

## ENGINEERING INVENTIONS.

A hydraulic thrust block for propeller shafts has been patented by Mr. William Cousins, of New York city. It is constructed with a piston attached to the shaft, in a cylinder supplied at both ends with water by a force pump through pipes with valves opened by the movement of the piston, so the thrust of the shaft will be sustained by a water cushion, the escape of water around the shaft being prevented at each end of the cylinder by packing rings.

A steam boiler has been patented by Mr. Benjamin F. Wright, of Oneida, Kansas. This invention covers a special construction of boiler in which a cylindrical fire box is entirely surrounded by water, and the gases, smoke, and heated air from the fire are driven directly through the water in the boiler without the aid of flues, the object being to prevent the escape and loss of heat, and secure a higher degree of economy in combustion, while preventing sparks.

An adjustable crank shaft has been patented by Mr. Edward Barrath, of Brooklyn, N. Y. The shaft sections have upon their adjacent ends heads with eccentric female screws having different diameters and reverse screw threads, the male screws having oblong openings to receive the ends of the crank, the screws having exterior and interior screw threads to screw into the female screws of the heads, and upon the ends of the crank, and the crank having oblong ends and male screw threads, so the crank can be readily adjusted and will be securely held.

## MECHANICAL INVENTIONS.

A nut lock has been patented by Mr. Jacob C. McAfee, of Dallas, West Va. The invention consists in making the recess for the threaded block entirely through the nut, and the threaded block of the same thickness as the nut, and combining with it a wedge which is driven in behind the block.

An oil cup has been patented by Messrs. Edward Mancort and Charles Thirion, of New York city. A diagonal passage is provided for, with a spindle set in line therewith, with other novel features, to prevent all varying of the flow after the spindle is once properly set to secure the desired feed of oil.

A means for connecting loom shuttle binders to shuttle boxes has been patented by Mr. Luman D. Bennett, of Jewett City, Conn. This invention provides a simple and efficient detachable joint, which allows of the binder being readily taken out or replaced, and in which the binder pivot shall be locked or held securely in its eye or socket when the binder is in its working position.

A chest for tools has been patented by Mr. John F. Zimmerman, of Washington Center, Mo. In combination with a chest and its lid is a series of trays, connected with each other and with the chest and its lid, so that when the lid of the chest is swung up and back the trays will be swung up and backward; a hinged front is also provided for, on the back of which a box is formed, so connected with the trays that it swings out when the trays swing up.

A clutch has been patented by Mr. Edward Barrath, of Brooklyn, N. Y. It is designed for presses and other machinery, and is especially for use where the clutches are to work both ways, the clutch bar being placed in a groove in a shaft and in recesses in collars attached to the shaft, pivoted at its ends to a link and lever, and connected at one end with a spiral spring to raise it into gear with the grooved pulley hub, with other novel features.

## AGRICULTURAL INVENTIONS.

A cane planting machine has been patented by Mr. Charles Coleman, of Honolulu, Oahu, Sandwich Islands. This invention covers an improvement on a former patent issued to the same inventor, simplifying the construction of the machine, and rendering it more reliable in operation.

A reaper attachment for traction engines has been patented by Mr. William Kimmel, of Cambridge City, Ind. This invention covers a novel construction whereby a traction engine and one or more self-binding reapers are adapted to work together, the engine furnishing the power to work the reapers.

A grain cleaner has been patented by Mr. Bertrand Scott, of Keyser, W. Va. The machine is compact and simple in construction, and is for taking off the fuzz or beard from the small ends of grains of wheat, removing all dust and impurities from the grain, thoroughly scouring it, and polishing and cleaning without crushing or breaking it.

A land furrower and roller has been patented by Messrs. David, Levi S., and Thomas T. Holdaway, of Provo City, Utah Ter. The invention combines with the draught bar or pole and the plows, diverging arms, having their forward ends pivoted to the draught bar or pole, and with bearings at their rear ends, with a roller journaled in the bearings.

A harrow has been patented by Mr. Chas. P. Snow, of Lanark, Ill. Combined with the main frame is a sliding frame and swinging teeth, bent at their upper ends to form pivots, the bearings being secured to the sliding frame, and having apertures with upper and lower flared surfaces, and means for adjusting the sliding frame.

A combined harrow and cultivator has been patented by Mr. John R. Dunlap, of Sherman, Ill. The side beams have harrow teeth, and are secured at a little distance from their forward end to a cross bar, in such position that their forward ends will be at a little distance from each other, so the plants can pass between the ends, and there are other novel features.

