

ENGINEERING INVENTIONS.

A rail joint truss has been patented by Mr. John McEwen, of Lawrence, Kan. It consists of a base plate, block, and opposite truss bars, secured to the rails by bolts, to prevent the settling of the end of one rail below the other at rail joints between the ties, to obviate the hammering of car wheels at these joints.

A spring rail frog for railways has been patented by Mr. Joseph E. Clifton, of Geneseo, Ill. It has tie plates with clips, combined with a moving rail and guard and fixed outer rail, with other novel features to obviate the defects in this class of frogs, and increase their durability.

AGRICULTURAL INVENTIONS.

A seed planter has been patented by Mr. George Lovick, of Temple, Tex. Its construction is such that the operator is enabled to see each seed in its passage from the planting wheel to the ground, and so guard against some of the rows being only half planted from the seed spout getting stopped up or the planter wheel failing to act properly.

A universal marker has been patented by Messrs. Elmer J. Hildreth and Thomas R. Miller, of New Haven, Conn. It is for use in marking fields for seed drills, hand planters, and other planting machines, and provides for the convenient adjustment of the shovels or marking points, so they may be grouped or spaced as desired, and any number taken out.

A cotton scraper has been patented by Mr. Richard Cooper, of Greenville, Tex. This invention covers a novel mechanism for a cotton scraper to cut a wider furrow with lighter draught, do the work more perfectly, be more easily held to the row, while the implement may be conveniently disconnected for repairing.

A hay rake and loader has been patented by Mr. Edward A. Gerrard, of Columbus, Neb. The frame has three wheels and but a single central forward wheel for a vehicle which can be drawn across fields to rake up hay, and is provided with means for separating the hay to be elevated from that which is to remain on the ground, with means for holding the rake teeth and means for running the elevator rope.

MISCELLANEOUS INVENTIONS.

An adjustable bedstead has been patented by Mr. Charles A. Jenkins, of New Berne, N. C. This invention covers a novel form of construction for a bedstead which can be used as a crib, a double crib, or a full sized bedstead.

A wagon box has been patented by Mr. Henry Jacobs, of Evansville, Ind. It is formed of sections which can be taken apart and put together very rapidly, making it convenient for one person to place it on or remove it from the running gear of the wagon.

A toilet fan has been patented by Mr. Joseph Silbernik, of New York city. It is light and simple of construction, but it is so made that the fan can be operated by a slight movement of one finger, without its being necessary to move the entire hand.

An adjustable and balancing seesaw has been patented by Mr. Arthur B. Flach, of New York city. It is a novel arrangement of rocking frame with hinged ends on which are the seats, with adjustable foot rests, and so constructed that when not in use it can be readily taken apart and compactly folded.

A shaft support for vehicles has been patented by Mr. Frank P. Chamberlin, of Carlisle, O. It consists of a metal strip carried by the shafts, with a spring carried by the shaft clip, and secured thereto in a novel manner, making an attachment for holding carriage or wagon shafts in an elevated or upright position.

A jump seat iron has been patented by Mr. Andrew F. Shuler, of Arcanum, O. It has front and rear bars of novel design so pivoted to a base bar that a wagon seat constructed therewith can be readily adjusted to form one or two seats, as may be required, the irons being applicable to any kind of vehicle or any kind of seat.

A waist belt buckle has been patented by Messrs. Louis Sanders, of Brooklyn, N. Y., and Harry A. Sanders, of New York city. It is of simple construction, and can be cheaply made, but is so formed that belts can be readily adjusted and firmly secured thereby to lie smoothly in place, while the buckle has a very finished appearance.

A bag or satchel fastening has been patented by Mr. Louis B. Prahar, of Brooklyn, N. Y. This invention covers a simple and novel arrangement of catch plates and a light frame to make a fastening for a purse, pocket book, or a hand bag frame, to hold the frames securely closed, but yet so they can be readily unfastened.

A fastening for hand bags and other articles has been patented by Mr. Louis Sanders, of Brooklyn, N. Y. Combined with a slotted eye plate, attached to one part of the frame, is a stem having a flaring notch in its top, and attached to the other part of the frame, making a fastening intended to be strong and reliable in use and neat in appearance.

A sash fastener has been patented by Mr. Charles Witzel, of Brooklyn, N. Y. This invention provides a novel arrangement of sliding bolts connected with levers and slots, intended to do away with weights and cords as used in an ordinary window, and to hold and lock the sash in any desired position, either raised or lowered.

An illuminated glass sign has been patented by Mr. Francis L. Fisch, of New York city. This invention provides for a sheet metal frame with bars so arranged that different parts of the sign can easily be united and taken apart, as desired for different effects, while the sign will be smooth on the outside, and has no projections in which the dust can settle.

An adding machine has been patented by Mr. Thomas W. Maxey, of Nevada, Mo. It has a number of wheels journaled to be revolved on a shaft, and provided circumferentially with figures to indicate the amount of an addition, so that the numbers in one

or more columns may be added by moving levers as many times as there are units in each column.

A mop holder has been patented by Mr. John McWilliams, of New Lebanon, N. Y. Combined with a mop holder, readily adjustable for thick or thin mops, there is a rod hinged on the stick, with a forked piece swiveled on the end of the rod, which forked piece can be used for wringing the mop, and when not in use can be swung back against the stick.

A defecator for cane juice has been patented by Mr. Leon F. Hauptman, of New Orleans, La. It has a skimming shaft and paddle and scum screen, with various novel features and special details of construction, whereby the scum may be removed automatically, and the valuable parts of the impurities readily preserved and again defecated.

A chenille ornament has been patented by Mr. Christian A. Schmidt, of Hoboken, N. J. It is formed of two or more strands of chenille of varying diameters twisted and bound together, and with which strands of tinsel or other material may be interwoven, to provide trimmings, such as pendants, drops, borders, etc., for furniture, upholstery, and articles of dress.

A machine for filing prescriptions has been patented by Mr. John S. Jarnagin, of Mossy Creek, Tenn. It consists of two reels, with suitable connections, drive gearing, and handle, the prescriptions to be pasted together to form a roll which can thus be wound up, and afterward readily referred to by unwinding from one roll and on another.

A power and speed regulator has been patented by Mr. Christian Rowland, of Lanark, Ill. It consists in the combination of a ratchet clutch mechanism, a driven shaft, and a flywheel rigidly fixed to the shaft at a point between the driven section of the clutch and the point of utilization of the power, for regulating the speed of machines run by hand or power.

A tube cutter has been patented by Mr. Delmer L. Baughman, of Albion, Ind. Combined with a tubular stock is a screw mandrel having a tapered part, with blocks in the stock resting on the tapered part of the mandrel and carrying cutters, the device being adapted for cutting off old boiler tubes in boilers or cutting and finishing off the ends of new tubes after the same have been expanded at one end.

An umbrella handle has been patented by Mr. Albert T. Schlichting, of New York city. The umbrella stick has its lower end screw-threaded, and the handle has a screw-threaded aperture with a cavity for the free ends of the umbrella ribs, so that by turning the handle in either direction it can be moved toward or from the ends of the ribs, to hold or release them.

