

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.

Peck's Patent Drop Presses, Blast Forges, Steel and Iron Drop Forgings. Beecher & Peck, New Haven, Conn.

Master Keyed Padlocks and Locks. Factory and Railway outfits. Miller Lock Works, Philadelphia, Pa.

Several large Paper Mills have adopted Volney W. Mason & Co.'s Friction Pulleys for driving their machines. Providence, R. I.

Hull Vapor Cook Stoves.—Best in the world; sell everywhere. Agents wanted. Send for catalogue and terms. Hull Vapor Stove Co., Cleveland, Ohio.

Crescent Steel Tube Scrapers are made on scientific principles. Crescent Mfg. Co., Cleveland, Ohio.

For Sale.—The patent of Boiler Tube Expander. For particulars, apply to M. Cashin, 525 Howard St., San Francisco, Cal.

For Sale.—Patent of a Miter Box; very cheap. Paul Cashin, 525 Howard St., San Francisco, Cal.

Universal and Independent 2 Jaw Chucks for brass work, etc., both box and round body. A. F. Cushman, Hartford, Conn.

"To Mechanics."—When needing Twist Drills, ask for "Standard," or send for catalogue to Standard Tool Co., Cleveland, O. See page xv., Export Edition.

Peerless Leather Belting. Best in the world for swift running and electric machines. Arny & Son, Phila.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y.

The most complete catalogue of Scientific and Mechanical Books ever published will be sent free on application to Munn & Co., 361 Broadway, N. Y.

Shafting, Couplings, Hangers, Pulleys. Edison Shafting Mfg. Co., 86 Goerck St., N. Y. Send for catalogue and prices.

Air Compressors, Rock Drills. Jas. Clayton, B'klyn, N. Y.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

The leading Non-conducting Covering for Boilers, Pipes, etc., is Wm. Berkefeld's Fossil Meal Composition:  $\frac{3}{8}$  inch thickness radiates less heat than any other covering does with two inches. Sold in dry state by the pound. Fossil Meal Co., 48 Cedar St., N. Y.

Every variety of Rubber Belting, Hose, Packing, Gaskets, Springs, Tubing, Rubber Covered Rollers, Deckle Straps, Printers' Blankets, manufactured by Boston Belting Co., 226 Devonshire St., Boston, and 70 Reade St., New York.

Write to Munn & Co., 361 Broadway, N. Y., for catalogue of Scientific Books for sale by them.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky.

Mills, Engines, and Boilers for all purposes and of every description. Send for circulars. Newell Universal Mill Co., 10 Barclay Street, N. Y.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 163 Reade Streets, New York.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

Guil & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

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

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 32 and 94 Liberty St., New York.

For Steam and Power Pumping Machinery of Single and Duplex Pattern, embracing boiler feed, fire and low pressure pumps, independent condensing outfits, vacuum, hydraulic, artesian, and deep well pumps, air compressors, address Geo. F. Blake Mfg. Co., 44 Washington St., Boston; 97 Liberty St., N. Y. Send for catalogue.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of 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.

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 348.

Stephens' Patent Bench Vises are the best. See adv., p. 348.

Curtis Pressure Regulator and Steam Trap. See p. 285.

Woodworking Mach'y, Rollstone Mach. Co. Adv., p. 364.

Anti-Friction Bearings for Shafting, Cars, Wagons, etc. Price list free. John G. Avery, Spencer, Mass.

Best Automatic Planer Knife Grinders. Pat. Face Plate Chucks. Am. Twist Drill Co., Meredith, N. H.

Iron and Steel Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Hoisting Engines. D. Frisbie & Co., Philadelphia, Pa.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv., p. 349.

Catalogue of Books, 128 pages, for Engineers and Electricians, sent free. E. & F. N. Spon, 35 Murray Street, N. Y.

The best Steam Pumps for Boiler Feeding. Valley Machine Works, Easthampton, Mass.

