

C, D, the point at C must remain stationary while the center, E, moves round to the point, F, making another quarter of a revolution. One half a revolution is made on one side of the square, or rather one side and at one angle. If the square be changed into a polygon of an infinite number of sides, or a circle, the case will not be changed. A. C. SEKELL.

Boston, Mass.

As the rolling wheel, in making one revolution upon its own axis, moves over a distance equal to its circumference, which is designated A B by the above correspondent, the distance traversed by the wheel in making a revolution upon its own axis will be the same whether the path traversed be curved or rectilinear. If the wheel made two revolutions upon its axis, the distance traversed by it would be twice A B.

MESSRS EDITORS:—Allow me to give my theory of the solution of the question of "How many revolutions will a wheel make on its own axis in going one round a fixed wheel of the same size?" I do not profess to be much of a mechanic but I think I have the solution. I took two ordinary cotton spools and put a shaft through one of them, then marked both the spools off into quadrants. I also marked the end of the axis, then held the axis firm and rolled that spool round the other one. I found, by observing the marks on the end of the axis and the marks on the face of the spools, that there were *apparently* two revolutions on the axis, while there was only one on the circumference, and then by a little consideration I found that the axis itself had made one revolution in an opposite direction from the spool, because in going all round it had presented all its sides to the surface of the fixed wheel, thus making the two *apparent* revolutions while in reality there was only one revolution of the wheel. This is easily understood when it is considered that the circle the axis describes in going round the fixed wheel is just twice as large as the surface of the fixed wheel, consequently it is necessary that it should show two revolutions while in reality making only one. J. B.

Philadelphia, Pa.

#### Advice to Young Mechanics.

In referring to the growing inclination on the part of young men, after they have served long and hard apprenticeships to acquire a good trade, to abandon that mode of making a living and to enter the legal or medical profession, where it is supposed greater emoluments can be secured and larger honors won, a cotemporary well observes that nineteen cases out of twenty such ventures are failures, for two reasons. First, the professions require peculiar talent and the most thorough education. As a rule, apprentices to the trades have neither the time nor the means to acquire this education. Hence, when a mechanic at the end of his apprenticeship aspires to and enters any one of the professions he does so at a great disadvantage. He may be a fluent speaker, know how to argue a point in a debating society or harangue a crowd at a ward meeting, but such talents do not fit him for the legal profession. He may know how to extract a splinter from his own hand, how to make a salve, how to mix a powder or administer a pill, but all this, while it might qualify him as a good nurse, does not fit him for the medical profession. The fact is, the young men who abandon their trades are tempted to do so by a feeling of false pride, erroneously imagining there is no honor to be secured in a pursuit of the mechanical arts. History proves the fallacy of such suppositions.

The brightest names which now adorn the annals of all countries are of the best mechanics who have blessed mankind with the productions of their genius. All that is beautiful and grand is the result of improvement in mechanics. The pendulum, the main-spring, the barometer, thermometer, printing press, steam engine, locomotive, sewing machine, telescope—all, all are the result of mechanics' arts, making those famous who produced them, and the people great who adopted them.

A good mechanic who becomes a pettifogger or quack, merely because he is too proud to work at his trade, is, indeed, a pitiful object. A man of the right mental balance, who has proper mental form, with the necessary independence, will win as much honor and as fair a living in the trades as in the professions; indeed an indifferent lawyer or doctor lacking briefs or patients, is always a miserable being, a bad example in the community. Let our young mechanics, then, become ambitious in their own peculiar vocations. If they dignify their trades by becoming proficient therein, the trades will dignify them with the highest honors. If mechanics pursue their business with a purpose to self-improvement therein, and not merely to hammer and file and saw, but to improve the art, to develop something new therein, the mind will be strengthened as the arm becomes muscular, and the heart of the mechanic will be made to swell with as true a pride as ever glowed beneath the doublet of a prince. Will the young mechanic think of these truths?

#### Walking and its Uses.

Dr. A. L. Wood, in the *Herald of Health*, gives the following sensible advice on walking.

Exercise is absolutely indispensable to the physical well-being of man, and walking is one of the most useful of the various modes of exercise. As a people we ride too much and walk too little. If we are in the country, and have a mile or two to go, we wait—perhaps long enough to walk the entire distance—for a horse to be got ready, and then sit lazily in our seats while this noble animal rapidly carries us to our destination. If we are in the city, and have a few blocks to go, we get into an omnibus or a horse car and sit our journey out, just as though we were not created with legs the same as horses are. The nation's legs are rapidly diminishing in size for the want of exercise, hence the demand for

false calves and for easier modes of locomotion is on the increase; so, also, is dyspepsia, liver complaint, general debility, and other physical derangements, which result, in great part at least, from a lack of muscular action.