A fence post has been patented by Messrs. William H. Meyers and Louis Anderson, of Oregon, Wis. It consists of a group of rods bound together at the desired distances above ground, their lower ends bent to form a triangular supporting base, and the rods interlaced to admit of the fence wires being passed between them and to stiffen the post to resist strain.

A fruit crate has been patented by Mr. Cyrus W. Lloyd, of Salisbury, Md. The invention consists in gaining or cutting the vertical strips of both the end and side panels, and fitting the horizontal strips into the gains, extending the ends of one set of panels out flush with the outer sides of the vertical strips of the other side panels, and fastening them by metal angle irons.

A combined fare box and lantern has been patented by Mr. Henry D. Clark, of Rochester, N. Y. This invention covers a novel construction, by the use of which a passenger can drop the fare into the fare box, and then the passenger and conductor can both see the fare after it has been dropped in and before it has been discharged into the money box, that both can be witnesses of its correctness.

A wind engine has been patented by Mr. John Serdinko, of New Braunfels, Tex. It has a vertical circular frame, with a windwheel covered to the half by a hemispherical roof supported by posts, only the lower blades of the windwheel being exposed to the wind, and the power obtained from the wheel being transmitted through a shaft, crank, and pitman rod to the machinery below.

A mechanical telephone diaphragm has been patented by Mr. William Taylor, of Niles, Mich. It is made of alternate layers of wood or straw pulp pressed into the form of thin sheets or boards and strong cloth, two or three thicknesses of each style of material being united by any suitable cement, making a diaphragm that is strong and durable, and calculated to reproduce messages in clear and soft tones.

A combination lock has been patented by Mr. Andrew J. Calhoun, of Socorro, N. M. It is designed more especially for vault or safe doors, and has a key frame slotted lengthwise to receive one or more notched bolts, and slotted transversely to receive notched keys, which remain in the lock and are adapted to slide through the notches of the bolts, together with a suitable casing inclosing the key frame, and key stems fitted in the vault or safe door to which the lock is applied, and adapted to be engaged with and disconnected from the keys.

A bark shaving machine is the subject of two patents issued to Mr. Benedict Ott, of La Crosse, Wis. The knives or cutters are held in a fixed rim, and the link moved into contact therewith by a revolving carrier. The bark is fed through the hopper through a sort of agitator throat, and by the connections between the sections the tensions and motions given to one are transferred to the others, and the sections are given a tension toward the cutter head, with a motion which prevents clogging, the machine being for cutting tanner's bark into shavings instead of grinding it.

A combined inhaler and atomizer has been patented by Mr. Hugh Thomas, of New York city. This invention provides a novel apparatus for inhaling steam or other vapor, or steam mixed with atomized or medicated materials, and for different modes of inhaling, and may also be used as a douche, greatly increasing the number of uses of such appliances. [For further particulars with reference to this patent address Mr. James M. Henley, 361 Broadway, New York city.]

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Barrel, Keg, Hoghead, Stave Mach'y. See adv. p. 76.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46.

Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 46.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names 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 in this department, each must take his turn. Special Written Information on matters of personal rather than general interest cannot be expected 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) W. H. P. writes: I would like a receipt for a preparation to coat over malleable irons that will color them a bronze color, something like Berlin or Tuscan bronze. A leading firm uses common furniture varnish, baking the castings to 400° or 500° heat, but I would like something that I would not have to bake, that is air-drying and cheap. A cheap and easily applied bronze color may be made on ironwork by painting with a thin paint, about the color required, and, when nearly dry, brush the articles lightly with bronze powder on a piece of fur or a rabbit's foot. You may obtain any colors in bronze powder and a corresponding oil color through the paint trade. 2. Can I export goods into Canada free of duty, when the article is patented in Canada? A. No.

(2) M. R. A.—To put a high polish on walnut, or any other kind of wood, and preserve the natural color and grain, the Wheeler patent wood filler, made at Bridgeport, Conn., is very highly recommended. It is quicker applied and much more satisfactory for all finishing of natural woods than the old method of rubbing down with varnish and oil.

(3) C. F. desires a receipt for paint with which to paint an iron bath tub. A. Use the best quality of white lead.

(4) H. S. B. desires a receipt for coloring billiard and pool balls. A. For Black.—Boil for a short time in a strained solution of logwood, afterward immerse them in a solution of iron sulphate. Blue.—Immerse for a short time in a dilute solution of indigo carmine. Yellow.—Immerse for about 15 minutes in a solution of potassium chromate. Red.—Macerate cochineal in vinegar, and boil the balls in the liquid for a few minutes. Violet.—Dye red first, then immerse for an instant in solution of indigo carmine. Green.—Dye yellow first, and afterward dip into solution of indigo carmine.

(5) T. R. writes: I have noticed advertisements of preparations claiming to make the hair grow; for example, one will, in a given time, it is said, cause profuse beard to appear. Is this true? A. The use of borax in the water employed for washing, together with stimulating lotions containing small amounts of tincture of cantharides, will have some effect, but not as much as stated, in assisting the growth of the beard, in cases where no impediments (i. e., skin diseases, etc.) exist.

(6) P. D. writes: A flat bottomed boat (sharpie model) fifty feet keel, fifteen feet beam, and scow stern, "drawn in" to twelve feet width, and fifteen inches draught, is required to run eight miles an hour. What would be the dimensions of boiler (locomotive), engine, and screw wheel, to attain above results? Also, what would be approximate weight of boiler and machinery? Boiler and machinery to be as light and to occupy least space practicable. Is there any device in actual use to raise and lower small screw wheels by

means of a universal joint in outboard shaft? A. You will require an engine with cylinder 6 inches by 7 inches, of nominally 8 horse power. A boiler, if vertical, 35 inches diameter, 80 inches high, with 60 2-inch tubes, or a locomotive boiler with shell 24 inches diameter. Fire box 18 inches by 34 inches diameter, 31 inches high, 25 tubes 2 inches, 66 inches long. Estimated weight, 4,000 pounds, complete. Cost, \$600 to \$700. Screw propeller, 34 inches diameter. Cost, \$10. Jointed shafts have been made and used for varying the depth of the wheel, and there are various patents on the same. You would have to design and have made a simple universal joint and depressing gear for the shaft.

(7) C. F. G.—See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 131, 177, 134, 29, 42, 140, 133, and others, which will give you full instructions in building and rigging boats.

(8) C. F. D. asks: 1. A vessel of 1,000 tons displacement is being towed by a vessel of 100 tons displacement at the rate of 8 knots per hour. If the machinery is taken out of the tow boat and placed in the vessel being towed, will it force the vessel through the water at the same rate (8 knots) of speed as she had been towed when machinery was in the tow boat? A. Yes; if the stern lines are sharp, so as to give the screw its full action. 2. What part of a boiler will first show signs of corrosion when using a jet condenser? A. We do not know what the jet condenser has to do with the boiler. Is fresh water or sea water used, and is the boiler fed from the condenser, and where fed?

