

clay soil, with exposure to plenty of air and sunshine, is preferable, and the tree is in its maturity when from fifty to one hundred years old.

Elm is found in all the States east of the Mississippi, and the present supply is drawn very largely from Ohio. It is cut in the same season as hickory, but the method of seasoning differs in some respects. When required for hubs, it is usually cut in the required lengths, and a hole bored through the heart; the bark is then removed, and each block reduced to a true cylinder, with the hole for its center. From this point the practice differs in different works, but generally the blocks are then steamed for a short time, to assist in seasoning them without splitting or checking; and after this the ends are dipped, to the depth of about half an inch, in a mixture of hot linseed oil and tallow (or resin), as a further preventive of checking. They are then stored in open sheds, where they remain from two to four years to season thoroughly.

Locust is sometimes used for hubs, and possesses special value on account of its durability; but it splits easily, to prevent which it requires to be carefully banded close beside the spokes. The mode of cutting and preparing it is similar to that employed for elm.

Gum wood, known in some sections as pepperidge, is found mainly in the States along the Atlantic seaboard, growing but sparingly in the West; and south of New York State it is used considerably by carriage builders for hubs. In its qualities it is very similar to elm, being very difficult to split; but it has not the lateral strength of elm, and in driving spokes it is more liable to break between the mortises. The method of preparing it is very similar to that employed for elm, the only difference being that the blocks are not usually dipped, although this treatment would doubtless be beneficial; and its market value is about the same as that of the latter.

WHAT CONSTITUTES A GOOD WHEEL.

The excellence of a wheel depends, first, upon the quality of the material employed; second, upon the proper preparation of this material; third, upon the proper proportioning of the different parts, and fourth, upon exact and skillful workmanship in combining these parts into a perfect whole. Mr. William Thompson Casson lays down a similar standard in his article which appeared in a recent number of *London Saddlers', Harness Makers', and Carriage Builders' Gazette*, wherein he says:

"The gem of the wall exhibits at the Centennial is an English dog cart wheel, shown by Hoopes, Brother, & Darlington; and from whatever point of view we take it, whether regarding its appearance, workmanship, or material, it is a source of admiration; the spokes and rims are oak, but it requires an experienced eye to detect whether the oak is English or American. They also show landau, brougham, and other wheels of the English pattern, as specimens of their ordinary manufacture, leaving nothing to be desired. Those of the old school of wheel makers, who yet dispute whether any steam wheels can equal those of hand make, would be convinced of the superiority of the former by a close inspection of the wheels shown by this firm; every joint and shoulder is up and close, without having one part squeezed into another, simply because every tenon, shoulder, and surface is made with mathematical precision. From personal experience learned at the bench, this really seems to be the whole secret of wheel making—to have everything tight, true, and fair."

SHAFTS, WHIPPLETREES, AND SIDE BARS.

For shafts, hickory is commonly used by American carriage builders, and answers the purpose admirably. Lancewood, however, from the West Indies, would, without doubt, be preferable; but it is difficult to obtain, and very expensive. It is much to be regretted that not a specimen of lancewood in the rough is exhibited at the Centennial; and although it is used in connection with several of the carriages exhibited, it is so disguised by paint or varnish as to give, to those unacquainted with it, little or no idea of what the timber really is. The valuable qualities by which lancewood is distinguished are great stiffness and elasticity, and remarkable strength. Some builders claim, however, that lancewood is not so safe as hickory for shaft purposes, for the reason that, when it breaks, it is liable to break off short; and to obviate this danger, some foreign builders fasten strips of whalebone under lancewood shafts, by means of round-headed screws. For whippletrees, hickory is used almost universally by American carriage builders.

Wooden side bars, now so popular in connection with light road wagons, are made of various materials, hickory being preferred by the majority of the best builders, while locust ranks next in favor; and experiments have also been made with *bois d'arc*, Chinese chopstick wood (name unknown to us), and lancewood. Lancewood would doubtless prove the best for this purpose, and come into general use, were it not for its expense, and the difficulty of obtaining it in sufficient quantities; for it possesses those qualities particularly demanded for side bars—namely, stiffness, toughness, and elasticity.—*The Hub*.

