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.

Lieut. George H. Palmer, of the 16th U. S. Infantry, will please send his present address to the publishers of this paper.

For Sale—Singly or half, a number of U. S. Patents; also perfected, patentable Inventions, big and little. Address J. B., 1444 S. 16th St., Philadelphia, Pa.

For Sale—Baldwin No. 1 Foot Lathe, with Chucks, etc. Nearly new. Address Lock Box 153, Dallas, Tex.

$3,000.—Wanted a partner with this amount in a Machine Shop, the inventory of which is estimated at least at $5,000, for manufacture of patented articles. Address A. D., 363 Morris avenue, Newark, N. J.

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

For Sale.—Half interest in Hoisting Apparatus for Saw Mills. Address John Rice, Chatham, N. B.

Tackle Blocks and Patent Iron Sheaves. Full line. Catalogues mailed free. Address Penfield Block Works, Lockport, N. Y.

Fountain Pen Holder—Wanted parties to manufacture, in quantities, the Pen Holder and Case. Address for particulars, Philip Goehring, Richwood, Union Co., Ohio.

Interest for Sale, or on Royalty—New Compound Engine, Marine, Locomotive, or Stationary; one Cylinder; no dead center or back pressure; lighter, more compact, and more economical than any known engine, either in first cost or consumption of fuel. For particulars, address J. N. Petty, 8 Broad St., N. Y.

Wanted—Party to put about $4,000 in manufacture of an article approved by the best mechanical engineers. Almost unlimited market and large profits. Address Box 3920, New York city.

Wanted—Second-hand Re-sawing Machine, in good condition. Address, with full particulars, R. B. P., 48 Liberty St., Utica, N. Y.

For Sale.—Rights to manufacture and sell in Western States, new patent Machine for Cutting Sides and Bottoms of Sheet Metal Vessels. Tinsmiths save one third by using it. Stiles & Green, Copenhagen, Lewis Co., N. Y.

Second-Hand Spoke Machinery for sale cheap. Address J. F. Perrigo, Canandaigua, N. Y.

Second Edition.—A Book and Documents giving instructions for Selling Patent Rights; commented by Scientific American, vol. 29, page 377. We sell all kinds of blanks. Circulars free. S. S. Mann & Co., 132 Dolphin St., Baltimore, Md.

Send for James W. Queen & Co.'s Catalogue of Drawing Instruments and Materials; also catalogue of Microscopes, Field Glasses, Telescopes, and other optical instruments. 924 Chestnut St., Philadelphia, Pa.

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

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., Pittsburgh, Pa.

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.

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.

Hyatt & Co.'s Varnishes and Japans, as to price, color, purity, and durability, are cheap by comparison than any others extant. 246 Grand st., N. Y. Factory, Newark, N. J. Send for circular and descriptive price list.

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 173.

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

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

Yacht and Stationary Engines, 2 to 20 H. P. The best for the price. N. W. Twiss, New Haven, Conn.

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

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.

