

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line.

Mechanical Working Drawings a Specialty. Pemberton & Scott, Draughtsmen, 37 Park Row, room 30.

Portable and Stationary Engines; Boilers of all kinds; 45 Cortlandt St., N. Y. Erie City Iron Works, Erie, Pa.

Air Compressors, Steam Pumps. James Clayton, Brooklyn, N. Y.

Alcott's Turbine received the Centennial Medal.

Vertical Scientific Grain Mills. A. W. Straub & Co., Phila.

Warranted best Planers, Jointers, Universal Woodworkers, Band and Scroll Saws, etc., manufactured by Bentel, Margendant & Co., Hamilton, Ohio.

24 inch Second-hand Planer, and 12 inch Jointer, or Buzz Planer, both in first-class order, for sale by Bentel, Margendant & Co., Hamilton, Ohio.

For Town and Village use, comb' Hand Fire Engine & Hose Carriage, \$350. Forsaith & Co., Manchester, N. H.

Wrenches.—The Lipsey "Reliable" is strongest and best. Six inch sample by mail 60 cents. Roper Caloric Engine Manufacturing Co., 91 Washington St., N. Y.

Agents wanted in every county to sell our new Machine to file all kinds of Saws. Every one that uses a Saw will buy one. Price \$2.50. Illustrated Circulars, etc., free. E. Roth & Bro., New Oxford, Pa.

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J.

For the best Bone Mill and Mineral Crushing Machines—five sizes, great variety of work—address Baugh & Sons, Philadelphia, Pa.

Galvanized Iron Cornice Machines.—The most Improved, Straight and Circular. Prices reduced. Calvin Carr, Cleveland, O., & Hewes Machine Wks., Newark, N. J.

Wanted.—2 H. P. Air or Spring Motor, weight 200 lbs., or less. J. M. Lauck, Parkersburg, W. Va.

For Sale.—Brown & Sharpe Universal Milling Machine; 5 ft. Iron Planer, 24 in. square; two 18 in., 44 in. bed Power Lathes. W. E. Lewis, Cleveland, O.

Carriage Axles, Springs, Bolts. Wanted full particulars and prices of machines used in the manufacture of above. Address Selby & Co., Longmore St., Birmingham, England.

Lot of Second-hand Machinery for sale. G. Place Machinery Agency, 121 Chambers St., New York.

For Sale.—A rare opportunity to secure Shop or State Rights, or the entire patent, for the best Balance Valve, with automatic cut-off regulator for portable and stationary engines; no experiment; hundreds of them in use giving good satisfaction. H., Carrier No. 4, Detroit, Mich.

More than twelve thousand crank shafts made by Chester Steel Castings Co. now running; 8 years' constant use proves them stronger and more durable than wrought iron. See advertisement, page 233.

Lansell & Leng's Lever and Cam Gate Valves. Cheapest and best. Leng & Ogden, 212 Pearl St., N. Y.

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

Cornice Brakes. J. M. Robinson & Co., Cincinnati, O.

Walrath's Improved Portable Engines best in market; 3 to 8 H. P. Peter Walrath, Chittenango, N. Y.

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

Blake's Belt Smds, best fastening for Rubber and Leather Belts. Greene, Tweed & Co., 18 Park Place, N. Y.

Friction Clutches warranted to drive Circular Log Saws direct on the arbor, and Upright Mill Spindles, which can be stopped instantly; Safety Elevators, and Hoisting Machinery. D. Frisbie & Co., New Haven, Ct.

Union Eyelet Company, Providence, R. I., Manufacturers of Patented Novelty on royalty.

Machine Cut Brass Gear Wheels for Models, etc. (New List.) D. Gilbert & Son., 212 Chester St., Phila., Pa.

Boilers & Engines cheap. Lovegrove & Co., Phila., Pa.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page.

Horizontal Engine, 16 x 36, built by the Fishkill Lathing Company, for sale cheap. G. Place Machinery Agency, 121 Chambers St., New York.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

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

John T. Noye & Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour & Co.'s Bolting Cloth. Send for large illustrated catalogue.

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

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 39 Park Row, N. Y.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

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

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

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing metals. E. Lyon & Co., 470 Grand St., N. Y.