NOTES ON THE AMERICAN INSTITUTE FAIR.

ENVELOPE MACHINERY.

There is a remarkably ingenious machine at the Fair of the American Institute, which is said to make 3,000 envelopes per hour. A similar apparatus is in operation in the Government building at the Centennial, but there it is not among the machinery, and is thus out of the route usually followed by those who make mechanism an especial study. It is one of those devices which even the practised eye can

not appreciate at a glance, and when at work it goes through its multitudinous manipulating performances so quickly and yet so deftly that the observer instinctively finds himself watching the envelopes come in and the envelopes go out as if a natural phenomenon were taking place, the internal operation of which it were useless to try to fathom. The motion of the apparatus is mainly obtained through cams, and these act on rubber rollers on the extremity of the rods moved. The envelope blanks, previously cut out, are placed on a table. Beside and above the latter is a paste slab whence mucilage runs to distributing rollers, and these in turn cover movable rollers, which are thrust forward to apply the gum to the undersurface of a stamp or plunger. The plunger now descends and takes against the parts of the envelope to which paste is to be applied, and then rising carries the envelope up with it. Now a carrier shoots under the envelope, takes it away from the stamp, and conducts it rearward under a square plunger which, descending, pushes the paper through a square hole, thus bending up its edges preparatory to folding. No sooner is the envelope through the orifice than four little doors or shutters clap over it and neatly fold the edges. Next it falls between arms on a long endless chain which moves very slowly rearward, the envelopes going down one way and coming up the other. This travel is long enough to enable the paste to become dry, a process facilitated by a little rotary fan under the chain, which keeps up a draft of air. Lastly, as each envelope returns to the table of the machine, fingers rise on each side, remove it from the chain, and place it on a small platform which, turning, deposits the envelope neatly on edge beside its predecessors. Then the young lady who presides over this wonderful machine quickly runs her finger over the requisite number of envelopes to form a pack, surrounds them with the usual ornamental strip of paper, and the process is ended.

There is one good feature about the American Institute Fair which occurs to us here, and that is that it offers excellent facilities for the undisturbed study of its contents. It is useless to attempt to examine intricate machinery at the Centennial, owing to the now almost constant crowd; and to post oneself in front of an object with a note book, and to ask questions of the exhibitor, or, worse yet, to try to sketch, is, especially in the latter case, to constitute oneself the center of a throng whose curiosity impels each individual member to ask questions on his own account, or else to constitute himself a critic on the efforts of the amateur pencil. Nothing delights us more, however, than to see the interest manifested by the people in machinery and invention, and in that view we can forgive the annoyance. It would not be a bad idea, though, for enterprising exhibitors to hire artists to sit and sketch their exhibits by the week, by way of advertisement. But this is wandering from the American Institute Fair, where—and here is a contrast to the Centennial—an exhibitor the other day set an engine racing for our inspection, at a most remarkable pace, and no one manifested the slightest interest in the proceeding. People passed, instinctively wagged their heads, as they always do, in time with the machine, and proceeded onwards. The engine in question, we found, presented some features not wholly new, but well worth examining.

THE BALANCE ENGINE.

It has two pistons in its single cylinder. From the front piston and through boxes near the edges of the cylinder cover extend two piston rods, each connected to a crank on the driven shaft. From the rear piston a single main piston rod passes directly through the front piston, then through the middle of the cylinder cover, and connects to a crank formed by making the inner sides, of the two cranks already mentioned, twice as long as the outer sides. That is, imagine a W with the middle angle twice as high as the side strokes, and consider a crank at each angle. The main piston rod would then be attached to the angle at the apex, and the two smaller rods to the angles at the base. The cranks, it will be observed, are set in the same plane, and not quartering, as is usually the case. The steam ports enter the cylinder at the middle and at the ends, and the stroke of each piston of course equals half the length of the cylinder. The steam enters between them and forces them apart, and then enters at the ends and carries the pistons together. Now the sum total of all is that the power is applied to the shaft just as the two hands are to the handle of an auger, and the reciprocating parts are balanced; while the engine—despite the very indifferent workmanship—runs at high speed with little vibration.