Woodworking Machinery. Full line. Williamsport Machine Co., 70 W. 8d St., Williamsport, Pa., U. S. A.

Knots, Ties, and Splices. By J. T. Burgess. A Handbook for Seafarers and all who use Cordage. 12mo., cloth, illustrated. London, 1884. Sent, postage prepaid, on receipt of 60 cts., by Munn & Co., New York.

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 Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Minerals sent for examination should be distinctly marked or labeled.

(1) G. E. S. asks (1) for information about hay caps. What size ought they to be, and what is the waterproof composition that they are covered with? A. Hay caps are from 4 1/2 to 6 feet square. They are made of good muslin, and should be hemmed on the two top edges. It is best to have a cord hemmed in all around the cap provided with a loop at each corner, through which a wooden pin is stuck into the hay, thereby holding the cap on. It is not considered necessary to have them made waterproof, as they will sufficiently shed water if properly put on. The following preparation, however, will render them thoroughly moisture proof, and will enable the caps to shed water like a goose's back: Make a solution by soaking a bushel of wheat bran in 10 gallons of water for 48 hours; then boil for one hour, and strain. To this liquor add 2 pounds of alum. When completely dissolved, put in the caps, boil for 15 minutes, then wring out and dry. 2. I am thinking of putting in a hydraulic ram to force water up into my house and stock barns. The distance from brook to house and barns is about 350 yards, and the height from water to second story in house is between 50 and 60 feet. Can this be done, and with what fall? A. This you can readily accomplish. In order to elevate water to a height of 60 feet, we know theoretically that the quantity raised should be to the water supply as the fall in feet is to the height in feet, but practically we are compelled to allow for friction, etc., which varies widely. In actual practice only one half of one-sixth, or one-twelfth, could be delivered. Douglas makes an excellent ram, but many think that A. Gawthrop's Son, of Wilmington, Del., furnishes something better. It should be placed in a frost proof building, and the pipes must be laid in a trench below the reach of frost.

(2) J. R. asks: 1. Can mustard be easily raised on common soil? A. Yes. 2. Is rich or poor soil the best? A. Rich soil. 3. Can it be thrashed with the common thrashing machine? A. Yes. 4. How much does it produce per acre? A. From twenty to forty bushels. 5. How many acres will a bushel sow? A. Six. 6. How much is it worth per bushel? A. From 3 1/2 to 4 cents per pound. 7. Where can I procure the seed? A. Any seedsmen. 8. What is the proper season to sow it? A. As early in spring as it is possible to work the ground well. 9. Can it be harvested with the self-binder? A. Yes, if done as soon as ripe, and when damp with dew. 10. Can it be cleaned out of the ground by fall plowing, or what is the best way to prevent it from growing the next year? A. Thorough cultivation will clear it out. 11. Which is the most profitable millet to sow for seed? A. Genuine millet for feeding purposes. 12. What variety and what kind of land is the best adapted to its culture? A. Any good, rich land; a clay loam is excellent. 13. The proper season to sow it? A. Not till the weather is settled and warm. Say June 15, in central Illinois. 14. Can it be harvested with the self-binder? A. Yes. 15. How much is sown per acre? A. According to the richness of the land, from 1/2 to 1 bushel. 16. How much does it produce per acre? A. From 15 to 40 bushels. 17. Is there any machine that will thrash beans without splitting or damaging them? A. There is. 18. If you know of any, please give me the firm's address? A. A. J. Edicks, Wright's Corners, N. Y. 19. Also if you know of any way to plant beans so they will all ripen together? A. Plant clean seed that is all of one variety. 20. What is the best way to clean the grease off of gummed axles and old machinery? A. Caustic soda or potash will remove all grease from axles and machinery.