A self-clearing revolving beam harrow has been patented by Mr. John D. Winters, of Davisville, Cal. It has a lower frame with rotating beams with teeth upon their opposite sides, and with cross rods at right angles with the teeth, and an upper frame with cross bars connected with the lower frame by hinged bars and a bail and lever, so the teeth beams can be allowed to rotate to clear the teeth of rubbish.

A horse hay rake has been patented by Mr. Adolphus W. Stevenson, of Troy, O. The draught frame and rake head are hinged to each other, and the seat standard is attached to a bar or other suitable device hinged at its forward end to the draught frame, and so connected at its rear end with the rake head that the driver's weight will assist in tilting the rake, and the rake head will be relieved of the strain of a downward impulse upon the seat bar, with other novel features.

## MISCELLANEOUS INVENTIONS.

A plaque has been patented by Stella A. Jackson, of New York city. It is of glass, with a transparent spot in the center on which to mount a picture, the remainder of the plaque being frosted or made in imitation of porcelain by grinding, or by grinding and painting.

A scarf has been patented by Mr. George Lennig, of New York city. It consists of an embossed leather front, with stiffening and lining, making a scarf which is simple and durable, will readily take any desired shape, will retain its color, and can be readily cleaned when soiled.

A basin trap cleaner has been patented by Mr. James E. Kelsey, of Brooklyn, N. Y. The invention provides for a flexible pipe, with a hollow tapering stopper at one end, so the waste pipe and faucet may be connected, and the clearer is adapted also to be applied to basins with large or small outlets.

A combined satchel and pillow has been patented by Mr. Benjamin Kiam, of Houston, Texas. This invention combines with a valise or satchel an air bag permanently incorporated therewith to form one of its sides, and having a mouthpiece upon the exterior, so the bag can be inflated without opening the valise.

A buckle has been patented by Mr. Albert H. Mantley, of Mound City, Kansas. The buckle has a sliding tongue plate held in a slot or passage made through the lower cross piece of the buckle frame, and the tongue plate is curved to facilitate the insertion and removal of the tongue from the strap, with other novel features.

A bushing for sheaves has been patented by Mr. Willard F. Wellman, of Belfast, Me. This invention relates more especially to roller bushings for the sheaves of ships' blocks, and provides for such construction as to do away with the friction of the bearing rollers upon each other and upon the pintle of the sheave.

A rope reel has been patented by Mr. Ephraim M. Bishop, of Olive Bridge, N. Y. This invention provides a new and improved spool on which coils or balls of rope or cord of various sizes may be held, doing away with the necessity of rewinding when it comes from the manufacturer, before being sold by the dealer.

A flying target has been patented by Messrs. Elmer and Howard Ridge, of Philadelphia, Pa. It is formed of a flat ring in which a bulb is held which can be inflated to give the target body, the bulb being secured to the inner end of a tube passed radially through the ring, and retained by wires or bands pivoted in the ring.

A quilting attachment for sewing machines has been patented by Mr. William G. Humphreys, of Seneca, S. C. This invention covers a novel arrangement and construction of parts, the frame being moved backward and forward as the work progresses, and the goods shifted by rolling and unrolling rollers, being all the time kept taut edgewise and lengthwise.

A cant book has been patented by Mr. Geo. W. Lord, of Bloomington, Pa. This invention covers novel constructions of the hook proper and joint portion of the clip to which it is pivoted, so the hook is prevented from falling unduly forward or moving unduly back, and thus is always kept within a convenient range of motion for its work, with other novel features.

A windmill has been patented by Mr. Merritt W. Palmer, of Holland, Mich. This invention relates to self-regulating windmills, where two rock shafts, with steering vanes, are mounted on a wheel frame, and geared together at right angles, made to throw the wheel more or less edgewise to the wind about a vertical axis in proportion to the strength of the wind.

A gate has been patented by Mr. John A. Anderson, of Hepburn, Iowa. It is made with longitudinal and cross bars connected by pivots, with a sliding latch having recesses in its lower edge to engage with a pin attached to a pair of the cross bars, and connected with the lower part of the gate by inclined bars, so the gate can be raised and lowered, and will be held in place when adjusted.

