

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion. If the Notice exceeds four lines, One Dollar and a Half per line will be charged.

Agricultural Implements and Industrial Machinery for export and domestic use. R. H. Allen & Co., N. Y.

Skinner Portable Engine Improved, 2 1-2 to 10 H. P. Skinner & Wood, Erie, Pa.

For Sale—Half interest in Foundry and Machine Shop. Machinist preferred. A. W. Maxwell, Knightstown, Ind.

Yacht and Stationary Engines, 2 to 30 H. P. The best for the price. N. W. Twiss, New Haven, Conn.

Wanted—A complete set of Patent Office Reports. Address, with price, P. O. Box 3,760, New York city.

Pattern Makers can get Metallic Pattern Letters, to letter patterns, of H. W. Knight, Seneca Falls, N. Y.

Scientific American, 34 vols. (2 to 35) for sale cheap. J. D. Rice, 923 Race St., Philadelphia.

Wanted.—Good second hand Back Geared Screw Cutting Foot Bench Lathe. P. O. Box 303, Amsterdam, N.Y.

Lightning Screw Plates. A perfect thread at one cut adjustable for wear. Frasse & Co., 62 Chatham St., N.Y.

More than Ten Thousand Crank Shafts made by Chester Steel Castings Co., now running; 8 years' constant use prove them stronger and more durable than wrought iron. See advertisement, page 78.

Metallic Letters and Figures to put on patterns of castings, all sizes. H. W. Knight, Seneca Falls, N. Y.

Split-Pulleys and Split-Collars of same price, strength and appearance as Whole-Pulleys and Whole-Collars. Yocom & Son, Drinker st., below 147 North Second st., Philadelphia, Pa.

Emery Grinders, Emery Wheels, Best and Cheapest. Awarded Medal and Diploma by Centennial Commission. Address American Twist Drill Co., Woonsocket, R. I.

Patent Scroll and Band Saws, best and cheapest in use. Cordesman, Egan & Co., Cincinnati, Ohio.

To Clean Boiler Tubes—Use National Steel Tube Cleaner, tempered and strong. Chalmers Spence Co., N.Y.

D. Frisbie & Co. manufacture the Friction Pulley—Captain—best in the World. New Haven, Conn.

Wire Needle Pointer, W. Crabb, Newark, N. J.

Send for circular of Brass Hydraulic Engine for blowing organs. Hilbourne L. Roosevelt, Church Organs, New York.

Power & Foot Presses, Ferracute Co., Bridgeton, N. J.

Magic Lanterns and Stereopticons for Parlor Entertainments and Public Exhibitions. Pays well on small capital. 74 page catalogue free. Centennial Medal and Diploma awarded. McAllister, 49 Nassau St., N. Y.

Superior Lace Leather, all sizes, cheap. Hooks and Couplings for flat and round Belts. Send for catalogue. C. W. Arny, 148 North 3d St., Philadelphia, Pa.

F. C. Beach & Co., makers of the Tom Thumb Telegraph and other electrical machines, have removed to 530 Water St., N. Y.

For Best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay Sts., Brooklyn, N.Y.

Water, Gas, and Steam Pipe, Wrought Iron. Send for prices. Bailey, Farrell & Co., Pittsburg, Pa.

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

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing metals. E. Lyon, 470 Grand St., 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, New York.

Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

M. Shaw, Manufacturer of Insulated Wire for galvanic and telegraph purposes, &c., 259 W. 27th St., N. Y.

Shingle, Heading, and Stave Machine. See advertisement of Trevor & Co., Lockport, N. Y.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Articles in Light Metal Work, Fine Castings in Brass, Malleable Iron, &c., Japanning, Tinning, Galvanizing. Welles Specialty Works, Chicago, Ill.

Boosey's Cheap Music and Music Books. Full Catalogues free by mail. Boosey & Co., 32 East 14th St., New York.

For Sale—Two sets Hydraulic Presses, 10 inch cylinder, 2 foot lift, 100 tons pressure, 5 inch one set, 4 inch other. In good order. P. O. Box 3396, Boston, Mass.



