

Business and Personal.

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 next issue. The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

Wanted—Two Machinists that are good on general jobbing. Address H. Gillett & Son, Lake City, Wabasha Co., Minn.

Poirrier's Anilines and Copying Composition. Copygram Co., 104 Duane St., N. Y. See adv. p. 220, last No.

For manufacturing sites, coke and gas coal lands, their qualities and prices, address Mellon Brothers, Pittsburg, Pa.

Mackenzie Cupola and Blower. The very best apparatus for melting iron; and with water bosh for smelting lead, silver, or copper ore. Send for pamphlet. Smith & Sayre Manuf. Co., 21 Courtland St., New York.

Backus Water Motor, 30 in. double, nearly new; for sale low. Gould & Eberhart, Newark, N. J.

Penfield (Pulley) Block Works. See illus. adv. p. 220.

LAKE VIEW HOUSE, LIVONIA, N. Y., Feb. 9, 1880: H. W. Johns Mfg. Co., 37 Maiden Lane, New York. DEAR SIRS: We have used your Paint on our buildings, and find one coat goes as far and covers as well as two coats of lead and oil.

Yourstruly, E. R. BOLLES. \$60 saved in one day on one engine by an intelligent use of the Indicator. See Lyman's Treatise on "The Use of the Steam Engine Indicator." Price \$1. Address Edward Lyman, C. E., New Haven, Conn.

Will pay \$25 for best article on Acoustic Telephones and Lines. Must be plain to ordinary readers, illustrated with plans, etc. Rejected MSS. returned. Good suggestions credited. Address "Teachers' Guide," Mallet Creek, Ohio.

For Standard Turbine, see last or next number.

Foundry and Machine Shops for sale. Established in 1846. Write for description to E. J. Hoern, Addison, Steuben Co., N. Y.

Recipe for sale for making a superior deep black Shoe Polish, without acids, etc. Address C. F. Doring, Troy, N. Y.

4 to 40 H. P. Steam Engines. See adv. p. 220.

The 1880 Pennsylvania Lawn Mower.—Light draught and easily adjusted. Machines warranted. See illus. adv. last week. Lloyd, Supplee & Walton, Philadelphia, Pa.

Wanted—Glass and Tin Fruit Cans; large quantities. Send price lists to E., Buff Bay, Jamaica, West Indies.

All kinds Machine Drawings. Inventors' work a specialty. Hours, 9 to 6. Wm. D. Skidmore, 733 Broadway, New York.

Brass Castings; bottom prices. H. B. Morris, Ithaca, N. Y.

For Alcott's Improved Turbine, see adv. p. 204.

Boiler Feed Pump, with tight and loose pulleys; sure to work. Price \$32. York & Smith, Cleveland, O.

For Sale.—An Agricultural Establishment, consisting of two story wood & machine shop, foundry, office, & storeroom; water power. Address Box "I," Weldon, N. C.

Boat Engines, for sidewheel boats drawing 6 to 12 in; direct acting; link motion—cheap. Box 559, Owego, N. Y.

For Sale.—Four Boilers, 100 horsepower each, return drop flue; A 1 condition; \$1,500 each. 1 Berryman Heater, 42 x 96; A 1 condition; \$100. D. L. Einstein, 16 White St., New York.

Corrugated Traction Tire for Portable Engines, etc. Sole manufacturers, H. Lloyd, Son & Co., Pittsburg, Pa.

For Patent Shapers and Planers, see illus. adv. p. 188.

Spokes and Rims, white oak and hickory, best quality, to any pattern, and Hammer Handles of best hickory. John Fitz, Martinsburg, West Va.

For the best Stave, Barrel, Keg, and Hoghead Machinery, address H. A. Crossley, Cleveland, Ohio.

Collection of Ornaments.—A book containing over 1,000 different designs, such as crests, coats of arms, vignettes, scrolls, corners, borders, etc., sent on receipt of \$2. Palm & Fechteler, 465 Broadway, New York city.

Best Oak Tanned Leather Belting. Wm. F. Forepaugh, Jr. & Bros., 531 Jefferson St., Philadelphia, Pa.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 40 John St., N. Y.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Stave, Barrel, Keg, and Hoghead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Sheet Metal Presses. Ferracute Co., Bridgeton, N. J.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Wright's Patent Steam Engine, with automatic cut-off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y. Bradley's cushioned helve hammers. See illus. ad. p. 205.