A shelf for exhibiting goods has been patented by Mr. Norman Robertson, of Kincardine, Ontario, Canada. The invention consists in the combination, with a shelf, of one or more eccentric V-shaped clamps pivoted to the under side of the shelf, between which clamp and the next lower shelf the goods are held, it being convenient to hold the goods by one or more clamps according to size.

A sash fastener has been patented by Mr. John McPherson Lowrey, of Jonesborough, Ga. A sash lock is formed of two metal strips crossed and pivoted to each other out of the middle, provided at their ends with jaws, of which those on the short ends have smooth edges and those on the long ends serrated edges, making a detachable device for holding and locking window sashes in any desired position.

A wick trimmer has been patented by Mr. Robert Hoffman, of Cohoes, N. Y. This invention covers an improvement in addition to a former invention of the same patentee, whereby a wick trimmer is combined with a clamping frame for pressing and holding the wick to the edge of levers or blades of the wick trimmer, for trimming lamp wicks which are to have their upper ends rounded.

A combined wagon jack and tire tightener has been patented by Mr. Melzar W. Coon, of Walla Walla, Washington Ter. A chain lever is mounted be-

tween two standards, and connected by a chain with a sliding block placed between the standards, and provided with a pawl of engaging ratchet teeth formed on the back of the standards, to lift and expand the wheel in the tire without resetting the latter.

A thermostat has been patented by Messrs. Willey J. P. and George L. Kingsley, of Rome, N. Y. This invention relates to the class of thermostats where metals of different coefficients of expansion are employed to operate an electric circuit, being designed for use where changes of temperature are only slight, and being capable of adjustment by a screw to the required temperature; it may also be used in connection with mechanical devices.

A nut lock has been patented by Mr. Gwilym Bowen, of Murphysborough, Ill. The washer has curved grooves with inclined ends, so that when a locking pin is forced through one of the grooves its ends will be bent outward beyond the face of the washer; when the pin is properly driven into place both ends will project beyond the face of the washer, when they may be struck a light blow and bent against the nut.

A sash cord fastener has been patented by Mr. Frederick S. Heiser, of Brooklyn, N. Y. The invention consists in a rod or plate adapted to be held in the side bar of a sash, with means for fastening the cord or chain near its lower end, and of such length that in any position of the sash the cord will be free to pass over the pulley, and so the plate or rod can be withdrawn from the top of the sash, and the balance cord secured without removing the sash from its frame.

A clasp, for use as a stocking supporter, skirt and sleeve adjuster, etc., has been patented by Mr. Henry Binley, of Albany, N. Y. The clasp comprises a book with a tongue pivoted at one end, and having a bifurcated or forked end; in attaching the clasp the fabric is placed in the hook in a doubled condition, and the tongue then closed down upon it, so the material is caught and wedged between the end of the tongue and the body.

A ship's log has been patented by Mr. David Carroll, of Union City, Pa. The invention covers a contrivance for setting the wheels in the line of the well, for passing them through a well of small size, and afterward swinging them up horizontally and into position in advance of the supporting rod, to enable the water to act on them in advance of any disturbing effect of the supporting rod, the forward and leeway motions of the ship being indicated by pointers.

An artificial stone vessel has been patented by Mr. Alexander S. Johnson, of New York city. This invention relates more particularly to stone wash tubs, and provides a metallic lining therefor, for protecting the bottom and side walls, and also a method of making a water tight joint between the lining and the walls of the vessel, by moulding the vessel upon its lining, or with a groove upon the inside, into which the edges of the lining may be worked by a tool and cemented.

An improvement in barrels, tubs, pails, etc., has been patented by Mr. James W. Weston, of New York city. The invention consists in a combination of tapering or wedge shaped keys with each other and with a separated head section, with an inner support or follower, affording a novel means of securing the heads on barrels, etc., and allowing of their ready opening and closing without removing the hoops around the chime when removing the head.

A combined burglar alarm and door bell has been patented by Mr. Eugene B. Travis, of Peekskill, N. Y. The invention consists in two parallel plates with lever hammers and their springs and stops, in connection with a bell, a collar on a knob spindle having spring pressed pawls, so that an alarm will be sounded when the knob is turned, whether the door be fastened or not, and whether attached to a door or anything else.

A wick trimmer has been patented by Mr. Robert Hoffman, of Cohoes, N. Y. It combines two levers, one having a flat plate formed on one end, with a curved recess in its under side at the inner edge, and with a flange along the outer edge on the upper surface, the other lever having a plate on its end fitting on the curved part of the other plate, making a trimmer that is very simple in construction and one that need not always be held in exactly the same position.

