

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.

Prof. Vose, in the preface to his "Manual for Railroad Engineers," says that Trautwine's "Civil Engineer's Pocketbook" is "beyond all question the best practical manual for the engineer that has ever appeared." See also Trautwine's "Railroad Curves" and "Earthwork."

An Irishman's Bull.

We are surrounded by difficulties and dangers, said Pat, from the cradle to the grave, and the only wonder is that we ever live long enough after leaving the one to reach the other. The greatest danger lies in allowing the seeds of disease to be sown in our system. If you feel dull and drowsy, have frequent headaches, bad taste in mouth, coated tongue, poor appetite, you are suffering from a torpid liver. Take Dr. Pierce's "Golden Medical Discovery" if you would destroy these seeds and avoid reaping a harvest of suffering and death.

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- Plain Tubular, Horizontal Boilers. One 100 H. P., 5' x 18', 3' tubes, \$650. Two 80 H. P., 5' x 17', 3' tubes, each, \$550. Two 75 H. P., 4 1/2' x 16', 3' tubes, each, \$525. Two 60 H. P., 4 1/2' x 15', 3' tubes, each, \$400. Three 50 H. P., 4' x 16', 3' tubes, each, \$300, \$325, and \$350. Four 45 H. P., 4' x 15', 3' tubes, \$275, \$300, \$325, and \$350. One 40 H. P., 4' x 13', \$275. One 30 H. P., \$250.

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- Three 100 H. P., 4' tubes, \$500, \$550, and \$600. Three 90 H. P., 3 1/2' tubes, \$450, \$500, and \$550. Five 80 H. P., 2 1/2' tubes, \$300 each. One 50 H. P., 3' tubes, \$275.

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Curtis Pressure Regulator and Steam Trap. See p. 142. Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Best Automatic Planer Knife Grinders. Pat. Face Plate Chuck Jaws. Am. Twist Drill Co., Lodi, N. H.

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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.

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

60,000 Emerson's 1886 Book of superior saws, with Supplement, sent free to all Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa., U. S. A.

Safety Elevators, steam and belt power; quick and smooth. D. Frisbie & Co., 112 Liberty St., New York.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 93 John St., N. Y.

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.

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Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Astronomical Telescopes, from 6" to largest size. Observatory Domes, all sizes. Warner & Swasey, Cleveland, O.

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

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

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.

(1) E. E. C. asks if a person weighs any more after eating a hearty meal than before, and is it the same with drinking as with eating? A. Immediately after eating or drinking, a person weighs more than before it.

(2) H. M. W. asks under what pressure gas for illuminating purposes is usually kept in the city mains. Also whether such gas is wastefully soluble in water if the two are in juxtaposition. A. The pressure of illuminating gas in street mains varies from 1 to 4 inches of water. It is not wastefully soluble in water.

(3) J. H. B. says: In a life of the Empress Josephine I have recently read, it is stated that on the 9th of November, 1799, the President of the Directory and guests were surprised by receiving "a telegraphic announcement that Bonaparte had that day landed at Frejus." Was not that date prior to the use of the telegraph? A. The telegraph then used was the semaphore, or visual telegraph. Posts or spires on which were movable arms were employed to convey intelligence.

(4) W. B. writes: I have some bone black from which I wish to make a porous receptacle for the absorption of gases. I wish to make it as porous as is consistent with durability. What substance shall I use to make it adhesive, and in what proportion? Can this substance be baked out in a common oven, or will it require greater heat? A. Mix the bone black to a thick stiff paste with molasses and water, or with coal tar. Then, after shaping, it must be baked at a red heat. This can be done in a good fire by inclosing it in a vessel and covering it with charcoal or sand. An ordinary flower pot might answer as containing vessel for baking at home.

(5) X. Y. Z. asks: 1. Where can I find a good account of the isolation of fluorine, recently hinted at in Nature? A. See the Chemical News, current volume, pp. 36 and 51. The original papers appeared in the Comptes Rendus of the French Academy of Science. 2. Have or have not diamonds been made in the laboratory? A. See the information on this subject in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 216 and 218. 3. What is the present accepted number of elements? A. Sheppard's Chemistry (1886) gives sixty-eight, but there are several elements since claimed to be isolated, whose existence is not altogether accepted. 4. The highest temperature obtained by the electric arc? Also by combustion? A. By combustion, practically between 2,000° and 2,500° Centigrade. By the electric arc, undetermined, but far higher. 5. How many products have been obtained from the distillation of coal, in making illuminating gas? A. Their name is legion. See article on gas, by Professor C. F. Chandler, in Johnson's Cyclopaedia.