E. L. C. can faster cloth to brass by following the directions given on p. 101, vol. 34.—C. H. E. will find directions for making manifold paper, for writing in duplicate or triplicate, on p. 154, vol. 30. It is a well known device.—A. C. will find directions for drilling glass on p. 218, vol. 31. As to soldering silver, see p. 251, vol. 28.—C. is informed that peroxide of manganese is sold in the market, packed in barrels containing about 800 lbs. each.—J. B. will find directions for separating platinum from gold on p. 409, vol. 35.—F. S. C. will find directions for French polishing on p. 11, vol. 32.—G. O. will find directions for preparing skeletons of animals on p. 75, vol. 28.—D. W. will find the desired information as to the transit of Venus on p. 180, vol. 32.—B. B. T. should state what method he employs, and what ore of nickel.—J. G. S. will find directions for bluing steel on p. 123, vol. 31. For polishing shirt bosoms, etc., see p. 213, vol. 34.—W. L. L. will find directions for silvering mirrors on p. 267, vol. 31.—J. N. will find something on the use of petroleum in boilers on p. 164, vol. 30.—C. V. L. will find a recipe for an aquarium cement on p. 202, vol. 28.—W. M. B. will find a description of the photo-engraving process, which is probably the one he enquires about, on p. 272, vol. 32.—E. D. L. will find the dimensions of the Birmingham wire gauge on p. 233, vol. 28.—J. J. should use rubber varnish on his cotton cloth. See p. 11, vol. 32.—J. M. will find on p. 151,

vol. 30, directions for nickel plating.—T. R. S. will find a recipe for a washing fluid on p. 27, vol. 34.—B. B. C. will find a good recipe for shoe blacking on p. 27, vol. 34.—C. A. M. will find directions for making an electric machine on p. 266, vol. 34.—T. J. M. will find directions for making a barometer on p. 394, vol. 33.—J. S. will find directions for making paper stick on tin on p. 362, vol. 36.—C. A. H. will find a description of toughened glass on p. 402, vol. 32.—B. S. will find a recipe for varnish for patterns on p. 409, vol. 33.—W. A. H. will find directions for making rubber stamps on p. 155, vol. 31.—R. T. W. will find something on hardening copper on p. 123, vol. 32.—E. J. will find directions for hardening rubber on p. 203, vol. 35.—C. I. H. will find full descriptions of air brakes on p. 289, vol. 34.—H. W. will find a recipe for white ink on p. 268, vol. 33.—R. C. will find directions for tempering steel on p. 122, vol. 30.—T. F. M. will find directions for making root beer on p. 170, vol. 27.—J. L. P. will find rules for calculating the proportions of gear wheels on screw-cutting lathes on p. 107, vol. 34.—C. D. will find directions for repairing sheet rubber goods on p. 155, vol. 26.—W. F. P. will find directions for moulding rubber on p. 283, vol. 29.—J. B. C. will find directions for making parlor matches on p. 75, vol. 29.—J. C. M. will find a recipe for a black walnut stain on p. 90, vol. 32.

(1) A. I. says: I have been told by a great many men who pretended to know, that a gun would recoil or kick much more violently if the shot or ball is not close down to the powder. I experimented with a gun barrel some time since, leaving 1 1/4 inches or more space between shot and powder, and found the recoil to be very much less than when the shot was rammed solid down. I laid the barrel on a plank and measured the distance of the recoil at each fire. I used only a barrel of a gun and fired it by a slow match, so it was free to move. A. Your experience is contrary to that of many a sportsman, who is sometimes forcibly reminded that he did not ram the charge home by getting a "kick" from the gun on his shoulder.

(2) J. S., of Brussels, Belgium, asks: 1. Can the ratio of expansion be changed in any high pressure engine that has not a variable expansion cut-off? A. It cannot be changed without making some alteration in the valve gear. Your engine should have the valve set to cut off the steam at about 3/4 of the stroke. 2. What is the formula for the quantity of water in cubic feet to be evaporated for an engine? A. Allow from 40 to 45 lbs. per horse power. 3. Would the crushing force between rollers be the same under two different speeds of the engine, not per hour, but at a given moment? A. Yes. 4. Is there any rule or formula to calculate the intensity of the crushing force between the rollers? A. It can be calculated approximately by the relative distances travelled by piston and roller respectively in a given time, making deductions for friction of the parts. 5. What will be the best ratio of expansion if the engine runs at 25 revolutions per minute? A. The same as before, supposing that you refer to getting the most power out of the engine.