THE HARRIS STEAM PUMP

is quite new, and has a positive action. The main piston, on arriving near the end of its stroke, raises a poppet which admits steam to the valve piston and at the same time closes its communication with the exhaust. This throws the steam valve, which admits steam, to the other side of the main piston, causing it to make the return stroke. The instant the piston moves from under the poppet it drops to its seat, closing the steam and opening the exhaust on that side of the valve piston, which, together with the steam valve, remains at rest until the other poppet is raised to admit steam to the opposite side. There are no outside connecting valves, etc., and the water end is of the double acting plunger pump pattern.

AN INGENIOUS MECHANICAL MOVEMENT

will be found embodied in the Vanhorn & Cranston paper-cutting machine in the main hall. The arm which draws down the clamp to hold the paper, prior to the knife rising from beneath, is pivoted to a long hand lever, near the lower end but above the fulcrum. Hence, when the lever is pulled down, the clamp is carried downward until its further mo-

tion is prevented by the paper under it. The lever then changes to one of the first order, having its fulcrum on the clamp rod pivot, while the former fulcrum now is the pivoting point of the lever end to the carriage which supports the knife. Consequently, further forcing down of the lever lifts the carriage with great force, and the knife is caused to cut the paper. The device is very simple, and so constructed that the greatest power is applied just where it is needed.

As a whole, the fair is interesting, and visitors to the Centennial, sojourning in this city, will do well to visit it. It is especially rich in household articles, and in new designs in furniture, etc. The machinery department is not so well filled as usual; but there are many novelties which will repay careful examination. The attendance is constantly large; and on Saturday and Wednesday nights which seem to be especially favored, the building is generally crowded.

Opening of the New York Aquarium.

The New York Aquarium, located on the corner of 35th street and Broadway, this city, was recently opened to the public. The tanks contain a large number of fish, including a white whale from Labrador, several shark, a huge sting ray, and terrapin, besides an interesting collection of zoöphytes. A laboratory for naturalists, with the necessary appliances for investigation, is provided; and in the piscicultural apparatus, the process of hatching and rearing salmon may be witnessed. On the opening night, President R. B. Roosevelt, of the New York Fish Commission, made an address on the objects of pisciculture.

A Disastrous Boiler Explosion.

A terrible boiler explosion recently occurred at Zug & Co.'s mills at Pittsburgh, Pa. The boilers in the nail mill blew up, demolishing that building and half the adjacent rolling mill. Some twenty men were killed and as many wounded. No cause is as yet assigned for the casualty. The boilers were in charge of a careful engineer, and it is stated that they were inspected some five weeks ago and were then in good condition.

NEW BOOKS AND PUBLICATIONS.

THE AMERICAN LIBRARY JOURNAL. Edited by Melvil Dewey, 13 Tremont Place, Boston, Mass. New York city: F. Leyboldt, 37 Park Row.

As its name indicates, this journal is devoted to the interchange of thought and experience among librarians, and with this aim it enters a field hitherto wholly unoccupied. We have a great many large and excellent libraries in this country; and there is a constant increase going on both in the numbers of these repositories of learning as well as in their contents. To render the vast mass of information thus accumulated accessible to the reading public, to keep his own particular charge up to the latest dates in constantly adding new works, and, perhaps above all, to constitute in himself a living index of what the book makers have done, is but a rough statement of the librarian's duty; and that these ends can be accomplished better by the union of librarians, which the present journal seeks to bring about, than by individuals, it is hardly necessary to suggest. The first number of the periodical, which is issued monthly, contains a number of interesting communications and papers, among which we note some sensible practical hints to starters of libraries, and a good many ideas for the care, indexing, etc., of books. There is, beside, a useful record of new publications, not merely in this country, but throughout the world. The journal is elegantly printed, the margins are luxuriously wide, and the present number has an illustration of the new Ridgway library building in Philadelphia. The subscription price is \$5.00 per year, or 50 cents per number.