An electric wire insulator has been patented by Mr. George W. Prince, of Brooklyn, N. Y. The insulator is formed with a special perforation and slots in its upper part, and upwardly inclined grooves in its lower part, whereby the electric wire can be readily inserted and secured in the insulator, and the wire and insulator will not be liable to become disconnected even if the insulator should be detached from its supporting pin.

A washing machine has been patented by Mr. Paul Maisonneuve, of Chicago, Ill. It is constructed with corrugated staves connected with each other and with a top cross bar by open annular rods and bolts, with an adjustable base bar to regulate the height and a rotary bottom with radial semicylindrical corrugated cleats, and rotated by shafts and gear wheels, the machine in use being placed in and secured to a wash tub.

A nut lock has been patented by Messrs. Isaac D. Weaver and Christian G. Singer, of Lebanon, Pa. The invention consists in a plate with apertures for nuts, and with a spring on the front of the plate having at its free end an aperture and with a flange, the plate being placed on the fish plate and over the nuts, or over some and against others of the nuts, one of the bolts being passed through the aperture in the spring strip, the device being specially adapted for locking nuts on rails.

A quilting machine has been patented by Mr. Evans Wood, of Lyons Station, Krohne P. O., Texas. Combined with a needle frame adapted to carry a series of needles is a feed plate, eccentric shaft, rock shaft, and various special features of construction, it being designed to operate the machine at the rear of a cotton condenser of a cotton gin, so that the thick bat of cotton as it issues from the condenser may be fed between the upper and lower webs of cloth used for making the quilt.

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# Notes & Queries

## HINTS TO CORRESPONDENTS.

**Name and Address** must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

**References** to former articles or answers should give date of paper and page or number of question.

**Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or mail, each must take his turn.

**Special Information** requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter**, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration.

**Scientific American Supplements** referred to may be had at the office. Price 10 cents each.

**Minerals** sent for examination should be distinctly marked or labeled.

(1) P. C. A.—Of what is pewter composed? I want a metal cheap, capable of making fine castings, of being run in steel moulds, not subject to rust, or that may be galvanized. A. Pewter is four parts tin and one part lead. The metal that answers your requirements is zinc (spelter). It will not rust, and does not require galvanizing. Very fine castings can be made from it. It flows easily. The metal mould should be warm.

(2) B. F. C. wants a good recipe for making soldering fluid for soft soldering jewelry; something that will not rust his tools. A. Dissolve sheet zinc in muriatic acid until the acid will take up no more zinc. Turn off the clear liquid and dilute it with alcohol instead of water. When diluted with water it must retain acid enough to rust, but with alcohol the dilution can go on until the acid is not perceptible to the tongue.

(3) P. J. D. says he wants to blue the "tops" of skates, probably the sheet of steel on which the foot rests. All bluing is done, after polishing, simply by heating. The polished article is laid in a bath of hot sand or ashes until it turns blue. Then let it cool in the air or cool it in water. If the article is of steel and has been hardened, the bluing will bring it to a spring temper—that of saw blades and case knives and wood firmers chisels. You can harden the bottom edge of skate runners, without springing or cracking, by heating them in the red hot lead bath and chilling in water. The edge, only, of the skate runner needs to be made red hot.

(4) J. W. P. asks: 1. What is the greatest engine piston speed recorded? A. In locomotive practice the piston speed will sometimes run from 1,400 to 1,600 feet per minute, though we do not know of any record of the absolute highest speed. 2. I see an old idea revived in Europe for propelling boats by forcing water through a tunnel parallel to the keel, or rather forcing boat over water in tunnel. Is it practicable? If not, why? A. This idea has been tried by many, and so far has failed to prove as economical as the other accepted methods of boat propulsion.

(5) C. R. B.—The best way to tin old copper utensils is to thoroughly clean them with sand and oxalic acid, and tin with a large copper soldering iron, using muriate of zinc and salammoniac (soldering fluid) for flowing the tin. It can also be done by heating the vessel and flushing melted tin over the surface, first sprinkling the surface with powdered resin. You may succeed in this after a few trials.

