

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.

See adv. of Mineral Glass, last week's SCI. AMER.
For Sale.—Castings and parts, with instructions for building the best Electric Engine, 1-30th to 1 horse power. Send for circular. L. G. Woolley, Mendon, Michigan.

Gray spent seven years in perfecting his "Elegy," but the time required to get a box of Esterbrook's Steel Pens is just long enough to send to the nearest stationer.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

Automatic Planer, Knife Grinders, best Solid Emery Wheels, Machines to run Emery Belts, etc. All warranted satisfactory. Amer. Twist Drill Co., Meredith, N. H.

See Bentel, Margeant & Co.'s adv., page 125.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Gould & Eberhardt's Machinists' Tools. See adv., p. 126.

Barrel, Key, Hoghead, Stave Mach'y. See adv., p. 125.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 126.

Vertical Engines, varied capacity. See adv., p. 125.

Sewing Machines and Gun Machinery in Variety. The Pratt & Whitney Co., Hartford, Conn.

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

Catechism of the Locomotive. 65 pages, 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N. Y.

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.

The Sweetland Chuck. See illus. adv., p. 126.

The Porter-Allen High Speed Steam Engine. South-west Foundry & Mach. Co., 430 Washington Ave., Phil. Pa.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p. 125.

Lightning Screw Plates, Labor-saving Tools. p. 126.

Engines, 10 to 50 horse power, complete, with governor, \$250 to \$550. Satisfaction guaranteed. Six hundred in use. For circular address Heald & Morris (Drawer 98), Baldwinsville, N. Y.

Mr. T. D. Lockling, care U. S. Consul, Panama, U. S. Colombia, will sell the whole or a portion of his patent for umbrellas, illustrated on p. 82, this volume.

Air Pumps for High Pressure, Hand, or Steam Power, at low prices. C. Beseler, 218 Center Street, New York.

Draughtsman's Sensitive Paper. T. H. McCollin, Phila., Pa.

For Mill Mach'y & Mill Farnishing, see illus. adv. p. 108.

See New American File Co.'s Advertisement, p. 110.

Steam Pumps. See adv. Smith, Vaile & Co., p. 109.

Books for Engineers. Catalogues free. E. & F. N. Spon, 44 Murray Street, New York.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 93.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 94.

Bostwick's Giant Riding Saw Machine, adv., page 93.

Red Jacket Adjustable Force Pump. See adv., p. 94.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 94.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 92.

4 to 40 H. P. Steam Engines. See adv. p. 94.

Cope & Maxwell Mfg Co.'s Pump adv., page 77.

Small articles in sheet or cast brass made on contract. Send models for estimates to H. C. Goodrich, 66 to 72 Ogden Place, Chicago, Ill.

Improved Skinner Portable Engines. Erie, Pa.

Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

Pure Water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multifold System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

"Abbe" Bolt Forging Machines and "Palmer" Power Hammers a specialty. Forsaith & Co., Manchester, N. H.

List 28, describing 3,600 new and second-hand Machines, now ready for distribution. Send stamp for same. S. C. Forsaith & Co., Manchester, N. H., and N. Y. city.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hansen & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Pietet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 2083, New York city.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. V. Dorman, 21 German St., Baltimore. Catalogue free.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Wood Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

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

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.
Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue or contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.
Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.
Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N. J.

NEW BOOKS AND PUBLICATIONS.

A HISTORY OF THE ST. LOUIS BRIDGE: CONTAINING A FULL ACCOUNT OF EVERY STEP IN ITS CONSTRUCTION AND ERECTION, AND INCLUDING THE THEORY OF THE RIBBED ARCH AND THE TESTS OF MATERIALS. By C. M. Woodward. St. Louis: G. I. Jones & Co. From D. Van Nostrand, New York.

A noble history of one of the boldest undertakings of modern engineering, at the same time a critical treatise upon a wide range of difficult practical problems in construction and the production and testing of materials—problems first encountered and successfully solved in the prosecution of the great enterprise which the book commemorates. It is fortunate for the profession that the work has fallen to the hands of a historian so painstaking, temperate, and capable. Particularly valuable are the chapters on the basin and regimen of the Mississippi River, the manufacture of special materials, the sinking of the east abutment and the great piers, the physiological effects of compressed air, the strength and elasticity of materials, the theory of the ribbed arch, the stability of foundations, etc. The work is generously illustrated with views of the work as it went on, plans, details, and appliances.