THE COMPLETE AMERICAN TRAPPER. By William H. Gibson. Illustrated by the Author. Price \$1.75. New York city: James Miller.

We are inclined to think that the author's claim that "this is the most comprehensive work on the subject ever published" is a fair one, judging from the almost endless variety of traps and other devices to effect the capture of animals and birds which he illustrates and describes. He even tells us how to trap the hippopotamus, the lion, and the tiger; and from these great beasts he descends through the scale until he reaches a daintily delicate way of catching humming birds by a few drops of birdlime on the leaves of a lily. Trap making—or, to speak generally, the pitting of human reason against brute instinct and cunning—requires a special kind of ingenuity, which not many possess; and in gathering together all the curious devices described in his volume, the author has done excellent service in helping very many people to ideas which doubtless would never occur to them. The book contains 143 engravings—mainly representative of the apparatus explained—and is written clearly and well. It will be useful not merely to hunters and trappers, but will also serve to exhibit to inventors what has already been accomplished in this particular line.

Recent American and Foreign Patents.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED METHOD OF CONVERTING MOTION.

Hiram L. Joslin, Mankato, Minn., assignor to himself and Henry K. Lee, same place.—This consists of a reciprocating head working backward and forward among belts, and having clutches or pawls contrived to take hold of one side of the belt going one way, and the other side going the other way, so as to apply the power continuously in one direction.

IMPROVED BRICK MACHINE.

Ferdinand Michel, Dallas, Texas.—The table to receive the tempered clay is attached to the top of the frame from which it is fed into the molds. Followers enter the molds from below, and serve as bottoms to the mold when being filled. A weighted block withdraws the followers when the pressure is removed. By operating a lever, the followers may be forced up to press the brick, and to raise them out of the mold after being pressed. There are other ingenious improvements in the mechanical construction.

FEEDING APPARATUS FOR CARD-PRINTING PRESSES.

William M. Clark, Philadelphia, Pa.—As the card passes down beneath a shelf, its ends pass beneath the flanges of guide bars, projecting downward along the platen to guide the card to the place where it is to be printed. As the card reaches the place where it is to be printed, it is stopped by inwardly projecting curved points, which receive its lower edge. As the platen is drawn back, these curved points raise the card slightly as its lower edge slips from them, so as to release it, should it stick to the platen, and allow it to drop from the press. The arms which carry the points slide upon grippers so that they may be adjusted as the width of the card may require.

IMPROVED APPARATUS FOR REMOVING COKE FROM RETORTS.
Joel F. Rice, Louisiana, Mo.—This consists of a sliding scoop placed on a swiveled support, that is carried by a truck, the scoop being forced into the retort under the coke by a winch, and withdrawn by the same means.

IMPROVED WINDMILL.

Edward Williams, Potosi, Wis.—This consists of a solid wheel of sheet metal, the vanes of which are of concave form in cross section. There is a secondary set of curved vanes outside of the rims to increase the capacity of the wheel. The power is transmitted to the pump rod by a pair of eccentric wheels and a lever, giving increased leverage on the upstroke, with quicker motion on the downstroke, and enabling the wheel to lift from a greater depth. The tail vane is double, and diverges each way, so that the wind has greater power to hold it steady. The connecting rod works upward from the crank to a level, having the pump rod connected to it in such manner that the pump rod has but little vibration in the hollow axis of the turntable, and thus does not require so much space as when the crank works over hollow axes. The main stem is set in the adjustable step, for plumbing the turntable readily when the tower settles.

IMPROVED TOOL HOLDER.

Christian C. Bergb, St. Paul, Minn.—This consists of a vibrating holder for holding engraving and other tools in applying them to the oil or grinding stone, so as to insure the proper angle of the bevel, and thus make the points true. The said holder is an extension rod fixed on a vertical pin at one end, and having at the other end a chuck in which the tool to be sharpened is fastened. The oilstone is placed at such inclination that the bevel of the tool bears fair on the face of the stone.