(3) M. H. P. asks: 1. What percentage of nourishment does butter, beef, and beans respectively contain? A. The ratio of nitrogenous or flesh-producing material in each is approximately as follows: Beef 25, beans 9, butter (pure) none. 2. Why is it that the tables, showing percentage of nourishment in food, by different authorities, differ so greatly? A. That differences do occur in tables of this kind, and principally in the figures given for animal food, is because of the non-homogeneity of such material, and the arbitrary methods of selecting the materials for determinations. The best results are, therefore, only approximate.

(4) A. P. B. says: I have a vulcanized rubber bath tub, which I have used till the rubber has become soft, and is now quite gummy and cracked. Is there any remedy for it? A. We do not know of a practical remedy for this. The interior surface may be somewhat improved by coating with a varnish made by dissolving equal parts of caoutchouc and gutta percha in hot naphtha or bisulphide of carbon; such varnish is sold in the market.

(5) A. J. and others ask: How can we make a good varnish for patterns? A. Use shellac varnish with just enough fine lampblack to color it. Do not apply the varnish too thick. It is not hygroscopic. Tap the pattern gently at different points before attempting to remove it from the sand. If your sand does not work well, dust the pattern over with fine blacklead, as it lies in the flask, preparatory to packing the sand.

(6) L. S. W. says, in reply to J. B. C., who asks for a demonstration of the following theorem: If tangents be drawn to 3 circles of unequal diameters, the points of intersection of the tangents are in a straight line. The best demonstration and the most rapid one is based on analytical geometry. If I can prove that (1), (2), (3) are in a straight line, the theorem is demonstrated: Let r, r', r'' be the radii of the 3 circles. The co-ordinates of (1) and (2) are:

(1) { x = (r' a' - a r') / (r' - r), y = (r' b' - b r') / (r' - r) } (2) { x = (r'' a'' - a r'') / (r'' - r'), y = (r'' b'' - b r'') / (r'' - r') }

Equation of the straight line passing at (1) and (2) is: { r (b' - b'') + r' (b'' - b) + r'' (b - b') } x - { r (a' - a'') + r' (a'' - a) + r'' (a - a') } y + r (b' a'' - b'' a') + r' (b'' a - b a'') + r'' (b a' - b' a) = 0. The symmetry of this equation sufficiently shows that the line it represents must pass through (3).

The latter has for co-ordinates: { x = (r'' a'' - r' a') / (r'' - r'), y = (r'' b'' - r' b') / (r'' - r') }

Remarks: The points (1), (2), (3) are called "centers of similitude." The line, D E, is the axis of similitude.

(7) J. P. M. asks: 1. If I have a glass tube 3/4 of an inch in diameter, with a bulb on its end 2 inches in diameter, and an airtight piston working in the tube, what force would it exert by heating from 60° to 104° Fah.? A. If air is employed, as the original pressure or volume is multiplied in a definite ratio by a given change of temperature, if it is greatly compressed, the change when it is heated will be proportionately large.

2. Would it be any more if filled with mercury or with compressed air? A. The tension of mercury vapor under this change of temperature would be very slight, and much less than in the case of compressed air.

(8) C. S. asks: What is oil of bay rum made from? A. Bay rum is obtained by distilling rum with the leaves of myrcia acris, sometimes called the bayberry. The tree is a native of Jamaica and other West India islands.

(9) O. A. S. asks: How is hop extract made? A. Tincture of hops is made by taking 5 troy ozs. hops in powder, and a sufficient quantity of diluted alcohol. Moisten the powder with 2 ozs. of the alcohol, pack in a cylindrical percolator, and pour diluted alcohol on till 2 pints tincture are obtained.

(10) J. C. D. asks: What is the best varnish for varnishing a drawing made in India ink with heavy lines and parts, which have been tinted with various colors? A. Put a drop or two of acetic acid in the ink; and when the drawing is dry, varnish with mastic varnish.