Forsyth & Co., Manchester, N. H., & 213 Centre St., N. Y. Bolt Forging Machines, Power Hammers, Comb' Hand Fire Eng. & Hose Carriages, New & 2nd Hand Machinery. Send stamp for illus. cat. State just what you want.

Electrical Indicators for giving signal notice of extremes of pressure or temperature. Costs only \$20. Attached to any instrument. T. Shaw, 915 Ridge Ave. Phila.

Instruction in Steam and Mechanical Engineering. A thorough practical education, and a desirable situation as soon as competent, can be obtained at the National Institute of Steam Engineering, Bridgeport, Conn. For particulars, send for pamphlet.

Hydraulic Jacks, Presses and Pumps. Polishing and Buffing Machinery. Patent Punches, Shears, etc. E. Lyon & Co., 470 Grand St., New York.

Portable Forges, \$12. Roberts, 107 Liberty St., N. Y.

Telephones repaired, parts of same for sale. Send stamp for circulars. P. O. Box 305, Jersey City, N. J.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 188.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Large knife work a specialty. Also manufacturers of Solomon's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 188.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Company, Buffalo, N. Y.

Wanted—A Second-hand improved Country Campbell Press, 31 x 46, for \$500 cash. A. G. Blair, Waynesboro, Franklin Co., Pa.

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y. Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

For Wood-Working Machinery, see illus. adv. p. 221.

Wanted—The address of 40,000 Sawyers and Lumbermen for a copy of Emerson's Hand Book of Saws. New edition 1880. Over 100 illustrations and pages of valuable information. Emerson, Smith & Co., Beaver Falls, Pa.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co., Box 423, Pottsville, Pa. See p. 189.

Eclipse Portable Engine. See illustrated adv., p. 222.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 62.

Eagle Anvils, 9 cents per pound. Fully warranted.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

For Separators, Farm & Vertical Engines, see adv. p. 188.

Best Turkey Emery in kegs, half kegs, and cans; liberal rates by the ton. Greene, Tweed & Co., N. Y.

Blake's Belt Studs. The best and cheapest fastening for rubber and leather belts. Greene, Tweed & Co., N. Y.

The Horton Lathe Chucks; prices reduced 25 per cent. Address The E. Morton & Son Co., Windsor Locks, Conn.

\$275 Horizontal Engine, 20 H. P. See page 221.

Emery Wheels of all kinds, and Machines at reduced prices. Lehigh Valley Emery Wheel Co., Weissport, Pa.

For Sale.—Two Windmill Patents, and set of patterns for same. None better. F. C. Maxwell, Columbus, O.

Judson's Sectional Assay Furnaces. No. 1, \$45; No. 2, \$70. W. E. Judson, Cleveland, O.

Pat. Steam Hoisting Mach'y. See illus. adv., p. 221.

Nellis's Cast Tool Steel, Castings from which our specialty is Flow Shares. Also all kinds agricultural steels and ornamental fencings. Nellis, Shriver & Co., Pittsburg, Pa.

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Circulars on application. Pittsburg Steel Casting Company, Pittsburg, Pa.

Self-feeding Upright Hand Drilling Machines of superior construction. Pratt & Whitney Co., Hartford, Ct.

Rue's New "Little Giant" Injector is much praised for its capacity, reliability, and long use without repairs. Rue Manufacturing Co., Philadelphia, Pa.

For best low price Planer and Mather, and latest improved Sash, Door, and Blind Machinery, send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

For Millings, Mill and Mill Furnishing, see adv. p. 222.

Elevators.—Stokes & Parrish, Phila., Pa. See p. 221.

NEW BOOKS AND PUBLICATIONS.

DIRECTORY OF THE FLOUR MILL OWNERS AND MILLWRIGHTS OF THE UNITED STATES AND CANADA, 1880. Milwaukee, Wis.: E. Harrison Cawker, editor U. S. Miller.

Business men having or desiring trade with millers and millwrights will appreciate the value of a list of names with post office addresses covering so fully the great flouring industry. The book shows a marked improvement on the former directory in size and fullness of information.

ANUARIO UNIVERSAL. Almanaque Estadístico, Administrativo y Comercial para 1880. Mexico: Filomeno Mata, editor. 32mo, cloth, pp. 405.