IMPROVED RAILWAY SIGNAL.

John H. Williams, Albion, N. Y.—This consists of an arrangement of levers and connecting rods, which are combined with a danger signal or flag in such a manner that the same is displayed by the action of a passing train upon levers and rods.

IMPROVED SAND PUMP.

William H. Birge, Franklin, Pa.—This consists of an inner and outer tube, forming together the lower end of a sand pump, arranged to slide one within the other. The inner tube is provided with a rotating valve having a segment of teeth on its outer end, which engages with a rack formed on the edge of a slot in the outer tube. A spring assists the parts to regain their nominal position. The object of the invention is to provide a valve which shall have a positive motion, not depending upon the action of the water or sand to open or close it.

IMPROVED PAPER PULP SEPARATOR.

Joseph S. Smart, Troy, N. Y.—The object is to utilize the coarse and heavy stock that is collected at the bottom of the settling vats in the manufacture of paper, so as to draw the same off to regrind, and conduct it back to the vat for use. To this end, a settling vat is provided with revolving bottom arms, that convey the heavy particles of pulp to an outlet, and, by a connecting pipe, to a grinding engine, that forces the ground particles through a goose-neck pipe back into the vat.

IMPROVED CONDENSER FOR STEAM ENGINES.

Robert Hardesty, Shepherdsville, Ky.—This invention comprises a condensing cylinder surrounded by an iron casing, with a space between condenser and casing. At the top, the casing extends above the condenser far enough to form an air chest. The condensing water is forced in between the casing and condensing cylinder at the bottom by a pump, ascends to the air chest, and enters therein in a shower. By suitable pipes, a portion of the steam is conducted past the condenser into the heater. The general construction is such that, when the engine stops, all the water above the condensing cylinder will soon pass through it, thus cutting off the supply of water to the valves. When the engine starts, the water will rise in the air chest until the air becomes sufficiently compressed to force the water through as fast as the pump supplies it. This will again supply the valves with water. This invention is claimed to suit both the high pressure and low pressure engine. If there is any exhausted steam above the pressure of the atmosphere, it will exhaust part of it into the air and condense the remainder. If the steam is below the pressure of the atmosphere, it will exhaust it by condensation.

IMPROVED BLOW-OFF COCK FOR STEAM BOILERS.

Samuel Myers, Pittsburgh, Pa.—The valve for controlling the discharge of water is made to fit loosely in its case or socket, so as to permit the passage of a small quantity of water around the valve and over the seat while the valve is closing, for the purpose of washing off from its seat any scale or other solid matter that may have lodged thereon. The valve is, however, designed to fit sufficiently tight in its casing to prevent scale, etc., passing along with the water, which thus washes the seat, at the instant of closing.

IMPROVED MIDDINGS SEPARATOR.

Edward T. Archibald, Dundas, Minn.—This invention consists in troughs arranged in one or more series above the reciprocating bolt, and in inclined gather boards arranged above the troughs and on each side of holes in the dome of the bolt, that lead into the fan chamber to guide the air and dust.

IMPROVED FLOUR BOLT.

William H. Woolard, Windsor, Ill.—This consists in providing a stationary auxiliary head, carrying a packing of sheep's pelt having the wool on, which is forced against the rotating head of the bolt reel by means of springs, and retained in place by leather straps. The object is to prevent the accumulation of dust on the bolt head, and to prevent the escape of specks and flour dust from the bolt, and also to do away with the device used in flour bolt chests commonly known as speck boxes.

NEW AGRICULTURAL INVENTIONS.

IMPROVED CULTIVATOR.

Edward Nauman, Bridgeport, O.—In this cultivator, by moving one of the side standards forward and the central standard back, the machine is adjusted as a side wiper. By moving the center standard forward and attaching a larger shovel to it, and moving the side standards back, and attaching half shovels to them, the machine becomes a potato plow. By detaching the center standard and moving one of the side standards forward, the machine becomes a double shovel. By detaching the side standards, the machine becomes a single shovel; and by detaching the center standard, and attaching half shovels to the side standards, the machine becomes a corn coverer. The farmer is thus provided with a number of useful implements arranged in compact form.

