature and uses of the objects shown in the engraving, we propose to give some explanatory notes, obtained in a recent visit to the works, through the courtesy of Lyman Hall, Esq., the superintendent.

Most of the parts here shown belong to a large marine engine now building for the Pacific Mail Steamer *America*. She will be the twelfth vessel of this line fitted with machinery from these works, and has the following dimensions: Length 360 ft., beam 50 ft., and depth of hold 32 ft. 6 in., giving a burden of over 4000 tons. She is to be fitted with a single beam engine of 105 inches cylinder, and 12 ft. stroke, with Allen's adjustable cut-off.

In the left foreground of the engraving, will be seen the front lower steam-chest, and one of the side pipes with the cut off shaft passing through its upper portion.

department, in which we noticed a building partly completed, of 65 feet front by 58 feet high, for parties at St. Pauls, Minnesota.

To the mechanic not already familiar with the building of heavy machinery, no more interesting place can be found for a visit than the Novelty Works. The ease and precision with which the largest work is planed, turned, and bored cannot fail to excite his admiration.

# OFFICIAL REPORT OF PATENTS AND CLAIMS

## Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 9, 1868.

*Reported Officially for the Scientific American.*

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

| | |
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| On filing each Caveat | $10 |
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☞ *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.*

78,637.—Lamp Burner.—Lewis J. Atwood (assignor to himself and Holmes, Booth & Haydens), Waterbury, Conn.

I claim 1st, A cone or deflector with a circular range of springs to form the chimney holder, in combination with a perforated burner shell, to which said deflector and chimney holder are hinged, substantially as set forth.

2d, A ring, n, formed around the edge of the burner shell by the sheet metal turned over, in the manner and for the purpose set forth.

78,638.—Plow and Planter.—G. C. Avery, Waldron, Ind.

I claim 1st, The combination of the rock shafts C C', standards d d, and seed boxes H H, arranged and operating substantially as described.

2d, The combination of the rake g, and seed box H, with the standard d, as set forth.

78,639.—Evaporator.—Pierre J. Badoux, New York city.

I claim the construction of the within described rotary evaporator, for evaporating all fluids at a low or high temperature, by means of the hollow spirals or serpentines, with any number thereof, substantially as described and set forth.

78,640.—Process of Treating Milk to obtain Useful Products.—Anna E. Baldwin, Newark, N. J.

I claim the imposed methods of obtaining products from milk, substantially as and for the purposes herein described.

78,641.—Potato Digger.—Edmund Bennett, Nankin, Mich.

I claim 1st, The method of separating the vines from the potatoes, by the curved teeth in the endless chain K, and endless belt L, and shield N, arranged substantially as described and for the purpose specified.

2d, The combination of the above with the frame or box A, the wheels B, the axles C, the cog wheels D and O, the pinions E H and F, the shafts G and I, the shaker M, the wheels X, the slatted scoop J, the lever R, the cord or chain S, and the fulcrum T, when constructed substantially as and for the purpose described.

78,642.—Folding or Ironing Table.—M. G. Briggs, Boston, Mass.

I claim the apparatus or device above described, consisting of the leaves A A', twin cross frames or legs c c' d d', and auxiliary leaf or shelf g, the legs being pivoted to each other and to the leaves, and provided with the stops f or f', and the whole operating together in manner and for the purpose as herein shown and described.

Also, apply one pair of cross frames or supports to the leaf by means of the bar b, and pin j, or its equivalent, essentially in manner and for the purpose as explained.

78,643.—Cheese Hoop.—L. Chapin, Antwerp, N. Y.

I claim the within described cheese hoop, composed of sheet iron and tin and formed in the manner specified.

78,644.—Making Horseshoe Nails.—S. E. Chase, Boston, Mass.

I claim in finishing nails the process of curving their bodies and beveling their points, and afterwards forcing them through an open die to shear off superfluous metal, substantially as and for the purpose specified.

78,645.—Hoisting Machine.—G. R. Clarke, New York city.

I claim primary wheels 32 and 33, pinion wheels 16 and 15, in combination with revolving case C.

Also, revolving case C, crank D, and collar O, when constructed, arranged and operated substantially as herein set forth.

78,646.—Elevator.—George R. Clarke, New York city.

I claim 1st, The combination and arrangement of the hollow and revolving table and worm parallel guides, rollers, and their supporting brackets, when the whole is operated by means of pulleys and endless belt, substantially as described.

2d, The endless belt t, when the same is used in combination with the table or platform p, anti-friction rollers b b, and screw thread arm t', when the whole is so constructed as to operate substantially as described and for the purpose specified.

3d, The combination of the lever r, the guide bar R, and the clutches, q and q', the stop lever H, and the stop pin w', when the same are used and operated in the manner substantially as described.

78,647.—Bedstead.—John C. Cline (assignor to himself and Henry C. King), Philadelphia, Pa.

I claim the bed bottom composed of the slats e, attached at head and foot to the bars e and f respectively, said bars being free to turn on end bearings or journals, in combination with springs k, and spring bar h, these several parts being constructed, arranged and operating substantially as shown and described.

78,648.—Coffee Mill.—I. Fremont Colby (assignor to himself and Daniel C. Colby), Washington, D. C.

I claim providing the coffee mill with a supply reservoir B, in combination with the smaller chamber C, and chamber E, all arranged for the purpose specified and set forth.

78,649.—Fastening for Gloves.—Isaac Cole, Brooklyn, N. Y.

I claim the glove fastening consisting of buttons a and b, and chain d, the head of one button being hollow or partly hollow, and within which is placed eccentrically a vertical post e, and having on its periphery openings h k, and a contracted slot f, leading into the hollow head, whereby the chain enters through one opening, goes around the eccentric post and out through the other opening, both in fastening and unfastening the glove, substantially as described.

78,650.—Thrasher for Grain, Clover, Flax, etc.—Lewis Cosler, Yellow Springs, Ohio.

I claim 1st, The adjustable arms M, as herein set forth.

2d, The extension sieve U, for the purpose set forth.

3d, The construction of the incline shaped throat L, when located at the top of the apron K, as herein described and for the purposes set forth.

4th, The arrangement of the two conveyers R and S, when located and operating with the sieve T, as described and set forth.

78,651.—Clothes Pin.—John O. Couch, Middlefield, Conn.

I claim the employment of a rubber or elastic compound, in combination with a metallic clothes pin made as herein described, and adapted to operate therewith, as and for the purposes herein set forth.

78,652.—Brace for Bit.—John W. Craig, Knoxville, Ill.

I claim the device for holding bits in braces, consisting of the pivoted spring lever C, formed with the toe b, which engages with the bit, the free end of said lever adapted to catch under the spring catch D secured upon the end of the brace and provided with a round hole for the passage of the bit, all constructed and arranged to operate as herein shown and described.

78,653.—Mode of Attaching Handles to Cross-Cut Saws.—Patrick Donoughe, Loretto Pa. Antedated May 19 1868.

I claim the arrangement of the handle a, ferrule b, washer c, rod d, and nut e, the whole being constructed, arranged and operating substantially as herein described and for the purpose set forth.

78,654.—Harvester Rake.—John C. Durborrow, Ellicott's City, Md.

I claim the inclined shaft C, jointed at G and provided with the fixed gear wheel B in combination with the revolving gear wheel E, and inclined rake and reel arms, all constructed and operated in the manner and for the purpose set forth.

78,655.—Penholder.—H. G. Eastman, Poughkeepsie, N. Y.

I claim 1st, The combination of the egg-shaped hand support or form A, with a penholder by means of the swivel joint or equivalent therefor substantially as hereinbefore described.

2d, In combination with a penholder the ring F as hereinbefore set forth.

78,656.—Steam Engine Oscillating Valve.—John S. Everitt and Osman Cook, Oshkosh, Wis.

I claim 1st, The valve holes S S, of the valve H, constructed with inclines n n, slots x x, arranged relatively to the arms m m, and valve stem C, as a means of adjustment in compensating for wear.

3d, The valve case A A, when constructed as described and arranged relatively to the oscillating balance valve H, as herein set forth.

78,657.—Mop Wringer.—John Filkins, Sandwich, Ill.

I claim the combination of the standards C C, D D rollers P R, springs Z Z, levers J J, having projections L, and treadle O, substantially as herein described.

78,658.—Petticoat Pipe for Locomotive.—W. G. Freeman, Richmond Va.

I claim the combination of the cone or converging sheet E, with a petticoat pipe D closed at its lower end, when arranged and operating as described for the purpose of equalizing the draft through the tubes by converging the escaping products of combustion towards the mouths or muzzles of the exhaust pipes.

78,659.—Beer Cooler.—Gerhard Fuchs and Jos. Luigart, Logansport, Ind.

We claim the pan H, and ice pan K, provided with a tortuous pipe J through which the beer is passed and cooled substantially in the manner specified and arranged under the pipes B B, as herein described all operator the purposes set forth.

78,660.—Fulling Mill.—Ernst Gessner, Aue, Saxony.

I claim 1st, The toothed segments c, gearing in pinions e, in combination with the beaters and tub or tubs of a fulling mill, substantially as and for the purpose set forth.

2d, The springs f or v, in combination with the tub or tubs of a fulling mill, substantially as and for the purpose described.

3d, The springs k, and adjusting screws k', in combination with the eccentrics L, the beaters B, of a fulling mill, substantially as and for the purpose set forth.

78,661.—Clothes Dryer.—Amos W. Griffith, Boston, Mass.

I claim 1st, The supports B B, constructed with a recess and openings in combination with the flexible frame D, and the fastenings d, as and for the purpose set forth.

2d, The flexible sliding frame, D D E, as and for the purpose specified.

3d, The flexible side pieces D D, in combination with the cord E, adjustable end piece D' D', as and for the purpose set forth.

78,662.—Fruit Gatherer.—R. S. Hall, Hamburg, Mich.

I claim the combination and arrangement of the semi-circular wires C, the outwardly projecting rim B, and the bag or conductor as herein represented.

78,663.—Tackle Block.—Jos. F. Harcourt, Cincinnati, O.

I claim a two or more sheave tackle block, whose partitions C extend from side to side in one piece and are formed with grooves G' in their sides for the reception of the inner forked strap D', all as herein described for the purpose specified.

78,664.—Corn Planter.—Wm. N. Harrison and John J. Harrison, Hornby, N. Y.

We claim the slide tubes J J, attached to cross bar J, the covering rollers K K, connected with hinged arms m m, and springs L L, and the double sets of seed holes f f', with shifting slide I, the whole arranged as described and operating in the manner and for the purpose specified.

78,665.—Corn Coverer.—J. D. Haynie, New Antioch, O.

I claim 1st, The arrangement substantially as described of the two series of rearwardly diverging tines F F', adjustable shares G G', g g', H, and roller I, as and for the purpose set forth.

2d, In combination with the described elements F F', G G', g g', H and I, of the preceding clause, the adjustable clevis L l m, for the object explained.

78,666.—Seed Planter.—Ashael Hays, Guy's Mills, Pa.

I claim 1st, The slide P, and droppers I I and H H, when operated as described for the purposes set forth.

2d, The whole seed planter, when constructed as described for the purposes set forth.

78,667.—Heel for Boots, etc.—Rudolph Herr, Brooklyn, N. Y.

I claim the combination of the above described yoke, sole, spurs, tap hole and heel, with its filling and cross bar, as within described and for the purposes set forth.

78,668.—Hat.—Fleury Huot and Constant Baudouin, New York city. Antedated May 23, 1868.

We claim a bonnet having metallic foil or leaf pressed upon its surface for the purposes and as specified.

78,669.—Plate for Artificial Teeth.—David S. Hutchinson, San Francisco, Cal.

I claim a flexible cavity plate, having in part or in whole the palatine portion of the plate made of flexible material D, in connection with a compound cavity or series of cavities, united or otherwise with a cavity on the center or palatine portion of the plate and upon the internal or external, or both, borders of the alveolar ridge, substantially as and for the purpose specified.

78,670.—Farm Gate.—T. W. Johnson, Grainger, Ohio.

I claim the links B B', gate A, links F, seaft H, and lever G, as arranged in the manner as and for the purpose set forth.

78,671.—Sheep Shearing Table.—Wm. C. Jones, Orangeville, Ohio.

I claim 1st, The tilting table B, with the folding leg M.

2d, The spring-supporting rests E E, in connection with the notches J, in the legs C C.

3d, The bed B, provided with leaves A A, secured in position by the hook G, and staple H.

4th, The block D, in combination with the straps I and F F, all operating in the manner described and for the purposes set forth.

78,672.—Composition for Tanning.—Eli Keith, Wabash, Ind., and Alfred A. Eylar, Pontiac, Ill.

We claim the tanning composition and process, substantially as herein specified.

78,673.—Bomb Lance for Killing Whales.—Zeno Kelley, New Bedford, Mass.

I claim the hammer V, spring h, rod j, pin i, and bar g, in combination with the head E, all arranged as and for the purpose set forth.

78,674.—Electric Fan for Lamps.—Charles T. Mason, Sumter, S. C.

I claim 1st, The application of electricity to cause the revolution of a fan for the production of a draft of air, substantially as and for the purpose described.

2d, The combination of the electric coil A and tan F, and their respective equivalents, in manner substantially as and for the purposes described.

78,675.—Hoisting Apparatus.—J. Vaughan Merrick and Wm. H. Merrick, Philadelphia, Pa.

We claim the combination with a hoisting cage of a weight arranged to move in a contrary direction to the said cage, when the said weight is attached to arresting cams, levers, or their equivalents, all substantially as and for the purpose herein set forth.

78,676.—Apparatus for Making Bottles of Clay.—E. H. Merrill and H. E. Merrill, Akron, Ohio.

We claim 1st, The combination of the bar g, adjusting stays a, roller F, and bottle mold, in the manner substantially as described.

2d, The disk C' provided with curved or radial arms or grooves D', terminating within a short distance of the margin of the disk leaving a rim around the entire edge for the purpose set forth.

78,677.—Machine for Grooving and Swaging Sheet Metal.—Martin Metcalf, Grand Rapids, Mich.

I claim 1st, The peculiar arrangement and construction of the small frame C C C C with the rollers 1 2, and the oscillating shaft d, fig. 2, substantially as and for the purpose specified.

2d, The construction and arrangement of the small frame C C C C with the rollers 1 2, and the shaft d, in connection with the small lever b, slot f, and stop pin n, substantially as and for the purpose described.

3d, The combination of the parts constituting the small frame with its shaft d, rollers 1 and 2, cog wheels 1' 3' 3, lever b, and thumb screw h, with the large frame A A, the stationary roller 4, and swedge rollers B B, and eccentric lever D, substantially as and for the purposes specified.

78,678.—Distilling Apparatus.—A. A. Meyendorff, New York city.

I claim 1st, Arranging in one distilling apparatus two stills and connecting them by means of pipes in such manner that the vapors of one can be forced through the mash in the other, substantially as herein shown and described, for the purpose of completely extracting the alcoholic contents of the mash, as set forth.

2d, Arranging in combination with the double still A B, a testing apparatus consisting of a tub f, and worm c, and so operating that the strength of the mash can be ascertained directly from the still, as set forth.

3d, The vapor collector G, arranged between the still and rectificator H, of a distilling apparatus, substantially as herein shown and described, for the purpose of condensing the weakest and most impure contents of the vapor, as set forth.

4th, The rectificator H, when provided with false bottoms g and h, between which detaining devices l l are arranged, and when so arranged that all liquids condensed above the lower false bottom g, are by means of pipe j and K, or j alone, separated from the low wines in the lower compartment of the rectificator, substantially as herein shown and described.

5th, The vessel L, containing decomposing or flavoring ingredients, when arranged in combination and connection with the rectificator of a distilling apparatus, substantially as herein shown and described.

6th, A distilling apparatus consisting of two boilers A B of a vapor collector G, rectificator H, column I, and final condenser J, and of a vessel L, containing decomposing or flavoring ingredients, all operating substantially as and for the purpose herein shown and described.

78,679.—Manufacture of Shovels.—H. M. Myers, Allegheny City, Pa. Antedated June 5th, 1868.

I claim a blank for the manufacture of shovel blades, made of steel or iron, of the form and with the tang portion split, substantially as herein described and for the purpose set forth.

78,680.—Switch for City Railroads.—Thos. Newman, New Orleans, La.

I claim the supplemental short bars B, in combination with an ordinary switch C, at the point at which a single-track city railroad runs into two tracks when constructed as shown and described for the purpose set forth.

78,681.—Machine for Cutting Files.—W. T. Nicholson (assignor to the Nicholson File Co.), Providence, R. I. Antedated June 5, 1868.

I claim in a file-cutting machine a rolling bed whose longitudinal axis is set angularly with the line of motion of the carriage, or of the cutting chisel if the former be stationary and the latter movable, in combination with such cutting chisel, substantially as described for the purposes specified.

78,682.—Grain Drill.—M. L. Nickels, Dunlapeville, Ind.

I claim the arrangement of the slotted arms C C, pitman D, slides F F, and plates H H, with the frame A, and its hoppers I, when the several parts are constructed and operating substantially as and for the purposes set forth.

78,683.—Shoe Brush.—J. E. Nolan, Chicago, Ill.

I claim the combination of the brush B, with the piece b, projection d, the connecting piece a, screw c, and brush A, as specified.

78,684.—Machine for Threading Thimble Skeins.—W. T. Norton, Dundee, Ill.

I claim 1st, The improved machine for threading thimble skeins consisting of the parts herein specified and shown, all constructed and arranged as described.

2d, The device G, with the lug H thereon, the slide A' having a head B, the rod C, slide D, lever E, and hook F, all constructed and arranged substantially in the manner set forth.

78,685.—Grate and Ash Sifter in Cooking Stoves.—D. E. Paris, Troy, N. Y.

I claim, 1st, A fire grate, made in two parts, having journals eccentrically attached, and arranged to dump or discharge its contents from the center of the fire box, whenever the two parts are moved off their supports and allowed to fall down perpendicularly, substantially as described.

2d, The elongated points o o on the shaker E, or stops on the side plate of the stove for the shaker to strike against or an equivalent therefor, which shall prevent the shaker from driving either part of the grate in too far when in use, and so as to prevent it from dumping while in operation.

3d, The support bars c c, placed over and in combination with a vibrating fire grate, for the purpose herein described and set forth.

4th, A sifting pan situated below or in front of a fire grate, having attached to its bottom sides or ends two or more open movable sifting grates or sieves, and arranged to vibrate inside of the stove by means of a pronged handle or double shaker operated from the outside of the stove, substantially as herein described and set forth.

5th, The lifting and sifting grate G H, or equivalent, in the hearth of a cooking stove, provided with journals, I I, projecting through the hearth, and adapted to be shaken or vibrated from the outside substantially as shown and described.

6th, A ball, attached to a sifting pan, or to its movable bottom grate or grates and so arranged as to move the grate or grates backward and forward by raising said ball up perpendicularly and letting it down horizontally substantially as herein shown and described.

78,686.—Water Reservoir Attachment to Cooking Stove.—D. E. Paris, Troy, N. Y.

I claim, 1st, A cooking stove constructed to be used with or without a water reservoir by means of an opening through the back of the stove, through which the flue passes when used with a reservoir, and which is closed by a movable piece, or by a pipe collar, bag, when used as a plain top stove, substantially as herein shown and described.

2d, A pipe collar, or a flue-opening through the rear part of the top plate of a cooking stove or range, arranged to receive a smoke pipe, also, an opening through the back plate of the stove arranged to receive a reservoir seat or flue chamber, so that either opening may be used separately or alternately as an exit passage substantially as and for the purpose described.

3d, A reservoir or water tank having the whole or a part of the bottom surface elevated sufficiently far to sit over an ordinary pipe collar, and so that the outer edges of the reservoir will set down level on the stove top substantially as herein shown and described.

4th, The extension piece or reservoir seat D, serving both as a sunken pit or flue chamber underneath the reservoir, and also as a top covering to a warming closet, when said piece or seat is fitted to and combined with an ordinary stove top and so arranged that the stove can be used with or without said piece, substantially as herein described and set forth.

78,687.—Oven of Cooking Stove.—D. E. Paris, Troy, N. Y.

I claim, 1st, The heating of the oven of a cooking stove by direct radiation from the fire box through the plates intervening between the two when said plates are constructed with bars and damper, substantially as and for the purpose described.

2d, The broiling pan and rack P and R, constructed and located as and for the purpose described.

3d, The self supporting oven slide I, constructed and arranged as herein shown and described.

4th, A slide or rack placed at or near the bottom plate of the oven either over or under it, and made self-supporting when partly or mostly drawn out substantially in the manner and for the purpose herein described.

5th, A movable self-supporting roasting spit or rack, arranged with hooks, or appliances for holding meat while roasting, placed at or near the top part of the oven of a cooking stove or range, in the manner substantially as and for the purpose described.

6th, A movable oven crane or rack, made to swing in or out of the oven of a cooking stove or range, placed at or near the bottom, or at the top of the same, or attached to the back oven plate, substantially as and for the purposes herein described.