Well filled with information in relation to the governmental, social, and commercial affairs of the State of Mexico, with a plan of the capital etc.

SEWERS AND DRAINS FOR POPULOUS DISTRICTS; WITH RULES AND FORMULÆ FOR THE DETERMINATION OF THEIR DIMENSIONS UNDER ALL CIRCUMSTANCES. By Julius W. Adams. Illustrated. New York: D. Van Nostrand, 8vo. cloth, pp. 228.

In 1857 Mr. Adams was charged with the planning of the sewage system of the city of Brooklyn, covering an area of twenty square miles; and as chief engineer of the Board of City Works he has taken a controlling part in the development of the great work. The constant inquiry for detailed information in regard to the system pursued has led to the preparation of this volume, in which he lays down the principles and describes the methods which he believes to be best adapted to the economical and successful sewerage of towns and cities. The work is eminently practical and to the point.

SAWS: THE HISTORY, DEVELOPMENT, ACTION CLASSIFICATION, AND COMPARISON OF SAWS OF ALL KINDS. By Robert Grimshaw, Ph. D. Philadelphia: Claxton, Remsen & Haffelfinger. Quarto, cloth, pp. 160. Price \$2.50.

Reserving sawing machines for another treatise, Mr. Grimshaw here describes with great fullness and with a profusion of illustrations, the saw blade, in all its varieties. The manufacture of saws and the various processes of setting, swaging, gumming, and filing of saws, and related matters are treated in appendices, which contain also many useful tables of gauges, log measurements, etc., and an alphabetical list of all United States saw patents from 1790 to 1880. The book is handsomely made and well indexed.

FREE SHIPS. By John Codman. New York: G. P. Putnam's Sons. Pp. 54, paper. Price 25 cents.

Second edition of No. VI. of Putnam's Economic Monographs. Adds to the original arguments for the restoration of the American carrying trade by the free importation of ships, a review of the plans of Senator Blaine and Secretary Sherman.

A MANUAL OF TOBACCO CULTURE. By R. B. Davis. Hickory, North Carolina: Hall Brothers. Paper, pp. 30. Gratis.

Sets forth the advantages of the Piedmont section of North Carolina for the production of yellow tobacco, and treats the cultivation and curing of the tobacco plant with special reference to the condition and requirements of Piedmont.

SAWYER'S HAND BOOK.

Emerson Smith & Co., extensive saw manufacturers at Beaver Falls, Pa., have issued an attractive hand book, in which they not only tell the public where to purchase saws, but the book also contains many useful hints on saw mills and machinery, how to straighten saws, their proper speed, prevention of heating, etc.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) W. E. asks: Is the apex of the zodiacal light in the same direction from the sun as the aphelion point of the earth's orbit? A. The zodiacal light extends out on each side of the sun nearly in the plane of the ecliptic.

(2) W. B. asks: 1. Is there an odorless coal oil in the market? A. No. 2. What chemical will dissolve old rubber boots? A. There is no practical solvent. See pp. 48 and 105, Vol. 39, SCIENTIFIC AMERICAN.

(3) F. A. P. asks: Is there anything that printers use to put in their ink, vermilion, lake, or black, for instance, which will give a lasting gloss? If so, what is it and how is it used? A. Use a fine, well milled ink. We know of nothing that will impart greater gloss to ink used in type work.

(4) L. F. T. asks how to make an imitation of ground glass by the use of acids or some inexpensive material other than machinery. A. The sand blast or wheel is the cheapest method of frosting glass. The only acid that can practically be applied is hydrofluoric, produced by the action of warm sulphuric acid on powdered fluorspar. Hydrofluoric acid in gutta-percha bottles is quoted at \$2.50 a pound in New York.

(5) A. J. P. writes: I wish for some process of duplicating writing by which I may secure more copies—say 500—and more distinct than by the new gelatine pad process; also an apparatus not so expensive as the electric pen or the papyrograph, which cost, I believe, \$35 or \$40. I wish something as cheap as the first, and effective as the last. I see no reason why the latter might not be afforded for \$5.00. A. Try the following: Use the gelatine pad made with a large proportion of glue. Soak writing paper in alum water to saturation and dry carefully. Write with any ink on the prepared paper and use as in the gelatine pad process; the parts of the gelatine surface not protected by the ink will be affected by the alum so as to leave a stencil which can be used by inking with a roller as in the electric pen process.

