

RECENTLY PATENTED INVENTIONS.

Engineering.

PROPELLER SHAFT THRUST BEARING.

—Hans C. Pedersen, Brooklyn, N. Y. A sleeve having frictional engagement with the shaft is held to revolve in the outer end of the thrust block, a collar rotating on the exterior of the block having recesses in its inner face in which are fitted adjustable blocks, while friction rollers engage the outer end of the thrust block and the collar of the shaft, balls being interposed between the outer ends of the rollers and the inner surfaces of the adjustable blocks. By this improvement, which is readily adaptable to any propeller shaft, it is designed that the friction between the shaft and the bearing will be greatly reduced, while the construction is economical and durable, and quick and convenient access is afforded to any of its parts.

GAS GENERATOR.—John H. Miller, Jr., Gallon, Ohio. This is a water gas generator for the manufacture of gas for either heating or lighting purposes by the decomposition of steam and oil. Above the fuel chamber is a vertical partition wall in the middle forming two compartments, with baffle plates arranged in them, and with oilinlets, draught dampers, and gas outlets arranged at the top of the compartments. The improved generator is easily and economically operated, and very effective in producing a large volume and good quality of fixed gas, without being fouled by deposits of carbon. The baffle plates are tiles which are easily put in and taken out, and afford a great heating surface for fixing the gas without the use of checker work.

Railway Appliances.

METALLIC TIE.—Albert E. Roberts, Norwalk, Ohio. The base or tie bar of this tie is formed of a steel plate with upwardly bent side flanges, in conjunction with which is used a metal seat block, having spiked sockets at its opposite ends ending at their lower ends in angular enlargements, into which angular detachable abutments are projected. This tie is designed to absolutely prevent the spreading of rails, is not expensive to manufacture, and can be quickly placed in position, the spikes as they are driven having their ends automatically clamped to the seat block to prevent drawing.

CAR STARTER.—Karl J. Pihl and Oscar W. Hult, Brooklyn, N. Y. On one of the car axles are two fixed clutch hubs and two loose clutch disks, a loose spiral spring on the axle being fast to the clutch disks, with means of locking and unlocking either clutch disk. The device is very simple, and is adapted to store energy when the car is stopped, giving out such energy again when a releasing lever is moved, to assist in turning one of the axles as the car is started. The device operates effectively in either direction of travel.

CAR COUPLING.—Gustav Runge, Sidney, Neb. This invention provides an improvement in that class of side latching or Janney couplings in which each of the twin jaws is locked in engagement by a pivot bolt passing through it, the object being to provide a more secure lock than in other couplings of this class. This coupling can be readily arranged for coupling with the ordinary link and pin coupling.

BLOCK SIGNAL SYSTEM.—John La Burt, New York City. This system comprises a series of semaphores arranged along the track, a circuit closer connected with each and acting as a balance for it, an electric motor at each geared to depress the arm and raise the circuit closer, a lever mechanism for tripping the circuit closer by the passing of a train, and electrical connections whereby the tripping of the circuit closer of one semaphore will close the circuit through a motor at the next semaphore. The system is comparatively simple and not likely to get out of repair, is positive and efficient, and is automatically operated by the movement of the train to throw up a semaphore as the train passes a block, and throw down the arms in advance of and in the rear of a train. The invention also provides for automatically shutting off steam and stopping the train, should the engineer accidentally run over a block.

TO SECURE RAILROADS AGAINST LOSS OF FREIGHT.—Joseph B. Mockridge, New York City. The invention provides an original system for controlling the shipping of merchandise to secure railroads and shippers of merchandise against loss of freight. The system prevents, first, the loading of merchandise in the wrong car at the shipping station; and secondly, in case it should happen that a package is wrongly loaded in a car, then it is at once detected, and the railroad will have no difficulty whatever in tracing merchandise from the time it passed into its hands until it is delivered to the receiver. The means consist principally in printing a shipping receipt with characters indicating the receiving car, and a ticket containing like characters, so that ticket and receipt control each other. The ticket is delivered to the stevedore and placed into a receptacle held temporarily on or near the car destined for a certain distant point.

Electrical.

ROCKING CHAIR ATTACHMENT.—Charles E. Hartelius, Bay Ridge, N. Y. This is a dynamo attachment, so arranged that the movement of the chair will operate the dynamo and generate a mild current of electricity, which passes through electrodes on prominent places, as the arms, the current passing through the body when the occupant places his hands on the electrodes. This improvement does away with the use of batteries, and enables a person to take a gentle shock for any desired length of time, the chair being used in the ordinary way when the hands are removed from the electrodes.

Mechanical.