(6) E. A. C. writes: I wish to construct an apparatus to level between points a few feet apart (say 12 feet or less) where a common level cannot be used on account of intermediate obstructions. To do this I propose to use two glass hollow tubes 1/4 inch diameter, say 3 inches or 4 inches long, each one to set in sand of metal, and each to have a scale marked on same; then connect the two stands by rubber tube, and fill with some liquid. Now, what I wish to know is, what liquid can I use that will show level on its surface in the tube, and not concave like water? Mercury would do, I suppose, only, being so heavy, it would be bad to handle in a rubber tube 10 feet or 10 feet long. Can you suggest anything? A. The device you describe is already in use. Use water with glass large enough to contain a little float. The capillary edge of the water is sufficiently accurate for most purposes.

(7) C. D. V. says: Admitting the fact that a base ball can be made to curve by causing it to take a revolving motion, why does not a rifle ball curve shot out of a grooved barrel? A. All round balls shot from rifled guns do curve to the right or left, according as they revolve to the right or left. But elongated balls or bolts of a length of 2 or 3 diameters are now principally used with rifled guns, and these projectiles go straight.

(8) W. R. H.—Can you tell me how I can retin copper cooking vessels? A. Make the copper chemically clean by washing with a saturated solution of zinc in muriatic acid, the acid to be weakened with

water to half strength after the dissolving of the zinc. Heat the copper vessel and pour in a small quantity of metal, of tin one, lead one, and shake or tip the vessel until the tinning runs over the parts. Or, "wipe" the melted tin over the bare places with a cotton canvas pad.

(9) O. W. K. asks how, in japanning small articles like buttons, back hooks, eyelets, etc., they are kept from sticking together while baking? A. By stringing upon fine wire stretched.

(10) E. P. McC.—A man is never too old to learn a trade. Every trade has its living grade. Success depends entirely upon industry and mental application. If you have given no thought until the age of 20 as to your future employment and aim in life, it is a matter of deep regret, and you should flee to the first industrial opening, resolved that you will be contented to work until you have accomplished a trade or calling.

(11) E. L. H. asks for some rule by which to figure the weight of counterbalances for the drivers (leading and trailing) of a locomotive. A. The weight of counterweights should be equal to the weight of the moving parts at the same distance from the center, or in proportion inversely as the center of gyration of the counterweight is further from the center of the wheel than the crank pin. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 368, on Balancing of Machinery.

(12) W. T. P. asks the amount of pressure to square inch a copper holder eight inches in diameter and twenty-nine inches long will stand. Holder is made of one-sixteenth inch brazier's copper with heads of three thirty-seconds inch in thickness, well riveted and swaged, soldered in. A. If properly made and with raised heads, should be safe at 250 pounds pressure.

(13) J. McL.—Steam pipes in contact with wood with the ordinary use of steam do not ignite or set fire to the wood. Superheated steam caused by low water in the boiler has caused the pipes near boilers to set fire to wood work in contact. There have been a few cases where mysterious fires have been attributed to spontaneous combustion from dust, paper, rags, wool, or cotton lying in contact with steam pipes. The "insurance interest" requires that all steam pipes shall be three-fourths of an inch or more clear of wood.

(14) E. E. C.—For processes of galvanizing iron see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 265, 176, 161. Zinc and galvanized iron are in common use for watercoolers; they are not as good or healthy as porcelain or brown stoneware. Nevertheless we use them constantly as linings in our water coolers without experiencing any poisonous effects. If water stands for a day in zinc, it acquires a disagreeable taste from the absorption of a small portion of zinc. Water remaining in galvanized pipes over night should be discharged in the morning, it being so impregnated with zinc as to be unfit for drinking or cooking.

(15) M. N. asks: Is there any method for removing the tin from what is known as tin plate that will pay commercially? A. The makers of colors for dyeing use the tin scrap in the vicinity of New York by boiling the scrap in nitric and hydrochloric acids, precipitating the coloring matter. There are chemical establishments that make this a part of their business.

(16) E. A. S. asks: 1. What length of oar (spoon shaped) do I need to obtain greatest speed out of a boat 15 feet long, 2 feet 4 inches wide, and 1 foot 2 inches deep, weighing about 50 pounds; also what length and breadth of blade? A. Oar of ash, 8 feet, blade 20 inches by 6 inches wide. 2. The above boat being made of one-quarter inch poplar, what is the best way of treating the wood to keep it from absorbing water and rotting? Would soaking it in raw linseed oil, then putting a coat of "filler" on and finishing in hard oil, answer my purpose? A. Use boiled linseed oil with a filler coat, rub down, and oil varnish.