7th, For stove ovens, a movable self-supporting rack or spit, for holding meat while rosting, in combination with a movable self-supporting oven slide or crane, made for holding a dripping pan, and placed underneath said spit or rack.

78,688.—Hot Water Tank on Cooking Stoves.—Daniel E. Paris and Chas. S. Davis, Troy, N. Y., assignors to D. E. Paris, same place, and Clement Olhaber, Cincinnati, Ohio.

We claim, 1st, The horizontal flue in or under the bottom of the reservoir, formed by elevating a part or the whole of the bottom above the outer lower edges of the reservoir sufficiently high to allow the products of combustion to pass rearward under the same into the exit pipe, substantially as described.

2d, The base slide or bottom piece g g, or its equivalent, made either permanent or movable and and forming the rear part of the bottom to said horizontal flue, and connecting both with the reservoir and the back flue piece G or its equivalent, substantially as herein described and set forth.

3d, The self-mounting cover or covers C C, together with the back piece D, formed with the concave prongs N N, the convex half rounds O O, the crooked hooks L, and the elongated slot M, or their equivalents, so arranged and hung that the drip of the cover shall fall back into the reservoir.

4th, The attaching, fastening or supporting a reservoir to or by a stove top by means of bolts, pins, bars, hooks or lugs inserted in or through the ordinary pipe collar or exit passage opening of the top plate of the stove.

78,689.—Tube Well.—A. B. Parsons, Dunton, Ill., assignor to himself and Edward Redhead, La Crosse, Wis.

I claim the combination of the tube C, provided with grooves and holes, the spirally arranged wire coil E, and the gauze screen F, arranged and operating in the manner and for the purposes set forth.

78,690.—Caster.—John W. Pugh, Grand Rapids, Mich.

I claim the disk A, with a square opening in its center, and provided with a space within which works a slotted metal plate C, when used in combination with the caster, having a shank B, with grooves on three sides, as herein set forth, all constructed and operating substantially as specified.

78,691.—Composition for Setting Posts, Timber, etc.—Amos D. Purinton, Dover, Mass.

I claim the above described argillaceous composition, as well as the employment or use of it, substantially in manner and under circumstances and for the purposes as described.

78,692.—Lumber Dryer.—Julio H. Rae, Syracuse, N. Y.

I claim a kiln A, for drying lumber, peat or other materials, containing the following combination, to wit, a corrugated metallic roof and metal lining r a, gutters d e, traps b, and wells F, substantially as and for the purpose described.

78,693.—Stem Winding and Setting Watch.—O. P. Rice and J. H. Gerry, Springfield, Mass.

We claim the reciprocating arbor K, having the inclined, and annular groove e, in combination with the segment x, spring lever q', when constructed and operating substantially as herein described and set forth.

78,694.—Tile Cutting Machine.—John Shellaberger, Shane's Crossings, Ohio.

I claim, 1st, The pivoted cutters C E D F, constructed and operating substantially as and for the purpose described.

2d, The hinged frame B, in combination with the cutters C D E F, for the purpose of adapting them to cut in a vertical plane, substantially in the manner and for the purpose specified.

78,695.—Sugar Evaporator.—William C. Smith, Warrensburg, Mo.

I claim the pan A A, as arranged on the body R, of the device, and in connection with the flues formed by the partition D, and the dampers m m, and the pan B B, divided by the partition r, having a gate h, when used in connection with the movable frame F, carrying the skimmer I, and a driver J moving upon the cogs L, by means of the cog wheels e, operated by the cranks n n, and used substantially as described and for the purposes set forth.

Also the dampers g g g g, with the connecting bar G, and the ashpit S, when applied to a sugar evaporator substantially as and for the purpose specified.

78,696.—Machine for Cutting Leather.—Caleb S. Stearns (assignor to himself, Chas. F. Davis and Thomas Corey), Marlboro, Mass.

I claim attaching the cutter or die to a movable frame, so that it can be brought over any portion of the table B, in combination with a mechanism attached directly to the frame and moving therewith for depressing the cutter, substantially as described.

Also the frame U, in combination with the movable frame C and the clutch, for throwing the mechanism into action which operates the cutter, substantially as set forth.

73,697.—Machine for Splitting and Rolling Leather.—Caleb S. Stearns (assignor to himself and Thomas Corey), Marlboro, Mass.

I claim, 1st, The roller S for rolling leather, in combination with the carrying cylinder C, when the roller S is acted on by levers T or their equivalent, all constructed and arranged substantially as and for the purpose described.

2d, The blocks M, with the springs N acting independently of each other, and constructed substantially as described.

3d, The screws Q and plates R, in combination with the knife E, substantially as set forth.

4th, The roller D, for feeding the split leather out of the machine, when used in combination with the carrying cylinder C, and arranged substantially as and for the purpose set forth.

78,698.—Pen and Pencil Holder.—Ambrose Tower, New York city.

I claim a pencil point protector having barrel l' and slot s, in combination with the stamped plate fig. 1b, constructed and operating substantially as specified, and all equivalents of the same.

78,699.—Nail Extractor.—James Tyzick, St. John, N. B.

I claim the combination of the lever A, sliding fulcrum D, and hook or gripper E, the whole constructed and arranged to operate substantially as specified.

78,700.—Harvester Rake.—John Underwood, Muscatine, Iowa

I claim, 1st, The combination of a revolving rake and gatherer, a concave grain receiver B, a rear elevated platform C, a reciprocating follower F, and a binder's support K or D, operating substantially in the manner and for the purposes described.

2d, The revolving rake and gatherer with its teeth applied to a rocking bar, in combination with the devices described and shown for causing the teeth to assume in their circuit the different positions required, and with a concave grain receiver, substantially as and for the purpose described.

3d, The binder's support K, which is attached to the finger bar, in combination with the elevated platform C and reciprocating follower F, substantially as described.

78,701.—Knife for Splitting Leather.—Azzy E. Van Gieson, Newark, N. J., administrator of the estate of Amzi H. Van Gieson, deceased, assignor to Newark Patent Leather Company.

I claim the construction of a knife for splitting leather, in sections, forming together a continuous knife, substantially as hereinbefore set forth.

78,702.—Head and Shoulder Rest.—Abraham V. W. Van Vechten, New York city.

I claim a head and shoulder rest composed of the main strap A, branches B, loops D, and head rest E, all as shown and described.

78,703.—SPUR.—Samuel Wehrly (assignor to himself and E. V. Sutter), San Francisco, Cal. Antedated May 4, 1868.

I claim a spur having the oog o, the rack m, and arm d, together with the spring c, and slotted plate b, the whole constructed and operating substantially as and for the purpose described.

78,704.—LUBRICATING JOURNAL OF CAR SHAFT.—Isaac P. Wendell, Philadelphia, Pa. Antedated May 23, 1 68.

I claim, 1st, The combination of the air chamber D with the oil distributing plate B and supply tube C, arranged in the oil box A, or other oil reservoir, substantially in the manner above described and for the purpose set forth.

2d, The box A, having a division plate a, and oil chamber, b, beneath it, in combination with the distributing plate B, substantially as described and for the purposes specified.

3d, The construction of the distributing plate B, with inclines and scrapers, substantially as described and for the purpose set forth.

78,705.—SPRING SEAT.—John L. Whipple, Detroit, Mich.

I claim the spring seat herein described, the same formed by the combination with the frame A, of the series of double coil springs D, on the four sides thereof, and having their loops or bights pointing inwardly, and connected by the transverse and longitudinal interlaced webbing, as and for the purpose set forth.

78,706.—CHURN.—Melvin Wood, Babe's Corners, Mich.

I claim the combination of the box A, posts, B B, double crank C, the connecting rods D D, the oscillating dashers E E, the cover F, the false bottom G, the openings H I J, and the balance wheel K, and water spaces, L L, when arranged and operating for the purposes herein set forth.

78,707.—MACHINE FOR EDGING WALL PAPER.—William P. Yeoman, Waukegan, Ill.

I claim, 1st, The combination of rollers J K, spring P, knives S S, cloth m m, and rings N O, substantially as and for the purpose set forth.

2d, The combination of the table D with rollers J K, substantially as herein specified.

78,708.—HARVESTER.—G. W. N. Yost (assignor to Corry Machine Company), Corry, Pa.

I claim, 1st, The frame A of a mowing machine, when constructed of a single bar a, approximating in form to a horseshoe, and a transverse strengthening bar b, when the extremities of the bar a, are bent down for the attachment of the shoe E, and finger bar, substantially as herein shown and described.

2d, In combination with the above, the main wheel, C, when arranged between the driver's seat and the transverse bar, b, substantially as and for the purpose set forth.

3d, The wheel, J, on the hinged bar, I, in combination with the slotted shoe, E, and with the lever, f, all made and operating so that the finger bar can be easily raised by means of the lever, f, as set forth.

78,709.—HARVESTER.—G. W. N. Yost (assignor to Corry Machine Company), Corry, Pa.

I claim the movable adjustable shoe, G, when arranged substantially as described, so as to adjust the width of the swath to the capacity of the binder, as set forth.

78,710.—HARVESTER.—G. W. N. Yost (assignor to Corry Machine Company) Corry, Pa.

I claim the described combination with each other of the finger bar, G, finger bar holder, F, pivot a, posts, J and J', cord or chain, b, and lever, H, all made and operating substantially as and for the purpose herein shown and described.

78,711.—HARVESTER REEL.—G. W. N. Yost (assignor to Corry Machine Company), Corry, Pa.

I claim, 1st, Making the sweeps of harvester reels of flexible bands or straps, substantially as herein shown and described.

2d, Making the arms by which the sweeps of a harvester reel are connected with the shaft, A, of spring metal so that they can be folded against the shaft when the sweeps are taken off, as set forth.

3d, A harvester reel, when composed of the shaft, A, spring bars, B, and bands or straps, C, the latter being adjustable on the bars, B, and all made and operating substantially as herein shown and described.

78,712.—MOWING MACHINE.—G. W. N. Yost (assignor to Corry Machine Company), Corry, Pa.

I claim hanging or pivoting the vibratory lifting bar, Q, upon the crank shaft, substantially as and for the purpose set forth.

Also, in combination with the vibratory or lifting bar, Q, the stationary segment, traveling pinion and hand lever, or its equivalent, by means of which the said bar, Q, may be readily manipulated by the driver, which at the same time it is free to move, as required, when not controlled by him, substantially as described.

78,713.—ROAD SCRAPER.—Nicholas E. Yost, Corry, Pa.

I claim, 1st, The reversible timbers, A A', pivoted upon a center brace, when constructed and operating substantially as and for the purposes set forth.

2d, The timber, A, in combination with the two plow points, B B', constructed and operating substantially as and for the purposes set forth.

3d, The timber, A', in combination with the two castings, C C', constructed and operating substantially as and for the purposes set forth.

4th, The extension brace, E E', in combination with mortise, c, tongues, f, bolt, g, and castings, D D', constructed and operating substantially as and for the purposes set forth.

5th, The tongue, I, and cross bar, J, when secured to the scraper by means of bolts, c and g, and in combination with the timbers, A A', constructed and operating substantially as and for the purposes set forth.

78,714.—CORN SHELLER.—J. C. Zimmerman, Eberly's Mill, Pa.

I claim the combination of the casing, B, its springs, F F, and shelling, E, with the sieves, S R, fans, h h, conveyor, P, operated the shafts, D H, and their cogs, the whole constructed as and for the purposes specified.

78,715.—PAPER BOX.—William Armour, Belfast, Ireland.

I claim, 1st, A paper box composed of the two covered boxes, A A, united by the hinge, a, in the manner described.

2d, The elastic fastening, C' to the hinged boxes, A A, as described.

78,716.—NET FOR FISHING.—Benjamin Arnold, East Greenwich, R. I.

I claim, 1st, The method herein described of intetlooping, twisting, and orming a net of a continuous length of cord, substantially as described.

2d, Netting constructed as herein described, as a new article of manufacture.

78,717.—FLUE BLOCK.—John Binns, Oskaloosa, Iowa.

I claim the combination of the hollow cylindrical block, A, having an outer shoulder, a, the outer cylindrical block, C, having internal shoulders, b, under its upper end to form a square chamber, the core, B, sections, e, and perforated cap, E, all constructed and arranged as shown and described for the purpose specified.

78,718.—PICK HANDLE.—William Blay, Helena, Montana Territory. Antedated June 4, 1868.

I claim the metallic strap, B, constructed and applied to the pick handle as shown and adapted to be pressed through the eye of the pick and secured therein by means of a key, m, as described and represented.

78,719.—TIRE SHRINKING AND PUNCHING MACHINE.—Walter Britton, Abingdon, Ill.

I claim, 1st, The plate, D, bearing slotted lugs, a a, the cam levers, E E, spring, b, in combination with the frame plate, G, slotted lugs, e e, all constructed, arranged and operating substantially as shown and described and for the purpose set forth

2d, The plate and punch M and n, and stirrup, L, for joint use with the subject matter of the preceding claim, in the manner and for the purpose described.

78,720.—WATCH.—Edouard Chatelain (assignor to Ernest Francillon), St. Imier, Switzerland.

I claim, 1st, The sliding stem carrying the loose wheel B and the sliding clutch C in combination with the oscillating levers, D and E, which operate so that the clutch will by them be moved in an opposite direction to the sliding motion given to the stem substantially as and for the purpose herein shown and described.

2d, The above in combination with the spring, F, made and operating as described.

3d, The loose bevel-gear wheel, B, which is only turned when connected with the sliding clutch, C, in combination with the bevel-gear wheel, H by means of which motion is imparted to the wheel which winds up the spring, as set forth.

78,721.—APPLE PARER, CORER AND SLICER.—Andrew Clark, La Fayette, Ind.

I claim 1st, The cam plate, R, and its dependent mechanism substantially as described for the purpose of paring apples and other similar fruit, all as set forth.

2d, A sash, D f f C, and a yielding fork O with its proper mechanism substantially as described in combination with the radial cutters, c, coring tube, d, and cylinder, V, all as set forth.

3d, The cam plate, R, wheel, T, plate, S, and arm, U, all constructed and operating substantially as and for the purpose set forth.

4th, The arrangement of the several parts of the machine, substantially as shown and described and for the purpose set forth.

78,722.—SPITTOON.—E. Detwiler, Milwaukee, Wis.

I claim a spittoon constructed with outside shell A with cover B with inside curb C with receptacle, D, lever F, with treadle F, and connecting rod H, secured together with springs, I I, substantially as and for the purpose specified.

78,723.—TRACTION RAILWAY BRAKE.—Rudolph D'Heureuse, San Francisco, Cal.

I claim the double-flanged or grooved wheels for brakes on railway cars, applied and operated substantially as herein described and represented.

78,724.—HOE.—Josiah Dodge, Grass Valley, Cal.

I claim in combination with a hoe the pick B, and the forked shank, D, substantially as and for the purposes herein shown and described.

78,725.—SHINGLE MACHINE.—L. H. Dodge, Oshkosh, Wis.

I claim the combination of the shaft P, sleeve m bevel wheels M N Q L, the arms a b, arm D, and plate E, of the carriage, substantially as described for the purpose specified.

78,726.—TAILORS' RULE.—Patrick W. Dolan, Jersey City, N. J.

I claim 1st, The rule consisting of the parts A C, grooved in each edge to receive the ends of the clasps D E, the latter being provided with a set screw G, all constructed and arranged to operate in the manner and for the purpose substantially as herein set forth.

2d, In combination with the adjustable rule A C the head piece F, having a curved upper surface and the pivoted tape H, substantially as and for the purpose set forth.

3d, The adjustable rule A C, provided with the head piece F, shaped substantially as shown and the tape measure H, the whole arranged substantially as described for the purpose specified.

78,727.—BRUSH.—John F. W. Dorman, Baltimore, Md.

I claim the combination of the package A, when constructed as described with the handle B, having a male screw on its lower end and the tapering ferrule D, having at its upper end a female screw to receive and hold the handle, the several parts being constructed to operate in the manner and for the purposes set forth.

78,728.—PLANING MACHINE FOR WOOD.—Frank Douglas, Norwich, Conn.

I claim 1st, The braces e e, when constructed to the double-inclined form, and used in connection with the plug or wedge F, in the manner and for the purposes specified.

3d, The fixed guide G, when employed in connection with the cutter head C, and the table E, substantially as and for the purpose set forth.

3d, The combination of the tapering spindle B, having a cylindrical screw on its lower end with the tapering socket having its lower end cylindriform and cut into a female screw to receive the screw on the lower end of the spindle when said parts are constructed to operate in the manner described and employed for the purpose of attaching a cutter head to its shaft.

4th, The combination of the taper-bearing box a, with the oil cup m, when made so as to slide one on to the other to adjust shaft A, to its proper bearing and to compensate for the wear of said parts, in the manner specified.

78,729.—SEWING MACHINE.—G. A. Fairfield, Hartford, Conn.

I claim 1st, The combination with the oil hole above the needle bar of the crossing distributing passages in the top of the needle bar, whereby all the sides or faces of the bar may be oiled at the same time from a single orifice and from the outside of the casing.

2d, The combination with the oil grooves in the needle bar of the orifice for conducting oil to the axis or pivot of the thread conductor, substantially as shown and described.

3d, The combination with the devices last above claimed of an oil passage, for lubricating the link which actuates the needle bar.

4th, The tension device described, the same consisting of a flanged roller and a rigid curved yoke spanning part of its periphery and adjustable as to its pressure by a spring.

5th, As a means for varying the feed, the employment of an adjustable rod having a pin or projection thereon movable within a slotted sleeve upon the rock shaft that imparts motion to the feed bar, substantially as shown and described.

6th, The combination with the lever q, and its plate of the rod, sleeve, and rock shaft, substantially as and for the purpose set forth.

7th, The spring R, for imparting adjustable pressure to the presser foot, when constructed arranged and operating as described.

8th, A shuttle race slightly inclined to the line of traverse of the shuttle driver, as and for the purpose set forth.

9th, A shuttle race and shuttle driver race cast in one piece when the same are in lines which approach each other.

78,730.—MANUFACTURE OF FERTILIZERS.—Levi S. Fales, New York city.

I claim 1st, The within described process of preparing the bones of equivalent highly-nitrogenized substances previous to their admixture with other materials, substantially as herein set forth.

2d, The manure composed of the several materials set forth, combined in the manner and in about the proportions herein specified.

78,731.—BREAST PUMP.—William T. Fry, New York city.

I claim a breast pump in combination with an india rubber breast shield, when the latter is applied directly to the milk receptacle of the former, and all arranged substantially in the manner as and for the purpose set forth.

78,732.—BED BOTTOM.—E. Gibbs and O. W. Gibbs, Richland Center, Wis.

We claim an improved spring bed bottom formed by the combination of the cross slats D, staples F, longitudinal spring slats, E, coiled wire spring, J, longitudinal spring slats G, wire loops, H, wound with cloth or its equivalent and cross slats I, with each other and with the side rails B, and end rails C, of the bedstead, substantially as herein shown and described and for the purpose set forth.

78,733.—APPARATUS FOR TURNING WRIST PINS, CRANK PINS, ETC.—Theodore A. Goff, San Francisco, Cal.

I claim the arrangement of the several parts of the machine as herein recited, whereby it may be used to turn off a wrist pin or a crank pin in place, as set forth.

78,734.—SHEET METAL FOLDING MACHINE.—George H. Goldsmith, Waverly, Ill.

I claim, 1st, The cog wheel, E, bearing cam blocks, h, or other equivalent device, substantially as shown and described, for the purpose of operating the break bar, F, all as set forth.

2d, The arm, i, and stud, k, or the equivalent thereof, substantially as shown and described, in combination with the break bar, F, and cog wheel, E, all as and for the purpose set forth.

3d, The fluted roller, A, substantially as shown and described, in combination with the blade bar, I, break bar, F, and cog wheel, E, all as and for the purposes set forth.

4th, The channel, l, of the blade bar, I, substantially as shown and described, and for the purpose specified.

5th, The pinion, D, and cog wheel, E, substantially as shown and described, in combination with the roller, A, break bar, F, and blade bar, I, all as and for the purpose set forth.

78,735.—HORSE HAY RAKE.—E. R. Hall, Utica, N. Y., assignor to himself, D. M. Golden, and B. G. Eaton.

I claim, 1st, Levers, m and n, in combination with the stop, b, substantially as and for the purpose specified

2d, Main lever, H, constructed and operating in connection with rake shaft, F, substantially as set forth.

3d, The combination of levers, m and n, with lever, H, substantially as described.

4th, The employment, in a horse hay rake, of foot lever, T, in combination with pawl, S, and connecting rod, P, substantially as and for the purpose specified.

78,736.—PAD BILLET.—Lydia Hays, Ames, Iowa.

I claim a metallic pad billet, B, having the buckle, E, attached, as shown, and secured to the leather strap, A, by the screws, C C, substantially as shown and described.

78,737.—SLEIGH.—Chester Heald, Marshalltown, Iowa.