(11) C. V. P. asks: How can I stain the grain side of a calf skin a permanent black? This leather contains oil, and the stain must have something alkaline, alcoholic, or acid to make it bite in. A. First rub well with a strong aqueous solution of proto-sulphate of iron, and then with a concentrated solution of extract of logwood.

(12) H. B. B. asks: How can I make a dark blue ink with gunpowder? A. Make a strong solution of the gunpowder in warm water containing gum arabic, and add a sufficient quantity of sulphate of indigo (in digo carmine) to produce the desired tint.

(13) B. F. B. asks: How can I cure chilblains? A. The following treatment has given general satisfaction: Melt together in a suitable vessel 3 ozs. beeswax, 3 ozs. Venice turpentine, 8 ozs. lard, and 1 pint sweet oil. Stir these well together and raise the temperature till the mixture simmers; then allow to cool. This should be applied to the feet on a piece of cloth when going to bed. A sure protection against this irritating ailment is found in good, dry, woollen clothing for the feet.

(14) J. C. C. asks: 1. Is there any electric current or power in the so-called electric belts and bands? A. Yes. 2. Is there any power in a belt made of alternate discs of zinc and silver, wetted in vinegar once a day, to be worn around the body to create an electrical current for the cure of pain, etc.? A. Yes, but such currents are very weak.

(15) G. W. S. says: I am using an oxyhydrogen gas machine by burning sheet lead together. I make the hydrogen by using commercial sulphuric acid 1 part, water 7 parts, and granulated zinc. It melts the lead well enough on flat seams; but on upright work the lead seems to tarnish and will not unite together. I use chemically pure muriatic acid as a flux. A. Use a saturated solution (in water) of sal ammoniac (chloride of ammonium) instead of the acid, and the inner cone of the flame—not the extreme tip—which oxidizes the metals rapidly. The operation should be performed as rapidly as possible. Your jet, being fed with air, which contains only about 1/5 part oxygen, is not an oxyhydrogen jet, but a blast lamp. The general arrangement of your hydrogen generator is correct.

(16) J. E. asks: How is solder applied in the manufacture of tinware, so as to make it adhere, and lay evenly on the surface of the tin? A. Use, in conjunction with the solder, hydrochloric acid in which has been dissolved all the pure zinc it will take.

(17) F. L. asks: Is there any mixture with which I can color an alloy of block tin and lead to a copper color? A. A lacquer composed of thin shellac varnish colored with turmeric and dragon's blood is sometimes used for this purpose. A thin electrolytic deposit of copper gives much more satisfactory results.

(18) H. P. S. says: In reply to A. A. A., who asks what wood is best for the top of a violin: The tops of all good violins are of spruce, with fine, straight grain. Backs are curled maple, the grain in short, fine waves, not wild, as it is termed. Shellac varnish is worthless, and worse, on a violin. Two kinds of varnish may be used, namely: 1. Best coach oil varnish, (a light coat, with long time to dry). 2. The old Cremona varnish, the basis of which is the rare gum amber. If this varnish is used, no other coloring will be necessary, as the varnish gives a beautiful amber color, though deeper stains may be used if desirable. The varnish is not in the market; but if A. A. A. will address the initials as above, at Syracuse, N. Y., I will give him particulars regarding it.

(19) H. T. D. asks: 1. How can I get a good deposit of iron from its sulphate, or any solution that may be preferable? I have succeeded in getting only a black powder from a sulphate solution. I think I can utilize a good deposit of iron. A. Use a very strong solution of the proto-sulphate in an aqueous solution of chloride of ammonia. The anode should be moderately large and of good wrought iron. Use one large Smee cell (carbon zinc, 1 quantity). The current should be strong and constant, but in no case strong enough to decompose water. The bath must be as nearly neutral as possible, and the surface of the cathode perfectly clean; this is the greatest source of the difficulty. The connections should all be made before the cathode is placed in the bath. 2. In Napier's "Electro-Metallurgy" there are some remarks upon depositing alloys. Would the carbonate of ammonia and cyanide of potassium solution, spoken of, answer for an alloy of equal part of tin and copper? A. Yes.