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

Safety Linen Hose. Suction and Rubber Hose of all kinds. Greene, Tweed & Co., 18 Park Place, N. Y.

NEW BOOKS AND PUBLICATIONS.

QUARTERLY JOURNAL OF INEBRIETY. Published under the auspices of the American Association for the Cure of Inebriates. Hartford, Conn.

The March number of this valuable periodical contains much interesting matter, including papers on "The Influence of Alcohol on Mental Maladies," by M. Magnan; "Inebriate Asylums," by Dr. N. S. Davis; "Curability of Inebriety," by Dr. Albert Day; and a variety of original and selected articles. The prevailing tone of the Journal is liberal, and is in pleasing contrast to the unfortunately too common falling of

many temperance advocates, who are apt to be led, through excess of zeal, into being intemperate in language if in nothing else. For instance, we find Dr. Day saying: "No doubt that wine—the natural product of the vine—was intended as food for its exhilarating, cheering qualities, and not as an intoxicant," and elsewhere in the present number similar expressions occur, evidencing an enlightened view of a subject rarely discussed with entire fairness.

REPORTS OF JUDGES OF GROUPS 4, 9, 12, 15 and 17, Centennial Exhibition. J. B. Lippincott & Co., Philadelphia.

These reports, edited by Mr. Francis A. Walker, Chief of the Bureau of Awards, consist largely of lists of prizes awarded and the reasons therefor, but are prefaced with general comments on the several groups of exhibits which furnish much valuable information. Group 4 includes animal and vegetable products and the machinery for their preparation, and its importance warrants the minuteness with which the reports have been drawn out; group 9 consists of wool and silk fabrics, materials and machinery; group 12, leather and its manufactures; group 15, builders' hardware, edge tools, cutlery, etc.; and group 17, carriages, vehicles, etc., and their accessories.

SECOND ANNUAL REPORT OF THE NEW YORK STATE SURVEY. 1878.

We are indebted to Mr. James T. Gardner, Director of the Survey, for a copy of this report, which gives particulars of the work accomplished during the year 1877. The triangulation now extends across eleven important counties in the heart of the State, and has afforded the means of determining with great accuracy nearly 170 geographical points lying within an area of 3,000 square miles, and forming parts of these counties. The expenses during the year were \$13,977 41, leaving an available balance of \$2,408 36.

MATTER AND MOTION. By J. Clerk Maxwell, F.R.S. D. Van Nostrand, publisher, New York. Price 50 cents.

This little volume is No. 36 of the Science Series, and is not inferior in point of interest to its predecessors. Mr. Maxwell has succeeded in compressing a very thorough résumé of his subject into a compact and serviceable shape—a task which, considering the temptations toward diffuseness, is by no means a light one.

The March number of *Industrial Art* contains the usual variety of readable articles, and is profusely illustrated. The leading topics are Art Education, Ancient Textile Art, Technical Education on the Continent, Fresco Painting and Modern Mosaics, and Notes on the Paris Exhibition of 1878. This excellent publication fills an important niche in serial literature, is ably conducted, and presents a handsome typographical appearance.



Notes & Queries.