THE DRUGGIST'S ANNUAL FOR 1882. Compiled by H. G. Adams. New York: Root & Tinker.

The compiler has brought together a large amount of information of use to druggists, comprising statistics of imports, exports, production and consumption of drugs, chemicals, etc.; tables of average prices of many drugs for a series of years; chemical and pharmaceutical tables; lists of pharmaceutical associations; patents granted in the drug, chemical, oil, paint, and allied trades in 1881, etc.

EFFICIENCY OF STEAM ENGINES AND CONDITIONS OF ECONOMY. By R. H. Thurston, A.M., C.E. Philadelphia: Merrihue Print.

Two important contributions to the theory of steam engine economy, comprising the paper on the behavior of steam in the steam engine cylinder, and on curves of efficiency, read before the New York Academy of Sciences, February 13, 1882; and the paper on the several efficiencies of the steam engine, and on the conditions of maximum economy, presented to the American Society of Mechanical Engineers, in Philadelphia, last spring.

STEAM ECONOMY AS ILLUSTRATED BY THE USE OF THE STEAM ENGINE INDICATOR, PRACTICALLY CONSIDERED, BEING A REFLEX OF ACTUAL TESTS. By A. Wilkinson. Philadelphia: the Author.

Mr. Wilkinson says that his first thought was to lay before his readers "a conglomerate mass of hypothetical mathematics, entering into the field of mystery, confusing rather than edifying." Why he contemplated misusing possible readers that way he does not say. Fortunately or unfortunately he changed his mind, and decided to print certain "hashed up" fragments of his experience, which he hopes may prove of interest to the engineer and a benefit to the steam user. Sincerely we hope so too; but never having heard of any valuable work being done with so uncertain a motive, we have our doubts.



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.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) C. K. H. asks: 1. Will you inform me if celluloid is soluble in or softened by oil? A. Celluloid is apt to soften somewhat after prolonged exposure to warm oils under pressure. 2. Would it answer for valves in a pump where oil is used in considerable quantities? A. You might try it. 3. From what other material besides oiled silk and bladder could I make thin valves for use in air pump? A. Goldbeater's skin and fine oiled vegetable parchment have been used.

(2) W. P. writes: There are said to be two substances, both solid, which, when brought into con-

tact, immediately melt and combine and then at once become solid again, forming an adhesive composition. A Phosphorus and iodine are two such substances. The combination is accompanied by considerable chemical activity, so that care is necessary to avoid accident.

(3) H. S. R. asks: Would you give me a receipt for preventing rust on polished steel? A. Dissolve 1 ounce bleached shellac in 1½ pints of wine spirit. Warm the steel and give it a flowing coat of this lacquer.

(4) P. B. asks: In which way can peas act best as a fertilizer, when the vines are plowed under while green or after they become decayed? A. After they become decayed.

(5) D. B. T. asks: Is there ever nicotine in cigarette paper? A. No.

(6) A. W. H. writes: To drill a hole in glass keep the glass under water while drilling.

(7) T. H. P. asks: 1. Please inform me of the proportion of ammonia (and whether in liquid form) to be used in baking bread or pastry, referred to recently by the SCIENTIFIC AMERICAN, and also whether yeast or baking powder should also be used with the ammonia. A. The ammonia referred to is the salt carbonate of ammonia (ammonium carbonate). It may be used with yeast, but is more commonly employed in connection with or as part of ordinary soda baking powders. The proportion may be one-twentieth the weight of the dry powder. 2. Please refer to the number of the SCIENTIFIC AMERICAN which gives directions for preparing the copying pad of glycerine and gelatin, also for making the necessary ink. A. See page 325, vol. xli. The proportions for the pad are: 1 ounce of Cooper's gelatin and 6¼ fluid ounces of pure concentrated glycerine, a small quantity of soap (about half an ounce to the pound of glue) is now frequently added to the composition. The ink usually employed is a solution of aniline violet or blue (2RB to CB) in water, to which a little alcohol and glycerine is sometimes added; a good proportion is aniline violet (or blue) 1 ounce; hot water 7¼ fluid ounces.