LUBRICATOR.—Vilhelm C. Th. Lohmann and Carl V. Andersen, Copenhagen, Denmark. This is a device adapted to automatically deliver a required quantity of oil to moving parts of machinery. It is very practical, durable, and inexpensive, and may be operated by the machinery it lubricates, while it can be easily and nicely adjusted to deliver just the required quantity of oil.

MOULD FORMING KNIFE.—Louis His, New York City. A vertically adjustable knife having an inclined lower edge is held by adjusting screws in the opposite end uprights of a supporting frame, a gauge, over which moves a pointer, being secured to one of the uprights. By means of this improvement a mould for a propeller blade may be quickly and accurately formed in a flask without the use of a pattern, the knife being quickly and nicely adjustable to form a mould of any necessary thickness.

CONTINUOUS BRICK KILN.—James P. Veirs, Omaha, Neb. In this kiln the brick burning proceeds continuously through a tunnel which returns into itself, the drying and burning of bricks, the cooling and removal of the burned bricks, and the recharging of the tunnel with green bricks, going on at the same time in different parts of the tunnel. The invention covers a peculiar construction and arrangement of parts whereby the operations are carried out more expeditiously, economically, and uniformly, insuring a better burning of the bricks and a greater economy of heat and saving of fuel.

Agricultural.

CORN HARVESTER.—Rasmus Pedersen, Dramman, Minn. This machine is drawn between rows of corn and cuts the stalks of two rows at the same time, delivering the corn to tilting tables, and when bundles have been formed or suitable quantities accumulated, the tables are tilted to spill the corn upon the ground. The construction is such that the cutters or knives may be either stationary or laterally reciprocated as desired. The levers are all within convenient reach of the driver's seat, and the front of the machine may be lowered to cut the corn as close to or as far from the ground as may be desired.

Miscellaneous.

ADDING MACHINE.—Augustus J. Brooks, Wichita Falls, Texas. This machine, while being simple, inexpensive, and easily operated, is adapted to mechanically register the amounts of successive additions in such a way that there is no chance for mistake. In operation, every complete revolution of the units wheel moves the tens wheel, and every revolution of the latter moves the hundreds wheel, the successive additions being made by depressing the keys marked with the successive figures, and where columns of figures are added and the amount of successive additions is registered, a locking plate comes into use. The sum of an addition is displayed on number wheels to be read at sight.

CHECK REGISTER.—Carol T. Daniels, Naperville, Ill. This is a simple, convenient, and positively working apparatus which may be easily arranged for use, and is designed to keep an absolutely accurate account of sales made. Tablets of celluloid or similar material, each representing a definite amount, are held in troughs of novel construction in such a way that, when a sale is made, and the salesman presses downward on a key-piece, the front tablet is pushed through a slot into a drawer, the tablets being thus deposited in the drawer to represent the amount of each sale made.

PHOTOGRAPHIC PRINTING DEVICE.—Wilhelm Ohse, Dessau, Germany. The frame of this device has a back of translucent glass, the top and bottom being of a clear glass backed with a colored strip, while a holder adapted to receive a negative is located at the front of the frame opposite the translucent glass, and a lighting device is located back of the translucent glass. The device is designed to facilitate printing at night by lamp light, and is designed to afford as good effects in such printing, with certain negatives, as can be obtained with the best natural light—negatives of a certain density being thus better printed than can be done by sunlight.

MUSICAL INSTRUMENT.—August Pettersen, Eskilstuna, Sweden. This invention relates to stringed instruments, such as violins, etc., providing an improved instrument with additional strings, arranged in connection with the regular strings, to produce additional harmonious sounds that are difficult to produce on ordinary violins. The invention consists of a detachable casing held on the neck of the violin and provided with spindles connected with the additional strings, the latter being arranged close to the ordinary strings, so as to be sounded simultaneously with the latter to produce harmonious sounds.

WINDOW.—Peter Vandernoth, New York City. This window comprises a frame having a movable sill, parallel guide rods arranged on opposite sides of the frame, and overlapping window sashes held to slide and swing on the guide rods, the lower sash resting normally on the sill. With this improvement the window sashes may be swung wide open and raised to the upper portion of the frame, thus opening the entire window to permit the free circulation of air and to facilitate the passing in and out of various articles. The movements of the sashes are positive and easy, and they may be cased up tightly if desired to have the appearance of an ordinary window.

SHUTTER WORKER.—Louis Kutscher, New Britain, Conn. This is a device which may be readily attached to any window, and readily operated in connection with any blind carried by the window frame. It can be operated from the inside of a room to open or close the shutters, and to hold them locked in an open or closed position, or in any intermediate position, the device being very simple, durable, and inexpensive in construction.