I claim a wrought or malleable iron knee a a b, when welded to a cast iron runner so as to form braces, and to equalize the weight of load on all parts of the runner, substantially as shown and described, in combination with a cross beam plate H, runners, A, cross beams, D D, all substantially as shown and described, and for the purpose set forth.

78,738.—PRESS.—Henry Henley, New Garden, Ind.

I claim 1st, The beam, b, hinged at, n y, and secured in an adjustable manner to upright, d, by means of stirrup, r, (or its equivalent,) substantially as set forth and for the purpose specified.

2d, The flexible rods, e and e', in combination with the uprights, d and d', and beam, b, substantially as set forth, and for the purpose specified.

78,739.—PROPELLER.—D. H. Heyen, New York City.

I claim 1st, The combination of the propeller wheel, C, and shaft, D, when adjustable laterally upon the central pivot, E slotted segmental plate, F, support, G, pinion, h, upon the upright shaft, J, engine shaft, O, pulley, P, and pulley, R, all arranged as described for the purpose specified.

2d, The combination of the propeller, C, shaft, D, having the ball joint, E, slotted segment, F, and pinion, h, upon the shaft, J, all constructed and operating as and for the purpose specified.

78,740.—COOPERS' CROZE.—John C. Hofer, Belle Air, Ohio.

I claim the bit, A, formed in two parts, having the alternate corners of their forward ends bevelled or ground off, said parts secured to each other and to the guide B, by the slotted clamping bolt C, as herein described, for the purpose specified.

78,741.—NURSING NIPPLE.—Francis H. Holton, Brooklyn, N. Y.

I claim, 1st, The India rubber nipple, having the annular or circumferential stop flanch, constructed in one piece therewith, substantially as and for the purpose specified.

2d, The hollow flanch, b, for attaching the nipple to the tube, by means of the perforated button B, substantially as shown and described.

78,742.—HEATING DEVICE FOR CHAIRS, ETC.—C. S. Hunt, Parish of Terrebonne, La.

I claim a chair, constructed substantially as herein described, that is to say, provided with the metal bottom, and the combustion chamber, adapted to receive a gas jet or its equivalent, substantially as and for the purpose described.

78,743.—APPARATUS FOR DISTILLING WOOD.—Gaspar Hunziker, Summit, Miss.

I claim, 1st, The oven A, constructed as described, having the rounded lower edges, and the central longitudinal inclined trough G, whose inclined wings, a, support the vertical strips and rails e, for the carriages C, the inclined plates a', above the wings a, the cold air pipes y, beneath said inclined wings, and between the flues F, the top of said oven provided with the condensing dome T, all arranged as described, for the purpose specified.

2d, The arrangement of the furnaces K, inclined flues F, trough G, cold air pipes y, draft pipes h, steam pipes t, hot air chambers M, and carriage supporting rails e, as herein described, for the purpose specified.

3d, The door P, provided with a track upon its inner side, whereby, when it is swung down in a horizontal position, it receives the carriages C, which are rolled out upon it to discharge their loads, as herein shown and described.

4th, The furnace flues F, when arranged to pass beneath the curved bottom of the oven A, upon each side of the projecting trough G, and curved outward extend in an inclined direction upon each side of said oven to the front thereof over the furnaces, to unite in the chimney S, as herein described, for the purpose specified.

78,744.—SHINGLE MACHINE.—Lyman Jennings, Winchendon, Mass.

I claim the combination of the horizontally sliding cutters g g g, and the rack c, with the wheels I I, pinions d d, racks k k, for operating the sliding block rest D, as described.

78,745.—TOP.—Chester L. Johnson, Utica, N. Y.

I claim the top A, and casing C, constructed substantially as described.

78,746.—VISE.—F. B. Johnson, De Witt, Iowa.

I claim, 1st, The elbow shank C, and movable jaw E, constructed and arranged substantially as herein shown and described, in combination with each other, and with the stationary jaw A, and clamping screw D, as and for the purpose set forth.

2d, The combination of the spring F, with the elbow shank C, and with the pivoted movable jaw E, and screw D, arranged substantially as herein shown and described, and for the purpose set forth.

78,747.—MACHINE FOR ENAMELING MOLDINGS.—John Johnson, Boston, assignor to himself and N. A. Brickett, Quincy, Mass.

I claim, 1st, The brushes G, mounted upon the vertical shafts E, one of which is adjusted laterally by the screw F, and both bearing beneath the brushes the disks H, arranged in relation with the vertically adjustable brush L, as herein described, for the purpose specified.

2d, The combination of the furnace P, feed rollers B U, brushes G G L, and laterally adjustable scraper N, all arranged and combined to operate in the manner substantially as and for the purpose set forth.

3d, The combination of the furnace P, brushes G G L, elastic roller B, feed roller U, scraper N, and guides T V, all arranged as described, for the purpose specified.

78,748.—HOLLOW HEADED SCALE BEAM.—Joel F. Keeler, Pittsburg, Pa.

I claim, 1st, Adapting hollow headed scale beams, of any known construction, to use as primary levers in the construction of compound lever platform scales, substantially as herein described.

3d, The use of the combined link bearer f', and link f, in the construction and operation of platform scales, substantially as described.

78,749.—CHURN DASHER.—D. Dwight Kellogg, Jr., Northampton, Mass.

I claim a churn dasher, constructed with spiral rows of arms a a2, etc., and strips M M' N N', attached to the arms, and arranged in combination with each other and with the shaft A, and the rows of arms, in the manner described, and for the purposes specified.

78,750.—SAW HORSE.—Frederic W. Mansfield (assignor to himself and H. C. Hitchcock), Fitchburg, Mass.

I claim the construction of the curved serrated levers A C, composing the clamp attachment, when arranged and adapted to be applied to a saw horse, in the manner and for the purpose herein shown and described.

78,751.—COOKING RANGE.—John McCloskey (assignor to Henry McGuckin), New York City.

I claim, 1st, Forming an air chamber across the back of the range, in communication with both the ovens of the range, substantially as described, so as to form a continuous oven and hot air space along three sides of the fire chamber.

2d, The gas combustion chamber, placed above the air chamber and beneath the smoke exit pipe, substantially as described.

3d, The boilers I, one or more, arranged over the ovens, so that they can be projected over the fire chamber, substantially as described.

4th, The bottom grate, when made in the form here shown, supported by journals at its ends, so that it may be taken out and turned upside down, thus enabling one to use it as a concave or a convex grate, substantially as described.

5th, Separating the divisions Q Q, of the water backs, by an air space, so that the temperature of the water in one will not affect the temperature of the water in the other, substantially as described.

6th, The inlet and outlet pipes in the annular air chamber that is placed between the water cylinders, substantially as described.

7th, Conducting the hot water pipe that leads from the water back to the inner cylinder V, through the outer cylinder U, and across the annular space W, substantially as described.

8th, Providing a range with staples a, or their equivalents, for the purpose of suspending it from a ceiling, as on shipboard, substantially as described.

78,752.—CIRCULAR SAW GUIDE.—Thomas Milner, Houston, Texas.

I claim, 1st, The arrangement of the bolt C, within the plate A, the rods r r, working in the holes o o, acting in combination to operate the movable jaw E, as and for the purpose specified.

2d, The flange B, and shoulders, constructed and arranged to operate substantially as and for the purposes shown and described.

78,753.—BED BOTTOM.—Thomas B. Moore and Garrett De Bow, Bridesburg, Pa.

We claim, 1st, The slats B, of a bed bottom, joined together by a continuous webbing C, which also serves as the covering for the padding, substantially as and for the purpose described.

2d, The covering for the slats of bed bottoms, secured to the slats by means of the grooves in the edges of the slats, and the strips fastened therein, substantially as and for the purpose described.

3d, The rails of a bed bottom frame joined together by means of the metallic plate D, having the several lips and flanges described, and the bottons s, substantially as and for the purpose set forth.

4th, The combination, with the slats B, and springs F, of the saddle E, substantially as and for the purpose described.

5th, The combination, with the springs and the rails, of the rod upon which the springs are wound, provided with the movable brackets G, and arranged in the said combination, substantially as and for the purpose described.

78,754.—ATTACHMENT FOR BAKE OVEN DOOR.—Smith Morton, Valparaiso, Ind.

I claim the application, to the doors of ovens, of a latch or catch, held immovable by the within described metal or metallic alloy while it is unfused, but which, when the said metal is fused, turns and unfastens itself, in combination with a weight or spring, to open the door, and the fusible metal and alarm on the inside of the oven, substantially as shown and described.

78,755.—DOBEREINER SELF-LIGHTING LAMP.—Gustav Muller, Newark, N. J. Antedated June 4, 1868.

I claim, 1st, Providing an inflammable lamp with a vertical or inclined channel c, substantially as described, for the purpose of preventing the accumulation of sulphuric acid in the channel, as set forth.

2d, Securing the spongy platinum of an inflammable lamp within a bell G, for the purpose of protecting the same, as set forth.

3d, A self-lighting lamp, when provided with a vertical or inclined channel c, and with a bell G, suspended above the outlet of the channel, all made and operating substantially as and for the purpose herein shown and described.

78,756.—BEDCLOTHES HOLDER.—John B. Munson, Bailey Hollow, Pa.

I claim, in combination with the cross bar F, secured to arms D d', which are hinged to staples E, fixed in the rail B, the cord H, pulley J, drum K, crank L, ratchet wheel N, and pawl M, all arranged to operate as and for the purpose herein set forth.

78,757.—ROPE TRACE.—Thos. Newman, New Orleans, La.

I claim, in combination with the rope trace A, the leather covering, metal clips B Cx and E, and the chain D, all arranged as described for the purpose specified.

78,758.—SOLE-EDGE PLANE.—Manly Packard, North Easton, Mass.

I claim as my invention or improvement in the sole edge plane the knife C, the throat piece D, and stock A, as constructed in separate pieces, and arranged together and combined by means substantially as described, so as to enable the knife to be adjusted with respect to the throat piece, and such throat piece to be moved relatively to the knife, all as and for the purpose or purposes as explained.

Also, the arrangement and combination of the abutment or supporting projection c, the stock A, the adjustable knife C, and the throat piece D, movable relatively to the knife, as and for the purpose hereinbefore described.

78,759.—CAR BRAKE.—W. T. Parsons, Thomasville, Ga.

I claim, 1st, The combination of the flanged shoes S, pivoted to the lower ends of the bars D D', which are hung from the frame A, by means of pivots e e', with the shaft, g, bearing grooved pulleys P P' P, ropes or chains m m', drum d, and spring R, all constructed and arranged to operate in the manner and for the purpose herein set forth.

2d, The device for retaining the shoes S, in an elevated position, away from the wheels, said device consisting of the beveled pin b, fixed in the shaft g, centrally-pivoted lever L, having projecting pin l, and spring n, all constructed and arranged to operate in the manner substantially as herein set forth.

3d, The flanged shoe S'', hung to the lower end of the single bar D'', which is connected to the pivoted lever L', by a yielding joint, substantially as described.

4th, The combination of the slotted shoe S, pivoted bar D''', lever l, pivoted at g, and springs v v'', all constructed and arranged to operate in the manner and for the purpose substantially as herein specified.

78,760.—RETORT FOR CONCENTRATING SULPHURIC ACID.—J. D. Perrin and Joseph Saunders, Brooklyn, N. Y.

We claim providing a retort with a projecting pipe or spout a, and with a pipe B, substantially as described, so that communication between various retorts can be established, as herein specified.

78,761.—GIB.—Amos H. Rhodes, Fall River, Mass.

I claim the construction and arrangement of gib A1, removable block B1, and bolts D1 and E1, operating substantially as and for the purpose set forth and described.

78,762.—WAGON AND CARRIAGE BRAKE.—Rodney Rice, Pittsfield, Vt., assignor to himself and J. H. Spaulding.

I claim, 1st, The treadle c, levers b b, and links a a1, in combination with the brake levers F F1, arranged and operating substantially as described.

2d, The brake levers F F1, provided at their inner ends with interlocking hooks, f, working in the loop G, substantially as and for the purpose described.

3d, The independently-hinged brake levers F F1, connected centrally by a sliding or hook joint, and operated by means of levers and connecting links, arranged substantially as described.

78,763.—EXPANDING PULLEY.—Thomas H. Savery, Wilmington, Del.

I claim the expandings C, of a pulley, operated by means of a hand wheel E, and scroll disk A, both working on the pulley shaft D, and connected by any suitable train of gear wheels, substantially as shown and described.

78,764.—VALVE GEAR FOR STEAM ENGINE.—Austin Seely, Alton, Ill.

I claim, 1st, The additional throttles T, arranged with reference to both cylinders, substantially as shown, for the purpose of operating the engines and controlling and modifying the expansion of the steam used, all as set forth.

2d, The expansion cylinder B, in combination with the additional throttle T', substantially as and for the purpose shown and described.

3d, The additional throttle valves T' T'', arranged in the pipe connections, substantially as shown and for the purpose specified.

78,765.—BRICK MACHINE.—D. Smith, Newburyport, Mass.

I claim, 1st, The annular series of open molds, l, operating in combination with arms j k, substantially as described.

2d, The intermittent rotary series of presses m o, constructed and operating in combination with the follower n, substantially as described.

3d, The combination and arrangement of the annular series of molds l, and the intermittent rotary series of presses m o, constructed and operating substantially as described.

78,766.—SHAKER FOR THRASHING MACHINE.—John P. Smith, Claverack, N. Y.

I claim, 1st, The rotating shaking arms f, in combination with the endless carrier or shaker B, substantially as and for the purpose specified.

2d, The arrangement of the shaking arms f, transverse shaft e, endless carrier or shaker B, and framing A, substantially as and for the purpose specified.

78,767.—MUSKETO SCREEN.—Edward Spaulding, Brooklyn, N. Y.

I claim so constructing and arranging the spring H, with the roller F, and screw bearing o, that the uncoiling force of said spring is exerted to tighten the bearings, and the contractile force to keep the screen in place and permit its removal when required, substantially as described.

78,768.—MILLSTONE DRESS.—Hedges L. Spencer, Social Circle, Ga.

I claim the millstone dress composed of the furrows a b c, formed and arranged as herein shown and described.

78,769.—MANUFACTURE OF AUGERS AND BITS.—Jas. Swan, Seymour, Conn.

I claim, 1st, The rising and falling and partially rotating arbor H, provided with the swaying and drawing dies J J, in combination with the holding dies B B, all arranged substantially as and for the purpose set forth.

2d, The combination of the cam, N, bevel wheels K L, links d e, arbor H, and the spring I, all arranged to operate the arbor in the manner substantially as and for the purpose set forth.

78,770.—COMBINED SQUARE AND BEVEL.—H. G. Taylor, Port Hope, Canada West.

I claim a combined square and bevel composed of a stock formed of two parts A A', connected by a screw and nut, B and a blade, C, fitted between said parts, and connected with part A, all arranged substantially as shown and described.

78,771.—IMPLEMENT FOR SHARPENING CUTLERY.—Augustus Thayer, Albany, N. Y.

I claim, 1st, The cutters C, two or more, constructed as shown, with beveled ends, and fitted in a slot in a tang B, and secured therein by a screw or wedge, substantially as and for the purpose set forth.

2d, The grooves d, in the ends of the cutters, for burnishing or hardening the cutting edges, substantially as set forth.

3d, The beveled shoulders c, in combination with the cutters C, substantially as and for the purpose specified.

4th, The sliding or adjustable tube E, either with or without the polygonal plate, F, substantially as and for the purpose set forth.

78,772.—SASH FASTENER.—Ralph Thomas (assignor to himself and E. Parker), Waterbury, Conn.

I claim a sash fastening consisting of the case A, and spring bolt C, in combination with the hinged cap D, all made and operating substantially as herein shown and described.

78,773.—WINDMILL.—G. J. Thorn, Pecatonica, Ill.

I claim, 1st, The windmill having each of its arms, B, provided at opposite ends with wings, C, placed at right angles to each other, said arms passing in different vertical planes through the vertical shaft A, and through openings, a1, in the sleeve E, all arranged as described, for the purpose specified.

2d, The sleeve E, suspended upon the shaft A by the rods F, attached to the arms of the governor, and provided with a series of openings, a1, in different vertical lines, for the passage of the arms B, and for the operation of the cams a2, as herein described, for the purpose specified.

3d, The device for changing the position of the wings C, consisting of the V-shaped cranks a2, upon arms B, and the V-shaped openings a1, in sleeve E, substantially as shown and described.

78,774.—HORSE HOE.—Elisha W. Walton (assignor to himself and Wm. H. Derrick), Stockton Cal.

I claim, 1st, The regulating brace m, constructed substantially as and for the purpose above shown.

2d, The standard E E of a horse hoe, constructed substantially as above described.

3d, The reversible hoe point, D, with its slot or mortise X, constructed and operated substantially as above shown.

4th, The reversible shares A, and also their two sharp cutting edges, constructed and operated substantially as above shown.

5th, The moldboard B in combination with the share A, substantially as above shown.

6th, The wedge, L, with its screw and nut, constructed and used substantially as and for the purpose above described.

7th, A horse shoe with or without the mold board B constructed and operating substantially as above described.

78,775.—CLEVIS IRON.—T. P. Warren, Norfolk, Va., assignor to D. W. Warren

I claim 1st, The combination of the perforated plate, D, with the bent rod C, when the said parts are constructed to operate in the manner set forth.

2d, In combination with a perforated draft plate D, and a rod or link C, for attaching it to the plow beam the screw nuts n n by which the plate can be adjusted back and forth on the rods or link so as to cause the plow to run more or less to land, in the manner described.

78,776.—CAR AXLE CAP.—William Werts, Pana, Ill.

I claim 1st, The combination of the eye bolt, D, coiled spring F and chamber E, with each other with the door B and with the cap or box A, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the cross-head bolt G, coiled spring I, and chamber H, with each other with the notched or grooved slotted projection b3, formed upon the door B, and with the cap or box, A, substantially as herein shown and described and for the purpose set forth.

78,777.—REFRIGERATING MILK CAN.—W. W. White and Martin King, Lowville, N. Y.

We claim the combination of the jacket A B, and cylinder D, together with the hollow lid H, the ventilating tube J, and the connecting tube E, substantially as specified and for the purposes therein set forth.

78,778.—DOUGH KNEADER.—C. I. Wilmans and W. J. Wolfe, Olney, Ill.

We claim, 1st, The combination of the pivoted kneader M m P, the stationary kneading board P', and curved bottom H, all constructed, arranged, and operating as described for the purpose specified.

2d, The adjustable roller Q Q', arranged and operating in combination with the kneader P, substantially as specified.

3d, The removable covers L L', in combination with the sliding frame W, and hooks X, substantially as and for the purpose set forth.

4th, The removable kneading board P', in combination with the groove a3, roller Q Q', and kneader M P, for the purpose set forth.

5th, The relative arrangement of the compartments C D E, removable partition F, stationary partition G, bottom H I, and cover K, substantially as and for the purpose set forth.

78,779.—JACQUARD FOR LOOMS.—Moritz Wolf, Philadelphia, Pa.

I claim, 1st, Operating the cylinder A, by means of the cylinder F, needles o, strings l, slotted extension n, of the lifter D', and frame K, all made and operating substantially as and for the purpose herein shown and described.

2d, Two or more independently acting cylinders, in combination with the vertical needles, substantially as described for the purpose specified.

78,780.—COMPOSITION FOR GILDING MOLDINGS, ETC.—David Wright, Boston, Mass.

I claim the preparation or compound for preparing frames, moldings, ceilings, and all surfaces for gilding in gold and silver, substantially as set forth and described.

78,781.—STEAM AND WATER-INDICATOR FOR BOILER.—Thos. P. Akers, New York city.

I claim, 1st, a low-water and high-pressure indicator, in which the adjusting-parts are so constructed and arranged as to be locked in their adjusted position, independent of any covering or other surrounding devices, substantially in the manner shown and described.

2d, The combination of the expansible tube, A, with the levers, I and K, the jointed lever, L, and the part M, together with their connections and fastenings, substantially as and for the purpose set forth.

3d, The combination of the inverted valve, Y', the valve-stem, Y, the nut, X, the cap, G, the spiral spring, W, and the whistle, E, substantially as shown and described.

4th, The tube, A, and the levers, I, K, and L, with their connections and fastenings, when combined with the inverted valve, Y', the valve-stem, Y, the nut, X, the cap, G, and the spiral spring, W, whereby to produce the double effect of indicating low water and excessive pressure of steam, substantially as herein set forth.

78,782.—GOVERNOR.—William Bellis, Richmond, Ind.

I claim, 1st, The construction of the triple-disk valve, I J K i j k, substantially as and for the purpose set forth.

2d, The diaphragm, D d E F f G H, constructed as described, when arranged in relation to the triple-disk valve, I J K, substantially as and for the purpose specified.

3d, The combination of the adjustible bracket, S, weighted prop or latch, R r, and weighted lever, P p, with the governor valve, I J K, and governor, N, all constructed, arranged, and operating substantially as and for the purpose described.

78,783.—PORTABLE FENCE.—Louis W. Bosart, St. Marie, Ill.