(8) C. H. M. asks: Will you be kind enough to give me the formula of the acids necessary to make the gases with which they fill small rubber balloons commonly vend at fairs, circuses, etc.? A. The gas (hydrogen) is generated on putting a quantity of scrap zinc or iron into a glass vessel containing sulphuric acid diluted with three or four volumes of water. The zinc or iron is oxidized and dissolved in the acid liquid and the gas is liberated. With zinc the reaction is chemically expressed as follows: Zn+H₂SO₄=ZnSO₄+2H.

(9) J. M. asks: Is there any way of transferring pictures such as wood cuts on wood or canvas? A. Coat the wood or other prepared surface with rather gummy mastic or similar varnish, and having very slightly but uniformly dampened the print, press it smoothly and firmly, face down, upon the varnished surface. When the varnish has quite dried saturate the paper with cold water, and with the fingers (and, if necessary, a piece of fine sand paper) crumble and rub the paper away, leaving the inked lines adhering to the varnished surface.

(10) T. S. V. writes: I would like to know how to recover nitrate of silver from bromide emulsion. A. Dilute the emulsion with an equal volume of hot water, acidify with a little sulphuric acid, and put into the vessel a few clean fragments of pure zinc. When the silver has been all reduced wash it with hot water several times, dry, and heat it to low redness for a few minutes. When this silver is dissolved in warm nitric acid and the solution evaporated to dryness, nitrate of silver is obtained as a residue. This requires to be purified by crystallization from solution in water.

(11) J. DeW. C. writes: In your issue of May 20, appears an interesting article, "Copying Drawings," on perusal of which, I beg to inquire if there be not some error in the statement: "In preparing paper to make the positive print, and the bath is made just like the first one; except that lamblack is substituted for burnt umber." I do not find "burnt umber" as a constituent of the "first" bath; but of the second, and in the "second," "lamblack" is already apportioned; does it mean that an additional quantity of "lamblack" is to be added for positives? A. Read first sensitizing, or negative sensitizing bath. For positives replace the umber with an equal weight of lamblack, this in addition to the measure of the latter indicated. 2. Further more, there does not seem to be any sensitizing agent in the first bath, but in the "second," namely, the chromic salt. A. The first bath is simply preparative; it does not require to be sensitive. The second bath sensitizes the prepared paper.

(12) J. F. writes: I am about to have the front show windows of my store inclosed with inside windows. Can you tell any way to prevent the outside windows frosting in cold weather? A. Clean the glass occasionally with a cloth moistened with pure glycerine, wiping it so as to leave only a trace of the glycerine adhering to the surface—this on the inside.

(13) M. L. G. writes: I desire to gild a quantity of brass pins. I have a No. 2 Smee battery and six quart solution jar. The work turns black. Can you give recipe for battery and solution, and full details for doing the work quick and cheap? A. Use a larger anode, or increase the amount of cyanide in your bath. See "Electrometallurgy, in SUPPLEMENT, No. 310.

(14) C. B. C. writes: I have heard that there is an alloy containing cadmium that is fusible at very low temperature. I am using the Newton alloy: 8 bismuth, 5 lead, and 3 tin, but wish something better if I could get it. A. Try the following: Lead and cadmium, 1½ parts; bismuth, 8 parts; tin, 12 parts; melt the lead, add the cadmium, then tin, then the bismuth.

(15) W. F. S. asks: What I wish to know is, what is used on surveyors' and engineers' levels to give the brass a dark color? A. Clean the brass, and having dissolved in two pints of hydrochloric acid five

ounces of arsenious acid and seven ounces of sulphate of iron, dip the brass in this liquid until properly colored, then wash well in running water and lacquer.

(16) H. R. writes: Desiring to make a rubber bag out of the ordinary rubber lined cloth, such as is used in waterproof cloaks, etc., please to inform me how I may best cement or bind together the edges of the cloth, so that the lines of junction may be perfectly waterproof and air tight. A. The cement used by the rubber companies is prepared by dissolving scrap rubber (pure gum caoutchouc) in naphtha by heating the latter gently (over a sand bath) and stirring in the rubber, until the latter is absorbed so as to form a thick sirupy liquid. It is better to let this stand for several days in a closely covered vessel before using it. When applied to cloth the naphtha evaporates, leaving the pure rubber behind.