(6) C. E. McC. asks what size of cotton-covered copper wire he must use on magnet in short circuit to get greatest drawing power, with one or two cells gravity battery. A. The size of wire to be used on electro-magnets depends upon the size of the magnet covers. We should recommend No. 16 or 18 wire as probably adapted to your wants.

(7) G. F. E. asks how to prepare a solution for copper electro-plating, also if one "crowfoot" battery has power enough for experimental work. A. For copper plating, a solution of sulphate of copper is required, obtained by dissolving blue vitriol in water. One crowfoot battery will answer for experimenting.

(8) T. N. C. desires (1) a receipt for a varnish for brass. A. An excellent brass lacquer consists of 8 ounces shellac, 2 ounces sandarac, 2 ounces annatto, 1/4 ounce dragon's blood resin, 1 gallon spirits of wine. The article to be lacquered should be heated slightly, and the lacquer applied by means of a soft camel's hair brush. 2. A cheap, simple method for generating hydrogen gases for inflating toy balloons? A. Fill a bottle about one-quarter full with zinc turnings, then pour water half way up the bottle and add a few drops of sulphuric acid. Fill the opening of this bottle with a cork through which a glass tube is made to pass. The generated hydrogen will escape up the tube, and then can be collected in the balloon.

(9) B. A. H. asks (1) directions for making wax moulds for moulding plaster centers for ceilings. A. Plaster centers are moulded in plaster moulds, oiled with linseed oil. In making an original design, you may use beeswax and whiting melted with a few drops of oil to soften, so that it may be worked. Clay is also used for designing patterns; oil the clay pattern before pouring on the plaster of Paris. 2. What thickness would a cast iron box 6 inches by 6 inches inside have to be made to hold 330° of steam heat? A. 330° heat in steam is equivalent to 90 pounds pressure; your box, if a cube, should have the inside corners rounded, and be about 1/4 inch thick for safety.

(10) A. S.—We know of no iron cement made as you describe. A strong, apparently welding cement may be made as follows: Take equal parts of flour sulphur and dry white lead with one-sixth part of borax; incorporate thoroughly in a mortar. When used, add to as much as you require for immediate use, sulphuric acid just enough to make a paste, which spread thinly on the surface and press them together with clamps. In 4 or 5 days the joint will be strong, and appear as if welded.

(11) W. P. J. asks why a loose pulley of certain size, or a wheel such as is used on a band saw machine, shakes when running a certain speed, whereas if the speed is decreased or increased the vibration ceases. A. The cause is the synchronism between the time of revolution of the wheel and the vibration of the band saw. At the speed in which they correspond, the vibration of the band is increased. This phenomenon often takes place with belting, sometimes extending to the floors and the building. We know of a case where at a certain speed of the engine the walls of a building shake.

(12) J. C. V. asks: 1. How can I restore the polish on opals blurred and scratched by wear? A. By rubbing with oxide of tin or putty powder on a piece of chamois skin, wet; finish with refined chalk, also on chamois skin, wet, then wash the opal with a soft brush and water. With a little care this may be done without taking it from the setting. 2. How can the original white color of silver filigree jewelry be restored when tarnished by wear or shop worn? A. First wash the articles in a solution of 1 fluid ounce of liquid potassa in 20 of water, rinse, and then immerse in a mixture of salt 1 part, alum 1 part, saltpeter 2 parts, dissolved in 4 parts water. Let them remain for five minutes. Wash in cold water, and dry with chamois leather. 3. Is there any metal that is oppositely affected from steel by heat? In other words, is there any metal that contracts from the same cause that steel expands, or are there any two metals that are oppositely affected by heat and cold? A. No. 4. Does glass expand and contract enough in hot and cold weather to materially affect a glass pendulum? A. Glass expands less than any metals by heat, but is not as good as dry lance-wood, varnished with shellac, for pendulums.

(13) H. E. T. asks if there is anything that can be practically used as a substitute for eggs in plum puddings, etc., and where it can be obtained, or how made. A. There are various so-called egg powders in the market, but they are of no great value, and we know of no satisfactory substitute for eggs. An old fashioned receipt for plum pudding without eggs is a cupful each of suet, flour, sugar, raisins, currants, one-half cupful of citron, with spices, and then add just enough milk to make it of the consistency of cake. Finally add two teaspoonfuls of baking powder and boil for three hours.

(14) H. B. B.—Either a solution of cupric oxide, i. e., black oxide of copper, dissolved in aqua ammonia, or an ammoniacal solution of basic cupric sulphate, possesses the property of dissolving cellulose. This solvent power increases with the amount of copper in the solution. We would advise you to have the solution made up by some competent druggist.