(9) C. F. writes: I have two double convex lenses (achromatic), each 2 inches diameter and 7 inches focus. I wish to use them, if possible, for a photographic camera. Can I use both, and if so, how far apart must they be set in the tube? What should be the distance from the ground glass to the nearest lens? Where would the best place be for inserting the diaphragm? A. Not knowing the peculiarities of their construction, we can only give you a general consideration of that class of lenses. Place them at half their focal lengths, with the crown sides outward. The diaphragm may be of one-half diameter of lenses for the aperture, or less with quick chemicals. Find the focal field by trial, at about 3 inches from last surface. If found satisfactory on trial, all right; if not, move the lenses a little further or nearer, keeping the diaphragm in the center, until the best effect is produced.

(10) R. B. McK. asks if in artificial stone, made of Portland cement and sand, there is any solution mixed with cement and sand to make it adhesive when turned out of the mould, soon after moulding. A. It is allowed time to partially set in the mould. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 154, 325, 355, treating upon artificial stone.

(11) G. M. A. asks if there is any compound or cement that will make paper stick to the smooth face of an iron pulley effectually. A. Clean the pulley face free from grease, scratch the surface with a file or deaden its polished surface with muriatic acid 1 part, water 2 parts, wash free from acid, and dry. Moisten the paper with a solution of nut galls. Use good common glue, rather thick, on the iron, with a brush, rolling the paper tightly around the pulley either upon a table or by hand. In this way you may apply as many thicknesses as required. The whole will dry solid and hard.

(12) G. E. B.—Drying kilns, whether heated by steam or a stove, should be shut tight until the lumber is thoroughly heated through, to a temperature of 212°, and kept so for a few hours. At this temperature the water is driven out from the interior of the lumber without cracking or checking the surface. Then ventilate gently until all moisture is removed and cool slowly, when you will find your lumber thoroughly dry and shrunk evenly without checks. See also several articles on treatment of wood mentioned in our SUPPLEMENT catalogue.

(13) W. M. S. asks if a radiator of a steam heating apparatus would throw off a black dust or smoke sufficiently to be noticed on showcases in a storeroom. A. Radiators produce a circulation of the dust held in the air, which will lodge on the showcases. There will be no apparent smoke arise, except from a freshly painted radiator.

(14) J. M. B. writes: We need some kind of a material to wipe the lime off our ribbon fencing while it is wet, so that there will not be anything left on it to come off into our machines while it is being barbed. We used very heavy felt, but that will not do. After wetting it in the usual way to clean it, then we drop the spool of wire into a tub of lime water, and this tub is arranged so that the spool will revolve in the lime; then we have a coiler to run out of the lime tub, so that the lime gets all over it nicely, but too much. We have pressure wipe box, but we don't know what to use in the box. A. We know of nothing better or cheaper than sawdust in a large wipe box. Pass the ribbon horizontally along and near the bottom of the box, have a slot at bottom to let out the moist sawdust as required. A pair of circular brushes revolving just outside of the box will clear the ribbon of adhering sawdust.

(15) F. W. D.—We cannot venture an opinion as to the temperature of the water at the north pole. The temperature of the Pacific equatorial current near the bay of Panama is from 80° to 85°. The temperature of the surface water of the Caribbean Sea is 85°; at a depth of 250 fathoms 48°, at 400 fathoms 43°. Temperature of the surface of the Gulf Stream has been found 80°, while at the bottom it was but 38°. Greatest temperature of the Gulf Stream, 86°. Highest temperature known in the equatorial Pacific Ocean, 90°, and near the islands, 95°. Have no record of the Aquilas current at Cape of Good Hope. The Mozambique current is about 83°.

(16) M. J. S.—A balloon with hydrogen gas should be 7½ feet diameter, and 11 feet high, of the usual shape, as illustrated in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 127, 146, for sustaining 15 pounds. It should be made of Marseilles or Chinese silk. The silk must be varnished with rubber, well

dried, cut to shape and sewed, the seams being varnished last. It cannot be bought prepared. It can be filled with hydrogen gas as made with sulphuric acid, water, and zinc, or with iron turnings. Gas should be washed by passing through water. Ordinary illuminating gas will do, but requires a balloon six times larger in capacity.

(17) G. L. P.—The use of the siphon for the purposes of a water ram to elevate water would be of great value in a few special cases. The common water ram is so cheap and well known that it can hardly be expected to be superseded by a new device that may not be so easily managed or started. If you can make the siphon so that it can be protected from freezing as easily as a ram, it might be made profitable. We can think of but few places where it would become a necessity.

(18) C. asks the working horse power from speed of shaft 265 turns per minute; size of pulleys, 24 inches diameter each; belt, 4 inches single rubber; belt runs nearly on level. A. 6½ horse power. 2. Also, size pulleys with same belt for 6 horse power with same speed? A. 23 inches.

(19) J. G. asks for the latest method of making good soap from vegetables, either by hot or cold process? A. See the articles on the "Manufacture of Toilet Soaps," contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 518, 519, and 325. 2. The most practical way of destroying the odor of common Mexican whisky made from sugar cane. A. The odor can be removed by filtering through charcoal or shaking with charcoal and then straining; as this will remove the color, add a little burnt sugar or caramel to the filtered liquid. 3. The quickest and best receipt for making beer? A. See article on "Lager Beer," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 318.

(20) D. C. B. asks: 1. Does constant use tend to diminish the magnetic power of lodestones? A. If by constant use you mean allowing the lodestone to constantly sustain a load, such use will tend to strengthen rather than weaken the lodestone. But frequent removal of the armature or load, or jarring, tends to diminish its power. 2. Is there any known metal or substance in which a lodestone may be enveloped so that the power of attraction of the stone will be bottled, or rather, neutralized? A. We know of no substance that will answer your purpose. 3. If nothing is known of what will totally arrest its power of attraction, what will do so to the highest degree? A. There is no magnetic insulator; but a plate of iron placed before the lodestone or magnet absorbs and apparently masks the magnetism.

(21) H. J. D. asks: 1. Are the prepared carbon plates for a Smee battery as good as platinized silver and as durable? A. We think there is very little difference between the platinized silver and the carbon. 2. Can I purify old punched silver coins so that they will be cheaper for plating than to buy pure silver? I have a furnace and small laboratory. A. It is not a simple matter to refine silver; there is no objection to using the old coin without refining it.

(22) W. R. says: Please inform me how to improve the memory by a short and quick method. A. It can only be done by real effort. Commit something to memory every day. Begin one of Shakespeare's plays, and never give up until you can repeat the whole rapidly without a mistake.

(23) G. S. asks us for books, treating of the science of electricity for a beginner? Also, where they could be obtained, and the probable cost of same. I am working where we have two Weston dynamo-electric machines, and having a great deal of spare time to myself, I could study and experiment with it considerably. A. We recommend Thompson's "Elementary Electricity," price \$1.25, also Thompson's "Dynamo Electricity," price \$5.00. We can furnish you with these books. 2. Also, please inform me if there is any known process of refining oil by electricity? A. We do not know of any process of refining oil by electricity.