F. E. B.—See answer No. 43, p. 188, SCIENTIFIC AMERICAN, current volume.—J. Y. L.—See SCIENTIFIC AMERICAN, June 30, 1877, p. 408.—E. B. C.—The inductive effect in the arrangement you describe would be only momentary, and under the conditions would hardly be appreciable.—A. L. B.—See p. 155, SCIENTIFIC AMERICAN of March 9, 1878, No. 19.—J. F.—Use the cement recommended F. G. R., this page. Melted rubber sticks well enough, but does not readily harden.—W. H. B.—It should read—65° C.—L. V. B. P.—See answer No. 34, SCIENTIFIC AMERICAN, November 10, 1877, p. 299.—A. L. B.—Consult "Chemical Recreations," by J. J. Griffin, F.C.S., London.—G. J.—Ether is not injurious to iron and steel.—W. M. S.—See SCIENTIFIC AMERICAN, January 23, 1875, p. 49; also, March 27, 1875, p. 193; January 4, p. 20.—F. A.—The solution is camphor and sal ammoniac in alcohol, and fails to give satisfactory results.—J. H. H.—We do not know of such a process.—C. N. V.—We think the plan you describe will answer.—S. C. T.—There are a number of materials for the purpose in the market. If you do not find addresses in our advertising columns, you might obtain them by inserting a notice under head of "Business and Personal."—E. B.—We think you will have no difficulty in using coal stoves as you suggest, if your chimney is of sufficient height and clean, with a separate flue for each stovepipe.—W. C.—Among the most important studies for a machinist may be mentioned arithmetic, algebra, geometry, trigonometry, elementary mechanics, drawing, and the laws of heat, steam, and combustion.—T. G.—It is generally more economical to run an engine fast, and as there would be no practical difficulty in your case, it might be better to use the short stroke cylinder. As to pressure required, see SCIENTIFIC AMERICAN for July 17, 1875.—T. & A. W.—The data sent are not sufficient for us to judge of the practicability of the scheme. It will be well to refer the matter to an engineer.—J. C. H.—We think you can use a cylinder 3 x 6 if it is convenient to increase the stroke.—W. H. A.—There are several varieties of the instrument you refer to in the market. It is commonly known as an ear trumpet.—A. J. and M. E. P.—See answer No. 17, SCIENTIFIC AMERICAN of March 4, 1876.—R. R. J.—We can imagine circumstances under which the flanges would probably break, but we do not think they would be certain to do so in ordinary use.—J. G.—In the query referred to, we understood that reference was made to stationary boilers of the two styles known as locomotive and return tubular, and our answer was based on the results of experiments.—S. E. W.—Your data are insufficient, but, as we understand you, there is probably no great difference between the two.—J. W. L.—A 2 x 5 inch cylinder will, we think, be sufficient for the work you describe.—H. L. C.—We do not understand, from your question, exactly how the device is to be used. Send a sketch and full description.—A. B. E.—You might use a small hot air engine, which would not occupy much space and could be placed in any convenient location.—J. V. A.—If you mean a permanent magnet, 12 inches would be a good length for the diameter mentioned.—C. C.—Fryer's work on "Constructions in Iron" will probably assist you.—W. T. B.—See "Science Record" for 1874, p. 98; also, Watt's "Dictionary of

Chemistry," with supplements.—A. M. D.—See SCIENTIFIC AMERICAN, vol. 34, p. 386.—J. A. J.—We do not know of such an explosive as "liquid dynamite." Probably nitro-glycerin, which sometimes exudes from dynamite when carelessly made, is what is meant.—W. H. C.—If you run the engine at a high speed, it would probably increase the power to make the alterations you propose. The covering mentioned usually prevents some loss of heat, and under some circumstances helps to preserve the iron.—L. B. H.—See answer No. 62, p. 156, SCIENTIFIC AMERICAN, September 8, 1877; and answer No. 10, p. 314, May 15, 1875.—E. C.—Brass can be cast in any iron mould that is properly vented to allow the air and gases to escape. The other materials you suggest would not be so durable. Diagram not received.—G. S.—About two horse power will be sufficient.—D. B.—There are such saw-filing machines in the market. Consult advertising columns or insert a notice under "Business and Personal." Emery wheels are made as thin as 1/8 inch. The saws are cut by punching machines.—C. F.—As we understand the arrangement, we think it will answer.—L. S., J. B., and J. W. Z.—Insert notice in "Business and Personal" column.

(1) M. S. asks: What is it in ginger beer that makes the corks start out when the wires are taken off, and causes the beer to foam? A. The liquid is surcharged with carbonic acid gas.

(2) J. B. C. asks: How can the capacity of a coal bin of given dimensions be found? A. If it is rectangular, take the product of the three dimensions in feet, and allow about 40 to 45 cubic feet for each ton of coal. If the bin is not rectangular, no general rule can be given without knowing the form, but you will find rules for special cases in works on mensuration.

(3) J. G. R. asks: What pressure will a boiler 18 inches high and 9 inches in diameter, made of 30 ounce copper, safely stand? A. From 15 to 20 lbs. per square inch. In reference to your second question, address the manufacturers.

(4) W. D. P. writes: O. C. L. can kill the vermin on his cattle with a decoction made from tobacco stems or other cheap tobacco. An application of coal oil put on very thin, or weakened, will answer; a strong application is not good for the animal.