(17) A. F. S. asks the rule for determining the size and focal length of the small mirror used in the Gregorian reflecting telescope when the focal length of large mirror is known. The small mirror is to remain stationary, and focusing to be done by rack and pinion. A. Make small mirror one and a half times the diameter of the field glass of the eye piece and one-tenth shorter focus than the large mirror. See works on optics.

(18) J. D. F., M.D., writes: In SCIENTIFIC AMERICAN SUPPLEMENT, No. 339, is an article on peroxide of hydrogen. In preparing the hair on a living person for bleaching with peroxide of hydrogen, how is it possible to digest the hair for twelve hours in ammonia and water, at a certain temperature too? Can you not state more clearly the process of bleaching hair on the head of a living person? A. In the article referred to, it is explicitly stated that "hot liquids or drying in drying chambers is excluded." When the hair is bleached on living persons, therefore, the process consists in simply applying the mixture of peroxide, to which about 10 per cent of ammonium hydroxide at 26° B. is added.

(19) J. H. says: I have a steam yacht thirty-four feet long, seven feet beam, draws thirty inches water, ordinary inverted link motion engine 5 inches by 5 inches, plenty of steam, can carry to 95 pounds pressure. What diameter pitch and number of blades should a wheel have to give the best results for speed and economy? A. Wheel about 28 inches diameter and 38 inches to 40 inches pitch; 3 blades.

(20) A. H. McC. asks how to bend the ribs for a small steam yacht. A. The ribs must be steamed or soaked in hot water till they are quite flexible, then bent and kept in their shape till dry. 2. How the boards are attached to the ribs? A. The plank can be fastened to the ribs by copper rivets, or by nails driven through from outside and riveted; put a forelock under the head and over the point.

(21) C. F. T. writes: I want something to add to a mixture composed of shellac dissolved in borax and water to prevent its drying too rapidly. I have tried glycerine, but it thickens or rather congeals it. A. The addition of more water is the only remedy

we can suggest. Almost everything else which would tend to make it dry slowly would also have the effect of preventing its drying at all, or else act as the glycerine did.

(22) E. P.—According to the act of March 3, 1883, antiquities are admitted into this country free of duty. An antiquity however is something that was produced or manufactured prior to the 15th century. Artistic copies are likewise admitted free of duty when the same are for a private collection or for some public institution.

(23) F. L. S. asks how the operation of washing emery so as to render it suitable for lens grinding is performed. A. Emery of all grades to a fineness of 120 can be purchased of emery dealers. For fine grinding or finishing, the finest flour may be gently stirred in a large pitcher, at the same time allow a small stream of water, size of a straw, to run in and overflow at the spout into a wash basin, and from the wash basin upon the opposite side of the pitcher spout. By careful management you may obtain emery of almost any fineness in the wash bowl. One pound is enough for a charge.

(24) W. M. C. writes: In a 12 inch iron pipe running full of water (fresh) at 10 feet per second, 40,000 feet long, what will be the total amount of friction in pounds? A. The head due to friction alone is 304 feet, or 132 pounds pressure. The head required for the rate of discharge through 40,000 feet of 12 inch pipe is 1,600 feet.

(25) C. J. M. asks: What amount of cement is needed to cover 3,300 square feet of surface? What kind, and how thick should it be spread? The soil is about 2 parts clay, 1 sand, which run together during beating rain. Wishing to use tank or reservoir for irrigation, I must raise the banks about four feet above surface level. A. About 200 barrels. Make a mixture of 2 parts sand, 1 part cement, stiff enough to beat firm with a large faced ram or block. If the backing is firm, 3 or 4 inches deep will be sufficient. Finish with a thin wash of pure cement.

(26) P. P. asks the price of sumac delivered in New York. He means the leaves. A. New York is not a market for sumac leaves. Only the ground sumac is sold here, the domestic product being principally ground at Richmond, Fredericksburg, and Petersburg, Va. Ground Virginia is now selling at \$60 to \$75 a ton.

(27) J. A. B.—Notwithstanding all the old prejudices in regard to the matter, there is nothing to show that planting when the moon is falling or waning, or at any portion of the signs of the zodiac, has anything to do with the growth of plants, any more than that certain stars have any effect on the destinies of those born thereunder. Numerous experiments in the planting of quick growing plants, at regular and short intervals, have shown their growth not at all dependent on the stage of the moon at the time of planting.

(28) E. S. asks at what depth the most valuable or the best paying gold ore is found. A. Metallic gold is generally found in superficial deposits. When it is in combination with pyrite, it may be found at any depth. See Professor J. S. Newberry's paper on the "Genesis and Distribution of Gold," SCIENTIFIC AMERICAN SUPPLEMENT, No. 329.