IMPROVED CULTIVATOR.

Horace C. Briggs, West Auburn, Me.—Novel devices are provided whereby the ends of the beams may be moved wider apart or closer together, as may be desired. The points of draft attachment may also be raised and lowered as circumstances may require. The depth to which the plows enter the ground may be regulated and the machine may be easily guided around short turns in crooked rows.

IMPROVED RIDGE-FORMING MACHINE.

Andrew D. Martin, Abbeville, La.—This invention is a machine for forming ridges for planting sweet potatoes; and it consists in the combination of two plows and two rollers inclined with each other, so as to throw the soil toward each other to form a ridge. The upper ends of the two rollers incline toward each other; and as soon as the dirt has been heaped by the plows, the rollers press it together to form a steep ridge. The plows may also be used without the rollers, for ordinary ridges, such as for cotton, corn, or cane.

IMPROVED CULTIVATOR.

Edwin W. Joy, Iowa City, Iowa, assignor to himself, Marcus F. Dunlap, and Samuel J. Faust, of same place.—This relates to cultivators in which short independent axles are hinged to a yoke connecting the two axles, to allow horizontal oscillation of wheels relatively to the beams, and which are used without a tongue; and it consists of the application of another yoke in a manner to regulate the oscillation of the wheels and prevent them from cramping too much and binding against the beams.

IMPROVED CORN PLANTER.

Burton Hakes and Ellis Hakes, Marengo, Iowa.—The general construction is such as to drop the seed automatically and at uniform distances as the machine is drawn forward to enable the bills to be planted in accurate check row, and to throw the dropping mechanism out of gear when the opening runners are raised from the ground.

IMPROVED STALK PULLER.

Robert D. Brown, Austin, Tex.—This consists of jaws which grasp the stalks, and which are actuated by hand levers to lift the latter from the ground. The whole is mounted on a suitable carriage. The device was described and illustrated on page 358, volume XXXIV.

IMPROVED WHEEL CULTIVATOR.

Thomas R. Wallis, Egg's Point, Miss.—This consists of a novel contrivance of frames for coupling the body frame of a wheel cultivator to the short independent axles employed in machines for cultivating high plants. The frames are composed of elliptical plates and connecting bolts, the plates being fitted at the middle on the axles, so that they can be readily taken off and shifted higher or lower, for which a number of holes are made in the plates for the axle.

IMPROVED BEE HIVE.

Noah D. Hayden, Dallas, Tex., assignor to himself and Amasa O. Clapp, of same place.—The brood chamber has its top and front open; and the back is securely attached to the back of the hive, so that, by swinging one side of the hive open, the brood chamber may be swung out, giving convenient access to its open side. The inner side of the brood chamber is made detachable, so that it may be removed to give convenient access to the said brood chamber, and enable the comb frames to be easily separated and removed.

IMPROVED SEED PLANTER.

John H. Lee, Livingston, Ala.—This invention relates to an improved construction of a seed planter, designed to plant corn, peas, beans, rice, turnip seed, and cotton seed, either in hills or rows, as may be desired. The invention consists in the particular construction and arrangement of parts, in which an ordinary plow is fitted up with detachable seeding devices, and is adapted to independent use as a plow or a combined use as a seed planter, thus forming an efficient and economical implement for farmers who are possessed only of a single horse.

IMPROVED DRAIN FENCE.

Dr. William A. J. Pollock, Kinston, N. C.—The object of the invention is to provide a means for preventing live stock from crossing over from one field to another, in which there may be growing crops, when such fields are bounded by canals, creeks, or large ditches. The invention consists in a very strong, peculiarly constructed frame work, which is designed to be placed in the canal of the dividing lines of the fields, whether such division line be a fence or a second ditch at right angles to the canal.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED FLUME.

Samuel C. Dike and Sidney M. Brawn, You Bet, Cal.—This invention relates to that class of flumes or chutes which are used for conveying lumber, wood, etc.; and it consists of a sheet metal trough, made up of semi-cylindrical sections, supported on trestle-work or other suitable support, and provided at its upper end with a grating for separating the wood, lumber, etc., from the water.