(24) J. F. M. desires a recipe for re-inking purple type ribbons. A. Use:
Aniline violet. ¼ ounce.
Pure alcohol 15 "
Concentrated glycerine 15 "
Dissolve the aniline in the alcohol, and add the glycerine.

(25) C. R. P.—The sample of binding twine you send is all Sisal hemp. Manila is finer, and has a soft feel, silky luster, and of a straw color when laid beside the Sisal. Manila is much higher in price.

(26) W. H. S.—Quicksand is very fine pure silica or silicate of iron worn nearly round, and owes its plasticity in water to its rounded and polished surface. It is found on some of the Southern sea beaches, and often found overlying clay beds, in the waterways of wells. There is a noted location at the New York navy yard and the adjoining Wallabout.

(27) T. H. B. asks whether the Russian government has yet found a cheap way (without using fuel) of obtaining drinking water from the brackish water in the country bordering on the Caspian Sea. A. We know of no new method having been applied in this direction.

(28) G. & M. ask how much pressure to the square inch it requires to stop a car with a 33 inch wheel going at a high rate of speed. A. If you mean the direct pressure upon the brakes, the pressure commonly used is from 600 to 1,000 pounds on each cross bar, or half the above on each shoe.

(29) J. M.—Gas meter valves and seats are made of tin 3 parts, antimony 1 part. In a three-bellows meter, the area of the three inlet valves should be twice the area of the inlet pipe, or each valve two-thirds area of inlet pipe.

(30) F. W.—Electro silicon is the latest and probably the best polishing powder now known for brass, German silver, and silver plate. It is silica of infinite fineness, and much of the appearance

of chalk. When it is finely pulverized from the lumps, and mixed with just enough glycerine to make it adhere as a paste, you will find it a valuable polishing paste, and suited to your wants.

(31) W. D. B.—The idea of a balanced or frictionless slide valve is not new. It is in use, and there are many patents on various devices for this purpose. If you will send us drawings or a model, we will ascertain the probability of your obtaining a patent.

(32) A. L.—The Colt barrels are mottled by spattering the coloring matter over them after they are finished bright. We do not know their receipt for the coloring matter, but suppose that it is gallic acid.

(33) J. W. A. asks: Is there any chemical that will deodorize cistern water, rendered offensive on account of a wooden pump? A. Know of nothing better than thorough cleaning out of cistern. Take out pump, clean and dry it, then give it a coat of melted resin, inside and outside; drive in the resin with a hot iron. Any chemicals will either make the water hard or add to the odor of goods washed in it.

(34) A. C. R. and F. H. ask: 1. Is the energy of a pound pressure of steam generated at an altitude of 11,000 feet as great, and capable of doing the same amount of work, as the energy of a pound pressure of steam generated at sea level and measured with the same gauge? Or does it vary in a ratio equal to the resistance of atmospheric pressure to overcome at the different altitudes? A. There can be no difference in the value of the energy from steam pressure as measured by a steam gauge under any conditions of atmospheric pressure. The gauge actually measures the difference between the inside and outside pressure, which is the real measure of energy. 2. Is the latent heat of steam generated by water boiling at 190 degrees as great as the latent heat of steam generated by water boiling at 212 degrees, and does it require more water to generate a pound pressure of steam at an altitude of 11,000 feet than at sea level? A. The latent heat of steam generated from water boiling at 190 degrees is greater than steam from water boiling at 212 degrees in the open air. The sum of the sensible and latent heat of steam being the same for different temperatures, with the exception of a slight increase with the temperature, would indicate less water for a given pressure under decreased atmospheric pressure.

(35) W. J. M. asks: 1. What is the horse power of the following described engine, viz., cylinder, 8 in.; stroke, 10 in.; boiler pressure, 100 lb.; revolutions, 180? A. Engine developing 30 horse power. 2. What horse power boiler, as follows, viz., boiler shell, 4 ft. high by 10 ft. long; 36 three inch flues; the fire box is within the boiler shell, being 2 ft. diameter, running the entire length of boiler? A. Boiler rates 27 horse power as stated. If you use the lower half of shell for heating surface, add 5 horse power to above. 3. How to obtain the average pressure of steam per square inch on piston? A. The average or mean pressure may be calculated by knowing the exact point of cut-off and the ratio of expansion for given initial pressure, which are tabulated in works on steam engineering. For your engine we assume the cut-off at half stroke, with the usual clearance. For special information in relation to mean effective pressure and indicator cards, with description of leading American engines and their theories, we refer you to Edwards' "Practical Steam Engineers' Guide" \$2.50, which we can furnish.

(36) F. J. W. asks: 1. Can freckles be removed from the face properly without injury to the skin, and how? A. They can. See article on this subject, page 210, SCIENTIFIC AMERICAN for Oct. 3, 1885.

(37) W. H. B. desires a remedy by which he can rid a place of rats, without the use of poison. A. It is said that a singing rat will drive his fellows away. Chloride of lime sprinkled around their holes is sometimes partially effective. But ferrets are the most radical means. They kill them when they catch them. They can be purchased for \$15 per pair, or hired at the rate of \$5 per night.

(38) K. R. P. asks for directions for making an indelible ink for marking linen, red preferred. A. Take enough finely pulverized cinnabar to form a moderately thick liquid, and very intimately mix with egg albumen previously diluted with an equal bulk of water, and beaten to a froth, and filtered through fine linen. Marks formed on cloth with this liquid, by means of a quill, are fixed, after they have become dry, by pressing the cloth on the other side with a hot iron. See also recipe given on page 406 of SCIENTIFIC AMERICAN for Dec. 26, 1885.

(39) A. B. asks the best way to take the rust off the steel spokes of a bicycle that has been lying in a garret all winter? A. You can only rub the rust off and retain a polish by using flour of emery cloth with a little oil.

(40) J. H. asks how to make pure bay rum. A. Take two pounds of leaves of the Myrtus acris, half pound cardamoms, two ounces cassia, one and a half ounces cloves, and nine quarts rum. Distill one and a half gallons. Bay rum may be colored with tincture of saffron or with a mixture of equal parts of caramel and tincture of turmeric.

(41) J. G. desires a receipt to give pictures of water colors a glossy appearance. A. The water colors having previously been coated with 2 or 3 coats of thin starch or rice boiled and strained through a cloth, they are covered with a varnish consisting of dextrine 2 parts, alcohol ¼ part, and water 2 parts.

(42) M. S. asks: 1. How to remove hair from the face, permanently, without injury. A. By electricity (see SUPPLEMENT, No. 178) or by depilatories (see answer to question 56, No. 4, vol. 5). 2. How to remove a wart from the hand. A. Take of Salicylic acid. gr. xxx.
Ext. cannabis indic. gr. x.
Collodion. ʒ ss.
Mix and apply.