(15) C. M. K. writes: I have a piece of furniture on which is what appears to be a very fine piece of inlaid work, but on close examination I find that the inlaid work is first sawed out and then put into some kind of black wax, and all polished, which presents a very fine appearance. How is the work done? A. The inlaid work is sawed out, as you say, and then attached to the work by means of glue; the wax used is ordinary sealing wax carefully applied to the interstices with a hot tool. The secret of the work lies in the skillful application of the wax and in the subsequent finishing.

(16) W. D. G. asks if there is any practical way of making chain with the links solid, or without welds or soldered joints. A. Solid link chain is now made by malleable iron works for special purposes by casting. It is not as strong as welded test chain, but answers for special purposes. We know of no way of completing a wrought iron chain without welding. Every other link may be made solid in a drop press. See SUPPLEMENT, No. 569, for information about chain casting.

(17) C. G. writes: Where a locomotive engine is running at the rate of say 50 miles an hour, is not the valve cut off by link motion, so it does not travel whole length of its stroke? A. The valve travels according to the position of the link slide, which governs the throw of the valve, and also the cut-off. This is entirely under the control of the engineer through the link lever, and has nothing to do with the speed of the

engine, but to control it by shortening or lengthening the cut-off by the stroke of the valve. You are right.

(18) W. M. S. desires a recipe for a quick drying varnish. A. Use the following: Pulverize 1 ounce sandarac, 1/2 ounce mastic, 1/4 ounce elemi, dissolving them in 1/2 ounce Venice turpentine, and adding to it a solution of 4 ounces shellac and 3 ounces oil of lavender in 12 ounces alcohol.

(19) B. G. asks: How long will it take for a tap on the telegraph wire to go around the world? A. On a good land telegraph line of length equal to the circumference of the earth, about one second would be needed. Ocean cables would considerably increase this, even to several seconds.

(20) J. H. M. asks: Will you please inform me what combination of metals, spirits, or chemicals is the most and quickest, or most sensitive to heat and cold as to expansion or contraction, that would act on the principal of the thermometer? A. The question is too indefinite for answer. The expansion of a gas is, in general terms, the most sensitive indicator of heat.

(21) W. L. asks: In reference to the dynamo described in SUPPLEMENT, No. 161, what difference will there be in the current, if the space between the armature and field magnets is one-sixteenth inch or a little over? A. A clearance of one-sixteenth inch is not too much for efficient working.

(22) W. H. N. asks: What is the difference between the composition of the wind and the atmosphere? A. There is no difference in the composition; wind is atmosphere in motion.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & Co., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted, December 21, 1886,

AND EACH BEARING THAT DATE.

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

Table listing inventions and their patent numbers, including items like Adding machine, Air and other gases device, Amalgamator, Animal trap, Annunciator, Axle coupling, Bag, Bag catch, Bait, Bar, Barrel bodies, Barrel machine, Barrel, sheet metal, Basket, Basket, folding sponge, Bearing, anti-friction, Bearing for shafts, Bed heater, Bedstead, Belt gearing, Belt tightener, Bicycle, Bicycle, Beat lowering apparatus, Boiler, Boiler cleaner, Boiler furnace, Boiler water cleaner, Boilers, purifying water for steam, Bone, horn, etc., device for cutting, carving, and fitting, Boot or shoe, W. La Banister, Boot or shoe insole, R. Dick, Boots and shoes, nail setting machine for, W. F. Wright, Box, Box making machine, Bracelet, S. D. Mason, Brake, Brake shoe, J. Meehan, Bridge street, J. Dennell, Brooder, H. J. Haight, Broom corn tabler, W. M. & L. N. Bowman, Brush, hair or other, J. Raper et al., Brush, reservoir blacking, J. T. Gaige, Buckle, W. W. Bell, Buildings, instrument for plumbing the corners of, W. W. Brown, Bung, M. G. Gillette, Bustle, E. B. Cady, Button fastener, F. H. Richards, Button, sleeve, A. McKenzie, Buttons, manufacture of, T. Smith, Can nozzle, R. Marsh, Car brake and wheel dresser, J. Meehan, Car coupling, J. Bersch, Car coupling, D. L. Ervin, Car coupling, H. Haddon, Car coupling, R. Jones, Car coupling, E. K. Opheim, Car heater, Johnson & Buerkel, Car seat and berth, E. A. Stanley, Car, stock, R. E. Ismond, Cars, pilot and guard for railway, G. W. French, Carburetor, W. H. Conner.