The special advantages of walking, as an exercise, are many. Perhaps the most important is that it takes us out of doors, and keeps us there in the pure air and the bright sunshine. The exercise, which is gentle and prolonged, increases not only the frequency but the fulness of respiration, thus bringing a much larger quantity of oxygen into the lungs and through them, to the blood, thereby giving the finishing touch to the process of digestion and vitalizing "the red current of life." Another advantage to respiration is this: when a person is sitting or standing still, the exhaled air from the lungs, which is unfit to be breathed again, fills the space about the face, and a portion of it is taken into the lungs at the next breath; especially is this the case if the head is bent forward; but when a person is walking and expels the air from his lungs, his head is carried past the expired air before he draws in another breath, and thus he gets a supply of pure air, with its full proportion of oxygen, at every inspiration, and thus is the vigor and vivacity which results from exercise in the open air partially accounted for. Walking is very beneficial to the digestive organs, by the gentle yet constant motion which it imparts to them, and which is essential to their long-continued, healthful action. It brings into action and properly develops more muscles than any other mode of exercise. It tends to equalize the circulation of the blood. Pedestrians, rope-dancers, and those who exercise their legs a great deal are not troubled with that almost universal complaint—cold feet. The simple reason is that exercise calls the blood to the parts exercised, and the blood feeds and warms.

One great objection to walking is that it takes so much time. True, it takes some time; more, as a general thing, than it does to ride; but so does the accomplishment of any thing desirable; and is not good health desirable? In the end, however, it results in the saving of time, by preserving the health and increasing the vigor of all the physical and mental functions. In no way is there so much time wasted, to say nothing of vitality, as in being sick, and yet people are unwilling to give a little time to keeping well.

To obtain the greatest amount of good from walking, it must, like every thing else, be done right. In the first place, it is always best to have some definite object in view when going out to walk, some particular place or object of interest to see, some purpose to accomplish, or some friend to visit, and not walk merely for the purpose of walking, if any other object can be attained at the same time. But better walk without any other object than not walk at all. The position of the body while walking is of great importance. The body should incline slightly forward from the hips, if walking slowly, and the inclination should increase according to the rapidity of the walk. The head should be kept on a line with the body, the shoulders and hips held back, and the chest unimpeded in its action by tight clothing or otherwise. The arms should be allowed to swing freely at the side. The respiration should be carried on entirely through the nostrils, and not through the mouth. In commencing a long walk, walk slowly at first, and gradually increase the speed. Invalids, and persons who are unaccustomed to walking, should begin with short walks, being careful not to overdo, and increase the distance as their strength and endurance increase. Any one who will practise this precept—never ride when you can just as well walk—will not only be more vigorous and healthy, but will accomplish far more than he or she otherwise would.

#### Absorption of Gases by Solids.

Among the interesting observations of Mr. Graham, Master of the British Mint, upon the passage of liquids and gases through solids, is the fact that atmospheric air, by passing through india-rubber, becomes super-oxygenated, and will rekindle smoldering wood like pure oxygen. Any kind of light india-rubber receiver, in which a vacuum may be obtained, the size being sustained by mechanical means, will collect super-oxygenated air; the better if the india-rubber be thin and the temperature high. Mr. Graham makes the suggestion that the solid films pass gases through them by first condensing them to a liquid form within the substance, and then passing them off on the other side by evaporation. Hydrogen passes through red-hot platinum, while oxygen and nitrogen do not, or not in appreciable quantities; hence their compounds with hydrogen are readily dialyzed by this method. The passage of carbonic acid, chlorine, hydro-chloric acid, vapor of water, ammonia, coal gas, and hydro-sulphuric acid, is also inappreciable, while the hydrogen, in compounds containing it, passes. One volume of red hot platinum absorbed 0.207 volume of hydrogen, retained in while cold, and gave it off on reheating. One volume of palladium absorbed 643 volumes of hydrogen, sensibly increasing its weight, and when heated afterward, gave off the most of it in a continuous stream. On the other hand, osmium-iridium does not absorb hydrogen, and copper absorbs it very slightly. Gold absorbs hydrogen and nitrogen slightly. Silver absorbs 0.289 of its volume of hydrogen, and then presents a beautifully frosted appearance. Oxygen is taken up in the proportion of 0.745. Red-hot iron and steel pass hydrogen as readily as platinum does.

#### Notice to Correspondents.

In consequence of a derangement of water pipes our editorial rooms were flooded a few days ago and a large quantity of correspondence and MSS. destroyed. Correspondents who fail to receive a response to their communications will please write again.