SCRUBBER.—Ophelia Smith, Shepherdsville, Ky. This is a reversible device, having a scrubbing brush on one side and a mop on the other, for first loosening the dirt on a floor with the brush and then following with the mop, there being a further attachment of a wringer by means of which the mop may be easily wrung without touching it with the hands, the operator not being required to bend much.

BREAD RAISER.—John C. Nicholls, Blue Mound, Ill. This apparatus includes an outer casing having an inner raising chamber, below which is a hot air chamber, there being three means of regulating the

heat in the raising chamber—one by adjusting the flame of the lamp, another by means of the valve air inlet opening, and the third by a valve-controlled outlet opening. The heat may be thus evenly distributed to the different portions of the raising chamber, the air of which will not be contaminated by any of the smoke or gases of the flame.

FAN.—Herman Scheuer, New York City. This is a simple form of fan adapted to be readily opened and closed, or snugly folded. It comprises a circular folding web, a metallic handle made in sections, a wooden strip secured on each metallic handle section and connected with the end of the web, and a metallic block held in the handle section and clamping the wooden strip in place at its outer end.

PNEUMATIC TIRE.—Foster H. Irons, Toledo, Ohio. This tire is formed with an exterior and an inner tube, each tube having a joint in its inner side, and a re-enforcing strip is held within the inner tube and arranged to cover the joint. The rubber tubes of the tire are moulded in a spiral shape, and straightened out when formed into a tire, thus contracting and condensing the rubber, so that if either tube is punctured the aperture will be closed by the pressure of the adjacent parts of the rubber.

FUNNEL.—Edward N. Gaudron, Portland, Oregon. Two patents have been granted this inventor for a funnel for conveniently filling liquids into receptacles, the funnel automatically closing when the vessel is filled to the proper height, at the same time retaining the liquid remaining in the funnel when the latter is removed from the filled vessel. A pivoted cylinder closed at its ends and containing a ball is connected at one side of its fulcrum with a valve adapted to close the funnel nozzle, a float being connected with the cylinder at that side of the fulcrum of the cylinder normally containing the ball, to trip the cylinder on the rising of the fluid. One of the patents especially provides for a magnet for finally seating the funnel valve.

ALE TAP.—John Neumann, Brooklyn, N. Y. Two patents have been issued to this inventor for ale taps, one patent providing specially for a tap adapted to withstand blows of a mallet when the tap is driven into a plugged cask, the tap being convenient to remove from an empty cask, having its faucet body separable from the tap shank, and being easy to manufacture. The shell of the tap, which may advantageously be made of cheaper metal than brass, has a faucet-protecting skeleton frame in front, an insertible faucet, and means for connecting the skeleton frame and faucet. The other patent provides a tap or spigot especially adapted for tapping casks in vaults or cellars, to be connected with a dispensing device in a room above. The tap is cheap and simple, while it is more durable than those of ordinary construction. The major portion of the tap may be made of malleable iron or soft steel, instead of brass, thereby greatly reducing the cost of production, and great facility is afforded for extending the tubular connection in any direction from either side of the tap stock.

LOADING DEVICE.—Louis A. De Mayo, New York City. This invention relates to devices for loading coal, grain, etc., into ships, from barges and other vessels, providing new and improved means therefor, to facilitate performing the work rapidly, without requiring much labor. Boxes, each having doors in its sides, are mounted to slide vertically in the barge, each of the boxes being preferably of nearly the width of the barge, and means are provided for raising the boxes separately or collectively.

SUSPENDERS.—Michael Feldman, New York City. This invention provides suspenders designed to insure the comfort of the wearer, the rear suspender ends readily adjusting themselves on the shoulder straps according to the movement of the wearer's body. The connection for the rear ends of the shoulder straps is provided with an elastic band, and its middle portion forms a self-adjusting bearing for the rear suspender ends.

LADDER.—Charles V. Childs, Pittsburg, Pa. This ladder is made in two sections hinged together, and a truss connecting the two sections with each other in such a manner as to prevent the sections from spreading when the ladder is used as a step ladder, and to strengthen the sections when they are extended to form a straight ladder. The ladder may be quickly and conveniently changed from a step ladder to a straight ladder and vice versa, and it can be very cheaply manufactured.

ROTATING GRAIN WEIGHER.—Benjamin Simons, Charleston, S. C. Fulcrumed upon a main frame is a balance frame carrying a rotary bucket wheel at one end and a track way at its opposite end, upon which travels a movable weight, stops on the main frame limiting the opposite movements of the weight. Automatic locking devices are adapted to lock the bucket wheel from rotating when raised, becoming disconnected therefrom when the wheel is depressed. Upon the upper board of the frame is a registering mechanism which records every dump of the bucket wheel.