(6) S. A. asks (1) whether it is advisable to build a cistern under the basement of a dwelling house. The architect of the building insists that it should be under the building; other parties contend that it will prove injurious to the health of the inmates, on account of condensed air in cistern. We would like your opinion on the subject. A. We do not advise placing the cistern under the house as proposed. 2. What are the proportions of the best concrete? A. 5 parts gravel or sharp sand, 1 part ground quicklime (fresh). Mix with a shovel, and slake with water into a thick mortar.

(7) R. G. asks: 1. Does the velocity of a projectile from a gun outside the gun ever exceed the highest velocity inside the gun? A. No. 2. Or another phase of the same principle: does a ball thrown from the hand ever travel more rapidly than the hand in throwing it? A. Possibly yes, as the muscles of the fingers give an impulse to the ball.

(8) E. L. K. asks if there is a mixture of any kind that will remove old paint from wagon bodies? A. There is no mixture that will remove the paint successfully and leave the wood in good condition to repaint. It is a better plan to soften the paint by heat from a hot iron, or alcohol or gas flame held near it, and then scrape it off with a suitable knife or chisel.

(9) W. R. H. asks: 1. Should steel for permanent magnets be hardened? If so, what temper is best? A. The steel should be hardened and drawn to a

deep yellow. 2. Where can I find information on minor details of construction of both permanent and electromagnets? A. In SUPPLEMENTS 142, Telephones; and 182, Electromagnets.

(10) F. E. G. asks (1) for dimensions for a boiler of an engine 1 inch by 2 inches. A. About six square feet heating surface. 2. What should be the thickness of plates of copper and iron for such a boiler? A. Thickness depends upon diameter of the boiler. 3. What would be pressure to the square inch to raise a valve 1/2 inch in diameter and center of valve 1 inch from fulcrum, and lever 6 inches long, and weight 3 lb. on end? A. 106 lb. per square inch nearly.

(11) F. W. S. asks if there is any method of deadening the noise of presses by any substance that could be placed under the feet of the machines. I run two presses, an 8 Gordon and an Acme cylinder, in the second story of a brick building, and the jar and noise is annoying to tenants on the floor underneath. A. We think if the frames of the presses were set on pieces of thick india rubber, and the floor deadened in any of the usual modes, the presses would cease to be a nuisance.

(12) R. K. asks: When does a stationary engine run backward or forward, or, in other words, which way does an engine run when the balance wheel runs from the cylinder or power? A. If the top of the balance wheel runs from the cylinder, the engine runs forward.

(13) W. R. W. asks: 1. When and where was the ship known as the Three Brothers (formerly the Vanderbilt) built, and who was her first captain? A. 1856, at Greenpoint, L. I., Captain Le Fevre. 2. What is her tonnage, and is she the largest sailing vessel now existing? A. 3,360 tons; the largest American sailing ship, but we believe there is a larger English ship.

(14) W. T. asks: 1. Can I separate the albumen from ordinarily albumenized paper after a photo has been printed on it, so as to leave a temporary film, to be fixed to glass? If so, how? A. We know of no satisfactory way of doing this. Try the following: Slightly coat the face with a thin negative varnish, press the print down smoothly on the glass, and when the varnish has hardened, thoroughly moisten the paper with hot water, and carefully detach the paper. A little ammonia may be used with the water. It is better to print the photograph directly on the gelatin coated glass. 2. What colors could I use (water or oil) for lantern slides? What pigment and how mixed? A. The available pigments are Prussian blue, gamboge, carmine, veridigris, madder brown, indigo, crimson lake, raw and burnt sienna, caph brown, and van dyke brown. The aniline or coal tar dyes are also used, but, unfortunately, they are apt to fade. No particular method of mixing the colors is requisite; ordinary oil or water colors will do, but they must be ground extremely fine. The pencils must be small, and their points unexceptionable. Camel's hair is preferable. The best vehicle to use for thinning out the colors is ordinary megilp, and the smallest possible quantity only of this should be used; if excess is used, the colors will run. The best medium for laying on the first wash of color is a hot solution of isinglass. If the lime light is to be used the colors should approximate as nearly as possible to nature. Lamp and ordinary gas light is deficient in blue, the yellow preponderating; where these are used the tints must be arranged accordingly; greens must be bluer than natural, yellows inclined to orange, and all shades of violet eschewed. Consult Groom's "Transparent Printing on Glass." 3. How are the sheets of paper prepared for ordinary transfers, and what is the dull film on the face side? A. The pictures are printed on paper heavily sized with gum, the face being also gummied.