I claim, 1st, In combination with the panels, the gate-posts, D, constructed and arranged substantially as and for the purpose set forth.

2d, The trestles, C, with slots and notches, c'', and projections, c', in combination with the panels, A and A', substantially as described.

78,784.—CAST-METAL BRACKET.—Purmort Bradford (assignor to Sargent & Co.), New Haven, Conn.

I claim the base, A, shelf, B, and brace, C, constructed so as to be united and locked together by hooks or projections on one part, and corresponding mortises or recesses in the other, so that when the three parts are set together, they will be locked and held in place, substantially as set forth.

78,785.—PLOW.—Chas. Brown and Leonidas Geith, Peoria, Ill.

We claim a combined plowing and cultivating machine, having levers, B and F, with ratchets thereto, rod, C, chains, D, knives, G, frames, H, P, and O, and swinging bars, M, constructed, arranged, and operating substantially as specified.

78,786.—PROCESS OF COMBINING WROUHT AND CAST METAL.—Edwsrd L. Brown, Philadelphia, Pa.

I claim, 1st, Preparing wrought metal for combining it with cast metal for castings of all descriptions, where great strength of any kind is required, by first thoroughly coating it, by galvanic action or other process, with nickel, or any other metal or metals, alloys of metals, or metallic or mineral substances, or their alloys, not easily oxidizable and very difficult to fuse, and which only melt, or whose point of fusion is at a higher degree of heat than the molten cast metal to be poured about it, the whole substantially as above described.

2d, The production of castings strengthened by the introduction of wrought metal coated with a metal, alloy of metals, or substance less fusible than the cast metal, substantially as above set forth.

78,787.—HOP-POLE.—Williston Conner, Rensselaerville, N.Y.

I claim the combination of the large and small rings, B B', constructed as described, that is to say, each having three openings, a, on the outer parts, and one central opening with teeth, and used with the poles, A and C C C, as and for the purposes specified.

78,788.—HYDROCARBON BURNER.—Alphonso W. Cook and Robert Dempster (assignors to themselves and J. S. Semon), Buffalo, N.Y.

We claim, 1st, The coil of pipe, G, in combination with the feed-pipe, F, and retort, A, arranged and operating substantially as and for the purpose described.

2d, The dripping-pan, H, and discharge-pipe, h1, in combination with the feed-pipe, F, and retort, A, for the purpose and substantially as described.

3d, The plate, C, having openings, C1 and C2, in combination with the furnace, B, draught-flue, E, and retort, A, constructed and arranged substantially as herein set forth.

4th, The removable bottom plate, M, in combination with the retort, A, for the purpose and substantially as herein described.

5th, The annular air-chamber, n, and outlet, n1, in combination with the retort, A, for the purpose and substantially as herein described.

6th, The chamber, I, plugs or bushings, i1, and strainer, J, in combination with the feed-pipe, F, for the purpose and substantially as herein described.

7th, The combination of the force-pump, P, feed-pipe, F, and blow-off pipe, L, for the purpose of cleaning the inside of the retort, A, substantially as described.

8th, The application and use of the apparatus herein described, for generating steam, in the manner and for the purposes substantially as herein set forth.

78,789.—PORTABLE FENCE.—Wm. Corson, Camden, Ohio.

I claim the flexible bar, D, in combination with the bar, C, and notch, c, substantially as described.

78,790.—WEATHER-STRIP.—Japheth Cross, Adrian, Mich.

I claim, 1st, the combination of the strips, a, b, c, and d, with the bed-pieces, f and h, to be used in doors and windows, all constructed in the manner and for the purposes substantially as set forth.

2d, The combination of the spring-catch, k, with the levers, l, and strip, b', constructed and operating in the manner set forth.

78,791.—CHURN.—Samuel T. Curtiss (assignor to himself and Lyman P. Thompkins), El Paso, Ill.

I claim the dasher, F, constructed and arranged to operate substantially as and for the purpose herein set forth.

77,792.—GRAIN-DRILL.—Daniel L. Dickson, Durham, Ill.

I claim the arrangement of the shaft, F, in the box, J, and provided with a series of wheels with circumferential grooves, in combination with the flukebars, O O, that extend under the hopper to the flanged roller, C, the various parts being constructed and operated substantially as specified.

78,793.—SUBAQUEOUS FOUNDATIONS.—James B. Eads, St. Louis, Mo.

I claim the combination and arrangement of the outer caisson, its ribs or posts, B B', with the internal caisson, C, in the manner and for the purpose substantially as herein set forth.

78,794.—HAWSER CLAMP.—Henry A. Ellis and C. Frederick Gladding, Norwich, Conn.

We claim the double cam-shaped lever, L, in combination with the moving jaw, C', when operating through the guide, G, and pin, p, substantially as described and for the purpose set forth.

78,795.—WATER-METER.—Henry Flad, St. Louis, Mo.

I claim the air-check in the chambers, A, C, and D, to prevent the flow of liquid in any direction but that of the line of traverse of the piston, substantially as set forth.

The combination of the magnet, E, the soft bar, e, and the revolving piston, B', when acting substantially as set forth.

78,796.—ATTACHING HANDLES TO CUTLERY.—James Flood, New Haven, Conn., assignor to Wm. Sanderson, New York city.

I claim the employment of the twisted tang, in combination with the composition handle molded around, all substantially as described for the purpose set forth.

78,797.—TRUSS-FRAMED BRIDGE.—John Foreman, Pottstown, Pa.

I claim the arrangement, substantially as described, of the inclined posts, suspension-rods, and diagonals, for the purpose specified.

78,798.—CASTER FOR FURNITURE.—Elliott E. Furney, Chicopee, Mass.

I claim, 1st, The lower plate, g, of a caster, when constructed with the elongated curved projection, g, thereon, and having the projection or bearing, m, said plate, g, being used in connection with the spindle, B, and roller, D, when constructed and operating substantially as described, and for the purposes herein specified.

2d, The combination of the plate, g, having a spindle, B, with the circular lever, d, said lever, D, operating in conjunction either with the plate, b, or with the furniture to which the caster may be attached, all constructed and operating substantially as herein described and for the purposes specified.

78,799.—CULTIVATOR.—George Garrett, Elkhart City, Ill.

I claim providing a double cultivator with a fender, F, having bearing chains, f f, when the same are united and combined with the beams, B and C C, and the whole is so constructed and arranged as to operate substantially as described and for the purpose specified.

78,800.—HARVESTER.—Wm. F. Goodwin, East New York, N. Y., assignor to himself and Charles R. Squire, New York city.

I claim, 1st, The employment of a cam or eccentric, in combination with the multiplying gear, shown and described, for the purpose set forth.

2d, The cam, A, attached to the pinion, A2, or a sleeve projecting from the latter, and working on and rotating round the shaft, H, of a harvester, in the manner and for the purpose substantially as described.

3d, The arrangement of the hoisting apparatus of a harvester, whereby the cutter-bar may be drawn up and turned over on the tongue, in combination with the retracting-spring, E, arranged and operated in the manner and for the purpose substantially as described.

78,801.—HORSE-RAKE.—C. N. Goss, Claremont, N. H.

I claim, 1st, The arrangement of the two pivots or centres, D d, upon which the tooth-bars turn in the described relation to each other, and to the shafts or thills, for the purpose set forth.

2d, The arrangement of the stop-bar, I, relative to the tooth-bar pivots, D d, substantially as and for the purpose set forth.

3d, The arrangement of the rock-shaft, D, substantially as described, whereby it is made to constitute the rest or support of the independently-pivoted tooth-bars, as well as the common centre upon which said tooth-bars are vibrated to discharge the gathered load.

4th, The levers, H and L, in combination with the pivoted tooth-bars and step-bar, I, substantially as described, whereby the driver is enabled to hold the teeth down to their work, and to raise the same for discharging the load, or for passing an obstruction, as set forth.

5th, The coil-spring, G, applied to and operating in combination with the rake-bars and pivoted rake-teeth, substantially as and for the purpose set forth.

78,802.—BRICK-DRYING APAARATUS.—Isaac C. Hatch, Camden, N. J.

I claim one or more kilns, built as herein described, and provided with hot-air or steam pipes P P', in combination with fans, F, within the rear end of each kiln, all constructed, arranged, and operating as and for the purpose herein set forth.

78,803.—TOOL FOR REJEWELING WATCHES.—C. Hopkins, Philadelphia, Pa.

I claim, 1st, The bed, A, having the clamp, a, and the centering screw, J, substantially as and for the purpose above described.

2d, Forming the ends of the reaming instrument, as shown at m m1, m2, substantially as and for the purpose set forth.

3d, The reaming tool above described, composed essentially of the bent spring-arms, G G, having the cutting-edges m m1 m2, and the exterior screw-threads, with the adjustible centering-needle, I, and the screw-nut, F, working up and down upon the arms, G, G, in the manner described, all said parts being constructed and arranged to operate together substantially as specified.

78,804.—COMPRESSION-COCK.—Cornelius A. Howard (assignor to himself and Richard McCloy), New Haven, Conn.

I claim, 1st, The valve, C, constructed with the passage, and arranged within the chamber, B, and combined with the plug, D, when the said plug, D, is arranged so as to operate the said valve to close the inlet at one extreme, and the plug at the other, and open at intermediate positions, substantially in the manner herein set forth.

78,805.—SPRINKLER AND DREDGE.—George Jones, New Haven, Conn.

I claim the arrangement of the ball-joint between the spindle, D, and plunger, C, and combined with the cover, B, and cup, A, so that the cover, may be turned from the cup, substantially as herein set forth.

78,806.—MANUFACTURE OF IRON AND STEEL.—John Allcock Jones, Middlesborough, England.

I claim the preparation of iron and the production of cast steel, by first submitting cast or pig iron to the processes of puddling, boiling, and balling, and then submitting the balls so obtained, either whole or in fragments, to fusion in separate crucibles or receptacles.

78,807.—SIDE-SNAP FOR HARNESS.—John Kerr and Dayton C. Kerr assignors to themselves and S. H. Miller, Ames, Iowa.

We claim the adjustable snap-hook, D, in combination with the metal plate, A, and socket, B, all constructed and arranged substantially as herein described, for being attached to the pad of the saddle of a harness, as set forth.

78,808.—HORSE-POWER.—Walter King, Richmond, Mo. Antedated May 27, 1868.

I claim, 1st, A locomotive horse-power, A C D, in combination with a stationary machine, B B1 B2, substantially in the manner shown and described.

2d, The housing, A, when combined with the driving-shafts, C D1, and the wheels, C1 C2, substantially as shown and described.

3d, The wheels, C1 C2, the bosses, c1, and spring clutches, c2, when constructed and arranged as described and set forth,

4th, The pole, E, when formed of two pieces, e e1, and applied to the housing, A, so as to form a one-horse or two-horse machine, as described and shown.

78,809.—CHURN.—J. J. McLane, Sagetown, Ill.

I claim the arrangement of the box, A, with the metal bottom, B C, two cross shafts, D D, having movable arms, H H, and adjustable by the journals, j, and bearings, h, the several parts being constructed and operating substantially as specified.

78,810.—MACHINE FOR SCUTCHING FLAX.—Abraham S. Miller, Bluffton, Ind. Antedated June 5, 1868.

I claim the knives, O, upright, C E, base, D, and spring bar, F, all combined, constructed, and arranged as and for the purpose herein set forth.

78,811.—MACHINE FOR BREAKING FLAX.—Abraham S. Miller, Bluffton, Ind. Antedated June 5, 1868.

I claim the guide, H, in combination with the break, I, constructed and arranged as and for the purpose set forth.

78,812.—CHURN.—Samuel Mills, Clinton, Ill.

I claim, 1st, The box, A B, constructed as described, and used while partially submerged in the cream, in combination with the wire gauze or perforated plate, C.

2d, The dasher, b c, provided with flaps, e, e, in combination with the box, A B, substantially as and for the purpose set forth.

78,813.—BEE HIVE.—Freeman Moore, Carrollton, assignor to himself and J. H. Tressel, Carroll county, Ohio.

I claim, 1st, The movable bottom board, D, provided with a slide, r, in combination with the wedges, t, or their equivalent, when constructed and arranged substantially as and for the purpose specified.

2d, The slotted honey board, I, in combination with perforated pasteboard and fancy honey receptacles, K, when constructed and used substantially as and for the purpose herein set forth.

3d, The cover, R, when provided with a queen cage, I S, and slide, p, substantially as and for the purpose specified.

4th, Suspending the movable frames, f, and the dividers, &, by means of metallic hooks thereon, and the horizontal wire rods and braces, g, as and for the purpose herein set forth.

5th, The air chambers, m, and the double ventilators, o and n, in combination with the slides, n, when arranged and used as and for the purpose herein set forth.

6th, The comb guides, H, when constructed and used in the manner and for the purpose set forth.

7th, The dividers, &, when constructed and used in the manner and for the purpose set forth.

8th, The combination of the honey box, N, as constructed, with the pasteboard separator, and arranged in the hive, as and for the purposes set forth.

78,814.—GRINDING MILL.—John P. Moore, Morning View, Ky.

I claim supporting the lower edge of the bed stone, F, by means of the screw rod, H, nut, H2, and spring, I, arranged as herein described, for the purpose of giving elasticity to the bed stone in its relation to the runner.

78,815.—MACHINE FOR STUFFING LEATHER.—Henry Muller, North Cambridge, Mass.

I claim, in the process of stuffing leather, the employment, subsequent to treating the leather with oil in a warm close drum or wheel, of a wheel or drum, so constructed as to admit free access of the air to the leather, substantially as and for the purpose described.

Also, the wheel, with the close circumference, a, and skirting, b, the door, c, and cross-bars, d, when made open at the heads or sides of the wheel or drum, as and for the purpose described.

78,816.—HORSE HAY FORK.—Harvey D. Palmer, Leonidas, Mich., assignor to S. O. Kaempfer, David G. Williams, and William C Wilson, Elkhart, Ind.

I claim the movable head piece, F, to which the prongs, D, are pivoted, in combination with the standard, A, link, c', and rods, d', and, E, substantially as and for the purpose set forth.

78,817.—SEWING MACHINE.—Charles Parham, Philadelphia, Pa.

I claim the combination, with the bracket, of the carrier, driver bar, groove and feed wheel, as described, for the purposes set forth.

78,818.—SEWING MACHINE.—Chas. Parham, Philadelphia, Pa.

I claim, 1st, The combination of the shuttle carrier, T, the guide, V, the cam slotted down, hanging arm, S', directly attached to the carrier and the crank, M, the whole constructed and arranged substantially as described.

2d, A shuttle driver or carrier, S, having a downwardly hanging arm, S', in combination with a guide, V, and groove, W, constructed and arranged substantially as described.

3d, A reciprocating shuttle face plate having feed teeth on its upper edge substantially as described.

4th, A reciprocating shuttle face plate, having feed teeth on its upper edge, in combination with a movable stripper plate, O, substantially as described.

5th, A reciprocating shuttle face plate having feed teeth on its upper edge, in combination with a movable stripper plate, O, and needle shield, E, substantially as described.

6th, The combination of a reciprocating shuttle face plate, having feed teeth on its upper edge, a movable stripper, O, and a reciprocating cam or wedge on the upper surface of the shuttle carrier or driver for the purpose of operating the feed stripper, substantially as described.

78,819.—HOT WATER TANK ON COOKING-STOVE.—Daniel E. Paris, (assignor to Burdett, Paris, & Co.), Troy, N. Y.

I claim, 1st, For the purpose of heating the reservior only, a double flue between the oven and the reservior, so arranged as to conduct the products of combustion downward in front of the back plate of the cooking-stove, and upward in the rear of it, substantially as here shown and described.

2d, A double acting damper, situated below or underneath the pipe-collar of a cooking stove, having its base at or near the back plate of the stove, while its top part shall move from side to side of said pipe-collar, in combination with the reservior in rear of and the double flue below said damper, substantially as herein shown and described.

3d, The back of a cooking-stove as a division plate for an upward and downward flue, or a double flue at the rear end of the same, in combination with a water reservior, when situated substantially as herein shown and described.

4th, A pipe-collar to a cooking-stove, situated at one side or end of the stove, and over or nearly over a double smoke flue and so placed that it shall receive the currents from either flue, as the damper below is shifted from side to side of said pipe-collar, substantially as herein shown and described.

5th, In combination with a water reservior, two flue dampers, both situated at one side or end of a cooking-stove or range, and arranged or capable of producing the results substantially as herein shown and specified.

6th, The upright flue, R, situated in rear of the back plate of a cooking-stove, connected and in combination with the flue chamber, K, and the pipe-collar, G, three sides of which flue are formed by the concave shape of the reservior, substantially as here shown and described.

7th, The rearwardly and upwardly projecting flue seat, K, or its equivalent when used to conduct the smoke or products of combustion from the rear flue or flues of the stove into the flue, R, or into a similar flue formed in or near the centre of the reservior, substantially as herein shown and described.

78,820.—HORSE-HAY FORK.—Edward M. Parker, Sion, Md.

I claim a hay fork or elevator, when the same is provided with two straight tines, in combination with a centre tine, of curved formation, the latter being controlled by a crank lever with a suitable bearing pin.

78,821.—BUTTON-HOLE STITCHING MACHINE.—Rufus H. Peabody, Chelsea, Mass.

I claim the combination, with a clamp substantially as described, of a spreader lever projecting backward from the nub, d, and constructed and operating as and for the purpose described.

Also, in combination with said clamp and lever, g, the device for securing said lever in any desired position within the range of its movement, for the purposes described, consisting of the teeth, n, and stationary pawl, m, or their equivalent.

78,822.—COAL COOK-STOVE.—Henry Pease, Brockport, N. Y.

I claim the combination and arrangement, with the oven, B, and central fire-pot, E, of the hot-air flue, a, surrounding the oven and the cold-air flue, I, surrounding the fire-pot, the effect being to equalize the temperature of the oven by shielding from over heat and cold, as herein set forth.

78,823.—BOILING KETTLE.—H. H. Pember, New York, city.

I claim a vessel, provided with a channel, B, around its upper edge, which communicates with the interior of the vessel by means of apparatus, E, as described, and for the purpose specified.

78,824.—HORSE-RAKE.—Lorenzo D. Pennington and John G. Woodfill, Vernon, Ind.

We claim, 1st, The bail, C, rod, g, and bolts, K and m, with the slot, c, in the continuation of the band, n, or their equivalents, when arranged to operate substantially as and for the purpose specified.

2d, In combination with the bail, C, rod, g, and bolts, K and m, and slot, c, the spring, D, and studs, a a, all arranged to operate in the manner and for the purposes as set forth.

78,825.—FORGING APPARATUS.—Nelson Peterson and George W. Jones, Antioch, Cal.

We claim, 1st, The bar, H, with its slotted lever, N, screw, P, and spring, I, in combination with the link, J, and the handle, B, substantially as described.

2d, The bearings, E, having the recesses, a a a, for supporting the axle D, so as to allow the hammer to be used on any part of the anvil, substantially as described.

78,826.—SHADE FIXTURE.—George T. Pillings, (assignor to himself and John W. Massey,) Leicester, England.

I claim the combination and arrangement of the frame, B, provided with eyes, e and e', worm, W, circular rack, R, and pulley, L, so as to operate substantially in the manner and for the purpose specified.

78,827.—SHAFT COUPLING.—T. W. Porter, Boston, Mass.

I claim, 1st, A shafting coupling, divided longitudinally in halves, as shown at, A and A, and secured together by bolts passing outside the shaft, as shown at, I I', and with the spline or key, a, or its equivalent, formed upon or inserted in the coupling, substantially as described and shown.

2d, The plane bearings, h, formed in a longitudal divided coupling, substantially as and for the purposes specified.

78,828.—GAS GENERATOR.—D. Webster Ranke, Limestoneville, Pa. Antedated June 4, 1868.

I claim the gas generator, constructed as described, consisting of the annular reservior, A, in the inner side of which the curved pipe, c, is secured, its base extending within the reservoir, above the level of the oil, and the burner upon its end extending to the central opening in the reservior, A, and provided with the protector, E, the perforated deflector, B, above the reservior, and the supply pipe, D, all arranged as described for the purposes specified.

78,829.—HOISTING MACHINE.—Henry J. Reedy, Cincinnati, Ohio.

I claim, 1st, The combination substantially as described, with a hoisting platform, of the suspending rope, E, weights, H H', rollers, d, sheaves, F F', and shaft, G, or their mechanical equivalents, by which the platform is both balanced and enabled to be elevated and depressed in the manner explained.

2d, The arrangement, substantially as described, of the shaft, P, ratchet wheel, R, rubber, S, lever, T, and pawl, U V, or their mechanical equivalents, for the purposes set forth.

78,830.—ICE CRUSHER.—Nathan Richardson, (assignor to "The Richardson Mill Company,") Gloucestor Mass.

I claim, in an ice-crushing mill, the vibrating teeth or spikes, M M M, &c, operated by cams, D D', or their mechanical equivalents, in combination with the tooth crushing wheels, substantially as described and for the purposes set forth.