(43) M. E. B. desires: 1. A receipt to make composition for treeing shoes? A. Dissolve gum tragacanth in water, then a little ink to make it black, and finally add a small quantity of neatfoot oil. It

must be quite thin, or else, if thick, it is liable to cake. 2. A receipt for dressing? A. Take of:

- Gum shellac ¼ pound.
- Alcohol 3 quarts.
- Dissolve and add
- Camphor 1½ ounces.
- Lampblack 2 "

(44) B. T. H. asks: Is there any real value in sulphate of iron as an antiseptic in waste pipes? If so, should the solution be used hot? A. Iron sulphate has long been considered a valuable disinfectant, but as fashions change, so do disinfectants, therefore we call your attention to the article on "Disinfectants," given on page 393 of the SCIENTIFIC AMERICAN for Dec. 19, 1885. See also "Cleaning out Waste Pipes," in SCIENTIFIC AMERICAN for Jan. 16, 1886.

(45) J. S. B. asks what will make leather stick to brass? A. Melt together equal parts asphalt and gutta percha, and apply hot under a press.

(46) C. E. S. asks what is used to make a finish on leather like sample inclosed? A. We should think it was made by a thin coating of size from hide cuttings, but possibly it is shellac varnish, if put on after the leather is formed as you send it.

(47) Lens asks if a wide angle lens, 6 inches equivalent focus, will work as rapid for instantaneous pictures as a more expensive lens of a rapid rectilinear type of a longer focus? A. No; the wide angle lens, with its largest stop, obstructs more light than could pass were there no stop. If no stop were used, no focus could be obtained. The same rule applies to single lenses of the cheap type. A stop of some kind must be used to obtain a good focus. With the rectilinear type of lens, such as the Ross, Dallmeyer, Steinheil, Bick, Darlot, and others, while the equivalent focus is longer, excellent definition is obtained when they are used with full aperture. With no stop the full power of the light passes unobstructed through the lens, and a much more brilliant, stereoscopic-like image will be seen on the ground glass than is possible with a wide angle or cheap lens. Rapid rectilinear lenses are therefore superior to all others for instantaneous work, and are exclusively used by professional and amateur photographers.

(48) P. Y. M.—See Muspratt's Chemistry, Ure's Dictionary, and encyclopdias at Astor Library. A reader of the SCIENTIFIC AMERICAN for 25 years should not forget to send his full address. The street and number are always necessary in large cities.

(49) W. H. L. asks what will take out ink spots from white table cloth, caused by Spafford's commercial ink. Oxalic acid does not seem to touch it, as in the case of ordinary iron inks. A. Use a cold aqueous or acetic acid solution of calcium hypochlorite, or try bleaching powder or javelle water.

(50) H. E. R. desires a receipt for a good and reliable cement for leather, etc. A. Common glue and isinglass, equal parts. Soak for ten hours in just enough water to cover them. Bring gradually to a boiling heat, and add pure tannin until the whole becomes rosy or appears like the white of eggs. Buff off the surfaces to be joined, apply this cement warm, and clamp firmly. See also SUPPLEMENT, 158, for a great variety of cements.

(51) G. L. L. desires a good recipe for bird lime? A. Boil the middle bark of holly 7 or 8 hours in water, drain it, and lay it in heaps on the ground, covered with stones for two or three weeks, till reduced to a mucilage. Beat this in a mortar, wash it in rain water, and knead it till free from extraneous matters. Put it in earthen pots, and in 4 or 5 days it will be ready for use.

(52) R. I. B. writes: I have a handsome vase, of what I understand was verd-antique marble. It is a dark green, mottled with lighter green, and stands about 1 ft. 3 in. high and 1 ft. diameter. It has been shattered, and I wish to mend it as perfectly as possible; all the parts fit so nicely one can hardly tell where fractured. Will you please tell me how to mend it? The vase is considered valuable, not only in itself, but on account of its associations. A. Take plaster of Paris, and soak it in a saturated solution of alum, then bake in an oven, the same as gypsum is baked to make plaster of Paris; after which grind the mixture to powder. It is then used as wanted, being mixed up with water like plaster and applied. It sets into a very hard composition, capable of taking a very high polish, and may be mixed with various coloring minerals to produce a cement of any color capable of imitating marble.

(53) F. H. S. and others.—If gypsum is overburnt, that is, heated over 204°, it loses the property of hardening with water. Common land plaster is not burnt, simply ground, in this country.

(54) D. E. B. asks: What evidence have we, or how is it known, that the shape of the earth at the poles is flat? A. Because the polar diameter is 26 miles less than the equatorial diameter.

(55) C. T. P. asks for a formula for making an illuminating substance for clock dials, etc. A. See "How to Make Luminous Paint," contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 249 and 497.

(56) G. H. L. desires a recipe to make wax into a liquid to be used in writing, so it will afterward become dry. A. Dissolve it in alcohol, ether, or some essential oil, which, when written with, will evaporate, leaving the characters present in wax.

(57) H. C. A. asks how to make black and red ink for rubber stamps. A. The composition consists of 5 parts glycerine, 1 part water, 1 part gelatine, and 6 parts coloring matter, generally aniline dyes, although carmine and Prussian blue may be used, if preferred.

(58) A. P. J. asks: 1. With equal loads, which will draw the easier—a two or a four wheeled cart, both carts weighing the same? A. On a smooth road there is very little difference; on a rough road four wheels are the easier. 2. If four wheels draw easier than two, would six be easier than four? If not, why not? A. The same conditions would apply as above; it would be dependent upon distribution of load and condition of road.

(59) J. K. asks how to make a composition for small printing press rollers? A. Take of Cooper's best glue 8½ pounds, extra sirup 2 gallons, glycerine 1 pint, Venice turpentine 2 ounces. Steep the glue in rain water until pliant, and drain it well. Then melt it over a moderate fire, but do not "cook it." Next put in the sirup and boil three-quarters of an hour, stirring it occasionally and skimming off impurities arising to the surface. Add the glycerine and turpentine a few minutes before removing from the fire, and pour slowly. Slightly reduce or increase the glue as the weather becomes colder or warmer.

(60) H. E. asks (1) if the inclosed sample contains anything but lead. If so, what? A. The sample is not lead, but an alloy, probably Britannia metal, consisting of copper 1 part, zinc 2 parts, tin 81 parts, and antimony 16 parts. 2. In making a casting with this metal, 6½ by 3 inches, one-sixteenth inch thick, do the brass moulds have to be hot or warm to give the face a smooth look, like inclosed sample? A. Brass moulds cannot be used, but they must be cast in well polished iron moulds under pressure. 3. What is the best etching fluid to use on this metal? A. Use nitric acid (aqua fortis).

(61) C. I. asks: 1. What is the best wood for ebonizing? A. Cherry. 2. Give full directions for ebonizing. A. Dissolve 4 ounces shellac with 2 ounces borax in ½ gallon water. Boil until a perfect solution is obtained, then add ½ ounce glycerine, of aniline black soluble in water a sufficient quantity, and it is ready for use. See also SCIENTIFIC AMERICAN for August 1, 1885, page 72.