STRAP.—Nils Nilsson, Brooklyn, N. Y. This is a metallic strap adapted to be used on packing cases and boxes of all kinds, the bands or straps being also capable of use as corner irons simply. The strap has openings to receive nails and fastening devices, the metal around each opening being so shaped that when the nails are driven the openings will be entirely closed, and the metal at the edges will be driven down into the material from which the box or casing is made.

HOOF TRIMMER.—Henry C. McCleave, Trimble, Ill. This tool comprises a knife part having an attached handle and an adjustable fulcrum part or bar having an upturned hook or lip at its outer end, the fulcrum piece having a series of holes by which it may be adjustably attached by a pivot to the knife. The implement is designed to greatly facilitate trimming the hoofs of horses or other animals preparatory to shoeing them, the work being thus effected more quickly and with less muscular exertion.

MATCH BOX.—Howard Cramer, Newberry, Penn. This invention provides a box in which the matches are retained by their heads, slightly separated from each other, the matches being individually ignited as they are withdrawn, without setting fire to any of the others. The box may be readily filled when empty, and the improvement is designed to prevent

smokers or others using matches from carrying off a handful of matches when it is intended to supply grates but one.

SHAMPOOING HAIR AND SCALP.—William C. Voss, Geneseo, Ill. A steam shampooing device is provided by this invention, the device being also arranged to dry the hair and scalp after they have been subjected to the action of steam. It is designed that a cleansing compound shall be sprayed upon the hair and scalp during steaming, the arrangement being such as to prevent the hair and scalp from being too highly heated. A belows or air attachment may be used or not as desired, and either hot or cold air used in drying the hair and scalp.

SYRINGE.—Joshua M. Wardell, Cadillac, Mich. This invention provides novel features in the nozzle and body of the syringe, whereby water of the required temperature may be discharged in a circle of jets or streams from the nozzle.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

STAR MAPS FOR EVERY MONTH IN THE YEAR. Specially prepared for use in North America. By Richard A. Proctor.—LUMINOUS STARS. A method for quickly learning the names and positions of the constellations, the movements of the planets, etc. By Alfred E. Beach. New York: Munn & Co. 1893. Pp. 35. Price \$2.50.

In this very elegant work we have given Proctor's celebrated star maps, twelve in number, for the night sky visible during different parts of the year. These maps are very elegantly printed in blue ground with the stars' constellation outlines, Greek letters and names in white. To make each map precise, the hours it corresponds to on each of six dates are given with each map. On the page opposite each map is given a full description.

The second portion of the work, "Luminous Stars," will have a more special interest, derived from its novelty as a delightful method of studying astronomy. The use of phosphorescent stars upon a dark background, or of dark stars upon a phosphorescent background, has already been described by Mr. Beach to the readers of the SCIENTIFIC AMERICAN. In this work we have the same subject put into permanent shape for the library and home. It is a home book—one which will do much to popularize the fascinating study of astronomy.

THE LIVING METHOD FOR LEARNING HOW TO THINK IN FRENCH. By Charles F. Kroeh, A.M. London, and Hoboken, N. J. Published by the author. Pp. 140, vii, ii. Price \$1.

Prof. Kroeh, in stating the basis of his method of learning French, states that you cannot speak French while thinking in English. To learn French he observes it is not necessary to live in France, but you must live in French. He therefore directs the student to associate complete French sentences with his daily actions. This book therefore carrying out this idea gives French sentences which describe the general actions of any one's daily existence, and presents an ingenious, easy, and practical system of rapidly acquiring familiarity with this beautiful language. It is decidedly the best work for the learner that has come under our notice. The "living method" is an outgrowth of the "natural method." As a species of appendix to this work, the author is preparing to supply at \$5 a set of phonograph cylinders which will give the pronunciation of the fundamental French sentences, the object being not to supersede the teacher, but to lighten his labor by enabling the learner to practice at home.

POOR'S HANDBOOK OF INVESTMENT SECURITIES. A supplement to Poor's Manual of Railroads 1892-93. Pp. 986.

We have to acknowledge the receipt of this standard work. Any review of it seems quite unnecessary, in the light of the authoritative stand which has been taken by Poor's Manual of Railroads among financiers. What that book does for railroads, this does for various investment securities. Every kind of information required by the general investor as regards the character of the investments, interest paid, when payable, and range of values of securities, and other allied topics, will be found to be exhaustively treated here. It is the third annual issue, and it is safe to say that many of those possessing the one work will have equal necessity for the other.

LOGARITHMIC TABLES. By Professor George William Jones, of Cornell University. Fourth edition. London: Macmillan & Co. Ithaca, N. Y.: George W. Jones. 1893. Pp. 160. Price \$1.