(15) J. A. E. asks: How can the rattling or bubbling of a kitchen or hot water boiler be prevented or remedied? I have one that is piped with 3/4 inch pipe, with 9 feet of pipe in the stove, with three return bends. A. When a coil is used in a stove instead of a water-back the diameter of the pipe should not exceed a certain proportion to its length, with the fewest possible turns, that the water as it warms can pass rapidly to the tank or boiler, and not be retained long enough in the coil to form steam or to get nearly as hot as it is possible, consequent with the pressure. Thus, short pipe, large diameter, with one bend, or water back with one ceplum, or if a chamber only, the water will take care of itself, according to gravity. Bubbling will be sometimes caused in a very hot tank when the pressure is relieved by drawing, on the same principle as water below 212° boils in a partial vacuum.

(16) E. R. asks how to deaden the noise of a foot lathe, so that it will not be heard in the rooms below. A. We take the following from the Workshop Companion: 1. Rubber cushions under the legs of the work bench. Chambers' Journal describes a factory where the hammering of fifty copper-smiths was scarcely audible in the room below, their benches having under each leg a rubber cushion. 2. Kegs of sand or sawdust applied in the same way. A few inches of sand or sawdust is first poured into each keg; on this is laid a board or block upon which the leg rests, and around the leg and block is poured fine dry sand or sawdust. Not only all noise, but all vibration and shock are prevented; and an ordinary anvil, so mounted, may be used in a dwelling house without annoying the inhabitants. To amateurs, whose workshops are usually located in dwelling houses, this device affords a cheap and simple relief from a very great annoyance.

(17) F. J. B. writes: I have some large Mata stone vases, with ornaments broken off in transportation, and for replacing need a nearly colorless and quickly setting cement that can be applied without heat, and that will stand outside weather if possible. Can liquid glass or white glue be prepared so as to answer the purpose? A. Try the following: Finely scraped old cheese, 1 1/2 parts; quicklime in fine powder, 1 part; mix thoroughly, moisten with milk to a paste, and use at once, as it hardens very quickly. Instead of milk a strong aqueous solution of water glass or borax may be used. White lead (in oil) applied on cotton gauze may also be used advantageously.

(18) C. W. C. writes: I am fixing up a small mill to grind feed for my stock. It has a pair of sixteen inch burrs which run vertically...

(19) A. B. writes: I wish to make some mirrors, will you give me formula for depositing the silver? Have tried carefully the Siemens method described in SUPPLEMENT No. 105, but do not succeed...

(20) J. J. C. writes: In receipt for cements in No. 9, current volume, you mention fresh beaten blood, etc., for Chinese cement; what kind of blood shall I use?

(21) G. B. writes: Some three weeks ago the town council engaged a man to dig a well for the public. He agreed to dig a 5 feet in diameter well for \$2 a foot in depth...

\$ 392x35 per foot and 3-92x35 feet=\$137.20

(22) J. W. writes: Please give an easy and practical method of setting a locomotive engine eccentric while on the road in case it should slip. A. If the position of the eccentric on the shaft is marked, as it should be, you have only to set the eccentric to the marks and fasten...

(23) E. De N. asks: Will a crooked pipe of the same size and length, having same pressure (for water head), pass as much water as a straight pipe would? A. No: every bend you make reduces the quantity delivered.

(24) A. S. D. asks: Do the steamboat inspection laws prohibit the use of portable boilers in small boats, such as small ferry boats, when the boiler is made of wrought iron and the tubes put close together as they are in portable sawmill boilers? A. They do not.

(25) F. A. writes: In answer to A. W. H. (7), of February 14, 1880, No. (7), I would say that I obtained a fair copy from an electrotype by means of the gelatin pad by saturating a cloth pad with the ink, then pressing it on the electrotype, and when dry, placing the same face down on the pad. If A. W. H. has a better method I will be obliged to him for instructions.

(26) J. W. C. asks: 1. Is tool steel better than machinery steel for magnets? A. Tool steel hardened and drawn to a yellow makes a good magnet if properly charged. 2. Will the Callaud battery answer as well as a Bunsen battery for a telephone? If not, why? A. Either will answer, but the Leclanche is considered the best battery for this purpose.