(62) A. E. H. desires a receipt for glycerine jelly, used for mounting microscopical objects. A. Take a quantity of Nelson's gelatine, soak it for 2 or 3 hours in cold water, pour off the superfluous liquid, and heat the soaked gelatine until melted. To each fluid ounce of the gelatine, while it is fluid but cool, a fluid drachm of the white of an egg is added. Boil this until the albumen coagulates and the gelatine is quite clear, then filter it through fine flannel, and to each ounce of the clarified solution add 6 drachms of a mixture composed of 1 part glycerine to 2 parts of camphor water.

(63) J. T. asks: What is the composition and nature of "agate," used for coating kitchen utensils, and will it bear heat and cold under pressure? A. The following produces a white and harmless coating: Powdered flints, calcined borax, pure clay, and a little feldspar are finely ground together and made into a paste with water. The iron ware being cleaned with dilute sulphuric acid, and well washed with water, the paste is applied to it with a brush. While this is still moist, it is dusted over with a glaze composed of feldspar, carbonate of soda, borax, barium sulphate, and a little tin oxide. The utensils are allowed to dry gradually, and are lastly heated in a muffle at a bright red heat until the glaze is fused in a uniform manner. They will stand considerable heat and cold under pressure.

(64) A. B. J. asks (1) how to clean kid gloves. A. For cleaning, see answer to query 18, contained in SCIENTIFIC AMERICAN for October 24, 1885. 2. How to dye old kid gloves black? A. The glove is washed in alcohol, and three times brushed over with a decoction of logwood, allowing between each brushing ten minutes for drying, afterward dipping into a solution of iron sulphate and then brushing with warm water. Should the color not prove sufficiently dark, a decoction of quercitron may be added to the logwood decoction. Instead of the sulphate of iron, some nitrate of iron may be used. As the leather begins to dry, it is rubbed over with talc powder and some olive oil and pressed between flannel. The treatment with talc and oil is repeated, and the glue allowed to dry on the stretch wood. 3. Where could I get the wood hands or forms used to draw the gloves on to dye? A. They are to be had from all dealers in glover's materials.

(65) R. H. asks if there is any means of discovering gold by its attracting powers. A. There are no means known except regular miners' methods by which the presence of metal can be satisfactorily determined. Magnets are attracted by iron ore. 2. What books are the best on physiognomy? A. We can send you "Indications of Character," price 25 cents; "Heads and Faces, and How to Study Them," price \$1.00; "New Physiognomy," by S. R. Wells, price \$5.00.

(66) J. P. O. asks what process to put parchment documents through, that have been steamed in a safe, and have drawn up and become stiff, in the late fire at Galveston. I have some land patents that formerly were 4x10 inches, and now they are about 1½ inches diameter and 4 inches long. They were in a large safe, and although the fire burnt away from the safe in less than an hour, everything of a leathery nature, such as backs of books, was entirely destroyed. A. We do not believe you can more than partially restore them, but would advise you to heat them with steam until they become pliable and then stretch them out as well as possible, taking care to prevent their becoming saturated with moisture, or they will pulp.

(67) H. S. desires a remedy for the removal of spots on the face resembling freckles. A. The following treatment, which is used for moles, may be found effective: Take tartar emetic in impalpable powder 15 grains, soap plaster 1 drachm, and beat them to a paste. Apply this paste to nearly a line in thickness (not more), and cover the whole with strips of gummed paper. In 4 or 5 days, eruption or suppuration will set in, and in a few days after leave only a very slight scar.

(68) J. P. R. asks why he failed to make platinum chloride adhere to a silver deposit in trying to get a black with it. A. We would advise you to use a solution of silver nitrate instead of platinum chloride. The article is dipped in the solution mentioned, then heated in the flame of a Bunsen burner until black, and finally all superfluous black removed by means of a rag dipped in sweet oil. This method will be found more economical and fully as satisfactory as the one used by you.

(69) G. M. M. writes: A white marble bust was discolored by smoke and water. Inform me the best mode of cleaning it. A. Take 2 parts of common soda, 1 part of pumice stone, and 1 part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble all over with soap and water, and it will be as clean as it was at first.

(70) E. S. A. S. asks: What is the cause of the Gulf Stream? A. The Gulf Stream is but a single portion of the great system of oceanic currents; the explanation of the phenomena would require too much space for this department. Text books on geography or geology will explain the details of the theory. 2. What will take ink spots out of marble? A. Take ¼ ounce antimony chloride and 1 ounce oxalic acid, and dissolve them in 1 pint rain water; add flour, and bring the composition to a proper consistence. Then lay it evenly on the stained part with a brush, and after it has remained for a few days wash it off, and repeat the process, if the stain is not quite removed. 3. Is there any cure for flesh worms? A. See answer to query 8 given in SCIENTIFIC AMERICAN for February 21, 1885.

(71) J. Z. S. desires a few rules for a very lean person to increase his weight to a much larger amount—diet, etc. A. Much depends upon individual temperament, but by refraining largely from exercise, avoiding care and worry, and following a diet liberally composed of sugary and starchy elements, with milk and butter and yolk of eggs, fat meat, etc., one can generally largely increase his weight.

(72) W. H. R. asks: How is the high polish put on gilt frames? Is it gold leaf or a composition? One part high polish, while on a strip alongside of it the gold is dead. How is the composition made that the flowered wood is made of on frames? A. The high polish referred to is obtained by burnishing a portion of the gold leaf. The moulding may be prepared as follows: Mix 14 pounds of glue, 7 pounds of resin, ½ pound of pitch, 2½ pints linseed oil, spirits of water, more or less, according to the quantity required.

(73) J. H. W.—Steam at 5 pounds pressure is about 224° temperature, and may be estimated at 8 per cent more effective than water at 212° for the same area of radiating surface. You will require nearly 2½ feet 1½ inch pipe with steam at 5 pounds to equal a foot of 4 inch hot water pipe at 212°.

(74) H. G. A. writes: I am transmitting about 2 horse power through a set of gears that make 50 revolutions a minute, and they wear out in a short time. Will they last longer, and about how much, if I transmit the same power through them, but increase their speed to 150 revolutions per minute? A. You will gain nothing in wear on your gear by increasing the speed. The contact of the teeth, although with less strain, will have three times the quantity of contact, with an increase of back lash or vibration which adds to the wear, and also to the noise.

(75) G. P. T. speaks of a fire starting in a mattress stuffed with fine shavings, and asks if the mattress could have become ignited by spontaneous combustion. A. Very probably, if the mattress has been wet.

(76) C. H. B. writes: I have a polyopticon, with lens 1½ inches diameter and 4 inches focus. Owing to size of lens, my pictures must not be larger than 1½ inches diameter, and, unless they are perfect pictures, the result is not what I would like. I want to get a larger and clearer image. If I use lens 2 inches diameter and about 3½ inches focus, shall I attain the desired end? A. Your single lens 2 inches diameter and 3½ inches focus will not give a satisfactory image, nor cover the required field; two plano-convex lenses of 2 inches diameter, 8 inches focus, placed from 2 to 3 inches apart, with their convex faces next to each other, set so as to adjust their distances for the best effect, will enable you to project a picture 2 inches to 2½ inches diameter.