(17) E. T. R. writes: I want to construct an apparatus so that I can convey changes of temperature in a moving body (an animal for instance) to a suitable recording apparatus by means of flexible cords. I have thought that some application of electricity could be made for this purpose. Can you help me? A. You might employ some modification of the thermopile—consult Ganot's Physics.

(18) G. H. N. writes: I would be very much obliged if you would tell me the proportions of potassium bichromate and sulphuric acid that give the best results for generating electricity in the battery. A. Pure potassium bichromate, 34 ounces; sulphuric acid, 27 ounces; water, 40 ounces.

(19) J. T. M. asks: How can I test for alum in baking powders? A. Digest an ounce sample of the powder for several hours with a small quantity of lukewarm water slightly acidified with pure hydrochloric acid, then filter (through purifier paper), boil the filtrate for a few minutes, let it cool somewhat, then add pure aqua ammonia to strong alkaline reaction. If alum were present in the powder the ammonia thus added will cause a white flocculent or gelatinous precipitate of hydrated oxide of alumina.

(20) C. H. R. writes: In the SCIENTIFIC AMERICAN for July 1, on page 11, in answer to C. A., you give the distance of Polaris from the true pole as 1° 32' 39". The mean place is given in the nautical almanac as 1° 19' 13" 06". The apparent place varies from month to month about 49"; but at no time is the distance as great as you give it by 13' or more. (C. H. R. is correct.)

(21) L. O. asks for the reason why the babbitt metal in the tap cap on the cylinder of planing machine loosens: whether it is from shrinkage or being too hard, or whether the holes in the shell are improperly bored. A. It is from shrinkage; a little antimony mixed with the metal would probably prevent it.

(22) T. H. says: Will you please inform me if a lightning rod should be insulated or not? My house is stone, with tin roof; a copper wire rope lies on roof and is fastened to the wall with books; ground connection with a quantity of iron, coke, and the lead water pipe, but I am told it should be insulated. A. The rod should not be insulated.

(23) D. G. B. writes: A man in a row boat sitting upon what is termed a sliding seat, is about to take a fresh stroke, and in doing so he moves in the boat from bow to stern. Does this have a tendency to move the boat further on its course or will it retard its motion? A. It will have little effect either way, but would tend to ease the pull of the oars, as the body or weight of the man is not instantly started with the new velocity given by the pull.

(24) H. S. W. asks: Do you know of any process by which Bessemer or common steel, such as is used in boilers, can be made any harder than it is when it comes from the rolls? A. The only way would be by case hardening with iron.

(25) W. G. C. asks: 1. What form and depth of thread would you advise to resist great pressure on rolls, for rolling iron in a rolling mill, where the screws are to be 4½ and 5 inches diameter, and where the nuts, in which these screws are worked, have a depth or surface of 10 and 12 inches? A. We think a V-thread with the bevel all on the upper side. 2. Of what kind of metal would you make such screws, iron or steel? A. Steel. 3. For such screws as you may direct, what kind of metal would be the best to use for the nut? And if of brass composition, give me the formula. A. Phosphor bronze. 4. Please give me the formula for what you consider the best anti-friction metal for roll necks, where above screws are used, and where increased pressure is to be gained over that now in use on train rolls. I wish to obtain from your advice a journal that will have the least friction and at the same time combine the desired quality to sustain the greatest pressure. A. We think phosphor bronze will make the best boxes. 5. What oils, grease, or composition would you advise me on these journals and screws? A. It should be a heavy natural mineral oil.

(26) F. G. W. asks: Can a pump be driven by steam passing from a boiler underground a distance of two hundred and fifty yards, and at what loss in steam? A. You can drive a pump or do any kind of work proper for steam through the distance that you require or even to a thousand or more feet. But you must insulate your pipe from condensing influences in proportion to its length to preserve the pressure and to economize fuel. With suitable size pipe in proportion to the quantity of steam to be used, when thoroughly felted and boxed you may not lose more than 10 per cent in pressure, in 750 feet. You must provide a trap to receive the water of condensation near the pump; and also provide for the expansion of the pipe, which will be 8 or 9 inches in the above length, if straight. If you can make offsets in the line you can obviate the use of slip joints. In this way steam is used in hundreds of mines, and also underground in trenches and arched. Many miles of steam pipes are now being laid in the streets of New York. The insulation in some cases being mineral wool packed around the pipes within wooden logs, and in other cases charcoal dust in wooden boxes.