#### Recent American and Foreign Patents.

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

LOOSE PULLEYS, GEAR WHEELS, ETC.—George M. Morris and John McCreary, Cohoes, N. Y.—This invention relates to a new manner of forming the recesses, channels, or grooves in the hubs of loose pulleys, gear or other wheels, or in the bushings fitted into their hubs.

BRUSH.—William W. Clark, New York city.—This invention consists in so forming brushes used for painting, varnishing, and other purposes, that the bristles which form the brush are rendered more elastic and the brush more durable than when they are put together in the ordinary manner.

SAW HOOD.—C. D. Blakeslee, Grand Rapids, Mich.—This invention relates to an improved saw hood and consists of an adjustable guard on which the hood is hung of peculiar form protecting every part of the saw except where the lumber is fed to the saw.

CONSTRUCTING MOLASSES CUPS.—Griffin B. Halsted, New York city.—This invention consists in constructing the cup of tinned iron plates swaged or struck up into vertical equal parts or halves, the edges of the swaged parts being trimmed and then united together by soldering. The feet, knob, lid, and handle, being afterward applied or attached.

PAWL AND RATCHET ATTACHMENT FOR THE NUTS OF SCREW BOLTS.—D. Elliot and E. Seely, New York city.—This invention relates to a pawl and ratchet attachment for the nuts of screw bolts whereby the nuts are prevented from casually loosening or becoming unscrewed. The invention consists in a novel manner of constructing the pawl on the washer of the bolt and in forming the ratchet on the nut, whereby a very economical device for the purpose specified is obtained.

NAIL PLATE FEEDER.—Cyrus D. Hunt, Fair Haven, Mass.—This invention relates to a new and useful improvement in feeding apparatus for turning or reversing and feeding nail plates in a nail-cutting machine automatically.

BRACE FOR CARRIAGE HOODS.—Moses Powe, Belvedere, N. J.—This invention relates to the joint of the brace of carriage tops or hoods and consists of a rigid metallic sheath lapping on three sides of the joint when the hood is raised.

HAND TRUCK.—Wm. May, Binghamton, N. Y.—This invention relates to a hand truck which is so arranged that it can easily take hold of boxes, packages, etc., and that it can be readily handled.

PISTOL AIM HOLDER.—Fisher A. Spofford and Mathew G. Ruffington, Columbus, Ohio.—This invention relates to a device for holding the aim during shooting practice with toy guns and pistols and for retaining the same when it has been hit, also for retaining the balls or marbles ejected from the guns or pistols.

MACHINE FOR FORMING SHEET-METAL MOLDINGS.—Valentine Fischer, New York city.—This invention relates to a new machine for pressing moldings for cornices, etc., from galvanized or other sheet metal and consists in so arranging the machine that but few kinds of dies for all kinds of smooth moldings that may have to be formed are needed, viz., rounded and square dies. Of the latter but one set is required for making all sorts of angles while of the rounded dies as many sets must be provided as there are different-sized curves to be represented in the moldings.

SKATE.—Alfred Woodham, New York city.—The present invention relates to the fastening of skates to the boot or shoe sole, and to that class of fastenings which seize the boot or shoe sole upon its sides and heel; the invention consisting in a novel arrangement of such side clamps upon the foot rest of the skate and in their connection together at corresponding points upon each side of the skate whereby a fastening is produced of most simple form and in its construction practical and not liable to become disarranged or to break from use and wear.

SLIDING PEN HOLDER.—C. M. H. Warren, Brooklyn, N. Y.—This invention relates to a pen holder of that class in which the pen is allowed to slide so that its point may be protected in case of the dropping of the pen and holder upon the floor. The object of the invention is to obtain a very simple, economical and portable pen holder which will answer equally as well as the expensive telescopic holders now in very general use.

BUTTER WORKER.—Henry Garrett, Richmond, Mo.—This invention relates to a machine for working butter depriving it of butter-milk after taking it from the churn. The object of the invention is to obtain a simple and efficient device for the purpose and one which may be manipulated with the greatest facility.

CHEERRY STONER.—Rufus Wright, Brooklyn, N. Y.—This invention relates to a machine for depriving cherries of their pits or stones, and it consists of a peculiar construction and arrangement of parts whereby the work may be done with great rapidity and in a perfect manner.

CARBURETTING MACHINE.—Iva Prichard, Terra Haute, Ind.—This invention is a simple and economical machine for the manufacture of illuminating gas from the volatile hydro-carbons.

PILE OINTMENT.—L. H. Mosely, Franklin, Tenn.—This invention is a compound which when properly applied works a speedy and infallible cure of the disease known as the piles.