(29) W. H. E.—What is the process of making cast iron malleable? A. The castings are made from "white hard" iron, very hard and brittle. They are packed in cast iron boxes with forge scales and powdered salammoniac, placed in oven and kept at a red heat for from six to eight days, depending on the size of castings; then gradually cooled.

(30) Boys.—We would discourage the use of a pretentious Latin name for your workshop, and would prefer to recommend the use of a title that would be expressive of the work, such as Mechanical Inventing Company or Iron Experimental Workshop.

(31) Dentist writes: An alloy composed of 19 grains tin, 19 grains copper, and the remainder of the ounce gold, when a sufficient quantity of mercury is mixed with it, becomes a plastic mass. Will the application of heat, or absorbing the surplus mercury, make this plastic mass hard and solid again, or what will it do and what will be its color? A. The hardening of your proposed amalgam by heat would require a temperature sufficient to evaporate the mercury, about 600° Fah. This could be readily done in ordinary mechanical work, but for filling for teeth it will be impracticable. Any agent that would absorb the mercury would only act upon the surface. We think that this method would not give satisfaction. The principle upon which amalgams for the filling of teeth are made is the mixing of the mercury quickly with a powdered metal that will absorb or make a chemical union of the two metals within a proper time to meet the necessities of this kind of dental surgery. Heretofore silver has been found to fill the bill. It would be very desirable to do this with a gold amalgam, and as pure gold does not make a permanent amalgam with mercury (to our knowledge), some of its alloys may be possible. We think, however, that you will find in the silver and copper alloys with gold a better amalgam than with tin. A trial with jeweler's red gold, which you may obtain from any manufacturing jeweler in your town, will no doubt give you a passable color for the amalgam. In order to obtain a fine full color for the amalgam, we fear that an excess of copper will have to be used which is objectionable in a sanitary sense.

(32) J. O. M. asks how to make a reliable composition to be applied on narrow strips of stout paper at intervals for cigar and taper lighter; the strips are rolled up and put in a box, and by a movement in the box when the lid is raised the strip is pushed up by a small friction clutch and the composition is ignited. A. According to Prof. Prescott who analyzed several compositions, it was found that they consisted of black sulphide of antimony, potassium chlorate, and potassium nitrate; another composition was simply potassium chlorate and sodium hypophosphite. The mixture is made in varying proportion, generally with a greater preponderance of the chlorate, and combined with liquid glue.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

E. L. M.—The specimen is selenite, a variety of gypsum or calcium sulphate. Its principal use is as a fertilizer, also as plaster of Paris for making cornices, etc.

## INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

August 19, 1884,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Addressing machine, Dennis, Jr., & York.....	308,922
Air brake, W. N. Willis.....	308,777
Alarm. See Burglar alarm.	
Amalgamating pan, J. A. Bidwell.....	308,698
Apple coring and slicing machine, G. G. Stegman.....	308,679
Arch. combination fireproof, H. G. Isaacs.....	308,856
Awning, White & Stevens.....	308,685
Ax handle, H. H. Trenor.....	308,767
Axle box, C. H. Smith.....	308,954
Axle, car, J. M. Garverick.....	308,684
Bag. See Paper bag.	
Bag and satchel frames, side catch for, R. Flocke.....	308,716
Baling press, D. B. Hendricks.....	308,847
Baling press, Q. J. Hoke.....	308,733
Bar. See Drawn bar. Grate bar.	
Bathing cabinet, electric, L. Von Dolcke.....	308,959
Billiard table leveler, J. W. Budson.....	308,696
Blacking machine, boot or shoe, L. Guzman.....	308,687
Block. See Paper cutter block.	
Blower, air, J. L. Noll.....	308,878
Boat wheel, J. F. Cunningham.....	308,819
Boiler. See Locomotive or steamboat boiler.	
Boiler explosions, preventing, G. E. Hall.....	308,941
Boilers, safety device for hot water, W. A. Tracy.....	308,765
Bolt. See Safety bolt.	
Bolting chest, cut-off, J. Todd.....	308,763, 308,764
Bolting meal, etc., machine for, G. & A. Raymond.....	308,665
Boot and shoe cleaner, C. W. Harris.....	308,845
Boot or shoe heel support, F. D. Taylor.....	308,682
Boot or shoe lasting machine, H. P. Aldrich.....	308,604
Boots, lasts or former for rubber, D. McNamee.....	308,940
Boots or shoes, machine for forming rubber soles for, W. Cable.....	308,904
Bottle and jar stopper, E. P. Hand.....	308,727
Box. See Axle box. Journal box. Paper box.	
Box and tub fastener, R. S. Willard.....	308,775
Box partitions, machine for making, G. L. Jaeger.....	308,935
Brace, J. W. Johnson.....	308,643
Braid rolls, automatic feeder for, E. Allen.....	308,605
Brake. See Air brake. Car brake. Wagon brake.	
Brick machine, S. P. Crafts.....	308,709
Brick manufacture, J. L. Durrrough.....	308,925
Bridle, L. S. Longcor.....	308,969
Bridle, A. Roerber.....	308,751
Brush for cleaning chimneys, A. Oelschleger.....	308,890
Buckle, A. H. Mantey.....	308,873
Buckle protector for harness, A. L. Whitney.....	308,686
Buggy, side spring, H. W. Hamelle.....	308,931
Burglar alarm, E. Haumbach.....	308,792
Bushing for sheaves, W. F. Wellman.....	308,770
Button fastener, J. H. Lange.....	308,648
Button fastener blank, E. D. Steele.....	308,673
Button or fastener for boots, shoes, etc., spring, I. J. Saunders.....	308,669
Button, separable, R. M. Heller.....	308,731
Buttons, attaching, G. W. Prentice.....	308,664
Buttons, mechanism for setting spring, I. J. Saunders.....	308,668
Caisson for use in building subaqueous structures, portable, H. Flad.....	308,830
Calk coverer, P. C. Lewis.....	308,650
Canals, etc., lock and lock gate for, L. Coiseau.....	308,807
Cant hook, G. W. Lord.....	308,870
Cant hook band, J. Watson.....	308,683
Car brake, J. F. Mailinckrodt.....	308,740
Car brake, J. Stephenson.....	308,892
Car coupling, L. A. Branchaud.....	308,698
Car coupling, F. R. Wilkins.....	308,687
Car door, grain, R. J. Wilson.....	308,960
Car, dumping, Sears & Mathews.....	308,757
Car, railway, J. F. Batchelor.....	308,791
Car roof, J. W. West.....	308,684
Car ventilator, J. M. Fennerty.....	308,631
Car wheel, S. Broadbent.....	308,700
Car wheel, S. P. Raber.....	308,750
Car wheel grinding and turning machine, W. P. Barclay.....	308,609
Carburetor, G. Froh.....	308,927
Cards, self-acting reader for Jacquard, E. W. Suttleff.....	308,661
Carpet stretcher, T. P. Butterfield.....	308,619
Carriage, J. F. Hurlig.....	308,933
Carriage spring, A. A. Stimson.....	308,680
Carriage trimming, J. P. Hagan.....	308,840
Carrier. See Pneumatic carrier.	
Case. See Physician's buggy case.	
Castings, apparatus for the manufacture of small, S. Johnston.....	308,645
Castings, mould for the manufacture of chilled car wheels and similar, G. W. A. Wiesing.....	308,773
Chair. See Opera chair.	
Charm, watch chain, J. H. Knapp.....	308,864
Checks, draughts, receipts, etc., device for cutting off, C. M. Moody.....	308,653
Chest for tools, etc., J. F. Zimmerman.....	308,783
Chimney cap, R. H. Craigbill.....	308,623
Chimney cowl, A. S. Capper.....	308,918
Clamp. See Match splint clamp.	
Clamping machine, M. Bancroft.....	308,909
Clasp. See Watch clasp.	
Clasp, H. Binley.....	308,798
Cleaner. See Boot and shoe cleaner. Grain cleaner.	
Clothes and towel drier, J. J. Bisel.....	308,695
Clutch, E. Barrath.....	308,789
Clutch, friction, W. C. Williamson.....	308,689
Coils, manufacture of metallic tubular, T. B. Sharp.....	308,952
Comb. See Curry comb.	
Combing machines, stop motion for wool, E. Lodge.....	308,987
Cooling liquids in bottles, apparatus for, J. Cramer.....	308,815
Cordage, machine for the manufacture of, J. W. Morton.....	308,943
Corn cutting machine, J. O. West.....	308,771
Coupling. See Car coupling. Faucet coupling.	
Thill coupling. Vehicle spring coupling.	