78,831.—PROCESS OF TREATING GOLD AND SILVER ORES.—Louis Edward Rivot, Paris, France, assignor to Jacques Gaillardson San Francisco, Cal.

I claim 1st, The roasting by means of superheated steam, of auriferous and argentiferous ores, when previously combined or mixed with oxide of iron substantially as set forth.

2d, The roasting of auriferous and argetiferous ores by mixing therewith oxide of iron, combined with iron or roasted pyrites, and then submitting the whole to the action of superheated steam, substantially as set forth.

78,832.—JOURNAL BOX.—James T. Robinett, (assignor to himself and G. W. Goodwyn), Petersburg Va.

I claim the method of attaching the brass plate, C, to the iron piece, A, as herein set forth.

78,833.—SEEDER AND CULTIVATOR.—J. S. Rowell, and Ira Rowell, Beaver Dam Wis.

I claim, 1st, The combination of the hollow axle and end piece of frame arranged as set forth, to form a bearing and end piece.

2d, The spindle, D, secured firmly in the hub of the driving wheel, to form a double bearing for the same.

78,834.—CONSTRUCTION OF HANDLES OF TABLE CUTLERY.—William Sanderson, New York, city.

I claim forming the handles by molding a suitable composition, under pressure, around the tang or metallic portion of the instrument, substantially as hereinbefore set forth.

77,835.—MACHINE FOR STUFFING LEATHER.—Joseph W. Schayer, Boston, Mass.

I claim, in combination with a stuffing-wheel, a heating-apparatus placed in a chamber, h, auxiliary to and opening into the stuffing-wheel, but separated therefrom by an open work or perforated partition, m, substantially as described.

Also, combining with a rotary stuffing-wheel an axial pipe, through which oil may be thrown into the stuffing-chamber while the wheel is in rotation, substantially as described.

78,836.—CARRIAGE-TOP.—E. S. Scripture, Brooklyn, N. Y.

What I claim as new, and desire to secure by Letters Patent, is, not the circular corrugated wedge friction surfaces as when made by themselves, as the same as has been made by me, and described in my patent, dated January 7, 1868, for compasses, calipers, etc.; but

I wish to claim their application, as described, when combined with a carriage-seat and top, substantially in the manner and for the purposes set forth.

78,837.—MACHINE FOR PLACING FRICTION MATCHES IN FRAMES FOR DIPPING.—George Sebold, Durlach, Germany, assignor to John F. Ziesemann and Helbore Rashcol, St. Louis, Mo.

I claim 1st, The receiving or feed-box, I, arranged with longitudinal plane ridges, i1, having transverse projecting slats, i2, substantially as set forth.

2d. The pressure-slide, K, actuated by ropes and weights, in combination with the feed-box, I, substantially as and for the purpose set forth.

3d The guide-tube box, F, and its tubes, f2, the sieve, G, and check-sieve, H, substantially as for the purposes set forth.

4th. The boxes, I, and, F, in combination with the axle, H, the shaking-lever, N, and pivot, 63, substantially as set forth

5th, The guide-slat frame, E, having longitudinal slats, e', in combination with the splint-frame, D, having transverse slats, d1, and the channel-plate, B, substantially as for the purposes set forth.

6th, The splint-frame, D, arranged with slats, d1, chamfered at ends, substantially as set forth.

7th, The spaces, c, in combination with the slats, d1, of the frame, D, constructed and operating substantially as set forth.

8th, The compresser device, Q, acting upon the slats of the frame, D, substantially as and for the purpose set forth.

9th, The supporting-bar, L, in combination with the shaking-lever, M, and shaking-wheel, m1, acting substantially as set forth.

78,838.—APPARATUS FOR DAMPENING GRAIN.—I. Shellabarger, Decatur, Ill.

I claim the combination and arrangement of the cylinder, A, grain chute, B, and water pipe, c', when the whole is constructed so as to operate substantially as described.

78,839.—UMBRELLA AND PARASOL.—John Anderson Simpson, Liverpool, England.

I claim, as a new article of manufacture, an umbrella constructed as herein described, the joints or junction of the ribs and stretchers being covered, and protected from injuring the covering by rubber shields, as and for the purposes herein set forth.

78,840.—SOAP.—G. W. Slagle, J. L. Miller, and H. C. Hoy, Washington, D. C.

We claim the mode of manufacturing soap from the ingredients, and substantially in the manner set forth.

78,841.—WAGON-BRAKE.—James Harvey Smiley, Caroline, N. Y.

I claim the combination and arrangement, consisting of the slide, C, the cord or cords, F, levers, G, and H, and springs, P, and pulleys and rollers, and plates, as described, making a brake sliding out and against the wheels, and retracting out of sight, substantially as set forth.

78,842.—ARTIFICIAL IVORY.—Alfred Starr and William M. Welling (assignors to William M. Welling), New York city. Antedated June 2, 1868.

We claim the compound herein specified, prepared as set forth.

78,843.—COMBINED THRESHING MACHINE AND GRAIN-SEPARATOR.—Lorenzo P. Tweed, Lewisburg, Pa

I claim, 1st, The apron, F, consisting of a number of sheet metal strips, suspended above the shaker-frame, D, substantially in the manner and for the purpose herein set forth.

2d, The slats, v, having wires, y1, at their edges and adjustable upon a frame, substantially as and for the purpose described.

3d, A plate or plates, k1, so hung, adjacent to an opening in the case of a fan, G, that the passage of air into the said case will cause the plate to be adjusted, substantially as and for the purpose described.

4th, The arrangement of the shaker-frame, D, platforms, H and K, bands, g and w1, with their bars or scrapers, and the sieves, t t1, all substantially as and for the purpose specified.

78,844.—DEVICE FOR RAISING AND LOWERING WINDOWS.—Elisha H. Tobey (assignor to himself and A. B. Hale), Bridgeport Conn.

I claim, as an article of manufacture, the socket, A, constructed with the internal flange or rim, a, and with or without the flush-plate, B, and so as to be applied to the sash, substantially as set forth.

78,845.—ELECTRO-PNEUMATIC APPARATUS FOR TRANSMITTING DISPATCHES.—Cromwell., Fleetwood Varley, London, England.

I claim, 1st, Operating the pistons and valves of the main compressed air and exhaust-pipes, o and n, by means of a series of auxiliary valves and pistons, and pipes connecting the exaust and compressed air chambers with the cylinder, and arranged to be operated by the keys or buttons, substantially in the manner and for the purposes herein set forth.

2d, The combination, with the valve-rods, M and l, and their detents, of the sliding-rod, 4, arm, 3, and piston-rod of the cut-off cylinder, V, substantially as herein shown and described.

3d, The combination, with the the cylinder V and its piston, of the cut-off mechanism herein described, arranged in such manner that either the depression of the stop or key, a', or the arrival of the carrier at the distant end of the message pipe, shall connect the said cylinder with the exhaust, substantially as and for the purposes herein shown and set forth.

4th, The use of the valves, x y, arranged in chest, N, so as to be operated by the movement of the arm, 3, for the purpose of destroying the vacuum in the chest and message-tube, as set forth.

5th The combination, with the message-tube, and mechanism for connecting the same with the air-compressing apparatus of the cylinder, F, and piston and slide-valve arranged to cut off communication between the message-tube and receiving-chamber, substantially as herein shown and set forth.

6th, Connecting the slide-valve, cylinder, F, with both the compressed-air and the cut-off mechanism, substantially in the manner and for the purposes specified.

7th, The combination, with the message-tube, of the herein described mechanism for connecting the same with either the compressed-air or exhaust-apparatus, and for cutting off the said connections, under the arrangement described, so that all the operative parts of such mechanisms shall be actuated by means of the button, A, a, and a', in the manner and for the purposes set forth.

78,846.—SEEDER, DRILL, AND ROLLER.—Luther R. Wallace, Adrian, Mich.

I claim, 1st, The employment of one hopper and one cylinder, or their equivalent, to supply both drill and broadcast-sower with the seed to be sown, the whole arranged in front of the rollers, B B, substantially as set forth and described.

2d, The hollow adjustable seed-cylinder, E, in combination with the concave, W, broadcast-tubes, L, and drill-tubes, N, substantially as set forth and described.

78,847.—BREECH-LOADING FIRE-ARM.—D. B. Wesson (assignor to Mason Fire-Arms Company), Springfield, Mass.

I claim, 1st, The metallic-block, b, and the recessed projection, E, upon the breech or loading end of the barrel or barrels, when constructed, arranged, and operating substantially as and for the purposes set forth,

2d, The described construction and arrangement, in reference to each other, of the block, b, and tumbler, f, whereby the hammers shall be raised to the half cock in the operation of releasing the breech from the frame, substantially as described.

3d, The projection, i, upon sear, h, in combination with the opening, l', in the plate, j', of the trigger, j, substantially as and for the purpose specified.

78,848.—SHACKLE JACK.—Jno. Whitlock, Birmingham, Conn.

I claim the combination of the hook frame, H H', with the slide, F, and the screw, G, or their equivalents, for the purposes above described.

78,849.—CATTLE TIE.—John Wiard, New Britain, Conn.

I claim, 1st, The socket, B, combined with the thumb screw, C, when the said thumb screw is provided with a head, having a perforation at one or both ends, so far to one side from the centre of the axis of the screw as that, when the tie is secured, the screw will be prevented from turning, substantially as herein set forth.

2d, The hook, G, formed upon the base, F, constructed with the lug, I, and seat, L, and provided with eye, E, or its equivalent, and combined with the snap, P, when the said snap is attached to its seat, I, and supported by the lug, f, substantially as herein set forth.

78,850.—BALL CASTER.—Lewis Wilkinson, Boston, Mass.

I claim a furniture caster having a ball, f, secured in a cup or socket a, by extensions, g, substantially as shown and described.

Also in combination with such socket, a, and extensions, g, the pins or projections e, against which the surface of the ball bears and rotates, substantially as shown and described.

Also in combination with the ball-containing cup or socket, the flanged plate or disk c, and screw spindle d, cast integral with the socket piece, substantially as described.

78,851.—CONSTRUCTION OF SAFES.—Francis H. Williams, Syracuse, N. Y.

I claim, 1st, So constructing and hinging the safe door A, and fitting it into the frame D, that this door shall be allowed to move bodily and squarely up to and from its seat without being rotated within the door casing, substantially as described.

2d, Fitting the door A to its frame D, by means of acute angular stepped faces b b' l l', substantially as described.

3d, Providing the double-leaf hinges b b, with a removable pintle c, when such hinges are applied upon the door of a safe or vault substantially as and for the purposes described.

78,852.—ANCHOR.—Frederick Wittram, San Francisco, Cal.

I claim an anchor having the shank A, with the openings B and C, and the two arms or flukes D and E, moving freely through the shank to either side, the whole constructed and operating substantially as and for the uses and purposes herein specified.

78,853.—STEAM ENGINE.—Devolson Wood and Stillman W. Robinson, Ann Arbor, Mich. Antedated March 31, 1868.

We claim the segmental pieces A A, to serve as a cylinder head, substantially as described.

## REISSUES.

2,968.—PLATE FOR ARTIFICIAL TEETH.—Alfred B. Ely, trustee, Newton, Mass., assignee of L. R. Streeter. Patented Dec. 17, 1867.

I claim, 1st, The use of hard resins or resinous bodies, mixed with fibrous or textile materials, and shaped by means of heat and pressure, substantially as described.

2d, The use of thin plates of metal, horn, shell, gutta percha, wood, or such other suitable material, capable of being properly shaped, between or in combination with layers of the resinous and fibrous compounds, as and for the purposes substantially as described.

3d, As a base for artificial teeth or gums, etc., the use of fiber or fibrous material, chemically or mechanically treated or prepared, and saturated or mixed with lac or other suitable substances, which, when heated and pressed, or pressed and heated, will assume the proper shape, and possess or acquire the proper hardness and elasticity, substantially as described.

2,969.—HEEL STIFFENER.—Alfred B. Ely, Newton, Mass. Patented Dec. 31, 1867.

I claim, 1st, The use of resinous bodies combined with fibrous materials, substantially as described.

2d, A heel stiffener made of the above described substances, and formed into shape by means of pressure, with or without heat, substantially as described.

3d, A heel stiffener made of felted or woven fabric, saturated with resinous or other gums or analogous substances, which, when properly heated and pressed in molds, will assume the proper shape, and acquire or possess the proper hardness and elasticity, substantially as described.

2,970.—CHARGING WATER WITH CARBONIC ACID.—Robert Grant, Brooklyn, N. Y. Patented Jan. 28, 1868; antedated Jan. 17, 1868.

I claim, 1st, The charging of water or other liquid with carbonic acid gas, by the use, in combination, of two vessels, one containing the water or other liquid to be charged with carbonic acid gas, and the other containing carbonic acid gas, at a pressure greater than that of the atmosphere, the gas-holding vessel being separated from and not connected with the apparatus, by means of which the gas was generated or compressed.

2d, The combination with two vessels, one to contain water or other liquid, the other to contain gas at a high pressure, but disconnected from the gas generator, of pipes and coupling, and suitable stop cocks, for connecting and disconnecting the said vessels, as herein described, so that the gas holding vessel may be readily replaced by others at pleasure.

3d, In apparatus such as herein described and claimed in the preceding clause, the use of a gage for indicating the pressure in the water vessel of the liquid charged with gas, substantially as and for the purposes set forth.

4th, The combination with an independent gas holding vessel, of a water vessel provided or connected with a pump or other means of supplying the same with water or other liquid, substantially as herein described.

5th, The combination of the water and gas holding vessels, as herein described, with an injector, whereby the liquid from the water vessel may be more highly charged with gas from the gas holder, substantially as set forth.

6th, In combination with a gas holder, disconnected from the gas generator, a water vessel provided with means of agitating and thoroughly mixing the water and gas which it may contain, substantially as herein specified.

7th, In apparatus for charging water or other liquids with gas, as herein specified, the use of a regulator such as described, for the purpose of regulating the flow of gas and maintaining a uniform pressure in the mixing vessel, as shown and set forth.

8th, The combination with the gas holder of an injector, connected with a water reservoir as herein described, so that the water as it flows through the injector chamber shall be charged with gas, substantially as set forth.

2,971.—MANUFACTURE OF GLUE.—George Guenther, Chicago, Ill. Dated June 4, 1867.

I claim the mode of drying glue by revolving or rotating surfaces, having their temperatures raised either by steam or hot air, substantially as described.

2,973.—ARTICLE OF GLUE.—George Guenther, Chicago, Ill. Dated June 4, 1867.

I claim scale glue, produced as herein described, as a new article of manufacture.

2,973.—LAMP.—P. Hannay, Washington, D. C., and Hudson Taylor, Poughkeepsie, N. Y., assignees by mesne assignment of Pascal Plant, Washington, D. C., to Hudson Taylor, trustee. Dated Apr. 16, 1858. Div. A.

I claim 1st, Causing a current of air to impinge upon or commingle with the lower or blue part of the flame of a hydrocarbon lamp, through the instrumentality of a cap piece or burner, without the aid of a chimney, substantially as described.

2d, A cap piece or burner combined with and applied to a hydrocarbon lamp, for the purpose of producing combustion without the aid of a chimney, substantially as described.

3d, Making the cap piece or burner adjustable relatively to the wick and wick tube, substantially as described.

4th, The combination of a flat wick tube with a cap piece or burner and arms or frames, whereby the burner is held on the wick tube, substantially as described.

5th, The combination of the burner, with devices for attaching and supporting the same, with the wick tube, substantially as described.

2,974.—LAMP.—P. Hannay, Washington, D. C., and Hudson Taylor, Poughkeepsie, N. Y., assignees by mesne assignments of Pascal Plant, Washington, D. C., assignors to Hudson Taylor, trustee. Dated April 6, 1858. Div. B.

I claim 1st, Combining a cap piece or burner, substantially as and for the purposes set forth, with the wick tube or top of a hydrocarbon lamp, so that the burner may be thrown back from the wick tube, substantially as and for the purposes described.

2d, The combination of a hinged cap piece or burner with the means of adjusting the same relatively to the wick tube, substantially as described.

3d, A hinged burner or cap piece for a hydrocarbon lamp, when constructed and arranged with reference to the wick tube, wick or flame, and the admisson of air, substantially as described.

2,975.—STEAM BOILER FURNACE.—Henry McClure and Jas. Ellis, Terre Haute, Ind., assignees of Henry McClure. Dated Oct. 2, 1866.

We claim the arrangement of a series of steam boilers within a furnace, so that they shall lie transversely with respect to the direction of the draft, so that the products of combustion on their way to the chimney shall be directed against the sides and bottom of the boilers, substantially as described.

2d, Transversely arranged boilers in combination with an inverted arch flue, arranged beneath the boilers substantially as described.

3d, The ash troughs N, with end openings for the removal of ashes from an inverted arched flue which is beneath steam boilers, arranged substantially as described.

4th, Regulating plates O, when applied beneath the spaces between transversely arranged steam boilers, substantially as described.

5th, While not claiming broadly the introduction of air into furnaces for facilitating and rendering more complete combustion of inflammable gases we do claim air inlet pipes, a a, applied to the ridges of the arched flue beneath spaces left between boilers, which are arranged substantially as described.

6th, Transverse or cross ducts, longitudinal draft passage and steam generators, substantially as and for the purpose set forth.

2,976.—DOOR AND GATE LATCH.—James A. Park, White House, N. J. Dated Feb. 12, 1867.

I claim the annular latch C, constructed substantially as described, secured upon a suitable rock shaft B, and operated in one direction either by means of a weighted handle upon said shaft, or by means of a spring, as and for the purpose herein specified.

2,977.—FRUIT JAR.—S. B. Rowley, Philadelphia, Pa., assignee by mesne assignments of Thomas G. Otterson, Millville, N. J. Dated Nov. 4, 1862.

I claim the within described recess, formed on the exterior of the jar beneath the mouth of the same, the bottom of the recess forming a continuation of the shoulder on the neck of the jar, all substantially as and for the purpose herein set forth.

2,978.—STEAM DRYING APPARATUS.—Wm. Ryner, Philadelphia, Pa., and John C. Hopewell, Flemington, N. J., assignees of Wm. Ryner, Philadelphia, Pa. Dated Aug. 27, 1867.

We claim a drying kiln in which are an upper and lower series of pipes, for the passage of superheated steam to, and the introduction of the same into, the kiln, so that the material to be dried situated between the two sets of pipes may be subjected to the combined action of the heat from the said pipes, and that of the superheated steam, as set forth.

2,979.—PULVERULENT ACID FOR USE IN THE PREPARATION OF SODA POWDERS, FARINACEOUS FOOD, AND FOR OTHER PURPOSES.—The Rumford Chemical Works, Providence, R. I., assignees by mesne assignments of Eben Norton Horsford. Dated April 22, 1856.

I claim 1st, As a new manufacture, the above described pulverulent phosphoric acid.

2d, The manufacture of the above described pulverulent phosphoric acid, so that it may be applied in the manner and for the purposes above described.

3d, The mixing in the preparation of farinaceous food, with flour, of a powder or powders, such as described, consisting of ingredients which phosphoric acid or acid phosphates and alkaline carbonates are the active agents for the purpose of liberating carbonic acid, as described, when subjected to moisture or heat, or both.

4th, The use of phosphoric acid or acid phosphates, when employed with alkaline carbonates, as a substitute for ferment or leaven in the preparation of farinaceous food.

2,980.—GRATE BAR.—Samuel Vansyckel, Titusville, Pa. Dated October 31, 1864.

I claim constructing grate bars with pins or projections on one of the sides of the bar and with corresponding mortises or recesses in the other side whereby the bars can be interlocked and held together and made self-sustaining throughout their entire length substantially as described and specified.

2,981.—VESSEL FOR HOLDING LIQUIDS.—Julia M. Colburn, Baltimore, Md., administratrix of the estate of James Stimpson, deceased. Dated October 17, 1854. Antedated April 17, 1854. Extended seven years.

I claim 1st, A pitcher for preserving ice water cool combined with double walls inclosing between them air or equivalent non-conducting material so arranged as not to impair the portability of the pitcher and its capability of discharging its contents by pouring, nor its capacity for holding water.

2d, In combination with a double wall ice pitcher a nose, lip, or spout, through which the water is discharged, and a movable cover across the discharge way which prevents access of air into the pitcher thereat except during the act of pouring.

2,982.—HARVESTER RAKE.—Owen Dorsey, Newark, Ohio. Dated March 4, 1856. Reissue 1,067. Dated October 23 1860.

I claim 1st, A continuously-revolving rake attached by a pivotal connection to the shaft on which it revolves so as to allow it to describe the proper path to gather or discharge the grain and to clear the frame.

2d, The combination of a platform, a vibrating cutter, and a continuously-revolving gathering and discharging rake so arranged as to enter the uncut grain in front of the cutter and to discharge the cut grain in the arc of a circle.

3d, A continuously-revolving gathering and discharging rake which enters the uncut grain in front of the cutters and discharges the cut grain in the arc of a circle in combination with one or more intermediate revolving gathering heads or beaters.