IMPROVED HARNESS LOOP.

Duncan McMillan, Dodge Center, Minn.—This consists of a double metal loop fastener, adapted to fasten two loops in hame, breast, holdback, breeching, and other straps to rings and buckles, without sewing the strap loops, as they are commonly done.

IMPROVED BALANCE LINE FOR MAST HOOPS.

William E. Leighton, West Pembroke, Me.—This invention is intended to make the hoops run up easily with the sail, and consists in the lacing together of the hoops by lines equidistant to the sail rope, and attaching the lines by sheaves running along the mast to the jaw of the gaff.

IMPROVED GAS BURNER.

Charles Royle, New York city.—This burner is so constructed that it may be adjusted to regulate the flow of the gas, and consequently the light from the outside, without its being necessary to remove any part of the burner for this purpose. The invention consists in a cap spun in to fit upon the neck and top of the base, having holes formed in its upper part corresponding in number and position with the holes through the said base, and having its lower part spun outward to receive the cover and the ring plate, and to serve as a handle for adjusting it.

IMPROVED WATCH BALANCE.

August F. Curpen, Plymouth, O.—This invention consists of a mode of connecting the balance wheel to the staff, so that in case the watch falls the wheel will move on the staff by the shock, and be stopped by the plates of the watch, if the watch falls flat on its side, or by other plates provided for the purpose in case the watch falls on the edge. This protects the jewels from breaking, and saves considerable expense for repairs.

IMPROVED PLUG TOBACCO.

George H. Lyford, Brooklyn, N. Y.—The object of this invention is to furnish plugs of tobacco so formed that the brand, trade mark, name of manufacturer, etc., or other desired information may be readily applied to them. Tags of wood are imbedded in the body of the plug beneath the wrapper, the said wrapper being cut away over the middle part of said wrapper.

IMPROVED HOLDBACK FOR THILLS.

George Sell, East Randolph, N. Y.—A short tube is slipped upon each of the thills from its forward end. Another short tube fits loosely upon the first tube, so as to be easily slipped on and off the end of the thill. The rear end of the second tube rests against a flange of the first tube, and to said second tube is attached a keep-

er, for securing the holdback strap to it. With this construction, should the drawing device become detached, the outer tubes will readily slip off the forward ends of the thills, and the horse will be entirely disengaged from the vehicle.

IMPROVED OPEN SIDE THILL.

Conrad H. Matthiessen, Odell, Ill.—The object of this invention is to improve the construction of the open side thill for which letters were issued to the same inventor November 30, 1875, to prevent the harness being drawn to one side by the springing of the thill, and to enable the holdback straps to be more easily connected with the thill. To this end the thill is now made hook-shaped in front, and in the rear has a bifurcation reinforced with an intermediate brace, all in one piece.

IMPROVED ATOMIZER.

Frank E. Stanley, Auburn, Me.—This relates to such improvements in atomizers that they may be employed for finishing photographs in water colors, india ink, and crayon, and also for all kinds of shading in which color can be used in a liquid state. The invention consists in inserting an adjustable wire with pointed end into the liquid tube, to regulate the amount of liquid issued. A cap or hood with detachable nozzles, having varying orifices, admits the confining of the spray to a certain surface.

IMPROVED WATCH CASE SPRING.

Numa J. Felix, New York city.—The object is to provide for an improved spring, that may be fitted with but little trouble into any case, so as to facilitate the repairing of broken springs by any watchmaker in a short time. The invention consists of a bearing or bridge piece, with downward bent end posts that bear in perforations the steel spring, the posts being readily recessed to fit any case.

IMPROVED SPARK ARRESTER FOR STOVE PIPES.