These tables will be welcomed by computers from their particularly clear arrangement. The numbers are widely spaced, and every facility is given for the application of differences in finding logarithms to the final figure. The range covered may be deduced from the fact that there are 18 different tables. Besides the tables of logarithms and logarithmic functions, some very valuable collection of data, etc., are given under mathematical constants used in chemistry, engineering and physics. The author offers a reward of \$1 for the first notice of each error, an excellent guarantee for the subsequent editions which we are sure will follow the present.

THE MINING DIRECTORY AND REFERENCE BOOK OF THE UNITED STATES CANADA AND MEXICO. George W. Ramage, editor. Chicago, Ill.: Pook Bros., publishers. 1892. Pp. 551. Price \$10.

To those interested in mining engineering, and all subjects connected therewith, the above work would seem to be of very great interest and in many cases indispensable. The book contains a most exhaustive list of all kinds of mines and quarries throughout the United States and Provinces. It also gives compilations of all

different mining laws of the States. Even from the point of view of its advertisements only, the work will have definite value for mining engineers and capitalists.

HOW TO KNOW THE WILD FLOWERS: A GUIDE TO THE NAMES, HAUNTS, AND HABITS OF OUR COMMON WILD FLOWERS. By Mrs. William Starr Dana. Illustrated by Marion Satterlee. New York: Charles Scribner's Sons. 1893. Pp. xv, 298. Price \$1.50.

This is not a botany, but is designed to have a place in the family where the botany with its technical description and its tedious Latin names would lie neglected in the corner. There is no ignorance so profound and startling as the ignorance shown by even intelligent and educated people about the commonest plants and flowers about them. This work is intended as a guide and aid to such, and not only would the reader learn to have, as the authoress says, a "bowing acquaintance" with old neighbors, but would with little effort be able to call them by name. The work possesses literary merit, and when the description seems to the authoress to wax a little dry, it is redeemed by some happy quotation or by some song of summertime. The accuracy and precision of the description is not sacrificed, however, and the scientific treatment is preserved throughout. There are separate indices for the Latin, the technical, and the common English names of the various flowers. The plants may be readily identified by the illustrations which are very carefully executed and are quite numerous, there being 104 plates, most of which were sketched directly from nature. The book is handy in form and may be easily carried in a stroll through the woods.

MANUAL OF IRRIGATION ENGINEERING. By Herbert M. Wilson, C.E. First edition. New York: John Wiley & Sons. 1893. Pp. xx, 351. Price \$4.

Irrigation is every year acquiring increased importance in the Western States. It will yet modify enormous areas of our Western Territories, and may even bring about climatic changes. This work is therefore particularly timely and represents what has been a long felt want. It is written thoroughly up to date and does not confine itself to the smaller features of irrigation, but treats of the great dams of the world as well as of the irrigating conduit. Numerous illustrations of structures and many diagrams are interspersed throughout the text, so that the whole subject is thoroughly covered and illustrated. The measurement of water is treated very interestingly, including the current water meters, the miner's inch, etc. We cordially recommend the book to our readers.

Any of the above books may be purchased through this office. Send for new book catalogue just published. MUNN & CO., 361 Broadway, New York.

SCIENTIFIC AMERICAN BUILDING EDITION. APRIL, 1893, NUMBER. (No. 90.)

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1. **Elegant plate in colors, showing an attractive cottage at Villa Park, Mt. Vernon, N. Y.** Floor plans and perspective elevations. Cost \$4,500 complete. Mr. Walter Stickels, architect, Mt. Vernon, N. Y.
2. **Plate in colors showing the handsome Queen Anne residence of the Hon. Craig A. March, at Plainfield, N. J.** Two perspective views and floor plans. Mr. Chas. H. Smith, architect, New York. An excellent design.
3. **A dwelling near Longwood, Mass., erected at a cost of \$5,200 complete.** Perspective views and floor plans. A model design.
4. **A dwelling at Chester Hill, Mt. Vernon, N. Y., erected at a cost of \$4,750 complete.** Floor plans, perspective view, etc. Mr. W. H. Symonds, architect, New York.
5. **Engraving and floor plans of a residence at Oakwood, Staten Island, N. Y., erected at a cost of \$3,540 complete.** Mr. W. H. Mersereau, architect, New York.
6. **A stable erected at Bridgeport, Conn.** A unique design.
7. **A residence at Wayne, Pa.** A very picturesque design, treated in the Queen Anne and Colonial styles. perspective elevation and floor plans. Cost, \$6,250 complete. Messrs. F. L. & W. L. Price, architects, Philadelphia.
8. **Engraving and floor plans of a Queen Anne residence at Newton Highlands, Mass.** Cost, \$6,000. Messrs. Rand & Taylor, architects, Boston.
9. **A square-rigged house, recently erected at Allston, Mass.** Cost, \$2,600. Plans and perspective elevation. Mr. A. W. Pease, architect, Boston, Mass.
10. **The Fifth Avenue Theater, New York.** View of the main front, showing the terra cotta decorations; also view showing the iron framework, erected by the Riverside Bridge and Iron Co., and a view showing the fireproof arching, erected by the Guastavino Fireproof Construction Co.
1. Sketch of a dining-room fireplace.
2. Miscellaneous contents: An improved woodworking machine, illustrated.—A new edge moulding or shaping machine, illustrated.—The box industry.—Natural gas at Geneva, N. Y.—Plaster of Paris floors.—Inside sliding window blinds and screens, illustrated.—City pavements.—The Alberene laundry tub, illustrated.—The "Murray" phaeton, illustrated.—An elegant bath tub, illustrated.—To thaw out frozen pipes.—Improved plane irons, illustrated.