RAILWAY SWITCH.—Joseph C. McCarty, Grafton, W. Va.—The object of this invention is to construct a switch by which the use of frogs can be avoided, and the cars be made to run always on a smooth, continuous track, and thereby to render the motion of the cars easier, and to save the wheels from wear.

CORN FLOW AND CULTIVATOR.—Isaiah B. Arthur, Sidonsburgh, Pa.—This cultivator is made with three handles, by which it can be more easily held and regulated. In connection with them, it has a new form of guards to protect the young corn from injury, and a new device for adjusting the instrument in width.

TOBACCO PIPE.—James Cook, West Groton, Mass.—This invention consists in placing and securing so as to be detachable at pleasure, within the bowl of the pipe, a cup or receptacle for the tobacco, that at its lower end is provided with a series of apertures for forming a communication between it and the stem, and with a space or chamber left around and between it and the interior of the bowl, whereby the stem cannot become clogged, and the smoke before passing to the mouth is cooled, as well as the tobacco kept dry and free from nicotine, as it is extracted by the smoking of the pipe.

GAS TORCH.—Wm. A. Lawton, New York city.—This invention relates to a method of constructing torches for the lighting of gas, whereby the alcohol or other fluid burned for that purpose is more economically expended.

VALVE.—Edward A. Rock, Ludlow, Vt.—This invention consists in arranging an open ring valve on the valve stem, which, when the valve is closed, shall be expanded by a stationary wedge in the valve seat.

TUNNEL EXCAVATOR.—Theodore A. Fisher and Anson F. Fisher.—This invention relates to a novel and useful method of constructing tunnels under water, and consists of an apparatus for boring and excavating the earth in the bottom of rivers, lakes, and other large bodies of water.

EYE GLASS.—J. K. McDonald, Newark, N. J.—This invention consists in the employment of soft rubber tubing for nose pieces, together with features of improvement.

BOOT ATTACHMENT.—Marvel M. Follett, Westboro, Mass.—This invention relates to a new and improved method of attaching the boot to the bodies of carriages, whereby they are rolled or wound up with more ease, and so as to occupy smaller space.

FILLING STEAM BOILERS.—E. Ferguson, Newbern, N. C.—This invention consists in attaching to the boiler a water supply pipe, which is provided with a suitable check valve, whereby the boiler may be filled with water by the vacuum produced therein by the condensation of steam.

HARVESTER.—S. O. Bartow, Bethel, Conn.—This invention relates to a grain and grass harvester, and consists in an improved sickle-driving mechanism and an arrangement of the frame of the machine and gearing, whereby a very rapid motion of the sickle is obtained, and a clean, smooth cut of the same is obtained, with a moderate expenditure of power.

**BALF TIE.**—Joseph Bragg Dunn, Petersburg, Va.—This invention has for its object to furnish an improved bale tie, simple in construction, which will hold the hoop securely, which may be easily applied, and which can be manufactured at small expense and without waste of material.

**CORN PLANTER.**—N. G. Hughes, Waynesburg, Pa.—This invention has for its object to furnish an improved corn planter, by means of which the ground may be marked and the seed dropped and covered at the same time and by the same operation.

**SNAP HOOK.**—John McKibben, Lima, Ohio.—This invention relates to an improved spring snap hook, the advantages of which are that while it secures all the advantages of other rein and spring snaps now in use, it is greatly reduced in size. By the position of the spring it acts as a guard snap, and as the spring is almost concealed within the hook, it is protected by the jaws that hold the lip on which it acts. It is also very compact, thus securing greater strength, so there is less purchase bearing upon it from its curtailed length of body and spring, also rendering it lighter, neater, and better, and more convenient.

**VISE.**—Samuel S. Barnaby, Macon, Ga.—The object of this invention is to produce a vise which will be of such a construction as to obviate the great inconvenience and loss of time now unavoidable with the use of all vises heretofore invented.

**MACHINE FOR RAISING HEAVY WEIGHTS.**—S. E. Tuttle, Genoa, Nevada.—This invention has for its object to furnish an improved machine by means of which heavy weights may be raised with a comparatively small outlay of power.

**ROTARY STEAM ENGINE.**—Chester B. Turner, Grand Rapids, Mich.—This invention consists in the arrangement of wings or valves on the piston core, or center, and in so forming the parts of the engine that the steam can be cut off at any part of the stroke, or at any desired point.

**HORSE RAKE.**—Oliver E. Randall, Lewiston, Maine.—This invention consists in the application of a separate and independent spring to each tooth bar, and in a peculiar lifting arrangement whereby the rake teeth, as hitherto, are allowed to conform to the inequalities of surface over which they may pass, and the rake at the same time allowed to gather up and retain a large quantity of hay or grain before being discharged.