Notes & Queries

A. B. S. will find directions for making an æolian harp on p. 330, vol. 26.—A. F. B. can copper iron wire by following the directions on p. 90, vol. 31. To silver it, use the preparation described on p. 299, vol. 31.—C. D. is informed that we do not know of the offer of a premium for a method of crystallizing maple syrup.—H. B. B. and many others should read our article on the horse power of an engine on p. 33, vol. 33.—E. T. will find directions for building a hen house on p. 139, vol. 36.—T. C. will find something on the formation of butter in the process of churning on p. 119, vol. 30.—T. F. M. will find a good recipe for ice cream on p. 251, vol. 28.—J. W. B. will find on p. 253, vol 30, a recipe for paste for fastening paper to tin.—C. W. D. will find on p. 123, vol. 31, directions for bluing steel.—W. W. does not give the length of his crank arm nor the speed at which the car is to run.—T. H. C. will find somethmg on the use of zinc in boilers on p. 36, vol. 32.—E. E. P. will find directions for building a refrigerator on p. 251, vol. 31.—C. E. C. is informed that steel has been used for making boilers. As to flow of water through pipes, see p. 48, vol, 29.—H. L. C. will find directions for polishing shirt bosoms on p. 203, vol. 31. To clean kid gloves, see p. 283, vol. 30.—W. D. can use aquarium cement on his wardian case. See p. 202, vol. 28.—A. B. will find a recipe for Babbitt metal on p. 122, vol. 28.—T. A. B. is right as to the size of the drill asked for by W. H. R. The $\frac{15}{64}$ drill would be about $\frac{1}{177}$ smaller than the $\frac{6}{25}$ hole.—H. & W. will find a good recipe for a depilatory on p. 229, vol. 28.—W. S. F. will find directions for nickel plating on p. 174, vol. 30.—I. A. H. is informed that the lava gas tip is made by a patent process.—B. F. F. will find something about the Australian colonies of Great Britain on p. 161, vol. 36.—H. L. C. is informed that we do not recognize his coin from the impression he sends.—D. F. H. will find an answer to his query as to large and small wagon wheels on p. 91, vol. 36.—H. Y. D. will find directions for making hydrogen on p. 341, vol. 27.—B. H. W. can mount photographs by following the directions on p. 91, vol. 31.—J. W. B. will find a recipe for an aquarium cement on p. 202, vol. 28.—McC. will find a recipe for mucilage on p. 202, vol. 31.—J. S. R. will find an article on American graphite on p. 55, vol. 25.—L. J. D. will find a recipe for a bright bronze on p. 51, vol, 33.—C. L. T. should read our articles, now in course of publication, on straightening metal plates.—O. S. is informed that we have no means of verifying the sea serpent story.—A. J. P. and R. W. C. will find a recipe for baking powder on p. 123, vol. 31.—E. J. will find a recipe for black enamel on iron on p. 208, vol. 26.—J. D., Jr., will find an answer to his query as an alloy that will expand on cooling on p. 138, vol. 36.—T. S. V. will find a recipe for cement for patching leather boots on p. 119, vol. 28.—J. H. W. will find a description of an incubator on p. 273, vol. 33.—C. R. will find a recipe for artificial marble on p. 57, vol. 28.—H. J. D. will find directions for French polishing furniture on p. 11, vol. 32.—J. M. T. will find a formula for safety valves on p. 363, vol. 29, and for horse power of engine on p. 33, vol. 33.—G. W. W. will find a recipe for a depilatory on p. 107, vol. 30.—C. B. W. will find directtons for re-tinning tinware on p. 139, vol. 36.—J. McF.'s device is not a perpetual motion, as it depends on heat for its power. As to the flight of birds, he forgets that the atmosphere rotates as well as the earth.—W. B. will find something on the retina of the eye on p. 20, vol. 32.—C. H. S. will find directions for making artificial meerschaum from potatoes. etc., on p. 307, vol. 34.—F. L. will find directions for coloring gold chains on p. 43, vol. 30.—H. J. D., S, H., J. F. L, T. M. F., J. H. N., W. B., B. L., E. E., R, S., P. W., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) G. O. E. asks: 1. What would be the effect of the explosion of 40 gallons each of pure oxygen and hydrogen, contained in gas bags like those used with the oxyhydrogen stereopticon? A. A mixture of oxygen and hydrogen in the proper proportion is as powerful an explosive, in proportion to its specific gravity, as nitro-glycerin. The explosion of such a quantity of the mixture as you mention, in an ordinary apartment, would endanger the building. If the gases are not mixed, there is no danger, as neither of them alone is explosive. 2. Is there no way of preventing the possibility of such an explosion? A. With suitable safety bottles between the gas reservoirs and jet, and with equable pressure in each reservoir, there is little or no danger under skillful manipulation.

(2) J. M. A. says: I find an apparent contradiction between two standard authors as to the definition of "living force." Bartlett's "Analytical Mechanics," page 45, says: "The living force of a body is double the quantity of work expended by its inertia while it is acquiring its velocity." This author represents the living force by $M v^2$. In Peck's "Mechanics," it is stated, on page 187, that "the expression $\frac{1}{2} M v^2$ is called the living force of a body. . . The living force of a body is the measure of the quantity of work expended in producing the velocity." Thus one author places the measure of the living force at twice the amount of the other. Why this discrepancy? A. Professor Bartlett's definition is probably the most generally accepted; but there is good modern authority for the other. It is a case of definition, about which authorities are apt to differ. All agree that the energy is $\frac{1}{2} M v^2$, while some consider that double the energy is an imaginary "living force," and others do not.