W. D. P. will find a recipe for bluing gun barrels in SCIENTIFIC AMERICAN, July 21, 1877, p. 44 (46).

(5) F. G. asks: 1. Is too much blast in a melting furnace injurious to the iron? What effect does it have upon the iron? A. The principal effect of too much blast is to waste fuel. 2. How much pressure of blast per square inch should we have for a 28 inch cupola melting 3,000 lbs. per day with best anthracite coal? A. Exactly what pressure is best, under given conditions, should be settled, as it readily can be, by a few experiments. 3. Does poor coal affect the strength of iron? A. Coal containing ingredients that are injurious to iron is apt to affect its strength.

(6) G. M. A. writes: Tyndall in his "Fragments of Science," p. 19, uses the following words referring to a brick thrown into the air: "If not here caught by the bricklayer, it would return to the hodman with an accelerated motion, and reach his hand with the precise velocity it possessed on quitting it." My preconceived ideas were in accord with Tyndall, and I was surprised when I read your reply to C. H., p. 108, current volume. Would it be asking too much to set forth your reasons for saying that a bullet fired upward from a gun will not return to the earth with the same velocity with which it ascended? A. The resistance of the air affects the velocity. In a vacuum, the initial and final velocities would be the same. You will find an interesting investigation relating to this question in Bartlett's "Analytical Mechanics."

(7) F. G. R. asks: How can I cement firmly small pieces of soft India rubber to brass? A. Try a fused mixture of about equal parts of gutta percha and genuine asphaltum.

(8) H. B. M. asks: What was the best time made by the steamboats Chauncey Vibbard and Mary Powell? A. The Vibbard is reported to have made the run from New York to Albany, in 1876, in 6 1/2 hours. The Mary Powell made the 76 miles between New York and Poughkeepsie in 3h. 3m., and it is claimed that on August 7, 1874, she ran from her dock to Piermont, 28 miles, in one hour. It is difficult to obtain trustworthy records.

(9) J. W. Y. wishes to know the mode of applying a waxed oil finish to black walnut furniture. A. Rub on a mixture of linseed oil and yellow wax, which may be colored by alkanet root.

(10) F. L. S. writes: I have a specimen of three parts copper to one part tin. How can I polish it? A. If it is scratched, you may first use very fine emery cloth, and then finish with rottenstone and oil.

(11) X. Y. Z. asks: What is the cause of sparks flying about more at one time than at another when they are casting in a blast furnace? A. It may be due either to differences in the iron moulds, or mode of handling.

What should be done to cure eruptions on the face? A. It is advisable to purify the system.

(12) C. W. B. writes: I am building a high pressure condensing engine, cylinder 7 inches diameter, 9 in. stroke, 180 revolutions per minute. Average pressure 30 lbs. It is for a steam yacht. 1. How many square feet of cooling surface do I require (surface condenser), water to be taken from outside? A. Allow 1/4 square foot of cooling surface for each pound of steam condensed per hour. 2. What should be the capacity of the cold water pump, making 180 strokes per minute? A. Make it large enough to supply from 35 to 40 times the weight of steam condensed. 3. What should be the area of steam ports for a cylinder 7 x 9? A. At least 1/10 of piston area.

(13) J. M. H. asks: 1. What is the meaning of the word "line" as applied to the measurement of watches? A. A line is 1/16 of an inch. 2. What is meant by the word "plate"? They are said to be full plate, three quarter plate, etc., as applied to the movements. A. In the full plate watch the balance

wheel is above the plate; in the three quarter plate, below. 3. Has a watch ever been invented to run by atmospheric pressure or compressed air? Would such an escapement be practicable? A. We never heard of such an escapement, but are not prepared to say that it is impracticable. Compressed air has been tried for clocks.

(14) F. T. C. asks: Why is a tidal wave formed on the side of the earth opposite to that directly under the moon? A. Brande makes the following statement: "The attractive force of a body on a distant particle of matter varying inversely as the square of the distance, the particles of the earth on the side next the moon will be attracted with a greater, and those on the opposite side with a smaller, force than those which are situated intermediately. The gravitation towards the earth's center of the particles nearest the moon will therefore be diminished, and, consequently, if at liberty to move among themselves, they will rise above the general level. In like manner, the moon's attraction on the most distant particles being less than on the central ones, their relative gravitation towards the center will also be diminished, and the waters will consequently be heaped up on the side of the earth which is turned away from the moon."