(27) R. H. G. asks: 1. What holds the smooth surfaces together that Professor Tyndall speaks of as being held as well in vacuo as in the open air? A. The force of adhesion. 2. Also of what is celluloid made? A. See p. 335, Vol. 39, SCIENTIFIC AMERICAN, query 46.

(28) M. J. L. asks: 1. What size should a boiler be (light as can be made) to raise and hold two or three pounds of steam, to run an engine not exceeding one horse power? A. To run a one horse power engine, it should have 2 to 15 feet fire surface. The thickness of metal may be 1-16 inch if the boiler is cylindrical. 2. How could the steam be gauged with perfect safety? A. Use both a pressure gauge and a safety valve, or if the pressure is not more than three or four lb. you can use a column of water as a safety valve.

(29) S. A. G. asks: 1. What makes the mark on sawed lumber. Does each tooth make a mark when a circular saw is used? A. If the teeth are evenly set, each tooth will make its own mark; but if not, some one projecting tooth will mark more distinctly than the others. 2. What would be the power required to run a boat 60 feet long and 20 feet wide—size of cylinders and boilers? A. For a stern wheel boat 66 feet by 20 feet wide, 2 engines, 10 inch cylinder and 30 inch stroke; one flue boiler 46 or 48 inches diameter and 18 feet long.

(30) C. B. G. asks: What is the best fire escape from a third or fourth story window that a lady could manage and carry in her trunk, and where could I get it? A. We think there is nothing better than a good strong knotted rope.

(31) P. A. H. asks how to make a strong battery out of a new pile Leclanche battery. A. The elements of Leclanche battery are not suitable for any other form. If you wish to make a strong battery see directions given in SUPPLEMENTS, No. 157, 158, and 159.

(32) R. E. M. writes: We have two saws, one 54 inches in diameter, the other 60 inches diameter. Now, if both run at the same speed, which will consume the most power in doing the same work? Both saws are alike in all respects but as mentioned. A. The larger one.

(33) E. J. C. asks: 1. Can I construct an induction coil of No. 36 wire and No. 16 or No. 24 wire? I have these sizes on hand. A. For a large induction coil, No. 16 will do for the primary and No. 36 for the

secondary. For small coils, use four or five layers of No. 18 or No. 20 for primary and No. 36 for secondary. 2. What size wire is generally used in sounders? I find 24 too large. A. Nos. 20 to 24 are used for local sounders, and for main line sounders Nos. 24 to 32, and in some cases wire as fine as No. 36 is used. The size depends entirely on the length or resistance of the circuit in which the instruments are used. 3. I constructed a telephone as shown in SUPPLEMENT, 142, Vol. 6, Fig. 4. It does not work as well as it should. Is it an exact representation of the Bell telephone? A. It is on the principle of the Bell telephone, and should work well if constructed according to the direction referred to.

(34) C. W. N. asks: How much will a 5/8 inch wire cable chain support? A. If you mean 5/8 inch diameter wire rope, about 14,000 lb.; if you mean chain of 5/8 inch diameter wire, about 26,500 lb. A safe working load is but one-fourth or one-fifth these weights.

(35) C. W. W. writes: A mechanical engineer of high standing claims that a pump will not draw water as high by running the pipe in a curve over a knoll as it would raise it vertically. As a proof of his assertion he states that it had been tried with a pump in good condition, to draw water out of a canal the bank of which was twenty-one feet eight inches above the level of the water. The pump was located about two hundred feet from where the pipe entered the canal. I claim that the pump or pipe must have been defective, as the only difference a curve would make would be what little additional friction the increased length of pipe, due to the curve, would have over a vertical lift equal to the highest point of the curve. I would state that the pipe in question was large enough to supply the pump under any condition. A. The curve makes no difference in the height the pump can lift, save only the increased friction, but the pipes must be tight; with the curved pipe as described, it is really a siphon in form, and if there be the slightest air leak, the air will collect at the top of the curve and thus stop the action of the pump. There should be a cock or valve at the highest point to let off the air.