(3) C. asks: What kind of dye is used in coloring rattan for fancy chair seats? A. For blue, sulphate of indigo, partly saturated with an alkali. For scarlet, lac dye used with tin salt as a mordant. For red, dye with madder, using tannin and alum as mordants. For black, impregnate with acetate of iron and boil with a decoction of madder and logwood. For green, boil with an alum mordant and then with sulphate of indigo, and a little fustic or quercitron. For yellow, use an alum mordant and dye with fustic. The coal tar colors may also be employed for this purpose.

(4) J. C. P. says: 1. I wish to build a tug boat for the purpose of towing barges laden with oyster shells. The barges are 30 feet long by 10 feet wide, and 3½ feet deep, and will hold 7 or 10 tons of shells. What size should the steam tug be to tow such barges at the rate of 3 or 5 miles per hour? A. If you only mean to tow one barge at a time, an ordinary row boat, 18 to 20 feet long, fitted with engine and propeller will answer very well. 2. What are the constituents of oyster shell lime? A. An analysis of oyster shells by Schossberger shows that they consist of three layers, as follows: 1. Inner layer, the so-called mother-of-pearl. 2. Brown hard scales, forming the outer edges of the successive laminæ of the outer shell. 3. A chalky layer, interposed between the laminæ of the shell. The first of these contains: Carbonate of calcium 94·7, organic matter 2·2, other salts and loss 3·1. The second contains 89·1, 6·3, and 4·6, and the third 88·6, 4·1, 6·7 of these ingredients respectively. You should consult our advertising columns for addresses of dealers and manufacturers.

(5) A. J. K. says: In the glass sand business we have during winter to dry all our sand. I dry it now on a floor, drying 15 tons in 10 hours. Is there an apparatus that we could use that would keep the sand in one place and save the work of shovelling it off the floor? A. For similar purposes the material to be dried is caused to pass, by means of continuous bell buckets, through the extended flue of a small brick furnace. This method has succeeded very well, and is employed extensively for the drying and roasting of certain ores, etc.

(6) J. J. asks: How can I unite a set of vulcanite teeth that are broken, that they may stand the saliva and heat of the mouth? If I knew how to make the vulcanite that the teeth are set on, I think I could have mended them with it. A. Mix dry caoutchouc with half its weight of flowers of sulphur, and thoroughly knead the mixture on a plate of warm metal. Heat the teeth to a temperature of about 212° Fah., join the fractured edges with a little of the caoutchouc dough, moistened with a drop or two of bisulphide of carbon, and expose the whole to a temperature of about 200° Fah. for 2 hours. At the expiration of this time, raise the temperature to 300°, and maintain it constantly at this for 4 hours more. When cool, the joint will be found firm, and may be trimmed with a sharp knife.

(7) W. R. T. says, in answer to C. S. D., who asks as to what is the best wood for a guitar: My experience shows basswood to be best. Either use the wood in pieces, or get a strip of a sufficient length, and steam it so that it will not break.

(8) J. A. M. says: I have a 26 inch under runner burr, and the spindle heats when the stand is full of oil, so that I have to stop. There is no grit in it. How can I remedy it? A. Make your spindle cone-shaped at the end, like a lathe center.

(9) J. N. P. asks: 1. What is draw-filing? A. Draw-filing is filing with the length of the file at a right angle to the motion of the file, the latter being held in both hands and made to cut on both strokes, by which process the file cuts more smoothly.

What is a shaping machine, or what is the difference between a shaping machine and a planer? A. A shaping machine is a machine for planing iron. In a shaping machine the slide carrying the tool travels, the table holding the work being stationary. In a planing machine the head and slide are stationary, while the table carrying the work travels back and forth.

A friend of mine has been working for years on a machine to be inclosed in a caisson, and let down in a cistern, claiming that the water of the cistern will run the machine and pump a continuous stream out of it at the top as long as there is any water in the cistern. I have tried to convince him that he is trying to make a perpetual motion, but he says he is not. A. Such an apparatus would be a perpetual motion.