(3) A. S. writes: Can you tell me the secret of plastering a house so that the walls will not show cracks? I am just about to plaster my new residence, and upon inquiry I find some houses have been allowed to stand for months, and yet the cracks occur after plastering. Timbers guaranteed seasoned and no perceptible settling in walls, and the same thing occurs. So that I am inclined to believe that it is perhaps in the mixture and application of the mortar or plastering. A. Cracks sometimes occur in walls that have had the best of care. Apart from allowing time for the wood work to season, the best advice that we can give is to finish with 3 coats, as in our best work. First a scratch coat. When this is well dried, put on the brown coat. When this is well dried, finish with a white coat which has plaster of Paris in it. This is sometimes called a stucco coat. Sometimes a little hydraulic cement is mixed with the first coats to harden them. It makes them less liable to shrinkage.

(4) E. M. S. asks: 1. Give composition of a good cheap varnish to be rubbed on furniture with a rag, which will restore the original appearance where varnish has been scratched, etc. A. See "Furniture Polish," in SCIENTIFIC AMERICAN for March 28, 1885. 2. A man is selling a liquid solder to the people about here to mend tinware, etc. Please tell what liquid solder is made of, and how? A. Dissolve as much zinc sulphate as possible in one pint of alcohol, and then add one ounce glycerine. 3. Please explain to us the astronomical terms, right ascension and declination. A. See Webster's dictionary under term of ascension. 4. What is the composition of window and tinware polish which looks like balls of chalk? A. It is difficult to

say just what the article is unless we have a sample. A great many polishing powders are white. See the article on "Polishing Materials," in SCIENTIFIC AMERICAN of January 17, 1885.

(5) C. E. F. asks (1) the proper instrument to test lye to its degree of strength, and how much it costs. Do you refer to common caustic soda in your answer (17), March 28, 1885, or double refined greenbank 98 per cent? A. The instrument used is Baum's hydrometer for liquids heavier than water. Price is 75 cents. It will be best to use the greenbank alkali although any good caustic lye will answer. 2. Receipt for making compressed yeast? A. There is a "patent yeast" made as follows: Simmer 6 ounces hops in 3 gallons water for 3 hours; strain it, and in 10 minutes stir in 1/2 peck ground malt. Next reboil the hops in water, and add the liquor to the mash already made, which must be well stirred, covered up, and left for 4 hours; then drain off the wort, and when cooled down to 90° Fah., set it to work with one pint yeast (patent is best); after standing for 20 to 24 hours, take off the scum, strain it through a coarse hair sieve, and it is ready for use. One pint is said to be enough for 1 bushel of bread.

(6) T. D. B. asks: 1. How are the carbon filaments fastened to the platinum wires in the miniature electric lights? A. By electro soldering. 2. How are these very small lamps made? A. You will find information on this subject in the back numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT. This subject is too extensive for treatment in these columns. 3. Would an exhausted incandescent electric light globe answer for a Geissler tube by using an induction current? A. No. 4. I have broken the platinum wires off short to the glass globe of a miniature incandescent globe; can you tell me how to repair it so it can be used for a stationary lamp? A. Fasten a wire to the glass with cement so that its ends will touch the platinum wire if possible, then complete the connection with a little amalgam scraped from a back of a mirror, and softened with a very small quantity of mercury.

(7) C. C. B. asks: 1. Is the process of burnishing electro silver plated goods a difficult one to learn? Does it require any particular knack or skill to accomplish? A. Burnishing silver plated ware is not difficult, provided the silver is deposited in a soft state and the burnishers are in good condition. Burnishers may be of hard steel or of bloodstone. They should be highly finished, and should be polished from time to time by rubbing them on a strip of sole leather charged with fine rouge. The burnishers should be wet while in use with a solution of white Castile soap with a little alkali added. 2. How is double or triple plating put on? A. By simply leaving the work in the battery for a longer time. 3. Is gilding burnished the same as silver plating? A. Yes. 4. How is the resistance coil or switch attached to or used with batteries? A. The resistance coil is connected with the battery, so that more or less of the length of wire of which it is composed may be introduced to the battery circuit at will.