(77) F. J. W.—If you are handy at tinkering, and really ambitious to learn a regular trade, it is now time (age 18) to make a start in earnest by going into the nearest machine shop, beginning, if necessary clear down at the bottom, a mere laborer or blacksmith's helper, it matters not which, if you are only there to see how things are done, industrious, and lose no opportunity to make yourself useful.

(78) G. L. C.—With the best rams now made on the same principle, water can be raised 150 feet or more, and in quantity from one-fifth to one-fiftieth the quantity used, according to the available conditions of feed pipe and height. A siphon cannot be relied on for more than 25 feet lift.

(79) G. K. asks: Which are the most powerful reflectors in use? A. The parabolic reflectors of our locomotives are the most powerful form that has yet been devised.

(80) C. H. I. asks the best receipt for keeping auger bits of cast steel from rusting. A. Wipe them with tallow; warm the bit, using the tallow on a rag. Vaseline or oil on a rag in the tool box is a ready means of preventing rust.

(81) M. G. F. & F. L. W.—Wind has no effect upon a thermometer, if otherwise protected from radiation from the ground or buildings. A thermometer, to indicate the temperature of the air, uniform with the regulations as issued by the Smithsonian Institution, should be sheltered from the sun, and from radiation, by being placed in a latticed cage of about a cubic foot space, so much open on one side as to admit of observation, the cage to be sheltered from the direct rays of the sun, and thermometer protected from rain.

(82) D. D. J. asks how to make a compound used for coating small pieces of steel intended to cast into iron. Where nothing is used, the iron does not lie to the steel, and blow holes are formed, which spoil the castings. I have seen a compound used, of which one of the ingredients is nitric acid, which entirely prevents blowing, and the iron and

steel in the casting seem to be almost fused together. A. The pieces of steel are cleaned free from scale by mixture of hydrochloric acid 1 part, water 3 parts, then washed in hot water, then dipped in muriate of zinc (ordinary soldering acid) and dried. Put the pieces into the mould as hot as can be handled.

(83) A. C. L. asks (1) how to remove machine oil and gasoline from the floor and siding of a frame building which some tenants have so completely saturated as to increase the fire risk and injure the appearance. A. It will not be possible to remove the oil, but the appearance of the wood may be improved by coating it with shellac and then painting the surface. 2. How is paper such as is used to wrap butter or candy coated with paraffine? A. Unsized paper is dipped in a solution of paraffine, or else the paper is waxed by means of heat being applied to beeswax, which is then absorbed by the paper. There are several patented machines for the purpose. 3. How can I make a paste which will unite such paper? A. Use a rubber cement. See recipe given in article on "Cements" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158. 4. How can I transfer a gold leaf sign from the glass of one store window to that of another? A. We know of no means by which this can be done.

(84) A. M. H.—The injector is considered the most economical for feeding boilers, and is no doubt economical for raising water. It is not in use for that purpose, because it heats the water. For a regular water supply, it is not reliable. There is no work on steam jets and injectors. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 212, on the theory of Giffard injector, and No. 356 for illustrations of various kinds of injectors.

(85) W. H. asks how to brown gun barrels. A. Rub the clean barrel with chloride of antimony mixed with a little olive oil; leave a thin coat on the barrel until the required degree of browning is reached. Then wash in hot water and soda, dry, and oil with boiled linseed oil. Varnish with shellac.

(86) C. S., Jr., asks: 1. What is the reason that the recoil in a pistol is greater than in a rifle chambered to use the same cartridge? A. Because the rifle is heavier, and absorbs the recoil. 2. Why is it that the penetration is greater in the latter than in the former? A. Because by the greater length of the barrel of the rifle the cartridge gives its full effect; also the recoil of the pistol is so much lost power in the bullet by lessening its velocity. 3. What good are the grooves in the bullet of the rifle cartridge? A. The rifling of a gun adds to the accuracy of the flight of the bullet by causing it to spin.

(87) G. A. W. asks: What is the cause of the humming, buzzing sound which is sometimes heard around telegraph poles and wires? A. The humming is caused by the vibration of the wires by the action of the wind, on the principle of the Aeolian harp. A very slight breeze will set the wires into active vibration.

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

T. H.—No. 1 is a silicious mineral containing carbonate of lime, and is of no apparent value. No. 2 is a clay slightly colored with iron oxide. It resembles ochre, and might be used as a paint if ground and mixed with oil.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted, February 2, 1886, AND EACH BEARING THAT DATE.

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

Accordion, F. Wittstadt.....	335,582
Adding machine, T. W. Maxey.....	335,374
Air brake valve, T. H. Haberkorn.....	335,446
Air moistening apparatus for factories, W. V. Wallace.....	335,403
Alarm. See Low water alarm.	
Album stand, T. M. Hass.....	335,450
Animal trap, L. F. Dunn.....	335,512
Artificial mother, P. Beuerlein.....	335,422
Atomizer, W. A. Turner.....	335,550
Awning, hop box, Dillenbeck & Neahr.....	335,115
Axle lubricator, car, Thurber & Brockway.....	335,163
Bag or satchel fastening, L. B. Prahar.....	335,307
Bags and other articles, fastening for hand, L. Sanders.....	335,311
Baking pan, A. B. Sparrow.....	335,251
Baling press, J. L. Dow.....	335,290
Bar. See Pinch bar.	
Bark shaving machine, B. Ott.....	335,532, 335,533
Barrels, device for raising, J. E. Mitchell.....	335,376
Basins, dirt collector and remover for wash, T. Keach.....	335,363
Beams or rails, splice for metal, J. F. Ward.....	335,185
Bearing, anti-friction, W. Kratzer.....	335,527
Bed bottoms, fastening, W. S. Seymour.....	335,542
Bed, folding, W. H. Dell.....	335,434
Bed for invalids, adjustable, M. G. Farmer.....	335,441
Bed rest, W. H. Aldrich.....	335,412
Bedstead, adjustable, C. A. Jenkins.....	335,360
Bedstead, invalid, Fillebrown & Chandler.....	335,218
Beehives, device for inverting, J. M. Shuck.....	335,153
Bell attachment, sleigh, D. W. Sexton.....	335,151
Belt, galvanic, H. M. Beidler.....	335,417
Belting, T. Gingras.....	335,187
Bench hook, J. B. Boyce.....	335,423
Bicycle leg, J. F. Morgan.....	335,297
Bicycle saddle, G. Rothgiesser.....	335,246
Blind slat, etc., G. Hayes.....	335,353
Blind stapling machine, N. P. Peterson.....	335,304
Boat. See Hunting boat. Ice boat.	
Boiler furnace, E. Boileau.....	335,207
Bolt. See Flour bolt.	
Bolt heading machine, A. B. Glover.....	335,280
Bolting cloth, device for tightening, G. T. Smith.....	335,155
Boneblack, process of and apparatus for drying, S. M. Lillie.....	335,137
Book, copy, A. Agar.....	335,103