4th, The combination of a continuously-revolving gathering and discharging rake which discharges the grain in the arc of a circle and the cam way or guide for regulating the course of the rake.

5th, The combination of a continuously revolving rake which discharges the grain in the arc of a circle with a platform having a fender conformed substantially to the path described by the outer end of the revolving rake in passing over the same, substantially as described.

6th The combination of a continuously-revolving gathering and discharging rake which discharges the grain in the arc of a circle with a vibrating cutter.

7th, The combination of a continuously-revolving gathering and discharging rake, a cam way or guide, and friction rollers attached to the arms of said revolving rake.

2,983.—OBTAINING CANE FIBER FROM CANE.—Sydney C. Long and F. Schumacher, Baltimore, Md., and Jackson Warner, Cincinnati, Ohio, assignees by mesne assignments of B. A. Lavender and Kate Lowe, administratrix of estate of R. Lowe, deceased. Dated April 4, 1851. Extended seven years. Reissued June 9, 1868.

We claim 1st, Obtaining the fiber from the cane or reed (*Arundinaria Macrosperma of Michaux*), for the purpose specified.

2d, Cane cotton or hemp, as a new article of commerce and manufacture, for the purpose specified.

3d Breaking down woody fiber of cane and other like plants and dissolving the gummy and other foreign matters therefrom by means of muriatic or sulphuric acid of the strength of 10° Baume or thereabout preparatory to making hemp or cotton for bagging, rope, paper pulp, etc., in the manner substantially as set forth.

### KING'S PATENT SOLID STEAM PACKING RING.

It is a well-known fact among mechanics that a properly-fitted solid piston without rings, especially when supported in place by a piston rod running through glands on each end of the cylinder, will keep tight for a long time and do good work. Such a piston has less friction than those which are held to place by springs, and while it fits, works very smoothly, but when worn must be replaced by a new one or turned down and reenforced. The rings of ordinary pistons, although turned very true, are apt to spring and warp when cut, and are difficult to keep true. To overcome these objections is the intention of the inventor of the piston packing herewith illustrated. It requires but one set of rings, and their inner surfaces need not be turned, as they fit neither inner rings nor the periphery of the spider; thus much time, labor, and expense are saved in fitting up the piston.

A is the piston rod, and B the spider. C represents a section of the steam cylinder, and D the packing rings. These rings are whole and two or more are used, although for

*Fig. 1*

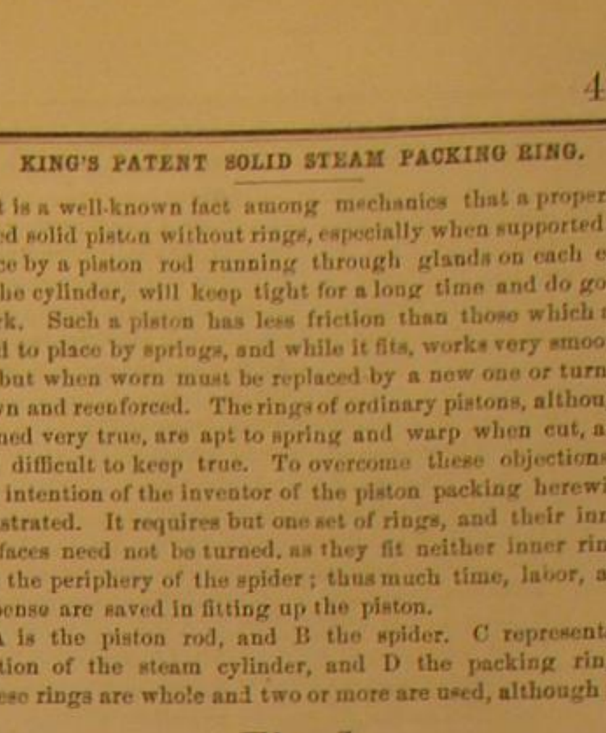
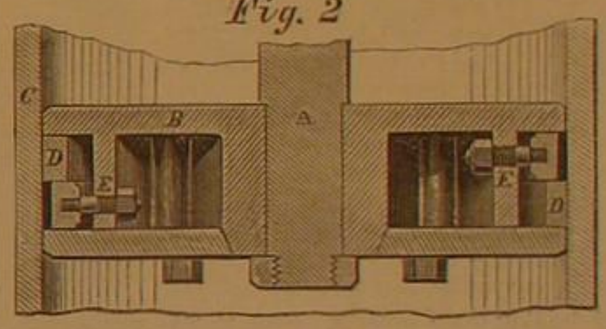



*Fig. 2*




most cases two are sufficient. A portion of each ring forms a spring, a bolt, E, on the opposite side passing through the periphery of the spider and engaging with the ring. This, as seen in the engravings, forces the ring for one half or two thirds its circumference against the internal surface of the cylinder, and as the two rings—if only two are used—are compressed on opposite sides, the result is a perfectly steam-tight joint. It may be advisable to make that part of the ring which receives the screw bolt, or its equivalent, thinner than that portion which bears against the cylinder; the thinner parts will thus be more elastic while the thicker or bearing parts will be more rigid and less liable to wear the bore of the cylinder oval. It appears to us that this piston has real advantages over the common split ring piston, and would prove economical not only in first cost, but in use, particularly for cylinders of moderate diameter. Its cost, the inventor says, is only five eighths of that of common ring piston packings, and one third of those having two sets of rings, saving sixty-six per cent of friction.

Patented through the Scientific American Patent Agency March 24, 1868. Shop, county, and State rights for sale for less than the difference of cost between it and steam or spring packing. Address H. J. King, 47 Hudson street, Hoboken, N. J.

### The English Iron Trade.

AT the present moment the iron trade of England is very much depressed, owing, it is said, to the fact, that the co-operative trade movement has disorganized the labor.

The consequence has been to transfer the trade to Rhenish Prussia and Belgium. The works at Essen produce 60,000 tuns of steel annually, which is more than twice the entire export of the United Kingdom; and the Terre Noire Company in France are now supplying one of the great French railway companies with 20,000 tons of steel rails at a price below their prime cost in England, in spite of comparatively dear fuel and ores. These are awkward facts to be well pondered both by masters and men, if haply, for their own sakes, they can find a remedy for their disagreements.

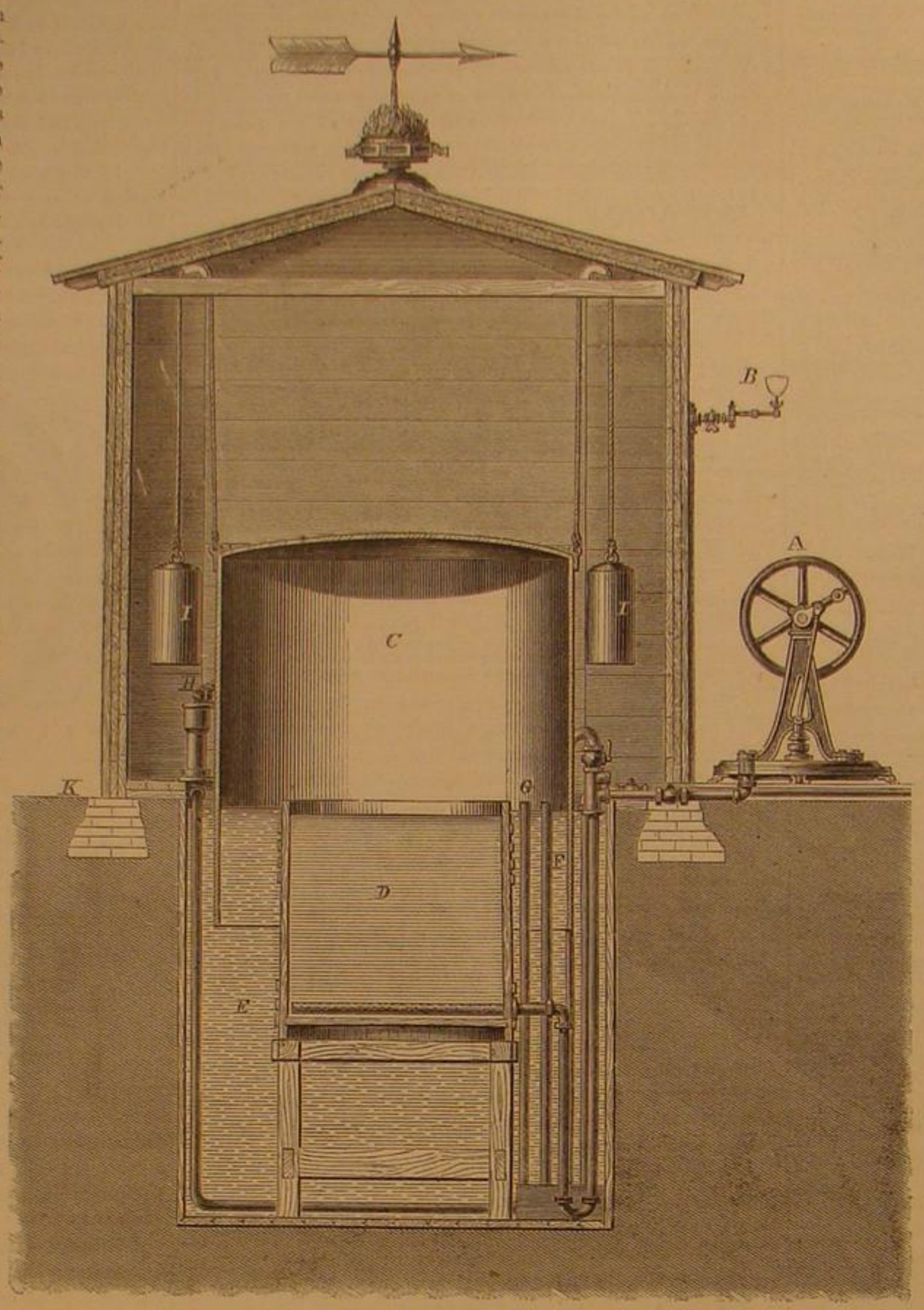
### Cast and Sheet Iron Stoves.

A FRENCH philosopher holds the opinion that cast iron stoves cause headache, nausea, and dryness of skin; while stoves made of sheet iron produce none of these effects, and, on the contrary, excite perspiration, and encourage appetite. He thinks it possible that the persistent disease of the silk worm in France, may be traced to the use of cast iron stoves in hatching and rearing the insect.

We have no means of verifying the above theory, but we well remember that, when the sheet iron air tight stove was first introduced "to save one-half the fuel," a statement was also put forth, that they were more healthy than cast iron.

### Improvement in Machines for Developing Gas from Hydrocarbons.

The manufacture of illuminating gas by carbureting the atmosphere with liquid hydrocarbons, has long been known and used, but its general introduction was greatly retarded by the cost of the hydrocarbon liquid before the discovery of petroleum in this country, and the absolute inefficiency of the different kinds of apparatus used to make the gas. A great many patents have been taken out to make gas from the volatile portions of crude petroleum, but they have been defective by reason of their being automatic, that is, they manufacture gas only as fast as used; therefore a constant evaporation is taking place while the gas is burning. The objections to this class of machines are these: In proportion to the rapidity of the evaporation of the liquid is the reduction of temperature or loss of heat; now, as the quantity of hydrocarbon vapor which will unite with the atmosphere depends upon the temperature of the liquid and atmosphere, it of course follows that unless a uniform temperature is preserved gas of a uniform quality will not be produced. In order to obviate this difficulty of refrigeration, heat has been applied in many ways to keep up the temperature. Now if a little too great heat is produced the atmosphere will become supersaturated with the vapor, and, most certainly, condensation of the vapor into a liquid will follow. The danger of such a condition need not be dwelt upon; every pendant and chandelier becomes filled with liquid gasoline, and, of course, as soon as the gas stops are opened the gasoline would be ignited by the match applied to light the gas. By Rand's process these dangers and difficulties are overcome by the utilization of the earth heat.




RAND'S PNEUMATIC GAS GENERATOR.

The *modus operandi* is simply this. A cistern is placed in the ground, and inside of this cistern is firmly secured a small tank, D, to hold the liquid from which the gas is made. Outside of this tank is the water bath, E, so it will be observed the sides and bottom of the hydrocarbon tank are covered by water. The air pump, A, supplies the air to the bottom of the tank, D, from which it issues in fine streams from a perforated horizontal pipe into the gasoline, up through which it passes into the holder, C; there it remains during the day and is drawn off through the usual exit pipe, G, into the pipes leading to the burners. If by reason of the very light specific gravity of the gasoline the gas should smoke, the diluting pipe, F, with the air pump, is so arranged that the air is driven at once into the holder without entering the gasoline tank. By the use of this pipe the gas can be made of any quality desirable. The objects of placing the tank in the ground are, first, its safety from accidents by fire; next, the uniformly low temperature maintained in the gasoline storage tank, and lastly, the heat known as sensible heat of the water, and latent heat in the earth, are utilized in this manner. As the gas for a large house is made by these works in five minutes, the evaporation of course is very rapid and the loss of heat consequently great. Now as soon as the temperature of the gasoline becomes lowered by evaporation, the heat from the water and earth acts upon the fluid, and before the next batch is to be made the gasoline has absorbed enough heat from the earth to bring its temperature up to the point where it was before evaporation commenced.

The tank, D, is always made of sufficient capacity to hold liquid enough for at least one year; thus the danger of filling often is avoided. This gas is practically incondensable, the gas having its birth at a low temperature, will not condense in the pipes leading to the burners. If it was possible at such a low temperature to surcharge the air with hydrocarbon vapor, the gas standing a number of hours over water would part with its excess of heat and precipitate the excess.

In the engraving, B represents a gas burner, placed in this instance in close contiguity with the works, but which may be at any required distance from the tank. H is a drip pump; I, the balancing weights, and K, the surface of the ground. The apparatus may be placed at any distance required from the point where the gas is used, and it may be covered by an ornamental structure, as seen in the engraving.

This method of utilizing liquid hydrocarbons is the subject of two patents, bearing date, Feb. 26 and Dec. 25, 1867. It has received the commendation of many competent judges, including persons who are using the apparatus, and has been adopted by the Metropolitan Gas Company of New York, who submitted the plan during the past winter to the severest tests of low temperature of the atmosphere, with such success that the company has purchased the right for their lines.

The New York office for these patents is at 16 Nassau street, where working models are on exhibition. Address A. C. Rand & Co., as above, for further information.

### Transfer Composition.

Patented by Max Rosenthal, of Philadelphia, Pa:—

I use the cheapest kind of unsized paper: I use one pound of fine starch; half an ounce of common washing soap; one ounce of rock candy, dissolved in water, and about twenty drops of glycerin. Mix the ingredients warm, and let the mixture stand until cold. I then apply this mixture to the paper with a brush, coating the paper on one side only, and leave it to dry. After it has thoroughly dried, I apply on the top of the dried surface another mixture, composed of gum-arabic and rock candy, one ounce of each, dissolved in a pint of water, and coat the same prepared surface again with a clean brush, and let it dry, when the paper is ready for use, and the prepared side of the paper to be printed upon by the usual mode of printing. After the printing is done, the printed side is instantly transferred upon any smooth surface of any material, by merely moistening the back of the paper with clean water, and the paper can be instantly removed by raising it up, and the impression is thus easily, quickly, and permanently transferred.

### DOWNING'S PATENT IMPROVED RAILWAY CHAIR.

Double rails, made in two pieces as though divided vertically, have been used, but the two sections were secured, to make a whole rail, by means of rivets or bolts, which were seated in place as the rails were laid. This made a smooth roadway, breaking joints, but the strain on the connecting bolts or rivets proved to be too great, and the halves of the rails tended to separate by the breaking of the connecting bolts. By the adoption of an improved chair, having only a single head, as at A, Fig. 1, the ends of these compound rails are intended by the inventor to be firmly held. These double rails may be turned to present one face when another is too much worn. The spike on the low side of the chair is driven, as usual, vertically, the rail put to place, and then the spike on the side of the chair head driven at an angle, as seen firmly locking the rail. This peculiar action of the angularly driven spikes with the double or single-headed chairs, is seen at B and C, Fig. 1. A top view of a double rail with single chairs is seen in Fig. 2. The third figure presents a a modification of the ordinary solid rail, only having a scarf joint, secured at D and E, by the single-headed chairs. By the use of this chair, with the angularly driven holding spike, all wedges are dispensed with, and the rails, either at their joints or at any other point, firmly held. The chair seen at B, Fig. 1, is considered by the inventor as well adapted to the present style of rails with butt joints, as two will take the place of three single ones. The saving in amount of spikes—as only one is used with this chair where two are used with the ordinary chair—and the dispensing with wedges, apt to work loose, would seem to recommend this device to the attention of railroad men. It was patented by John H. Downing, Dec. 10, 1867, who may be addressed relative thereto at Salem, Mass.

*Fig. 1*

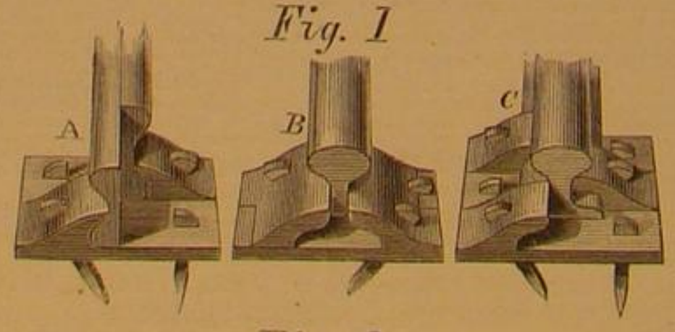



*Fig. 2*

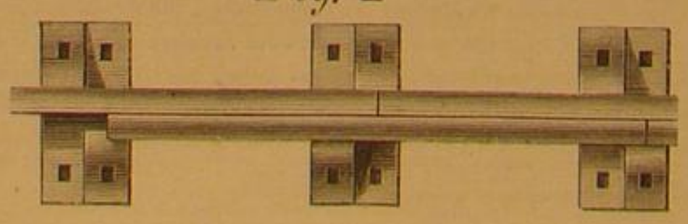
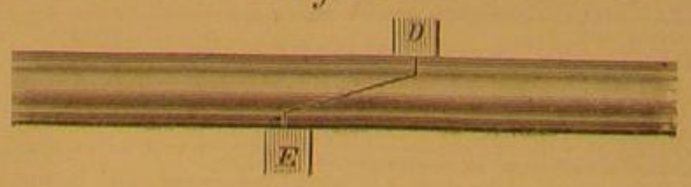


*Fig. 3*




### Silk Manufactures of Lyons.

France possesses within her own bounds three out of the four fibrous substances from which clothing is made—she has flax, wool, silk. The latter, which employs so many people at Lyons, is grown further south. The silk is separated from the cocoons, and is spun in other districts. The trade of Lyons consists of weaving cloth from the thread which is brought into the town. The silk grown in France is not sufficient to supply the demand, and she imports raw silk from Italy. The culture of silk receives considerable attention in France, where the Government seems to act upon the idea expressed in the China laws, which point out two classes as deserving the gratitude of all—the grower of corn and the grower of silk, the former supplying food, the latter clothing. Lyons has none of the peculiarities which we usually connect with a manufacturing town. There are no tall chimneys, no dingy warehouses, no immense factories, no smoke. The looms are light, and are erected in the houses of the people. They are worked by hand. Thus you do not see at certain hours busy masses of people flowing to and from the same spot. The work goes on quietly. A good deal of it is, as the silks are narrow and the throw of the shuttle short, done by women.

The price paid for weaving plain silks is about fourteen cents per yard; for rich and flowered silks it is more. This trade suffered much from the American war, which greatly lessened the demand, and the people are not now working more than half time. The silk manufacture of France originated in the luxury of the Court of Francis I. In addition to that grown in France, the imports of raw silk were, in 1792, 136,000 lbs. The manufacture had increased so much that the quantity imported in 1851 had increased to 2,291,500 lbs., or about seventeen fold. Lyons has on several occasions been the scene of trade outbreaks, in consequence of attempts to introduce machinery or to alter the rate of wages. The cost of carrying coal will always operate in favor of manual labor. Great Britain offers a large and increasing market. She used to import raw silk and manufacture it in England, but the importation of raw silk has decreased, and silk manufacturing has lessened. The imports of raw silk have lessened to one half, of silks from India to one fourth, while the import of silks from Europe has increased nearly tenfold, and that of ribbons has doubled. The Lyonese silk weavers comprise about 120,000, out of a population of 300,000.

### Estimation of the Quality of Soap.

The quality of soap may be properly estimated from the amount of fatty acids which any given specimen contains. The following simple analysis may be performed by any one, and may be relied upon as giving good results.

The soap to be examined should be dissolved in water. If distilled water cannot be readily obtained, rain water will answer well enough. When a perfect solution is obtained, add hydrochloric acid. After a little while the fatty acids will be found to be separated from the other constituents of the soap. These should be collected, and their relative weight for any given quantity estimated. The relative weight thus found will be a sufficiently just indication of the quality.