(8) A. H. B. writes: Having constructed a Carre dielectric machine capable of a spark about an inch long, I am desirous of some experiments to perform with it, especially those which illustrate luminous effects. Would a glass tube with wires sealed in each end, and exhausted by boiling water in it and then sealing, transmit the electricity with that glow peculiar to the Geissler tube, or would the moisture in the tube carry away the charge invisibly? A. We do not think you could produce any visible effects in the vacuum tube prepared in this way. 2. Would boiling mercury in a tube produce the desired effect? A. You might, with sufficient care, be able to produce a vacuum that would answer the purpose. You should not inhale the vapors of the boiling mercury. 3. Are there any fluids or solids which become luminous when the current is passed through them? I don't mean the galvanic current, but the current produced by an electrical machine? A. The current from your machine would render fowls' eggs luminous. 4. I have one Geissler tube with vase of uranium glass, and want to know if there is any way I can produce the necessary vacuum without an expensive air pump? A. No. 5. I have heard that sulphate of quinine fluoresces on the passage of the current. Is this true, and on what conditions must the quinine be in? A. The solution of sulphate of quinine must surround the vacuum tube.

(9) E. N. L. asks: Has there ever been a telephone yet made, or device by which the voice of one talking in the transmitter at one end of a given line is reproduced or heard at the other end of the line, speaking the words out loud, so that it can be heard two or three feet from the receiver, and on how long lines? A. Edison loud speaking telephone does this. It works on lines of the usual length.

(10) P. P. B. writes: I have built a dynamo machine similar to that described in SUPPLEMENT, No. 161, only twice the size of one described. I wound the armature with 5 layers of No. 14 wire, the field magnets with 7 layers No. 12 wire. The machine weighs about 160 pounds. It will heat a 16 candle power incandescent lamp white hot, but will not heat it sufficient to make scarcely any light. Can I do anything to improve my machine? If so, what? Communicator springs are 2 inches wide; is that sufficient? How fast should it run to get best results? A. Try placing two lamps in multiple arc. We think you would succeed better by using more lamps of smaller candle power; say 8 candle power each. The speed of the armature should be from 1,500 to 2,000 revolutions per minute.

(11) M. V. C.—There is no danger attending the washing of the best steels with hot soap suds, provided, of course, that the mercury or quick-silver compound does not penetrate into the flesh through open cuts, etc., or in other words, it cannot be considered more dangerous than if cold water was used.

(12) J. G. D. asks: What will cement celluloid letters to the outside of show window? A. Try a thick solution of marine glue in wood naphtha, or else melt resin and stir in calcined plaster until reduced to a paste, to which add boiled oil, a sufficient quantity to bring it to the consistence of honey; apply warmly.

(13) H. F. asks how to find the horse power of boilers. A. Divide all the surface that is exposed to the fire and heat, in square feet, by 14, which is the nominal horse power.

(14) W. R. J. asks the cause or causes of sound from stretched telegraph wires. A. The sounds are produced on the principle of the Aeolian harp, the wires being set in vibration by the motion of the air.

(15) G. W. H. asks: What danger is to be apprehended from running electric wires underground, several united and insulated, in a cable, or in near proximity, as in usual street construction? This applies to electric light wires as well. A. No danger if the wires are properly laid and protected.

(16) C. J. G. asks how to soften a leather carriage top which has been varnished. A. You will find the removal of the varnish a somewhat difficult task. Benzine or turpentine will probably help some. Caustic soda will cut the varnish, but it will also ruin the cloth unless great care is taken. Turpentine and soap is used to remove varnish.