**PORTABLE SAWING MACHINE.**—G. W. Bell, Rising Sun, Ind.—This invention has for its object to furnish a simple, cheap, and portable machine, by means of which timber for shingles, staves, fire-wood, etc., may be sawn in the woods without its being necessary to incur the expense and labor of transporting the logs to a machine, as is now the case.

**STREET AND STATION INDICATOR FOR RAILROAD CARS.**—Anthony Pirz, and Manucl Pirz, East New York, N. Y.—This invention relates to a new and improved street and station indicator for railroad cars, and of that class in which the names of the streets or stations are on a belt or band which is moved at certain proper intervals, after each street or station is passed, in order to exhibit to the passengers the name of the preceding street or station.

**FLOUR SIFTER AND SIFTER.**—F. A. Hoyt, Hanover, Mis.—This invention relates to an article of household use, and consists of a sifter operated by a crank and gearing, the said sifter located over a drawer covering the flour receptacle beneath.

**DITCHING MACHINE.**—A. A. Tassler, Alkiers, La.—This invention relates to an improved machine for excavating ditches or canals, and consists of a carriage mounted on wheels, to be worked and propelled on temporary movable rails, by a steam engine, and supporting drums for carrying an endless belt or chain to which are affixed excavating buckets.

**CALCULATING AND REGISTERING MACHINE.**—Thomas T. Strode, Mortonville, Pa.—This invention relates to an improved calculating and registering machine, being a simplification of the calculating machines heretofore invented.

**COMBINED FLOUR SIFTER AND SCOOP.**—G. W. & C. L. Sherman, Seymour, Conn.—This invention of an improved article of domestic utility relates to a flour sifter and scoop.

**MACHINE FOR EMBOSSEING WINDOW SHADES.**—R. K. Slaughter, and J. O. Hundt, New York city.—This invention relates to a new machine for embossing window shades of all sizes with ornamental borders, corner or central pieces, and consists chiefly in the use of a sliding carriage, which is covered with a plate of rubber or other elastic surface, and which is provided with adjustable guide bars for guiding the rollers, by which the ornamental borders are produced, and for holding the shade to be embossed on the table.

**HAY PRESS.**—George W. D. Culp, East Enterprise, Ind.—This invention relates to an improved beater press, which is so arranged that the motion of the follower can be reversed whenever desired, without reversing the motion of the horses; and that, furthermore, the beater or the follower, or both, can be thrown out of gear whenever desired, without stopping the horses, and in which an automatic self-opening and closing feed door is arranged in such a manner that when the beater ascends it will be closed, while it will open as soon as the beater is down.

**SPINNING WHEEL.**—S. W. Clark, Seneca, Wis.—The nature of this invention consists in a novel and useful modification of the ordinary domestic spinning wheel, enabling the operator to sit while spinning, and thus avoid the labor of walking to and from the head of the wheel.

**WALKING VEHICLE.**—R. C. Vernol, New York city.—This invention relates to a new manner of operating vehicles, and consists in the use of legs, to which a motion is imparted imitating as near as possible the motion of the human extremities. At least two legs or bars are arranged on each side of the platform of the wagon, or vehicle, and are secured to and suspended from a horizontal axle, which has its bearings on the platform. On the shaft are two circular eccentric cams, to which the legs are secured, the cams projecting equally far from opposite sides of the shaft. An alternate up and down motion is thus imparted to the two legs on each side of the platform.

**BRICK MACHINE.**—Ephraim R. Greene, and Henry D. Phillips, Trenton, N. J.—This invention relates to a machine for pressing and molding brick, and it consists in a novel manner of operating the plungers, by which the clay is forced into the molds, and in a novel manner of operating the molds, feeding them underneath the press boxes.

**CORN GATHERER.**—James Mains, Olena, Ill.—This invention has for its object to furnish an improved machine for gathering the corn, simple and inexpensive, in construction and effective in operation.

**HORSE HAY FORK.**—L. S. Mason, Middlefield Centre, N. Y.—This invention relates to a harpoon hay fork, which is provided with tines projecting from the sides of the shank, so that the hay, straw or grain will be prevented from slipping on the shank.

**PORTABLE HAY AND GRAIN ROOF.**—John J. Naylor, Brighton, Mich.—This invention has for its object to furnish a simple and convenient portable roof for covering hay and grain stacks, and for other purposes.

**GRINDING MILLS.**—John Snyder, Hart's Mills, Ind.—This invention has for its object to furnish an improved manner of hanging the upper mill-stone or runner, so as to insure freedom of motion and the proper and effective action of the runner and spindle, and at the same time to facilitate the tramping of the spindle.