Book, copy, J. L. Tyler, Jr.....	335,256
Boots and shoes, applying wear points to rubber, J. L. Thomson.....	335,323
Boots, device for pulling on, H. W. Benham.....	335,415
Boring tool, J. Birkenhead.....	335,206
Bottle, mullage, G. R. Wight.....	335,329
Bottle, nursing, F. E. Forster.....	335,347
Box. See Fare box. Lunch box. Paper box. Tobacco box. Wagon box.	
Box covering and trimming machine, C. E. Clute.....	335,429
Bracket. See Lamp bracket.	
Brake. See Car brake.	
Brush, dental plate, A. C. Estabrook.....	335,345
Buckle, F. B. Spooner.....	335,252
Buckle, B. S. Wash.....	335,490
Burnishing tool holder, G. A. Fullerton.....	335,185
Bush moulding machine, bung, A. G. Anderson.....	335,331
Button, J. C. W. Jefferys.....	335,226
Button attaching machine, C. J. Brosnan.....	335,211
Button fastener, E. D. Steele.....	335,333
Button fastener, J. F. Thornton.....	335,162
Button feeding device, C. J. Brosnan.....	335,212
Cable conduit, W. A. Wright.....	335,553
Calipers, S. Taylor.....	335,437
Calipers, micrometer, E. S. Cobb.....	335,214
Can. See Oil can.	
Cane juice defecator, J. F. Hauptman.....	335,352
Canvas stretcher, keyless, J. L. Rawbone.....	335,480
Car brake, G. T. Horton.....	335,521
Car brake, F. H. D. Newhard.....	335,378 to 335,380
Car brake, automatic, F. H. D. Newhard.....	335,377
Car coupling, J. O'Riordan.....	335,381
Car door, Williamson & Pries.....	335,169
Car starter, Muller & Ruter.....	335,472
Car starter and brake, J. C. Elliott.....	335,217
Car, stock, G. D. Burton.....	335,109
Car ventilator, railway, A. B. Harris.....	335,448
Card or sheet transferring apparatus, T. M. Kenney.....	335,204
Carpet stretcher, M. A. Higgins.....	335,356
Carriage top, S. M. Chester.....	335,426
Cartridge decapper, recapper, and reloader, S. McNeill.....	335,291
Caster, G. M. Patten.....	335,301
Caster, trunk, A. V. Romadka.....	335,145, 335,149
Chain clasp, C. Schlag.....	335,247
Chair. See Convertible chair. Nursery chair. Rocking chair. Window cleaning chair.	
Chair seat and back, F. Latulip.....	335,461
Check bar for bridles, H. Lowe.....	335,465
Chenille ornament, C. A. Schmidt.....	335,315
Chimney cap and ventilator, W. J. & C. Kayser.....	335,362
Cigar rolling table and wrapper cutter, combined, J. R. Williams.....	335,263
Clasp. See Chain clasp.	
Clothes hook, E. W. Philbrook.....	335,237
Clothespin, J. K. P. Nourse.....	335,399
Clutch, friction, W. P. Brett.....	335,106
Clutch, friction, J. R. Little.....	335,468
Coal bucket, J. Smith.....	335,249
Coffin, W. R. Hassard.....	335,451
Collar pad, horse, A. Ortmyer.....	335,143
Collar pad, horse, W. H. Osmer.....	335,332
Combination lock, J. A. Calhoun.....	335,387
Convertible chair, C. M. Hamilton.....	335,283
Convertible chair, A. P. Yarnall.....	335,410
Cotton, etc., metallic wrapping for, A. H. Douglass.....	335,216
Cotton press, C. A. Hege.....	335,194
Cotton scraper, J. R. Cooper.....	335,507
Cotton thinner, S. C. Dickson.....	335,180
Coupling. See Car coupling. Pipe coupling. Thill coupling.	
Cradle, folding, C. P. Kenna.....	335,203
Crate, fruit, C. W. Lloyd.....	335,369
Creamer, centrifugal, G. De Laval.....	335,344
Cultivator, F. M. Helms.....	335,222
Cut-off or waste valve, Walsh & Martin.....	335,404
Cut-off valve, G. W. Anderson.....	335,172
Cutter. See Key seat cutter. Vegetable cutter.	
Cutter head, W. G. Rendall.....	335,309
Desk and seat, school, J. F. Coulter.....	335,508
Desk, office, C. N. Dazell.....	335,432
Dies, making, J. Brady.....	335,334
Dishes, machine for cutting oval shell, S. B. Conover.....	335,431
Distilling ammoniacal waters, apparatus for, B. P. Clapp.....	335,427
Doll, walking, F. W. Peloubet.....	335,302
Doorhanger, H. T. Moody.....	335,232
Dovetailing machine, E. M. Byrkit.....	335,335
Dress shield, J. Janowitz.....	335,225
Drier. See Fruit drier.	
Drill. See Rock drill.	
Drilling machine, W. Evans.....	335,184
Dustpan holder, W. W. Squier.....	335,545
Ear knob, Adams & Dodge.....	335,100
Educational device for the illustration of longitude and time, D. C. Young (r).....	10,683
Electric circuits, switch or turn-off for, E. Thomson.....	335,548
Electric distribution system, of E. Thomson.....	335,159
Electric machine and motor, dynamo, W. L. Voelker.....	335,326
Electric machine, dynamo, C. Hering.....	335,855
Electric machine or motor, dynamo, W. L. Voelker.....	335,325
Electric machines, armature for dynamo, H. R. Boissier.....	335,107
Electric motor, E. Thomson.....	335,545
Electric motors, device for transmitting power from, E. H. Johnson.....	335,285
Electrical switch, C. F. Brush.....	335,269
Elevator, F. H. Prince.....	335,239
Elevator, J. H. Wisheart.....	335,403
Engine. See Gas engine. Pumping engine. Rotary engine. Rotary steam engine. Steam engine. Traction engine. Wind engine.	
Envelope counting machinery, A. A. Rheutan.....	335,245
Envelope machine presser, A. A. Rheutan.....	335,244
Ethers, manufacture of resin acid, E. Schaal.....	335,485
Excavator, inclined wheel, S. M. Lockwood.....	335,230
Excavator, inclined wheel earth, S. M. Lockwood.....	335,229
Extension table, T. B. Hennessy.....	335,453
Eye-glass nose guard, W. Freeman.....	335,277
Fan, toilet, J. Silbernuk.....	335,310
Fare box and lantern, combined, H. D. Clark.....	335,408
Feather sorter, H. Penner.....	335,144
Feed water heater, F. Shickle.....	335,117
Feeding rack, sheep, D. Phillips.....	335,384
Fence making machine, J. B. Thies.....	335,399
Fence post, Myers & Anderson.....	335,298
Fences, machine for manufacturing, R. B. Stapp.....	335,253
Fertilizer distributor, Sheldon & Patterson.....	335,152
Filing prescriptions, machine for, J. S. Jarnagin.....	335,457
Firearm, magazine, Franklin & Ehbets.....	335,417
Fire escape, W. H. Bailey.....	335,514
Fire escape, W. Brown.....	335,103
Fire escape, electric, Marcus & Epsteyn.....	335,372
Fishing fly book, T. J. Conroy.....	335,608
Fishing fly book, H. P. Wells.....	335,491
Flatiron heater, G. Bennis.....	335,42