(17) R. L. H. writes: I make ink under a recipe taken from your SUPPLEMENT. The proportions and ingredients are: 168 grains extract of logwood, dissolved in one pint of either hot or cold water, and add 14 grains yellow chromate of potash. Sometimes add 20 grains common washing soda to prevent decomposition on exposure. This ink is somewhat objectionable because it is too pale, and eventually loses all its color. It however flows readily, and is the best non-corrosive ink I ever used. I can find nothing which will improve its quality; in fact, nearly all chemicals will destroy it. Can you suggest any additional chemical which will make it a good permanent black ink? A. It is very doubtful if the ink you describe can be improved. It is generally known as Runge's ink, and a great number of formulas exist, slightly differing from each other. The following is one of the many modifications:

Table with 2 columns: Ingredient and Amount. Sodium carbonate... 30 parts. Warm water... 1300. Extract of logwood... 30. Dissolve, and add then a solution of 5 parts potassium bichromate in 100 parts of water. The addition of sulphate of indigo or of a small quantity of soluble aniline blue to the ordinary gall inks is recommended for the purpose of increasing their blackness. A superior quality of gall ink is composed of: Galls... 45 parts. Ferrous sulphate... 15. Gum... 5. Water... 200.

(18) L. D. B.—There is considerable flax raised in this country. Its principal use until recently was for the production of the seed, but latterly it has been used for coarse carpet warp. The imported flax is of finer quality, and is used for the manufacture of thread.

(19) C. L. N. asks: 1. How is water power best used to compress air? A. By a water wheel working a pump. By a direct acting water and air pump. By an injector. By the falling of water down a long pipe. 2. How many pounds of dead weight will be lifted clear of the ground by 1,000 cubic feet of nominally pure hydrogen gas? A. 1,000 cubic feet hydrogen gas will lift 70 pounds. 3. Is there any process by which silk or other woven fabric can be made impervious to hydrogen gas? A. Varnish the silk with India rubber cement thinned with naphtha. Can be obtained at any rubber factory.

(20) F. H. B.—You cannot kill the life of steam until it is entirely condensed, and it might pass a thousand elbows, if they were near together, with a loss on a hundred pounds pressure of 25 per cent. The fact that the crosshead has an upward bearing while a locomotive is running forward should be apparent to any one. If the cylinders were placed behind the drivers, then the action would be the same as in the stationary engine. By studying the push and pull of the piston with the upper and lower position of the connecting rod, the philosophy becomes very plain to the most casual observer.

(21) W. B. B.—The best forms of wind mills develop from 1/4 to 1/2 horse power for a 12 foot mill. The tensile strength of Bessemer steel varies from 72,000 to 76,000 pounds per square inch, and occasionally will run up to 100,000. Hammered bar Bessemer has been tested to 150,000. The Siemens-Martin costs about 10 per cent less than for Bessemer. Bessemer for merchant bar, about \$50 per net ton. Siemens-Martin, about \$45. The prices vary very much according to sizes and shapes.

(22) W. K.—The only peculiarity in hardening mill picks is, to leave the edge thick, say one-sixteenth inch. Harden at the lowest heat that the particular kind of steel will take, in clean water at about 60°. Draw temper as little as possible, which may be ascertained by trial at a straw color to begin with. Do not draw temper with the same heat used for hardening. The pick after hardening should be tried with an old fine file, which by a little experience will tell you if the hardening is even. The grind and heat from the center for color drawing. If you use low grade steel of first rate quality, the color temper may be dispensed with. The greatest difficulty is caused by burning the corners in forging or in heating to harden. Therefore use a dull charcoal fire if possible with light blast. Blast often ruins the finest steel.

(23) G. C. K. writes: 1. A tank filled with water, 50 feet high and 10 feet in diameter, with a spigot at the bottom, 1 inch flow, what rate per cent will the first 25 feet of water run out faster, if any, than the last 25 feet? A. The average flow of the upper half of the tank will be equal to a pressure of 37 1/2 feet, while the average flow of the lower half will be equal to 12 1/2 feet pressure. The upper half will flow three times as fast as the lower half. 2. It is claimed that the standard of gas burning is a fifteen hole Argand lamp, interior diameter 0.44 inch, consuming 5 cubic feet per hour, evolving a light from common coal gas of from 10 to 12 sperm candles, 6 to the pound. How is this number of candle light power ascertained, when making a comparison with gas light to candle light? A. There