(36) W. H. M. asks: 1. What are the requisite qualifications to become a locomotive fireman? A. Activity, faithfulness, sobriety, close observation, and a cool head. 2. Who are the proper persons to apply to for a situation? I don't think it is the master mechanic, as I have written to several and have received no answer. A. The master mechanic or superintendent. 3. In link motion, is it necessary for every hanger to be a little above or below the central line of motion? Will it not work just as efficient by being exactly upon the line of motion? A. It depends upon the proportion of the parts. 4. Which is the accepted mode of firing a locomotive boiler? A. There is no accepted mode, as the treatment differs with different fuel and different service; the best mode with any particular fuel and service is the result of experience.

(37) W. T. S. asks (1) whether 12 3/8 inch stay bolts are sufficient to stay the top sheet of a fire box 24x42 inch; one end of the bolts are turned into an eye, the other end running through a clevis with a nut on, steam pressure to be 120 lb. per square inch. A. No; you should have at least 30 stays, 3/4 inch or 7/8 inch diameter. 2. Would there be any objection in using steam from two boilers, by running a steam pipe from the smaller boiler into the larger one, running the pump on the smaller boiler to supply it with water? A. No.

(38) S. F. A. writes: We have a difference of opinion in the shop (U. P. R. R. machine shop) in regard to how a key should be fitted in a driving wheel. One party claims that the key should be fitted to bear the hardest, top and bottom; and the other party claims that it should be fitted to bear the hardest on the sides. A. The key should be a close fit at the sides, but have no draught; all the draught should be on top and bottom.

(39) W. H. D. asks how in using a "Richards" indicator for taking diagrams from steam engines, one is sure to have the proper spring inserted in the instrument. The indicator lent me has several springs all stamped with different numbers, which to an amateur like myself are very puzzling. I want to take diagrams from different engines, under varying pressures of steam, say with 20, 30, 40, 50 lb., and up to 100 lb. pressure in the boiler. I suppose I must change the springs for each rise or fall in pressure I work at, as the springs indicate such a course from some being stronger than others; 40 to 50 lb. will probably be what I will use most. A. The numbers on the springs are the number of pounds one inch in height of the cards made with that spring will represent. If you are using, say a spring marked 40, then in marking off the card, you will divide each inch in height into 40 parts, each part being one pound per square inch, and so with a spring marked 30, divide each inch into 30 parts, etc. There should be with the indicator a scale corresponding to each spring and marked 20 scale, or 30 scale, or 40 scale; these scales are to be used in measuring a card made by a corresponding spring.

(40) E. E. K. asks: 1. What is the weight of an ordinary locomotive without tender? A. For passenger engines 50,000 to 70,000 lb., for freight engines 70,000 to 80,000 lb. 2. What is the weight of the tender? A. Depends upon their capacity. 3. What proportion of the locomotive rests on the drive wheels? A. In passenger engines about two-thirds, in freight engines from four-fifths to the whole. 4. Is there any device in use to prevent drive wheels from slipping, outside of the use of sand? A. None successful that we are aware of.

(41) D. L. writes: I wish to locate two hydraulic rams to work together; the fall is 10 feet, and length of entry pipes 25 feet. The water is to be raised 80 feet through a pipe 1,000 feet long. Will they raise the same quantity of water through a tube of 2 inches diameter as through one of 1 inch diameter (outlet tube of course)? Would the rams work successfully in case the tube were 4 inches diameter? A. The rams will operate better through a 2 inch than a 1 inch pipe. No objection to the pipe being 4 inches diameter.

(42) H. S. asks: 1. What pressure will mercury flasks bear for a steam boiler, as in SUPPLEMENT, No. 182? A. We do not know the test to which mercury flasks are submitted; but they will undoubtedly

bear ten times the pressure usually carried on steam boilers. 2. How many flasks, and what size cylinder and propeller would it require for a Sharpie 26 feet long, 6 1/2 foot beam, to go eight to ten miles per hour? A. 20 flasks submitted to the fire, and 4 or 6 for steam reservoir; engine 4 inch by 4 inch stroke; propeller 24 or 26 inches diameter, and 33 to 38 inches pitch.

(43) P. H. asks: 1. Should in the speed of circular saws there be any difference for a cross cut and a rip saw? A. No difference of speed between a cross cut and rip saw. 2. What should be the speed of the cylinder of a planer (surfacer), and what the feed for soft wood work, such as general mill work, and what for hard wood work, such as furniture? A. For a planer, about 800 revolutions per minute; the feed must depend upon the character of the wood and condition of the knives. 3. What is the proper speed of a band and what for a scroll saw? A. Speed of band saw 6,000 feet per minute; speed of scroll saw if well constructed and balanced, from 800 to 1,000 strokes per minute.