THE *Amelia* steamboat, at San Francisco, Cal., is being fitted to burn petroleum. Anthracite coal being worth $20 a ton, and oil $5 a barrel, it is expected that the liquid fuel will prove exceedingly economical. In back number of the SCIENTIFIC AMERICAN we have given the comparative fuel values of oils and anthracite, to which those interested in the subject may readily refer.

# Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

☞ "The American News Company," Agents, 121 Nassau street, New York
☞ "The New York News Company," 8 Spruce street
☞ Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.
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VOL. XVIII., No. 26....[NEW SERIES.]..*Twenty-third Year.*

NEW YORK, SATURDAY, JUNE 27, 1868.


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## END OF VOL. XVIII.--BEGINNING OF A NEW VOLUME

The present issue of the SCIENTIFIC AMERICAN completes Volume XVIII., new series. Probably there never was a time when greater activity was displayed in the sciences and arts than the present. And this activity is not confined to this country, but our foreign exchanges afford us, weekly, many items of interest to the scientist, mechanic, and farmer. From these sources we glean everything which can interest our readers, in whatever walk of life, and every important improvement in mechanics or discovery in science, which is made in this country, receives an early and prominent recognition. Thus the SCIENTIFIC AMERICAN is literally a compendium of all that is new and valuable in the arts and sciences.

In other departments we believe it to be equally valuable. Its pages contain correspondence from all parts of the country and the world, on subjects which cannot fail to interest all classes. They are frequently the productions of our most eminent scholars and engineers, while the hints, suggestions, and directions of our working mechanics find place in our columns. These are always interesting, and not seldom exceedingly valuable.

The answers to correspondents are always instructive. We endeavor in framing them not only to convey the information sought by the individual inquirer, but to instruct others. In fact, this department is intended to give such items of information succinctly as do not require a column of editorial. The contributors to this department are men who are practically conversant with the subjects upon which they profess to treat.

Our descriptions, accompanied with illustrations, give our readers accurate information of the latest and most important inventions. The engravings are not equaled by those published in any other country, and the descriptions, for terseness, clearness, and conciseness, are certainly not surpassed.

Our weekly list of patent claims are received direct from the Patent Office in Washington. They are full, accurate, and alphabetically arranged for convenience of reference. They are invaluable to the mechanic, inventor, and capitalist.

Editorially, we believe the SCIENTIFIC AMERICAN will compare favorably with any journal devoted to similar objects. The writers are gentlemen of long experience and undoubted ability, and they aim rather at presenting facts and practical suggestions than mere conjectures and speculative theories.

That we have succeeded in making a popular scientific and mechanical journal, our constantly increasing list of subscribers fully demonstrates. What the paper has been in the past it will be in the future; encouraging the struggling inventor, instructing the unlearned mechanic, informing the scientific student, interesting the young and the old. It will fearlessly expose unwarranted pretension, and rebuke charlatanism, while it faithfully records the improvements made by inventors and mechanics.

## THE INDICATOR AS A FIXTURE TO THE STEAM ENGINE.

The steam engine indicator has received occasional notices in our columns, in which its construction and operation have been described and its uses partially enumerated. We have shown that it gives exact information of the working of the valves, the admission, expansion, and pressure of the steam, its action at all parts of the stroke, transferring these points to paper and forming a diagram which is a basis of the calculations to ascertain the force expended and the power exerted.

But there are other offices and uses of the indicator. By it the relative value of the lubricants used can be ascertained and the best mode of applying them; the amount of steam required to work the attached machinery as compared with the work done, consequently the saving that can be made in changing machinery to do the same work. Another important office of the indicator is to compare the power developed with the amount of fuel used. This is a check upon the carelessness of the fireman or of the engineer; for if it is known that an engine can be run with an expenditure of two and a half or three pounds of coal per hour for each horse power on one day, there can exist no reason, except carelessness or heedlessness, why, other things being equal, it should not do the same on another day. It also determines the quality of the fuel. Suppose the last invoice of coal gave one horse power for every two and a half pounds consumed per hour. On one day four thousand pounds are used, but on another day, four thousand five hundred pounds. The indicator shows on both days the same amount of power exerted and that the engine is in the same condition. Then the question is narrowed down to the neglect or carelessness of engineer or fireman, or to a difference in the quality of the coal. If, on weighing the ashes and clinkers it be seen that on one day they exceeded in amount those made on the other day, it would be plain that the difference in results arose from difference in the quality of the fuel. The incombustible portion of anthracite coal varies from six per cent to thirty per cent. The proof of its quality can be determined in no way so well as by the indicator combined with the scales.

Every engine—all large engines—should have a pair of indicators permanently attached, and an engineer should be employed who can intelligently use them. A pair of diagrams should be taken twice a day, say at 9 P. M. and 3 P. M. Let every pound of coal be weighed and also the ashes and clinkers, and a tabular statement of these facts and the results of the indicator diagrams be made out daily on blanks furnished for the purpose, and a balance struck each week. Thus the proprietor will know at a glance the condition of his engine, the efficiency of his machinery, and the value of his fuel—in fact the cost of all his expenditure of power as compared with the work done.

This may be objected to on the ground that few engineers can be found who can use the indicator, and that some firemen cannot read the scale of the weighing machine. The objection refutes itself; if men are not competent to perform these duties they are not competent engineers or firemen. The use of the indicator can be acquired by the study of such elementary books as "Porter on the Indicator," "Paul Stillman's Treatise," "King's Notes on Engineering," "Bourne's Handbook," etc. By the aid of these and practice with the implement any intelligent engineer can readily become an adept in the use of the indicator.

Such education will tend to raise the status of mechanical engineers, reduce the cost of power, insure better work, and induce superior mechanics to adopt practical engineering as a vocation.

## CAPITAL AND LABOR AS AFFECTED BY LABOR-SAVING MACHINERY.

It was thought in former times that the introduction of labor-saving machinery into any department of manufacture, would be the means of throwing large numbers of operatives out of employment, yet the result has shown those fears to be unfounded. The introduction of any improvement that enables individual productions to be made with less manual labor, and at a consequently reduced cost, has always made an increased demand for labor in that department. *Labor creating machines* would be a more significant term, so far as the effect of such inventions upon the amount of production is involved.

To illustrate this idea, let us suppose a machine to be invented that would enable an operative to make two hats while he now can make one. Let us further suppose the cost of producing hats by manual labor only, to be $3 00 apiece, one half the cost being for labor and the other being for the materials of which each is made. Allow a profit of one dollar, which will make the price of the hat to the purchaser $4 00, so long as manual labor alone is used. Upon the introduction of the machinery, which doubles the amount of production, the cost for labor would be reduced one half. The profit for a single hat, estimated at the same rate of percentage, would be less than a hat costing $3 00, so that the price of hats would thus be reduced, say one third. Further, suppose the reduction in price to increase the demand for hats, so that three hats would be wanted where one was desired previous to the improvement in their manufacture. It will now be apparent that the introduction of machinery, while it has reduced the manual labor connected with the production of a single hat one half, has increased by one half the amount of labor needed for the entire production of hats.

How has the relation which capital bears to labor been affected by the constantly increasing use of machinery in all branches of manufacture? Manifestly they have been brought nearer together, until now it is somewhat difficult to determine which has the balance of power. Operatives complain of insufficient remuneration, and are continually embarrassing large manufacturing interests by combinations and strikes. On the other hand, capitalists complain that, in view of all the risks and complications attendant upon fluctuations of trade and unreasonable demands of employés, that capital cannot be embarked in any manufacturing enterprise with a certainty that it will return the legal interest upon the amount invested.

These complaints, though in some measure sustained by facts upon both sides, are essentially without a solid foundation. Capital and labor are interdependent, and are only rendered antagonistic when either disregards the just claims of the other. Both suffer from the withdrawal of either; but when they mutually and harmoniously coöperate, all classes prosper.

We cannot admit, however, that of late capital has obtained any undue advantage over labor. That money has been made in certain branches of manufacture cannot be denied; but if we deny the right of capital to accumulate by legitimate use, we strike a blow at the very root of sound social organization. But where any remarkable instance of profit by manufacture, within the last ten years, can be pointed out, it will doubtless be found that the question of capital is involved with other elements, which should not be allowed to escape observation. If, for instance, an individual with limited means is enabled to commence the manufacture of a patented article, and, by virtue of the intrinsic value of the invention, can obtain a very large advance on cost of production, sufficient to allow him to realize a fortune in a short time, it is not the capital involved, nor the labor, considered singly or together, that are the cause of profit; it is the brain which devised, and the skill which developed the means for the acquisition of wealth. For employés to demand, in such a case, an increase of wages, on the ground that the employer is making money so fast, is equivalent to demanding of him a share of the privileges which are granted to him by letters patent, in addition to the market value of labor, at the time the demand is made. Notwithstanding the evident truth of this proposition, such demands are often made. In fact, the sole cause of discontent among operatives at the present time, is the desire to enjoy the luxuries and privileges, which in former years were only the accessories of wealth. It is not the gratification which such things are capable of imparting of themselves alone, which is sought, but the avoidance of the unhappiness generated by the lack of them.

We intend in a future number to show that the effect of the introduction of labor-saving machinery has been to constantly increase wages, and to prevent any permanent reduction, and that, from the nature of the case, such must be its effect in the future. If we establish this proposition, it will follow that the whole machinery of "Trades Unions," and combinations of a similar character, are only attempting to secure that which is inevitable, and to prevent that which can never come to pass.

## THE LATEST NOVELTY IN PHOTOGRAPHY.

Perhaps the most curious invention of the present day is the new kind of photographs, made on a so-called phosphorescent surface, of which absolutely nothing can be seen in the daylight, but which is distinctly visible in the dark. Many years ago, compounds were invented which had the property of shining in the dark many hours, and even days or weeks, after an exposure to sunlight for only a few seconds. These phosphoric compounds, called after their inventors Canton's, Baldwin's, Bolognian phosphorus, etc., were formerly of no use whatever, but it was hoped that they might eventually reveal something concerning the nature of light; and such has indeed been the case, as the phenomena connected with these experiments are a strong argument in favor of the undulatory theory, and the correlation of forces.

An English photographer lately conceived the idea of covering a sheet of paper or glass with a layer of such a phosphorescent substance, and then treating it in a similar manner to paper or glass sensitized in the ordinary way for taking a photograph. Pictures taken in this way seem, by daylight, to have no existence, but the places where the light has acted upon, become phosphorescent or luminous in the dark, the shadows remaining invisible, the semi-tints slightly luminous, and the result is such a change in the surface that the picture is only perceptible in a dark room, by an unearthly glow of a greenish, blue, red, or purplish tint, according to the preparation used.

We notice this invention only by reason of its oddity, and not for its utility. The only practical use we see for it, would be to terrify the uninitiated by the exhibition of luminous images of skulls, skeletons, demons, and similarly cheerful subjects suddenly appearing on the walls, window panes, curtains, or other unexpected localities at the moment the lights are extinguished. It is very easy to make such pictures. A sheet of albumen paper is moistened to make it sticky, and then equally covered with a thin layer of the finely powdered phosphorescent substance, or a pane of glass is covered with a thin coating of paraffine, to which also, when warmed, the powder will stick; then the prepared surface is treated as in taking an ordinary photograph, either by placing it in the camera, or exposing it for a few seconds under a positive to the rays of the sun, or the magnesium or electric light.

The only thing remaining to state is the preparation of these phosphorescent substances. One of the cheapest is Canton's phosphorus, and it is made by burning oyster shells for half an hour, powdering and mixing with an equal weight of sulphur, and heating again for one hour in a covered crucible. The produced substance must of course be preserved in the dark, and protected from moisture in a well closed bottle. Wach found that the luminosity is much increased by moistening the mixture of shells and sulphur before the second heating, with a solution of sulphide of arsenic in liquid ammonia. The powder thus obtained emits so strong a light of blue color that it does not require perfect darkness to perceive its glow.

Baldwin's phosphorus, mentioned above, is prepared by dissolving chalk in nitric acid, then heating and grinding it to powder. The Bolognian phosphorus is made by simply heating a mixture of powdered heavy spar with the white of eggs, gum water, or a solution of tragacanth. Fluor spar is naturally such a phosphorescent substance, some specimens however more than others, and diamond appears to be the best; but the expense of the powder would hardly admit of its employment for the above mentioned purpose. Experiments have proved this property, in some degree, to exist in a great number of substances not suspected to possess such a singular quality; for instance, many natural compounds of lime, baryta, strontia, and magnesia; besides corals, fossil bones, and teeth; the shells of eggs, oriental

pearls, dry bleached linen, white paper, and even the stones extracted from the human bladder.

Grott has found that the same luminous rays—the blue and violet—which produce the photographic pictures, also produce this effect, and that the rays which have no photographic powers—red and orange—not only do not produce it, but extinguish the existing luminosity. However, this is not because it is easily extinguished, as handling and even immersion in water will have no effect upon it, neither plunging the body in different gases. Groszer found that the luminosity was not even in the least impaired in a perfect vacuum.

Some philosophers have already, and with apparent good grounds, mentioned their suspicion that in nature the same phosphoresence may take place on a larger scale, that we see in different minerals, fossils, and preparations on a small scale, and if so, planets and comets are luminous partly by light reflected from the sun, and partly by phosphoresence of their own. That comets possess such a light of their own has been proved by Arago's conclusive observations by means of polarized light; and perhaps the peculiar appearance of the moon during its eclipse is due, besides the refraction and absorption of light in our atmosphere, to such a phosphoresence; even ice shows luminosity in the dark for several hours, when suddenly withdrawn from sunlight exposure to a dark room. The periodical obscuration taking place during the moon's phases is so slow that no phosphoresence can show itself, but on the occasion of an eclipse the obscuration is so rapid that any phosphoresence on its surface persisting for an hour or half an hour must become visible.

### Practical Researches in Sugar Refining.

M. Monnier, of France, has recently published his researches in sugar refining from which we publish some interesting facts:

If sulphurous acid gas is conducted into a chamber containing coarse sugar, the latter is promptly bleached, and about three-fourths of the coloring matter is entirely destroyed, while the sugar undergoes no change whatever in composition. After this treatment the sugar smells strongly of sulphurous acid, which presents no inconvenience in the process of refining. To bleach sugar in this manner; for 1000 parts by weight of sugar about four parts of sulphur must be burnt and the gas conducted into the chamber. When the operation is once set going, the proportion of sulphur may be notably diminished. The sulphur is converted into gas by combustion in a little furnace placed at the side of the chamber. When the action is complete, the sugar is dissolved in water and its sulphurous acid neutralized by a small quantity of lime. This lime may be previously converted into sucrate of lime by M. Peligot's method, that is, by crushing it with a little sirup; for 1000 pounds of sugar three or four pounds of lime are requisite to obtain this sucrate.

M. Monnier has been at great trouble to ascertain whether the sulphurous acid gas thus used modified the sugar so as to produce a certain amount of grape or non-crystallizable sugar, and he has convinced himself that sugar bleached in this manner undergoes no change whatever. The quantity of non-crystallizable sugar, found by analysis after the operation in question, was in each case exactly equal to the amount which the sugar contained before being bleached; namely, on the average, about 2·15 per cent. In all these experiments the sugar was exposed about forty-eight hours to the bleaching action.

The above process gives most striking results with exotic sugars, which are highly colored; with lighter-colored samples, the bleaching is not so marked, but in the former case, two thirds to three-fourths of the heterogeneous coloring matters are eliminated completely.

The author took the same opportunity of examining into the action of chlorine gas, and precisely in the same manner. But the result was very different. In destroying the coloring matters present in the sugar, chlorine is converted into hydrochloric acid, which at once renders a certain amount of sugar non-crystallizable even at the ordinary temperatures. A specimen was taken for experiment which contained two per cent of non-crystallizable sugar; it was submitted to the action of chlorine for twenty-four hours only, and then a fair specimen of the whole bulk was taken and analysed. It showed no less than nineteen per cent of uncrystallizable sugar. If it were not for this enormous loss, the action of chlorine as a bleaching agent would be preferable to that of sulphurous acid, for its action is more rapid and complete; but it does not appear possible to prevent its destructive action upon the sugar itself.

It was lately hinted in London that ozone was going to be used as a bleaching agent in sugar refining, and we believe one or more patents were taken out for this purpose. We should be glad to learn whether anything really practical has been done in that direction, and whether ozone will prove to be a more economical agent, or more complete in its action, than sulphurous acid gas, used as indicated above.

### New Grain Warehouses of Liverpool.

The city of Liverpool is justly celebrated for its magnificent docks, which extend a distance of seven miles along the river Mersey. With a view to the proper handling and storage of the immense shipments of grain, the Harbor Board at Liverpool and Birkenhead have constructed some new warehouses, which we recently visited, the most perfect buildings of the kind in the world. On the Liverpool side the new warehouses, which are fire-proof, comprise three blocks, forming a quadrangle, within the margin of which is the dock. The total length of the building is 1,485 feet by 70 feet in width. Beside the quay floor there are five stories available for storage, and a sixth, which is appropriated as a machinery floor.

The aggregate clear internal area, including the quay floor, is 11¾ acres. The hight of the building from the quay to the top of the cornice is 82 feet. The stores, with the exception of the quay floor, which is 15 feet 3 inches high, are 9 feet three inches from the surface to the underside of girder above. Every attention has been paid to the relative strength of each part of the structure, the breaking strain of the beams and girders being three times the load they are intended to carry. An idea of the vast capacity of the warehouses may be gained from the fact that the total weight of grain upon the floors when fully loaded will amount to not less than 77,660 tuns. The clear aggregate storage area of all the floors, exclusive of the quay and silo spaces, is 48,918 square yards, affording storage capacity for 196,000 quarters of grain. A quarter is equal to 8 bushels. Rails are laid within the warehouses, forming a communication with the main dock line.

Throughout the building the machinery for hoisting and distributing the grain is worked by hydraulic power. There are five self-acting, traversing, rocking cranes, for raising the grain in tubs from the hold of the ship. Each crane is capable of raising a tun of grain at a time at the rate of 50 tuns per hour, through an extreme distance of 136 feet. Having brought the grain to the machinery floor at the top of the warehouses, the cranes discharge it into hoppers, from which, after being freed from dust, it is weighed by a single operation in one tun lots, and then transmitted by a most ingenious arrangement to any part of the warehouses. This work of transmission is effected by means of endless bands, of which there are two running the entire length of the three stacks of warehouses. The bands are of vulcanized india-rubber, 18 inches wide, and traverse at a speed of about 500 feet per minute. They are capable of transmitting grain from end to end of the warehouses at the rate of 50 tuns per hour. There are chutes for passing grain from one floor to another, into the holds of vessels, or into wagons beneath. Beside the cranes there are eleven hoists for barrels and sacks, and twenty jiggers for lowering purposes.

The Birkenhead warehouses are in many respects similar to those on the Liverpool side of the water, and are fitted up in the same manner. Their storage capacity is 212,800 quarters of grain. They are not fire-proof. When completed, the warehouses on both sides of the Mersey will be handed over by the dock board under a ten years' lease to the Liverpool Grain Warehousing Company. We may here add that the imports of grain during the year 1867 into Liverpool were as follows: Wheat, 1,805,044 quarters; barley, 93,918 quarters; malt, 7,418 quarters; oats, 201,018 quarters; beans, 209,495 quarters; peas, 132,549 quarters; Indian corn, 913,855 quarters; oatmeal, 153,445 loads; flour, 382,572 sacks and 132,040 barrels—making a total of 3,363,293 quarters, 153,445 loads, 382,572 sacks, and 132,040 barrels; or about one-fourth of the entire grain imports of Great Britain.

### A Royal Railway Train.

The Queen of England, with a numerous suite, recently left Windsor to pay her annual visit to Balmoral, in Scotland. It will interest our readers to know some of the particulars in regard to the style in which Her Majesty travels.

The directors of the Northwestern Railway Company were commanded to prepare a special train for the purpose, consisting of fourteen carriages. The Queen's carriage was fitted with a perfect system of electric communication with the guard—a thing which has bothered the English a good deal. This apparatus consisted of a small, square, gilt box, hollowed out in front, and furnished with a glass handle, by the pulling of which the Queen could at any moment bring the train to a dead stop. When once the handle was drawn out, it could not be replaced by persons occupying the car. An experimental trial proved that the plan operated very perfectly. This same system has been applied to a Birmingham train, and in two instances it has been called into use—once for a joke, by a young officer, and in the other case by a medical man, whose curiosity led him, when the express was approaching a station, to pull out the handle. To his great consternation and chagrin, the train was immediately pulled up, and he heard the bell in the guard's van ringing loudly. As the handle of the "communicator" remained out, the culprit was at once detected, and nearly lynched by the excited passengers, who were, of course, much surprised at the sudden stopping of the train, and annoyed at the loss of time occasioned by the foolish freak.

Her Majesty's saloon, in addition to the eelctric communication with the guard, was likewise fitted with an electric dial and index, for the purpose of calling the royal dressers and personal attendants, for whose accommodation a new saloon, expressly built by the directors, and was placed in a position in front of and directly adjoining the Queen's saloon. A time table was expressly arranged for running the train 591 miles, which was made in about nineteen hours.