(20) A. H. W. says: I send you a bottle containing a worm which troubles our well water. It is never seen in summer, and then the water is pure and quite cold. As soon as cold weather comes the worms come also; and then the water has a smell and seems warmer than in summer. Can you inform me of something, not injurious to health, that can be put in to clear the worms out? A. Test a small sample of the water by just tinting it with an aqueous solution of permanganate of potassa. If, after standing for a few hours, the tint

disappears, the water is unfit for drinking purposes. It is not advisable to add any chemical to the water; the best that can be done under the circumstances is to add a few frogs or tadpoles which feed upon the insects and worms, and purify the water. This method is an old one.

(21) R. L. asks: 1. To what degree of heat should coal be exposed to make illuminating gas in the most economical manner? A. About 2,300° Fah. 2. Would it be necessary to have the gas purified for heating purposes, and what would be the disadvantages of non-purified gas? A. The purpose of purification is principally to remove the carbonic acid gas, which greatly impairs both the heating and light, producing qualities of the gas, by obstructing its proper combustion. The gas will burn readily, however, without purification. 3. Have there ever been any successful attempts to generate coal gas with a small heating apparatus of about the capacity of an ordinary stove? A. With an iron retort and good fire, coal gas may be obtained in small quantities in the way you mention. The pipe leading from the retort should be of ample dimensions to prevent clogging, and the hot gas, as it comes over, should be thoroughly washed with cold water in order to remove the tar, coal oils, ammonia salts, etc., which come over with it. 4. Would the gas and coke burnt separately give out a smaller or larger amount of heat, than the quantity of coal wherefrom they are produced? A. The total amount expressed in foot-pounds would be the same in either case.

(22) W. J. T. says: I saw on each side of the sun a perpendicular rainbow-colored streak, about 15° in length, with the orange side toward the sun, and about 10° away. Thermometer +19, atmosphere hazy. What was the cause? A. This class of phenomena is caused by the refraction and decomposition of light by crystals of ice floating in the atmosphere, on the same principle as the prism produces the different colors.

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

A. M.—It is galena (sulphide of lead) containing in 100 parts, 86.6 lead, 13.4 sulphur. It is the principal ore of lead worked.—R. & P.—It is a piece of amorphous quartz rock, somewhat discolored by sesquioxide of iron. There is a remote possibility that it may contain a small percentage of gold. This would necessitate a qualitative analysis.—A. H. K.—It contains sulphide of antimony, sulphur, nitrate of strontium, nitrate of potash, and gunpowder.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On Boiler Explosions. By B. F. C., and by J. M. L.
On Public Buildings. By J. B.
On Balloons. By J. F. B.
On Migratory Spiders. By J. S. D.
On Thomas Edward, Naturalist. By —.
On the Suez Canal. By —.
On the Ball Puzzle. By J. T. H.
On Mathematics. By T. F.

Also inquiries and answers from the following: J. O.—J. L. L.—E. G. S.—W. T.—C. C.—S.—J. R.—H. H. D.—A. G. F.—H. F. A.—B. F. G.—T. W. S.—R. M.—E. H.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes water motors? Who sells pressure-regulating gas burners? Whose is the best water wheel? Who sells batteries for plating? What is the price of peroxide of manganese in the New York market?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the week Ending

December 12, 1876. 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, 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.

[This list should have been published before the two in our last week's issue, but the copy did not arrive in time.]

Table listing inventions and their patent numbers: Air valve for blast cylinders, J. Hemphill... 185,321; Bake pan hanging, J. Gravenstine... 185,226; Bale band stretcher, C. M. Pearre... 185,347; Bale tie, J. C. Du Bois... 185,304; Bale tie, G. S. France... 185,310; Barbed fence wire, W. Knickerbocker... 185,313; Barn door hanger, J. A. Swan... 185,261; Basket making machine, S. H. Wheeler... 185,273; Bee hive, G. W. Snider... 185,194; Bench plate, L. Bailey... 185,290; Bessemer, ladles operating, W. R. Jones... 185,327; Blank book, H. S. Archer... 185,205; Blind slats, mending, N. Hotz... 185,179; Boats, launching, M. Bourke... 185,283; Book cover protector, G. W. Holden... 185,294; Book support, C. & J. G. Brunner... 185,287; Boot cleaner, T. Ash... 185,273; Boots, scalloping uppers of, W. Manley... 185,248.