(44) J. C. B. asks: Can you give me any remedy that will drive off or kill water bugs? Our house is becoming infested with them. A. Persian insect powder thoroughly blown into all the crevices at the wall, around the water pipes, and around range will generally dislodge and kill them. The powder should be applied once a week for three or four weeks.

(45) J. G. S. asks: Can you tell me through the SCIENTIFIC AMERICAN how I can copper plate or silver plate small brass articles without a battery, or how to make a battery and liquid to do it as cheaply as possible? A. You will find on p. 409 (15), Vol. 40, of SCIENTIFIC AMERICAN, directions for making a silvering solution to be applied with a cloth, and on p. 219 (43), same vol., there are directions for coppering castings.

(46) J. S. B. writes: In your issue of March 20, under "Notes and Queries," your correspondent, B. S. (19) complains of the wasting away of copying pad in cleaning after use. There is no necessity for cleaning off the impression. If the pad is laid aside for 24 hours it will be found that the ink has been entirely absorbed, and a perfectly clear surface is left for another copy.

(47) S. B. G. asks: 1. Why was Cleopatra's monolith named a needle? A. Slender rock columns, whether natural or artificial, are commonly called "needles." 2. Has Cleopatra's needle reached New York yet? A. No. 3. In what part of the city will it be set up? A. Not decided. 4. Does the Cassiquari River in Brazil always flow in the same direction? A. No.

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

G. W. G.—Nickeliferous pyrrhotite—worth an analysis.—J. M.—Quartz, with sulphide of iron—not valuable.—J. W. K.—Magnetite—magnetic oxide of iron—in gneiss rock.—J. B. G.—It is quartz rock—of no value.

COMMUNICATIONS RECEIVED.

Report of Weekly Meeting of Polytechnic Association. On the Iowa Meteorite. By A. W. B. Curiosities of the Key Board. By

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

March 9, 1880,

AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, or any patent issued since 1867, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Table listing inventions such as: Alcoholic vapors in water, apparatus for collecting, M. C. Ziner, 225,349; Aluminous cake making, C. V. Petraeus, 225,300, 225,301; Animal trap, T. Wilson, 225,251; Audiophone, T. W. Graydon, 225,364; Augers, operating earth, G. H. Wood, 225,453; Axle box, car, G. W. Brownell, 225,269; Axle box, car, T. Haynes, 225,219; Baling press, A. M. Paxton, 225,416; Barrel machine, L. Smith, 225,303; Bedstead, folding cabinet, A. W. & C. T. Kendrick, 225,393; Belt fastening, R. McCully, 225,405; Bicycle brake, S. Sawyer, 225,239; Boiler furnace, steam, J. Mahony, 225,402; Book for holding blank forms, A. J. Clark, 225,343; Boot and shoe, J. T. Shaw, 225,427; Boot and shoe, R. W. Witham, 225,451; Boot and shoe sole burnishing machine, D. C. Mathews, 225,228; Boot or shoe measure, G. H. Cushman, 225,210; Boring machine, G. Gardner, 225,114; Boring tool, metal, L. C. Little, 225,291; Bottle stopper, S. S. Newton, 225,298; Bottling washing machine, C. Michel, 225,331; Brake lever, A. C. Fish, 225,358; Brick machine, C. V. Hemenway et al., 225,283; Brick machine, J. A. Reeder, 225,418; Building blocks, pottery shape for, A. Campbell, 225,338; Bulletin board, Watkinson & Whelan, 225,446; Burglar alarm, electric, C. H. Carter, 225,271; Button, A. D. Jeffrey, 225,288; Button holes, eyelids, etc., stitching, J. A. House, 225,381; Car brake, L. S. Hoyt, 225,382; Car center plate, railway, O. Bradley, Jr., 225,332; Car coupling, Myer & Skinner, 225,410; Car door sill, grain, D. F. Van Liew, 225,441; Car starter, A. Stewart, 225,433; Cars, apparatus for delivering railway ties from, J. Pusey, 225,236; Cars, implement for moving, J. M. Brown, 225,336

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