**WAGON HUB REAMER.**—J. W. Emerson, Rochester, Minn.—This invention has for its object to furnish an improved machine by means of which wagon and other hubs may be reamed out quickly and accurately, so as to be ready to at once receive the cast-iron box.

**DRYING AND VENTILATING APPARATUS.**—Jarvis Royal, Rochelle, Ill.—This invention has for its object to furnish an improved means for drying and ventilating damp grain, fish, and other things, stored in bins, holds of vessels and other places.

**ANIMAL TRAPS.**—Joel Manchester, New York City.—This invention has for its object to furnish a simple, cheap, and effective trap, by means of which animals may be killed and thrown from the trap, the trap setting itself for the next animal.

**WOOD SAWING MACHINES.**—Isaac B. Jones, Xenia, Ohio.—This invention relates to improvements in machines for sawing wood, whereby great strength, firmness, simplicity and efficiency of operation are secured.

**BED BOTTOMS.**—S. L. Southard, Rock Island, Ill.—This invention relates to an improvement in bed bottoms, and consists in an arrangement of compound special springs attached to the under side of the bed bottom and resting upon cross pieces set in the bedstead.

**SEEDER.**—Olney Fry, Jr., Albany, Oregon.—This invention has for its object to furnish a simple, cheap and effective machine for sowing grain broadcast, which shall sow the grain evenly and cover it at a uniform depth, thereby decreasing the labor and time required for putting in the grain, and at the same time increasing the yield.

**PORTABLE PISTOL GALLERY.**—F. A. Spofford & M. G. Raffington, Columbus, Ohio.—This invention relates to a device for supporting the aim and for retaining the balls, marbles, or other articles thrown at the aim, during target exercise with toy guns.

**SECURING THE OUTER SOLE OR PATTERN AND THE HEEL TO BOOTS AND SHOES.**—L. A. Favre, Paris, France.—This invention consists in securing to the underside of the inner sole, whether it is sewed or nailed to the vamp, a metallic plate, which is provided with small perforations or slots, and in securing said plate, either by nails, rivets, screws, or other suitable means thereon. The outer sole or pattern, which is to be connected to the sole and to complete the shoe, is provided with a set of projecting screws or tenons on its upper face, said screws or tenons being intended to fit into corresponding slots in the plate.

**FASTENING BOILER TUBES.**—James U. Adams, Richfield, Mich.—This invention relates to a mode of fastening tubes in steam boilers, and consists in attaching a thimble or ferrule having external and internal threads cut on it which screws are placed with the internal threads upon the end of the boiler tube and with the external threads upon the boiler plate.

**PORTABLE FENCE.**—H. A. Stewart, Minneapolis, Minn.—This invention has for its object to furnish an improved portable fence, simple and cheap in construction, durable, easily taken down, set up, or transported from place to place, and which, when not in use, can be packed for storage in a very small space.

**ELEVATING DEVICE FOR LOADING HAY, ETC.**—Ezra N. Curtice, Spring Water, N. Y.—This invention relates to a new and useful device for making hay loaders, elevators, &c., and consists in applying rubber friction rollers to the front wheels, in such a manner that they shall rotate one or more drums placed on the shafts of the friction rollers, and wind a rope for elevating hay, &c., as may be required.

**BOILER FOR HEATING WATER.**—John Ellis, White Plains, N. Y.—This invention relates to a boiler for heating water for buildings, green houses, and other similar purposes, and consists in arranging a series of horizontal pipes between two hollow heads, in such a manner that the water will flow at least twice through the tubes, so as to be very completely heated.

**SAP SPOUT.**—R. F. Livermore, Starksboro, Vt.—This invention consists of a metallic sap spout of such a form that many important advantages are secured over the common wooden spout as heretofore used.

**CARPET HOLDER.**—F. Smith, Alexandersville, Ohio.—This invention relates to a device for holding carpets upon the floors, whereby the same are more firmly held against them on board and more easily at any time moved.

**PUMP ROD.**—H. F. Purmort, Saginaw City, Mich.—This invention relates to pump and drill poles or rods, and consists in a novel manner of jointing together the several sections composing the same, whereby rivets are dispensed with, consequently obviating not only all injury to the interior of the pump now resulting from the breaking and falling of rivets into the same, but also the frequent drawing up of the pump tube from the well to remove the rivets.

**SAFETY HOOK.**—E. F. Brundage, Virginia City, Nevada.—This invention relates to a safety hook for watch and lock chains, bridle reins, trace chains, etc. The object of the invention is to obtain a simple and efficient hook of the kind specified, and one which will admit of the jointed portion of the hook being readily opened and closed and also readily secured in a closed state.