(10) C. R. S. asks: 1. Which is the most powerful and economical for a road locomotive, a double engine of 8 horse power in each cylinder, connecting on the same driving shaft, or one single engine of 16 horse power? A. The double cylinder would be the best. 2. How large should the boiler be? A. Consult a manufacturer.

(11) J. C. M. asks: How can the amount of friction of a valve on its face be ascertained, if we have the pressure of steam per inch and the area of the surface occasioning the friction? The answer should designate the number of lbs. applied to the valve rod necessary to move the valve. A. The precise pressure cannot be calculated because it depends upon the fit of the valve to its seat.

(12) E. H. M. asks: What kind of curve is best to use in bent arm gears? A. Variously shaped curves are used, all serving equally well.

Of what size should master taps be? A friend says that they should be of the same size as working taps, while I hold that they should be $\frac{1}{32}$ of an inch larger. A. Master taps for tapping dies should be from once to twice the depth of the thread larger than the bolt the die is intended to cut.

(13) L. M. C. asks: If a locomotive is running on a down grade (the drivers, of course, having a forward motion) without working steam in the cylinders, the throttle being entirely closed: if the engineer throws back the reverse lever so that the backing eccentrics work the valves, what would be the result? I read some time ago that air would be pumped through the steam pipes into the boiler and thus increase the pressure. But how is any air going to enter the boiler, the throttle being closed? A. The piston would draw air from the exhaust, and pump it partly back through the exhaust and partly into the steam chest.

(14) J. J. asks: Will a well constructed condensing engine of 5 inches bore and 12 inches stroke, cutting off at ¼ stroke, with a steam pressure of 100 lbs. (which would be 25 lbs. at end of stroke, and an average of about 57 lbs.), give as much power as a compound engine taking the same amount of steam? A. No. The compound engine would give most power.

(15) G. E. C. says: I read that to reverse a stationary engine the eccentric should be turned halfway round on the shaft from where it stood. I claim that it will not do to turn it exactly halfway round, and other engineers dispute this. Please let me know. A. If the valve has no lead, the eccentric may be turned halfway round on the shaft to make the engine run the other way. But if the valve has lead, the eccentric turned halfway round would set the valve wrong to twice the amount of the lead.

(16) O. J. says: You are doing the community a good service in pointing out the poisonous character of the fumes of the colored fires ordinarily employed, and the dangers that may arise to delicate constitutions by their use. With a view of introducing some mixtures that seem to be free from injurious ingredients (sulphur and antimony and arsenic compounds being eliminated) and producing fumes not even so annoying as tobacco smoke, I append the following formulæ, and send you samples of two different red fires: Red No. 1: Chlorate of potash 16 parts, nitrate of strontium 30 parts, lycopodium 3 parts, sugar of milk 2 parts. Red No. 2: Chlorate of potash 1 part, nitrate of strontium 8 parts, shellac 2 parts. Green No. 1: Chlorate of potash 9 parts, nitrate of barium 30 parts, lycopodium 3 parts, sugar of milk 2 parts. Green No. 2: Chlorate of potash 1 part, nitrate of barium 8 parts, shellac 2 parts.

(17) J. F. asks: Please tell me how I detect tellurium in ores, and in what minerals it is chiefly found? A. Metallic tellurium is a tin-white, brittle substance, with a metallic luster, and a specific gravity of 6·25. It is never found free in Nature, but usually in combination with either bismuth or gold and silver. With bismuth, it constitutes the mineral known as tetradymite, which has a steel-gray color and a high metallic luster. Tetradymite occurs in tubular crystals or foliated masses, which mark paper like black lead. Tellurium, in combination with gold and silver, forms the mineral sylvanite, of metallic luster and steel-gray color. When fused on charcoal it yields a light yellow, malleable globule, which contains 1 part telluride of silver and 2 parts telluride of gold. Metallic tellurium has, at present, no place in the arts, and finds a market only in the preparation of mineral and other scientific cabinets. Its price is quoted by dealers in rare metals at about $8 per ounce or $90 per pound.