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The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Acme engine, 1 to 5 H. P. See adv. next issue.
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Best Handle Machinery. Trevor Mfg. Co., Lockport, N. Y.

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William Jessop & Sons, Ltd., the celebrated steel makers, observe the centennial of their firm this year.

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The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

Canning machinery outfits complete, oil burners for soldering, air pumps, can wipers, can testers, labeling machines. Presses and dies. Burt Mfg. Co., Rochester, N. Y.

An investor desires to communicate with inventors needing funds to patent, develop, or promote their inventions. References. "Financial," Scientific American, New York.

Competent persons who desire agencies for a new popular book of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York.

For Sale—Patent No. 424,106, lubricator. Inventors, Vilh. Lohmann and Carl Andersen, Copenhagen. Described in Scientific American, April 8, page 219. Address V. L., P. O. box 2212, New York.

Inventors and Business Men Take Notice—We incorporate stock companies for any business. Send 10 cents for report blanks. Don't wait. Write now. It may be worth money to you. Backus & Co., Cleveland, Ohio.

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.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(4828) J. P. asks: What solution should be used in a Smee's cell in order to get the most strength from the cell? A. The solution used in the Smee battery is sulphuric acid 1 part, water 9 parts. The zincs must be well amalgamated and the platinized silver or carbon should be in good condition to insure perfect depolarization.

(4829) H. B. asks: Can you let me know anything concerning metal plating with Russian white metal for knives and forks? That is, the metal is melted. A. The Russian white metal is probably only a name given to Banca tin, with possibly a small admixture of bismuth to make it flow easy. It is being extensively advertised in the West. The work done with it is excellent. The directions are sold.

(4830) P. F. M. says: As your paper is one of our "standard text books" in our High School, will you please answer in your "Notes and Queries:" 1. If water at 39° Fah. were perfectly confined, could it be frozen in any temperature; i. e. could it not expand? A. Water when confined at the temperature of greatest density, 39°, upon being cooled below the freezing point, produces an immense pressure, and begins to freeze at a few degrees below 32°. The increasing pressure from the expansion of the ice so retards the freezing of the remaining water that a temperature below zero may be reached before it is all frozen. 2. Will you please give rule for finding horse power of ordinary locomotive, with cylinders 17 x 24 and 5 foot drivers, steam pressure in boiler 130, and speed 15 miles per hour? 30 miles? A. The actual horse power of a locomotive is so variable that any computation

depends entirely upon the cut-off, and the cut-off is governed by the actual pull required of the engine. Assuming a heavy train at 15 miles per hour and a mean piston pressure of 50 pounds per square inch, the piston speed will be approximately $15 \text{ m.} \times 5,280 \text{ feet} = 79,200 \text{ feet}$ per minute and $\frac{79,200}{\pi \times 17} = 1,320$ revolutions per minute. As a revolution is equal to twice the stroke, then $88 \times 4 \text{ feet} = 352 \text{ feet}$ piston speed per minute. The area of the cylinders is $2 \times 226 \text{ square inches} = 452 \text{ square inches} \times 50 \text{ pounds mean pressure} \times 352 \text{ feet piston speed per minute} = 7,955,200$ foot pounds per minute = 241 horse power.

The possibilities of such an engine are about 400 horse power. The increase in power of the engine is not proportional to the increase in speed, and for 30 miles may be no more than 300 horse power. 3. Why are the wheels of a locomotive larger near the flange? And how can it pass a curve when the wheels are worn half an inch smaller next to the flange? A. The taper tread on driving wheels is to partially compensate by difference in circumference made by the wheel flanges hugging the outer rail on curves, the wheels slipping to make up for the loss of compensation by taper. Wheels that are grooved run hard on curves, as well also on straight tracks.