**STREET LAMP LIGHTER.**—Albert Assman, Rahway, N. J.—This invention relates to a device for lighting lanterns in streets, public buildings, railroad depots, or wherever a large number of lights are arranged too high to be reached without the use of a ladder or long lighter. The invention consists in attaching the lamp or light to the upper end of a pole of suitable length, and in arranging the pole and lamp within a tubular inclosure.

**HOOKS FOR HOLD BACK STRAPS.**—N. W. Robinson, Norwich, N. Y.—This invention relates to an improvement in hooks for hold back straps of harnesses, which improvement consists in a novel combination of a post with the hook, whereby the unfastening or detachment of the strap therefrom, by accident or otherwise, except so desired, is rendered impossible, while at the same time the unbitching of the strap, if desired, can be accomplished with the utmost ease and dispatch.

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.

W. M., of Canada, asks how he can lengthen boiler tubes three-eighths of an inch. They are 7 feet, 8 1/2 inches long by 3 1/2 inches diameter and were cut too short by three-eighths of an inch. We think they might easily be lengthened by heating two feet or so between the ends and then stretching them in an ordinary horizontal screw press. Or, they may be slightly drawn by means of a die which may be made in halves, one half to be forced upon the other by a screw.

G. & P., of Ky., ask how to bronze or lacquer the handles of steel instruments. We have often answered similar questions and should, in justice to ourselves, refer this correspondent to back numbers of our paper; but, as we have frequent inquiries on this subject we will repeat what we have several times said before. An ordinary coating of a copper color can be deposited on polished iron or steel by immersing the article in a solution of sulphate of copper (blue vitriol), the mineral being dissolved in water. But if a more brilliant bronze is required it can be produced by simply painting the article with a sizing and sprinkling it with bronze powder. Coating iron or steel with bronze can be done only by a deposition of the copper or brass on the surface of the iron by the galvanic battery. Its difficult and costly.

In reply to a correspondent who asked how to harden plaster of Paris casts, X says: A little glue dissolved in the water with which plaster is mixed will harden it to almost any degree. Experiment will soon determine the proper quantity for the degree required.

N. C. L., of N. Y., asks if it is not time for "C," of Troy, N. Y., to explain, as promised, his system of cypher published in No. 13, Vol. XVII. He says: "I, for one, have worried enough over it."

J. L. B., of Iowa, says he has a well 45 feet deep, surface of water generally within 20 feet of the ground, never more than 25 feet. From well to house 100 feet with rise of 12 feet. He wishes to use wind power for pumping so as to supply a reservoir at the house at all times, but there are tall trees near the well which would interfere. He asks if he can locate the windmill near the house and what sort of pump he shall use. There are plenty of good pumps in the market intended for lifting and forcing. The proper location for a pump in this case would be at the well so that it could lift 25 feet and force 12 feet higher through 100 feet of pipe. Of course, the windmill and pump should be located together. If the pump and powers should be located at the house it would be found difficult, even with an air chamber, to obtain a supply from an ordinary lifting or suction pump. Any sensible pump maker or dealer can overcome your difficulty on a personal inspection of the premises.

G. W. E., of Wis., asks us to give him the rule for calculating horse-power of non-condensing engine. John Bourne states it briefly thus: "Multiply the square of the cylinder's diameter in inches by the cuberoot of the length of stroke in feet, and divide the product by 47. This is the nominal horse-power." We prefer to state it thus: "Multiply number of feet traveled by the piston per minute by the pressure of steam on the piston and divide by 33,000." We choose that you apply the above to the data you send rather than have us tell you the power of your ten-inch cylinder engine.

J. F. L., of Ohio.—Henry Carey Baird, 406 Walnut street, Philadelphia, Pa., will probably furnish you with a manual on sugar refining from which you will obtain more information than it is possible to crowd into our columns.

G. H. W., of N. Y.—"How many feet of grate surface will be required for a boiler nine feet, six inches long with thirty-two-inch tubes?" The rule is to allow one square foot of grate surface to twenty inches flue surface. See No. 9, Vol. XVII SCIENTIFIC AMERICAN for the proper method of setting boiler. It has saved our readers already many hundreds of dollars.

F. M. D., of Va., asks "what is the best mixture to temper [harden] files in?" Files are not generally "tempered" they are left of full hardness. There is no "mixture" equal to clean cold water for the hardening. Before they are heated for hardening, the teeth are coated with strong brine thickened with beer grounds, yeast, or bean flour and allowed to dry. This makes a protecting flux for preventing the teeth from burning.