Horace W. King, Richmond, Mo.—Holes through the pipe, above the water level, in a boiler attachment which surrounds its lower section, allow the steam to escape from the boiler into the pipe and extinguish the sparks. An air jacket surrounds the pipe above the boiler, with holes in the bottom to allow the air to enter. Vessels extend down into the boiler from the head, for holding the medicating or other substance to be discharged into the air by the heat of the boiler. Holes in the top of the boiler are provided for the escape of the vapor of the water, and receive ball covers when they are to be closed.

IMPROVED CORDER FOR SEWING MACHINES.

John J. Donahoe, New Orleans, La.—A trumpet-mouthed tubular guide is constructed in two parts, and joined together for keeping the tube closed. A double spring gage guides the cloth both above and below the holding plate of the tube, and there is a contrivance of the attaching plate for regulating the bight of the cord guide. All are arranged with special reference to fastening a cord wrapped in a strip of cloth between two pieces of cloth, by sewing the edges of the cord-inclosing strip and the edges of the cloth together at the same time.

IMPROVED TAX AND INTEREST CALCULATOR.

Niels Larsen, West Point, Neb.—The invention consists in the combination of three concentric cylinders, which are movable independent of each other, and the two outer ones provided with openings, allowing portions of each cylinder to be seen. The cylinders bear numbers or figures, the inner cylinder representing hundreds, the middle one tens, and the outer one units. By properly moving the cylinders the tax or interest upon a given sum or amount will be exhibited through a stationary shield.

APPARATUS FOR THE GENERATION AND HYDRATION OF SULPHUROUS ACID GAS.

William Maynard, New York city.—This invention relates to apparatus for generating and hydrating sulphurous acid gas, and it consists mainly in the following features: First, constructing the pan for burning the sulphur with a conical bottom, whereby a large amount of heat is conserved and the sulphur burnt without subliming, as is the case in ordinary furnaces; secondly, in the peculiar construction of the furnace door, designed to secure ease of manipulation, safety, and other incidental advantages; and thirdly, in the arrangement of a water tank upon the top of the condenser, which both operates as a reservoir for the water fed to the condenser, and is a receiver for the waste gas and azotized air.

IMPROVED RIDING SADDLE.

John T. Gathright and James C. Watson.—The object of the invention is to form a more perfect seat for the rider without adding either weight or expense to the saddle, by making the cantle of the tree and the thigh puffs on the skirts form a continuous concave or hollow seat extending well down on the leg of the rider.

NEW HOUSEHOLD INVENTIONS.

IMPROVED IRONING APPARATUS.

Henry J. Nott, St. Mary's, Texas.—This machine embodies nine novel contrivances, which cover nearly the entire mechanical construction. The iron is attached to a carriage above the table, and is supported in rails so that it may be drawn forward and back by cords communicating with a crank. The table is pressed up against the iron by levers. Devices for fluting and other operations are provided.

IMPROVED FOLDING TABLE.

James M. Kimball, Woodstock, Ill.—This consists of an under frame pivoted to one of the middle boards, so as to swing around in line with it for folding, and crosswise of it for setting up the table, in which latter position it stands on two legs which support one end, and locks with the legs of the other end, so as to hold the table upright. There is a weighted hook for hooking the two sections of the table together.

IMPROVED KNOB ATTACHMENT.

William H. Gonne, Chatham, Ontario, Canada.—This invention consists of a spindle that connects the knobs and shanks, and binds the same tightly by a head at one end and screw nut, turning into the shank, and on the spindle at the opposite end. The roses are provided with spurred sockets to be attached securely to the doors. This admits the ready adjustment of the knobs to any thickness of door.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED VEHICLE SPRING.

William Hunt, Oskaloosa, Iowa.—To the upper part of the forward spring is bolted a circular block, which fits into a recess in a wheel, which is bolted to the middle part of the spring bar. The upper part of the forward spring and its disk are pivoted to the bar, and the flanged block by a bolt, which passes through the said parts, the blocks thus forming the fifth wheel of the vehicle. A spring brace bar, the rear end of which is secured to the center of the rear axle, holds the springs perpendicular. By this construction, when the vehicle is loaded so as to compress the springs and bring the brace into horizontal position, the parts of the spring will be nearly vertical, and thus in the most favorable position to resist a strain.