(4831) G. J. L. writes: To settle a dispute will you kindly state what scientific astronomers suppose or figure the temperature of the boundless space of the firmament outside of the influence of suns and worlds? If it were possible to have such a thermometer, what would it register if placed in the opposite direction from the sun, as far away from the earth as the sun, where the sun's rays would not be affected by friction of atmosphere whatever? A. The temperature of interplanetary and stellar space is supposed not to be lower than absolute zero, or 461° Fah. below zero Fah., or 493° below freezing temperature.

(4832) L. A. L. writes: Last fall I dug a well here for domestic use. I struck water at 26 feet, in a gravel bed, immediately below a stratum of blue clay. We have used the water all winter and always considered it good (though hard) until a week or so ago, when it developed a peculiar minerataste, having a lot of reddish sediment in it. I inclose a sample of this latter, which I took from less than a gallon of the water. I would like to know what is the reason of it, and also if it is safe to use the water? A. The sample appears to be oxide of iron and clay. Probably it is harmless, but not pleasant to drink. We recommend putting a drive pipe in the bottom of the well and connecting directly with a pump to draw water from a deeper and possibly more satisfactory stratum.

(4833) L. S. F. asks the fastest way to find how many gallons a cistern or tank can hold, and if it is better to pump water into a tank through the bottom. I can use the pipes to lead the water off or where we need it; but I think it is much harder on the pumps when the tank is half full. A. If tank is round, square the diameter in feet and decimals. Multiply the product by 0.7854. Multiply last product by the height in feet, for cubic feet. Multiply, the cubic feet by $7\frac{1}{2}$ for gallons. You can pump into bottom of the tank or the distributing pipe without loss of power.

(4834) L. W. B. asks if copper is more difficult to heat by hammering than soft iron. A. Copper develops less heat than wrought iron by hammering or compression. Its specific heat is considerably less than that of wrought iron. It also parts with its heat faster than iron.

(4835) B. asks: Would the atmospheric pressure on a piece of gold leaf be greater than on a spherical piece of gold which displaces the same amount of air? A. The pressure is as the surface exposed to atmospheric pressure. The total pressure would be much greater on the gold leaf.

(4836) G. S. N. asks how the induction coil in a Blake transmitter for a telephone is wound, amount of wire, etc. A. The induction coil in the Blake transmitter consists of a bundle of soft iron wires, No. 20, inserted in a thin spool, about $2\frac{1}{2}$ inches long, with two layers of No. 20 wire on the spool and ten layers of No. 36 wire wound in the primary wire, an intervening layer of writing paper being tightly wrapped on the primary before winding the secondary. The direction of the winding in either case is immaterial.

(4837) G. D. C. asks: 1. Will the gravity or Crowfoot battery run the simple electric motor in Experimental Science? If so, how many cells will it take to get enough power to run a sewing machine or other light machinery? A. The gravity battery, owing to its resistance, is not suitable for running an electric motor. 2. What size wire should I use to make one half the size of the one described? I have completed the one man power, now I want a smaller one. A. If you intend to make a smaller motor, one-half the size linear, No. 20 wire will be about right.

(4838) J. N. F. asks: How many strokes per minute can an air compressor, similar to the one used by the Westinghouse Air Brake Company, be driven and work successfully? Or, in other words, how many cubic inches of air will valves of similar size and capacity receive and deliver per minute? A. The Westinghouse air brake can safely make 250 single strokes per minute, and will deliver air at nearly their full capacity, the valves being equal to their pumping capacity. We cannot name the cubic inches.

(4839) F. & T. ask how many storage batteries it would take to run eight lights (incandescent) for five or eight hours, provided the cells were about $12 \times 7 \times 5$? A. The number of storage batteries required to run your lights depends upon the resistance of the lamps. For eight 20 volt lamps you will need 11 cells; for eight 30 volt lamps you will require 16 cells; for eight 50 volt lamps you will require 26 cells; but these cells will run about 20 such lamps.

(4840) J. W. D. writes: I am winding some field magnets with two wires in parallel, and I wish to determine their resistance when so connected. The two wires are of different sizes. One is No. 22 double cotton-covered and the other is No. 21 bare. I do not know how much of each yet, so I would be greatly obliged if you could give me some general rule for finding the resistance. I should also like to know the comparative re-

sistance of the fields and armature in shunt and series wound dynamos. A. It is bad practice to wind the field magnet with wire of two sizes. No. 22 wire runs 60 feet 6 inches to the ohm, while No. 21 is 76 feet 4 inches to the ohm. In a shunt wound machine the resistance of the field magnet should be about fourteen times that of the armature, while in a series wound machine the resistance should be as small as possible consistent with the proper excitement of the field magnet.