(18) E. C. H. asks: 1. Is cast cast-steel suitable for laps and dies for steam pipes, and for other kinds of screw-cutting? A. Yes. 2. What is the shrinkage of cast cast-steel, and of malleable iron? A. It is very irregular, differing according to the size of the casting. 3. How much larger should the tap be for cutting open dies than the bolt that the dies are to be used on? A. About 1½ times the depth of the thread larger.

(19) J. D. E. asks: Why could we not make a telescope on the principle on which the Huyghenian eyepiece is made? A. Because the chromatic and spherical aberration cannot be corrected by such a combination of lenses.

(20) W. W. H. says: I wish to stain some windows for a church. Please give me a recipe for making a good imitation of colored glass. A. You cannot stain the glass without removing it from the window, but you can imitate the stained glass by means of transparent colors applied as paints. For this purpose, use such colors as Prussian blue, gamboge, and carmine. These will give you the three primary colors, and by their mixture the other tints may be produced. Apply with a brush, and use any transparent varnish, such as dammar, as the vehicle.

(21) E. R. asks: Is there any liquid cement, that is less expensive than shellac, with which I can cement together fine white sand or pulverized pumice-stone? A. Common rosin dissolved in naphtha, with the addition of a little gutta percha to render the resulting cement more binding and less brittle, is a preparation at once strong, cheap, and waterproof. It may be concentrated to any consistence by evaporation of the solvent.

(22) J. F. S. asks: How can I recover sulphuric acid from waste, after the washing of nitro-glycerin? A. There is no method sufficiently economical to be of any practical value for this purpose. The concentration of the acid by the evaporation of the diluent would be tedious and expensive. If the solution is not too dilute, the greater part of the sulphuric acid may be removed as sulphate of lead by agitating it with the proper quantity of dry lead carbonate, allowing to settle, and subjecting the dried precipitate to dry distillation in stoneware retorts heated to bright redness.

Please tell me of a simple and cheap method of making glue? A. Gelatin or glue exists in many animal tissues, as the skin, cellular membranes, tendons, and ligaments, and forms the framework of bones, horns, hoofs, etc. It may be separated and dissolved out from these by protracted boiling with water. The aqueous solution, when cooled, gelatinizes; and when this jelly is dried, it constitutes ordinary glue.

(23) S. J. T. asks: What form of coupling is the most durable and best adapted to run the line shaft of a threshing machine cylinder, 700 or 800 revolutions per minute on an angle, say, of about 20°? A. Use an ordinary universal coupling.

(24) W. W. asks: 1. Please give me the philosophy of the expansion of steam in the cylinder of a steam engine. Why does a cylinder 7 feet long and 3½ feet in diameter, other things being equal, give a power twice as great as a cylinder of half that length, although the surface of the pistons is the same? A. The power of an engine is the resultant of three data, pressure, distance, and time. If a piston has 1,000 lbs. pressure on it and moves 3½ feet in 1 second, it has half the power of one that has 1,000 lbs. pressure and moves 7 feet in 1 second. 2. Is the pressure on the piston, after it has passed 6 feet from the starting end of the 7 feet cylinder, any greater than it was when it had reached a point 1 foot from that of starting? A. Yes, unless the steam is cut off before the end of the stroke. If the steam follows the piston full stroke, the power will increase in proportion to the length of the cylinder. If the steam supply is cut off before the piston reaches the end of the stroke, the steam will expand and lose pressure in proportion to the increased space it occupies.

(25) M. S. D. says: For the information of the correspondent who asked as to twisting augers, allow me to say that the blade or twist of the common carpenter's auger is made by drawing the iron or steel out nearly flat, something like the blade of a table knife in shape, but thicker through the center than at the edges, as wide as you want the cutting size of the auger to be, and a little longer than the twist is to be when done. This is then heated; the cutting end or head is clasped in a vise; and the workman, holding the other or shank end with tongs, twists it over from right to left by hand. It is afterwards made true by means of crimp dies rapidly opened and shut upon it. The head is struck out in a die afterwards.

(26) C. W. H. asks: What paste or glue will fasten paper firmly to iron and stone? A. Melt together equal parts of asphalt and gutta percha. Use hot. The surfaces to be joined should be perfectly clean and dry.

(27) G. S. W. says: About 4 feet square of our flooring, with about 15 inches thick of sawdust between