(15) A. C. F. asks: What is the safe working pressure of a boiler shell 44 inches in diameter, 1/2 inch good boilerplate? A boiler maker says it is safe at 150 lbs. to the square inch. A. We think 60 lbs. would be a much safer figure.

(16) H. & S. write: We have a 12 x 20 cylinder that now takes steam to within 2 inches of the last part of stroke. Can we by lengthening the valve soas to cut off at one half or two thirds the stroke get one half or two thirds the same power, which is all we need? A. We think your best plan will be to change the point of cut-off as suggested. If you can also increase the speed of the engine, you may effect some saving.

(17) C. S. I. asks: 1. What effect does it have on a slide valve to diminish or increase the size of the openings under it, the valve to remain the same size in both cases? A. If that is the only change the general effect would be to cause a very unfavorable distribution of steam. The question is so general that no very definite answer can be given, but you can make a model out of cardboard or stiff paper, and determine the action in any given case very readily. 2. Suppose there were no openings under the valve, what would be the pressure on it? A. The projected area of the valve, multiplied by the steam pressure, if it is supposed that the valve is tight.

(18) C. H. L. asks: 1. What is the best solvent for asbestos? A. There is no solvent for asbestos as such. 2. Can asbestos be reduced to a powder, so as to be mixed with other ingredients? A. Yes; heat it strongly and quench in cold water; then grind to powder.

(19) B. H. W. writes: I have a telegraph line 1 1/3 miles long in excellent working order. The wire is No. 12 galvanized, and is worked with 9 cells gravity battery. 1. Can I convert it into a telephone line? A. Yes, by removing the relay or sounnder that is in connection with each end of your main line, and substituting a telephone. 2. Must I use the battery to operate the telephone, or can I operate it without the use of a battery? A. The use of the battery is not necessary. 3. Can the ground be used the same as in the telegraph line? A. Yes. 4. Where will I find instructions for the construction of a magnet suitable for the telephonic instrument? A. See answer No. 16, p. 299, of SCIENTIFIC AMERICAN of November 10, 1877.

(20) J. P. writes: When I dip my pen in ink the silvered holder shows a spot of copper where it touches the ink. What is the cause? A. Galvanic action may be the cause. If so, copper is present in the ink.

(21) G. D. H. asks: Can the electrical arch be produced with a Grove's battery of 4 cups, and also can it be made by the current developed by a magneto-electric machine? A. Four cups of Grove's battery are hardly sufficient for this purpose. From 20 to 50 cups of Grove's or Bunsen's battery, or a magneto-electric machine, are generally used; see p. 1814 of the SUPPLEMENT of March 9, 1878.

Would two or three cubic inches of air, or as much as would remain in a gas bag holding three gallons, after the sides were brought together so as to expel as much air as possible, render the hydrogen with which the bag is to be filled dangerous to be ignited at the end of a tube a foot long? A. There is a possibility of the gas exploding under the circumstances you mention; if you first introduce into the collapsed bag a small quantity of gas, and then expel this, there will be less chance of an explosion; but a safer way is to interpose a wash bottle between the bag and the tube from which the gas is burnt.

(22) M. H. asks: 1. Can steel be mixed with melted cast iron when in the ladle? A. Yes. 2. If so, what per cent of steel can be used? A. There is scarcely any limit. 3. Does it improve the iron? A. So far as we know, in certain proportions and for special purposes, it does, but scarcely enough to make the mixture very desirable.

(23) H. S. R. asks: How should the cut-off valve on a slide valve engine be set to get the greatest amount of power, to cut off the steam at equal distances from each end of the cylinder, or at opposite points in the revolution of the crank? A. It is generally advisable to equalize the cut-off in reference to the stroke.

(24) L. G. writes: I have a boiler which is too small for its work, and intend putting in another in connection with it. The proposed new boiler is to be shorter and with less tubes than the present one. The connections are to be a steam pipe running from the top of the new boiler to the dome of the old one, and a water pipe at the back of the boilers. I propose to fire both boilers together, or with the same fireplace. Will this arrangement answer? A. Yes; if you fit check valves to the feed pipe, so that the water cannot be forced from one boiler into the other.