G. G. B., of Conn., inquires "whether yellow pine or cypress is to be preferred for frame and tressle work for water wheel where the timber will be exposed to water and steam." The cypress in use in this country is not the true cypress of which we read in sacred and profane history. It is a deciduous tree whose value for timber exposed to constant moisture we do not fully understand. The yellow pine is very long lived under the circumstances mentioned.

G. W. R., of Pa.—"Can you tell me the ingredients of a good marking ink that will not evaporate and will resist the action of rain, etc.? I want something better than the mixture of lamp black and turpentine now used." We have used successfully shellac varnish thin, with lamp black stirred in. It will evaporate but will stand water. The evaporation, however, is necessary if you want the marking ink to dry rapidly.

E. B. R., of Mass.—"Can you inform me of the best method of conveying power a distance of one hundred feet, whether by a leather or other flat belt or a rope running over a wheel with a V-groove?" The latter method we put in practice nearly twenty years ago, the distance between points being over two hundred feet. It was speedily rejected for the ordinary belt and pulleys. We know of nothing better than flat belts or a continuous shaft. The rope is unreliable and annoying.

J. S., of Pa.—The essential oils of wintergreen, mint, spruce, hemlock, etc., are procured by steam distillation of the leaves, buds, blossoms, or roots of the plants. For processes and full details we refer you to the "Art of Perfumery" by Plesse, published by Lindsay & Blackiston, Philadelphia, Pa., or to "Perfumery: Its Manufacture and Uses," by Campbell Morfit, published by H. C. Baird, 406 Walnut street, Philadelphia, Pa.

Business and Personal.

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

Inventors and Patentees wishing to get small, light articles manufactured for them in German Silver or Brass, address Schofield Brothers, Plainville, Mass.

\$300 will buy a Patent of A. Grushus, St. Paul, Minn.

Agents wanted everywhere—enormous profits. Sample doz. \$1.50. Retail for \$3 each. Thomas Powell, Milroy, Ind.

Scale removed from Boilers by Winans' Powder (11 Wall st., N. Y.), 12 years' use proves it reliable and uninjurious.

For Steam and Gas Fitters Tools, Machines for Hand or Power to Screw and Cut-off Gas pipe; stocks, dies, pipe, vises, Peace's adjustable pipe tongs, address Camden Tool and Tube Works Co., Camden, N. J.

Address J. S. Elliott, East Boston, Mass., for best machinery for making lime and sand building blocks.

Good 2d-hand engines, all sizes & styles. A. Logan, Tideoute, Pa.

Persons having the best barrel and bucket machinery send circulars to D. C. Baggerly, Luray, Page Co., Va.

Manufacturers of potato diggers send circulars to H. C. Oathout, Luana, Iowa.

Inventions made for those desiring them, or aid lent to perfect others. Address A. E. Watkins, 114 Fulton st.

Hamilton's self-oiler for shafting uses one half-pint of poor oil for two-inch bearing in three months. Has been in constant use two years, and fast coming into use. Rights for sale by A. G. Stevens, Manchester, N. H.

J. N. Proctor, of Albion, Orleans county, N. Y., wants the address of Inventors and Manufacturers of Brick Machines with descriptive circular and mode and operations for burning brick.

W. C. Stripe, Keokuk, Iowa, wishes to obtain a mill capable of grinding fifteen barrels of lime per day.

Manufacturers of Wood-working Machinery send Catalogue and prices to Wm. Z. Hallam, Denver, Colorado Ter.

EXTENSION NOTICES.

Mablon Loomis, of Washington, D. C., having petitioned for the extension of a patent granted to him the 2d day of May, 1854, for an improvement in plates for artificial teeth, for seven years from the expiration of said patent, which takes place on the 2d day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

Phlander Shaw, of Boston, Mass., having petitioned for the extension of a patent granted to him the 2d day of May, 1854, and reissued the 17th day of July, 1860, for an improvement in air engines, for seven years from the expiration of said patent, which takes place on the 2d day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

Conrad Liebrich, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him the 2d day of May, 1854, for an improvement in trunk lock hasps, for seven years from the expiration of said patent, which takes place on the 2d day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

E. G. Allen, of Boston, Mass., having petitioned for the extension of a patent granted to him the 27th day of October, 1857, for an improvement in steam pressure gages, for seven years from the expiration of said patent, which takes place on the 27th day of October, 1871, it is ordered that the said petition be heard at the Patent Office on Monday, the 29th day of June next.

E. G. Allen, of Boston, Mass., having petitioned for the extension of a patent granted to him the 22d day of November, 1859, for an improvement in combination steam gage, for seven years from the expiration of said patent, which takes place on the 22d day of November, 1873, it is ordered that the said petition be heard at the Patent Office on Monday, the 29th day of June next.