(4841) B. J. E. says: If oil put in the cylinder of an engine would pass through the exhaust pipe (into a well into which the suction pipe runs) and be drawn into the boiler with the water, would the oil ignite or cause boiler explosion if taken up? Or would it take a long time before enough oil to get into the boiler, as the boiler pipe, of course, is at the bottom of the well? A. The oil from the exhaust pipe in the well might do no harm for a while; but its gradual accumulation would cause it to come within the range of the suction pipe and to the boiler. In the boiler it will tend to gather the dirt and loose scale, forming masses that agglomerate and finally lodge on the fire sheet, cause it to be overheated, bulge, and if not discovered in time may cause a disaster. Many a boiler has made a large bill of expense from this cause alone. The oil will not ignite in the boiler; the danger is from lodging over the fire and allowing the boiler plate to be heated red hot and to bulge.

(4842) P. B. asks: 1. How many volts does it take to run the small electric motor described and illustrated in No. 641 of the SCIENTIFIC AMERICAN SUPPLEMENT? A. Two volts. 2. Of what resistance is the field magnet and of what resistance is the armature? A. The resistance has not been measured. We think, however, that the entire resistance of the machine is not more than three or four ohms.

(4843) E. E. J. says: I am desirous to know which is the hardest to bend, a solid bar, say 2 inches in diameter and 6 feet long, or a hollow bar of the same dimensions having a 1 inch hole in the center. What is their difference, both in strength and price of manufacture? A. The solid bar is the hardest to bend, i. e., it will bear the greatest load, and costs less than a hollow bar, which by your dimensions would have to be a double extra strong pipe, which costs twice as much as a solid bar of the same size. On the other hand, the same weight of metal as a tube is harder to bend, or will bear more weight than a solid bar, both of the same length.

(4844) C. H. S. says: Will you please give me a rule, through Notes and Queries, for finding the remaining bearings of a survey when the interior angles, length of sides, and the bearing of one side are given? A. Plot the survey on paper with the side having the given bearing for the base, and draw the meridian at the proper angle with the side given. Use the difference of the given course and the meridian for adjusting the several angles of the plot. Make the necessary changes as the angles carry the lines across the cardinal points of the compass. Then retrace the angles and bearing the reverse way to prove the work. See Gillespie's Surveying, by Staley, a complete guide to the survey and plotting of land. \$3.50, mail.

(4845) W. H. P. writes: I have a storage battery which, after charging for about twenty hours with large dynamo, it will only run about two hours. It looks to me as though it runs down while not in use, as it gives a large spark when freshly charged. The negative plates look all right, but the positive plates look empty. If so, how can I refill them? Is there any article on making and repairing storage batteries in the SCIENTIFIC AMERICAN? If so, what number? A. Possibly your storage battery is short-circuited, or it may be that you are using it on machines having too little resistance. We think you have destroyed your storage battery by subjecting it to the action of too much current. Better send the battery to the makers for refilling. We hardly think you will be able to refill the plates yourself. You will find many references to articles on storage batteries in our new SUPPLEMENT catalogue, which is mailed to any address without charge.

(4846) A. L. E. writes: In your issue of March 4, 1893, page 134, C. L. Wolley describes a storage cell. What is the use of the red lead paste? How are the connections made with dynamo or primary cells when charging it? How long should the connection between dynamo and storage cell be kept up? When charged, how long will it be before it is necessary to charge it again? Can you give a description of a small dynamo, one say that would run from 10 to 20 incandescent lamps? A. Red lead paste is used on storage battery plates to facilitate the forming of the oxide, the red lead being more easily converted into lead peroxide than the metallic lead. The two poles of the battery are connected with the binding posts of the dynamo for charging, and the battery should always be connected up in the same manner. It requires from five to seven hours to charge a storage battery. We cannot, within these limits, give you full information in regard to the construction and use of storage batteries and dynamos. We refer you to our SUPPLEMENT catalogue.

(4847) C. P. P.—1. Please give me a list of all the metals, as I am unable to find a complete list, including the later discoveries. A. A list of metals will soon be published in the SCIENTIFIC AMERICAN. 2. What is the fastest railroad ever made? When and where was it made? A. The fastest railroad time is claimed at the rate of 80 to 90 miles per hour on the Central Railroad of New Jersey, between Bound Brook and New York. See SCIENTIFIC AMERICAN, October 24 and November 21, 1891, for particulars of fast railway time.

(4848) H. G. M. writes: I am designing an automatic plug for electric light circuits. The plan requires a substance of great resistance, which will expand greatly when hot. Now what I want to know is, what will this substance have to be to heat and expand quite a little with about 4 amperes and 110 volts? A. We know of no substance better adapted for your purpose than brass. Compound bars of brass and steel are often used for thermostatic bars. Possibly such a bar would be better than one of brass only. Neither the brass bar nor the compound bar would have great resistance.

(4849) L. P. writes: I have built my house from plans made by you, and am more than pleased with it. Since then a number of lightning rod agents have been around to try to sell me their rods.