### The Pneumatic Dispatch.

We learn that the Governor has approved of the act to facilitate the transmission of letters and merchandise by means of the Pneumatic Dispatch, and that our citizens now have the promise of soon enjoying the most improved and rapid means of intercommunication. The act authorizes the laying down of the pneumatic tubes under the streets of New York and Brooklyn, and also under the waters of the North and East rivers.

The present enterprise contemplates the connection of the Brooklyn, Jersey City, and all our sub-post offices, with the general post office, and also the erection of pneumatic letter-boxes in place of the present lamp-post boxes, so that letters and parcels will be both collected and delivered by air pressure acting on cars, which will fly along at the rate of thirty miles an hour. The mails will go back and forth between the New York and Brooklyn and Jersey City post offices in from three to five minutes. Letters deposited in any of the street letter-boxes on the pneumatic line below Forty-second street will be carried to the general post office, or to any intermediate station, in from three to six minutes. Our citizens can easily understand the great benefit that will accrue to business transactions from this arrangement.

The introduction of the Pneumatic Dispatch is due to the efforts of our enterprising neighbor, Mr. Alfred E. Beach, of the SCIENTIFIC AMERICAN, and we congratulate him upon his success before the Legislature. The Pneumatic Dispatch was first put into practical operation last October, at the American Institute Fair, and a full account of its construction and operations was then given in our columns. We understand that it is the intention of the grantees to put a short line of the Pneumatic Dispatch into operation within the next ninety days. The exact route has not yet been determined, but it will probably extend from the post office, corner of Nassau and Liberty streets, to the City Hall Park. If this short line is found to operate as well as is expected, the pneumatic tubes will then be laid down extensively in many different directions.—*New York Sun.*

### THE SALE OF PATENTS IN OHIO.

The General Assembly of Ohio, at its last session, enacted a law regulating the sale of patent rights in that State. The law renders it necessary for the patentee, or his authorized agent, to produce his documents to be examined by the Judge of Probate of the county, who issues a certificate authorizing the sale of rights, providing he is satisfied of the good faith of the parties. It is questionable whether any State has the constitutional right to impose restrictions upon the sale of patents granted by the United States government, but as the law was enacted for the purpose of preventing swindling, it cannot affect unfavorably legitimate and honorable enterprises.

### Commissioner of Patents.

A recent telegram states that a movement is going on at Washington to secure the appointment of Hon. Elisha Foot—now of the Appeal Board—to the office of Commissioner of Patents. Judge Foot has a thorough knowledge of the patent law, and is well versed in mechanical science. The selection would be an excellent one.

## Editorial Summary.

BREECH-LOADERS IN ITALY.—The Commission appointed by the Italian Government for examining into the comparative merits of the different breech-loading rifles known, have decided in favor of the Prussian needle gun. This is the only instance of its having been approved by a non-German state, all other countries having endeavored to construct an even more perfect weapon. More general recognition has been bestowed upon the Prussian breech-loading cannon. Having some time ago been adopted by Russia, Belgium, and for fortress and naval artillery, by Austria also, it is now about to be introduced into the Italian service.

THE SPECTRUM RECONSTRUCTED.—Prof. Listing, of Gottingen, considers the solar spectrum as made up of nine colors, in the following order: brown, red, orange, yellow, green, blue, indigo, violet, and lavender. He has also calculated the number of vibrations of each, and has found that their numbers constitute an arithmetical progression; the interval between one color and the next always being 48,524 billions of vibrations per second. The number of vibrations constituting the two extreme colors are represented by 364 trillions for the brown, and 801 trillions for the lavender.

THE London local post office is one of the best conducted institutions in the world. It employs 1,152 letter carriers, who distributed 76,000,000 letters in 1863, and in 1868 it is estimated will deliver 90,000,000; that is, 1,730,000 letters per week, and 288,000 per day. Carriers are paid abont twenty-five shillings per week—nearly $8 75—and the expense of the department is estimated at £120,000. The net profit amounts to nearly £300,000, or two millions of our money.

AT a meeting of the Société de Photographie, Paris, M. Civiale made some observations upon the employment of sulpho-cyanides in toning and fixing. He stated that in the summer of 1867 he fixed about 700 positive proofs by means of potassium and ammonium sulphocyanides. A print, one half of which had been protected from the light, the other unprotected, and which had been exposed for three months, showed only a uniform tint.

REMEDY FOR CHAFING.—Obese persons suffer greatly, especially in warm weather, from chafing. We know of nothing better than a wash of alum dissolved in water, and applied with a linen or cotton rag.

SOUNDINGS have been made in the sea to a depth of six thousand feet, without finding bottom, within 1½ miles of the shore of the island of Santa Cruz, W. I. This island is the apex of an immense submarine mountain.

THE grasshoppers, having survived rain, fire, snow, and frost, during last fall and winter, have hatched out thicker than ever on the prairies of Iowa and many other western States.

NEVER leave file marks on a turning tool. It greatly weakens the material. The grindstone, in this case, is a better finisher than the file.

## Recent American and Foreign Patents.

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

CLAMP ATTACHMENT TO SAW HORSES, ETC.—Frederic W. Mansfield, Fitchburgh, Mass.—This invention relates to a method of constructing portable clamps for holding wood firmly upon a saw horse or bench, whereby wood may be sawed or cut with less fatigue to the operator.

EXPANDING PULLEY.—Thomas H. Savery, Wilmington, Del.—The object of this invention is to provide an expanding pulley the operation of which is more perfect for the use intended than others heretofore in use.

REEL FOR HARVESTERS.—G. W. N. Yost, Corry, Pa.—The object of this invention is to produce a reel which can be adjusted for straw of different hight which will not thrash the grain out while throwing it back and which can be easily folded together for transportation.

MOWING MACHINE.—G. W. N. Yost, Corry, Pa.—This invention consists in the manner of arranging the frame of the machine. The same is composed of a horseshoe-shaped metal bar or plate to the two ends of which the shoe at the inner end of the finger bar is secured. The main body of the frame is about on a level with the driving shaft of the machine while its two ends are bent down to reach to the shoe and to be hinged to the finger bar.

NARROW SWATH HARVESTER.—G. W. N. Yost, Corry, Pa.—The object of this invention is to produce a harvester which can be drawn by one horse and which can mow as much grain as can be bound by one man riding on the platform of the machine. One man for binding, one boy for driving, and one horse will be all that is required to operate the machine.

CARPET WEAVING MACHINE.—Moritz Wolf, Philadelphia, Pa.—This invention relates to an arrangement of the Jacquard attachment of a carpet loom, and consists in the use of a double set of needles by which the harness is operated. Two figure cylinders are employed, one for each set of needles. One cylinder is provided with figure cards in the usual manner and raises as many of the vertical needles which constitute one set as have to be lifted according to the pattern. The vertical needles which are raised elevate the ends of the horizontal needles which constitute the other set and those horizontal needles which are thus elevated will at the next stroke of the upper cylinder, which has only holes but no cards, be thrown back as they will not fit into the holes of the cylinder and thereby the threads of the harness with which such needles are connected will be thrown into the lifter or knife so as to be elevated by the same during its next move.

APPARATUS FOR DISTILLING WOOD, ETC.—Gaspar Hunziker, Summit, Miss. This invention relates to a method of constructing an apparatus for distilling wood and stone coal, whereby the resin and tar contained in the same are more effectually separated from the charcoal or carbon, and whereby the same is more economically done.

AUGERS AND BITS.—James Swan, Seymour, Conn.—This invention relates to a machine for manufacturing screw augurs and bits, and it consists in a novel arrangement of dies and and a clamp, whereby bits and augers may be very expeditiously manufactured, and at a moderate cost.

FLUE BLOCK.—John Binns, Oskaloosa, Iowa.—This invention relates to a flue block for stovepipes to pass through in a partition or flooring, in order to prevent heated pipes from firing the building.

ENAMELING MOLDINGS.—John Johnson, Boston, Mass.—This invention relates to a machine for enameling moldings, preparatory to gilding the same, and it consists in a new and improved heating arrangement for warming the preparation, smoothing brushes, and a scraper, all arranged in such a manner that the desired work may be performed expeditiously and in a perfect manner.

EXPANSION ENGINE.—A. Seely, Alton, Mo.—This invention consists in an improved method of expanding steam in two cylinders, the pistons of which are connected with cranks at right angles on the same shaft, whereby the expansion of steam in two connected cylinders can be made available and practicable on boats or elsewhere.

VOTE REGISEER.—N. A. Patterson, Winchester, Tenn.—This invention relates to the registering of votes of the members of an and consists of a column of blocks bearing the raised names of such members, and so connected by wires that they can be actuated to indicate the negative or affirmative votes of each member. The invention contemplates the subsequent printing of the whole vote, and its mechanism is arranged with reference to that end.

SLEIGH.—Chester Heald, Marshalltown, Iowa.—This invention relates to the construction of sleighs, and certain braking mechanism attached thereto.

SHINGLE MACHINE.—Luther H. Dodge, Oshkosh, Wis.—This invention relates to shingle machines, and is more particularly designed as an improvement upon that known as the "Valentine Shingle Machine," though it may be applicable to other machines, having a similar operation of the carriage. It consists in actuating the carriage holding the shingle block back from the saw, by the positive movement of a revolving arm, thus dispensing with the spring now used for that purpose, and obviating the disadvantages attending the use of such springs.

HOE.—Josiah Dodge, Grass Valley, Cal.—This invention consists in making the hoe with a horn or pick attached to the blade, and with a forked shank, thereby adapting it to various new and useful purposes, and rendering it much more strong and durable than the ordinary hoe.

MILL STONE DRESS.—H. L. Spencer, Social Circle, Ga.—This invention relates to an improved method of dressing mill stones for grinding wheat, corn, or other grain.

SELF-LIGHTING APPARATUS.—Gustav Müller, Newark, N. J.—This invention relates to certain improvements on the well known Döbereiner's inflammable lamp, and consists in arranging the tube through which the hydrogen passes in a vertical position, and in suspending the spongy platinum above the same, and in protecting the platinum in a perforated bell.

PANTALOON MEASURING RULE.—Patrick W. Dolan, Jersey City, N. J.—This invention has for its object to furnish a simple and easy way for obtaining the correct measurement for gentlemen's pantaloons, so that no mistake can be easily made in the length and other measurements, and the invention consists in an extended rule, with a measuring tape attached thereto.

CANAL BOAT PROPELLER.—D. H. Heyen, New York city.—This invention has for its object the construction and arrangement of a propeller wheel which shall be adapted to the propulsion of boats on canals, more especially, but which may be used to propel boats on all navigable waters.

COMBINED MOWER AND REAPER.—G. W. N. Yost, Corry, Pa.—This invention relates to a mower and reaper, so arranged that the finger bar and its appendages can be easily raised over obstructions, while mowing, and can be held in an elevated position for reaping, the finger bar being held steady and prevented from lateral motion by a guide, in which the finger bar plays up and down.

DISTILLING APPARATUS.—Adolph Meyendorff, New York city.—This invention relates to a distilling apparatus, so arranged that it will distill directly from the mash, and so that none of the alcoholic contents of the mash are lost, and the spirits separated, according to their degree of purity, and that the condensed liquid in the rectificator will be decomposed so as to give off any alcoholic parts that may remain in it. The invention consists chiefly in the use, in one apparatus, of two stills, which are connected by means of pipes in such manner that the vapors arising from one will be forced through the mash in the other, so as to take up all the alcohol that would otherwise remain in the second still.

CAR AXLE CAP.—William Wertz, Pana, Ill.—This invention has for its object to furnish an improved cap for car axles, which shall be simple in construction, effective in operation, and easily opened and closed.

CROZES.—John C. Hofer, Bell Air, Ohio.—This invention has for its object to improve the construction of crozes, designed especially for slack work, such as flour, apples, sugar, cracker, and salt barrels, nail kegs, and other cooperage of similar character.

WIND MILL.—G. J. Thorn, Pecatonica, Ill.—This invention relates to a method of constructing wind mills, whereby the fans of the same are always in proper position with respect to the direction of the wind, and the speed of the same is more uniform and regular.

RETORTS.—J. D. Perrin & Joseph Saunders, Brooklyn, N. Y.—This invention relates to a new manner of arranging retorts for concentrating sulphuric acid and other purposes, so that circulation of the liquid to be concentrated or evaporated may be produced in a series of retorts at once, the liquid flowing from one retort to the other.

SASH FASTENER.—Ralph Thomas, Waterbury, Conn.—This invention relates to a sash fastener, which consists of a spring bolt, fitted in a case, secured to the upper edge of the lower sash, and of a cap hinged to the lower bar of the upper sash; the cap can be locked by means of the bolt to the case, and thereby the two sashes are locked together securely, so that they cannot be opened unless the cap is first released from the bolt.

CLEVIS IRON.—Thomas P. Warren, Norfolk, Va.—This invention is a simple, cheap and durable clevis, that can be attached to a plow beam of any size, by which the plow can be adjusted more or less "to land," and can be caused to cut a deep or shallow furrow, as may be desired.

BRUSH.—John F. W. Dorman, Baltimore, Md.—In this invention the bristles are put up in sparate packages, one of which answers for a brush; and a new but cheap device is employed to attach them to the handle. The packages are designed to be made and sold independently of the handle, to which they can in a moment be attached, or from which they can be detached—so that at any time when the bristles wear out or become damaged they can be removed and new ones substituted.

CHURN DASHER.—J. D. Kellogg, Jr. Northampton, Mass.—This invention relates to a new form of churn dasher, by which the butter can be more quickly and easily made and gathered than by any hitherto in use, it being only necessary to rotate the dasher in one direction to make the butter, and in the reverse direction to gather it.

CUTTER HEAD AND SPINDLE FOR MACHINES FOR PLANING, RABBETING, MOLDING, ETC.—Frank Douglas, Norwich, Conn.—This invention comprises three important features: First, a new method of adjusting the cutters in the head, by which they can be held more firmly, and by which cap cutters, consisting of two single cutters, can be employed; second, in a new form of cutter spindle and a new method of attaching it to the shaft, by which it can be instantly adjusted with perfect accuracy, and so held for any length of time; and thirdly, in a new method of stopping the spindle shaft, by which it can be easily adjusted and oiled, and by which its friction is greatly diminished.

TRACTION RAILWAY BRAKE.—Rudolph d' Heureuse, San Francisco, Cal.—This invention consists in the application of double flanged or grooved driving-wheel to locomotive engine.

BED CLOTHS HOLDER.—J. B. Munson, Bally Hollow, Pa.—This invention has for its object to furnish an improved device for securing the bed cloths in place upon the bed, so as to prevent them from being thrown out of place by the restlessness of the sleeper.

SPRING BED BOTTOM.—E. Gibbs, and O. W. Gibbs, Richland Center, Wis.—This invention has for its object to furnish an improved spring bed bottom, simple and durable in construction, which will not allow the head part to tip down, and which will be noiseless, easy, and comfortable in use, whether lain upon by a light or heavy person.

VISE.—F. B. Johnson, De Witt, Iowa.—This invention has its object to furnish a simple and convenient bench vise which shall be so constructed as to adapt itself to the shape of the object to be held whether said object be straight or tapering.

SHINGLE MACHINE.—Lyman Jennings, Winchenden, Mass.—This invention consists in the horizontal action of the cutter and elevating block rest, together with the mechanism conducing to the operation of the same.

CAR BRAKE.—Wm. T. Parsons, Thomasville, Ga.—This invention relates to an improved rail-car brake, which consists of shoes pendant with suitable mechanism, whereby they are let down under the wheel and partially receiving the weight of the latter, act as a chock to stop its revolution.

TIRE SHRINKING AND PUNCHING MACHINE.—Walter Britton, Abingdon, Ill.—The object of this invention is to accomplish the shrinking of wheel tires in a simple and effective manner.

APPLE PARING AND CORING MACHINE.—Andrew Clark, La Fayette, Ind.—The object of this invention is to produce a machine by means of which apples and other similar fruit may be pared, cored, and quartered in an expeditious and rapid manner.

MACHINE FOR DOUBLE LAPPING SHEET METAL.—Geo. H. Goldsmith, Waverly, Ill.—This invention relates to a machine chiefly used by tinsmiths. It consists of an automatic break bar for bending the tin with a double lap at the edge, together with other devices perfecting the operation of the whole.

SAW GUIDES.—T. Milner, Houston, Texas.—The nature of this improvement consists in the arrangement of the parts constituting the parts of a guide for circulrr saws, so that they can be operated with facility and accuracy, together with devices for improving and perfecting the whole.

BREAST PUMP.—Wm. T. Fry, New York city.—This invention relates to an improvement in breast pumps of that class which are provided with an elastic bulb for producing the necessary suction.

PAD BILLET.—Lydia Hays, Ames, Iowa.—This invention relates to a pad billet for harnesses, and it consists in a novel construction of parts, whereby several advantages are attained over the ordinary leather billet.

ROPE TRACES.—Thomas Newman, New Orleans, La.—This invention relates to an improvement in rope traces for harnesses and it consists in a novel manner of securing the clips to the trace, whereby firm connections of the trace with the collar hames and whiffletrees are obtained, and the trace adapted for all kinds of harnesses.

PAPER BOX.—William Armour, Belfast, Ireland.—This invention relates to an improvement in the construction of fancy paper boxes, designed more especially for holding gloves, handkerchiefs, confectionery, etc. The object of the invention is to obtain by a simple arrangement two compartments which, when the box is opened, are both accessible, each being provided with a separate or independent lid. The invention has also for its object a fastening by which the box may be kept in a closed state and still be readily opened when closed, the device as a whole being designed as a new and improved article of manufacture for the purpose specified, both useful and chaste or ornamental.

COMBINATION OF SQUARE AND BEVEL.—H. G. Taylor, Port Hope, C. W.—This invention consists in a combination of a square and bevel, whereby the blade may be set at any required angle or bevel, and at the same time a square be always preserved.

SHARPENING CUTLERY.—Augustus Thayer, Albany, N. Y.—This invention relates to a device for sharpening cutlery, and is more especially designed for sharpening table cutlery, scissors, pocket knives, etc., but it may be used for sharpening cutlery of various kinds.

JOURNAL BOX.—James Robinett, Petersburg, Va.—This invention relates to an improvement in that class of bearing pieces employed in car axle boxes, in which the bearing of the body piece is of iron, the main portion of the convex surface being of Babbit metal, and the central portion being of brass. The improvement consists in a new method of attaching the brass central plate to the iron body of the bearing piece, whereby the former will be more securely held in position, and prevented from working out, or being thrown out by any accident.

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### EXTENSION NOTICES.

Elias Ingraham of Bristol, Conn., having petitioned for the extension of a patent granted to him the 3d day of September, 1861, for an improvement in design for clock case front, for seven years from the expiration of said patent, which takes place on the 3d day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 17th day of August next.

Gardner Chilson, of Boston, Mass., having petitioned for the extension of a patent granted to him the 26th day of September, 1855, and reissued the 27th day of September 1864, for an improvement in furnace or heat regulator and radiator, for seven years from the expiration of said patent, which takes place on the 26th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 31st day of August next.

Wm. H. Atkins and Joseph C. Burritt, of Ithaca, N. Y., having petitioned for the extension of a patent granted to him the 19th day of September, 1854, for an improvement in calendar clocks, for seven years from the expiration of said patent, which takes place on the 19th day of September, 1868 it is ordered that the said petition be heard at the Patent Office on Monday the 31st day of August next.

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903.—HATS AND OTHER COVERINGS FOR THE HEAD, TO OBTAIN VENTILATION AND COMFORT IN WEAR.—George Deas, New York City. March 21, 1868.

1,263.—PURIFYING, SEASONING, AND PRESERVING WOOD, AND MAKING IT WATER AND FIRE PROOF.—Theodore W. Hinemann, New York city. April 25, 1868.

1,265.—STEAM GENERATOR AND FURNACE.—S. Lloyd Wiegand, Philadelphia, Pa. April 25, 1868.

1,310.—TELEGRAPHY, AND CONSTRUCTION AND ARRANGEMENT OF APPARATUS FOR COMMUNICATING SIGNALS AND INTELLIGENCE.—Lancelot H. Everitt, M. D., New Orleans, La. April 27, 1868.

1,376.—BREECH-LOADING FIRE-ARM.—Kiel V. Barnekov, C. E., Newburgh, N. Y. April 27, 1868.

1,241.—HAIR SEATING, AND MODE OF SEAMING OR JOINING HAIR SEATING AND OTHER WOVEN FABRICS WITH A HAIR FACE.—Charles Bradley, Providence, R. I. April 28, 1868.

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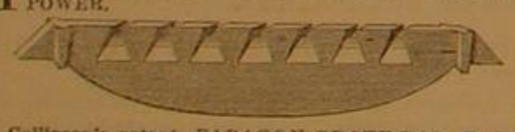

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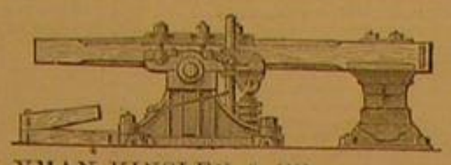

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