Business and Personal.

The Charge for Insertion under this head is One Dollar a line or 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.

The Universal Calculator.—A novel labor-saving machine for solving questions in arithmetic and mensuration without mental labor. The most tedious problems solved in less than half a minute. Invaluable to engineers, mechanics, and business men. Sent free for \$1. Send for circular. Address W. H. Wythe, Red Bank, N.J.

Abbe Bolt Forging Machines and Palmer Power Hammers a specialty. S. C. Forsaith & Co., Manchester, N.H. For Walrus Leather, Bull Neck Emery, Glue, Crocus and Composition, write Greene, Tweed & Co., New York.

I want cheap method of drying 15 tons sawdust per day. Address Allan Sterling, Room 52,35 Broadway, N.Y. Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

The Newark Filtering Co., of Newark, N. J , are filling orders from cities and manufacturers for their "Multifold Filters."

Steel Name Stamps, 15 cts. per letter; Steel Figures, \$1 per set. W. G. Sackmann, 59 Vine St., Cleveland, O.

The newly perfected pure Asbestos Steam Rope Packing made by the H. W. Johns M'f'g Co., 87 Maiden Lane, New York, is the most perfect and compact article of the kind we have ever seen. Its success cannot be doubted, as it can be sold at a lower price than any heretofore produced.

Elm Boards Wanted.—C. Ledig, 13 Peck Slip, N. Y.

Oar goods rank first for quality, safety, and durability. Please compare them with any other make, and if not found better and cheaper quality considered, will bear the expenses of the trial. Lehigh Valley Emery Wheel Co., Lehighton, Pa.

To Stop Leaks in Boiler Tubes, use Quinn's Pat. Fer rules. Address S. M. Co., So. Newmarket, N. H.

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Latest Improved Diamond Drills. Send for circular to M. C. Bullock, 80 to 88 Market St., Chicago, Ill.

Wood Working Machinery of Improved Design and Workmanship, Cordesman, Egan & Co., Cincinnati, O.

"How to Keep Boilers Clean," and other valuable information for steam users and engineers. Book of sixty-four pages, published by Jas. F. Hotchkiss, 84 John St., New York, mailed free to any address.

Peck's Patent Drop Press. See adv., page 94.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the Sci-ENTIFIC 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. Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

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

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited. Erie, Pa.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. gines, etc. Sole mfrs., H. Lloyd, Son & Co., Pittsb'g, Pa. Supplee Steam Engine. See adv. p. 93.

List 27.-Description of 3,000 new and second-hand Machines, now ready for distribution. Send stamp for same. S.C.Forsaith & Co., Manchester, N.H., and N.Y.city. Presses, Dies, Tools for working Sheet Metals, etc.

Improved Skinner Portable Engines. Erie, Pa. C. B. Rogers & Co., Norwich, Conn., Wood Working

Fruitand other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Machinery of every kind. See adv., page 77. The Sweetland Chuck. See illus. adv., p. 78.

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made, 631 Arch. Phil. Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's l'arallel Vise, Taylor. Stiles & Co., Riegelsville. N.J. Lightning Screw Plates and Labor-saving Tools, p. 93.

For Rubber Packing, Soapstone Packing, Empire Packing, and all kinds. write Greene, Tweed & Co., N. Y.

For the Garden and Farm. - A great variety of Seeds and Implements. Send for catalogue. Address R. H. Allen & Co., P. O. Box 376 New York city.

Cope & Maxwell M'f'g Co.'s Pump adv., page 108.

The Berryman Feed Water Heater and Purifier and

See Bentel, Margedant & Co.'s adv., page 110.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders, R. Dudgeon, 24 Columbia St., New York Telegraph, Telephone, Elec. Light Supplies. See p. 109.

50.000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Eagle Anvils, 10 cents per pound. Fully warranted. For Pat. Safety Elevators, Hoisting Engines. Friction Clutch l'ulleys, Cut-off Coupling, see Frisbie's ad. p. 108. Peerless Colors for Mortar. French, Richards & Co. 4 0 Callowhill St., Philadelphia, Pa.

Saw Mill Machinery. Stearns Mfg. Co. See p. 93. Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. L. S. Graves & Son, Rochester, N. Y. Gould & Eberhardt's Machinists' Tools. See adv., p. 108. Gear Wheels for Models (list free); Experimental Work, etc. D. Gilbert & Son. 212 Chester St., Phila., Pa. Barrel, Kev. Hogshead, Stave Mach'v. See adv. p. 110.

ment of Hilles & Jones, on page 108.

Pays well on small investment. - Stereopticons, Magic Lanterns, and Views illustrating every subject for public exhibitions. Lanterns for colleges, Sunday schools, and home amusement. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., N. Y.

Engines, 10 to 50 H. P., \$250 to \$500. See adv., p. 109.

Catechism of the Locomotive, 625 pages, 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N.Y. Safety Boilers. See Harrison Boiler Works adv., p. 109.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p.103. ing wood to make blackboards for school purposes, etc. Lathes, Planers, Drills, with modern improvements. The Pratt & Whitney Co., Hartford, Conn.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blint Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa. Portable Power Drills. See Stow Shaft adv., p. 108.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher. Schumn & Co., Philadelphia, Pa. Send for circular.

Common Sense Dry Kiln. Adapted to drying of all materialwhere kiln, etc., drying houses are used. See p.108.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co.,430 Washington Ave., Phila.P. Ore Breaker, Crusher, and Pulverizer. Smaller sizes run by horse power. See p. 109. Totten & Co., Pittsburg. 4 to 40 H P. Steam Engines. See adv. p. 108.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the Scientific American Supple-MENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identi-

To our Correspondents.—The destruction of our old offices by fire January 31, 1882, caused the loss of a considerable number of inquiries from correspondents to lift water at any distance? If not, will you please and of our replies thereto, which we had in hand for publication. Those of our friends who find their inquiries neglected will know from the above the reason why; and they will oblige the editor by repeating their inquiries without delay.

(1) E. M. F. asks: Can you give good receipts for making indelible aniline black inks, for use Corrugated Wrought Iron for Tires on Traction En- in marking linen with a pen? A. Dissolve 1 oz. of cupric chloride in 31/2 oz. of distilled water, and add 11/4 oz. of common salt, and 11/8 oz. aqua ammonia (C. P.). One volume of this solution is then mixed with four parts of a solution prepared as follows: Aniline hydrochlorate, 334 oz.; distilled water, 21/2 oz.; gum arabic solution (gum 1 oz., water 2 oz.), 2½ oz.; glycerine, 1¼ oz. The greenish liquid resulting is an excellent indelible ink for linen, although the characters written with it do not develop a full black color until after exposure to the air for a day or two if not hot pressed. The following is Puscher's formula for a similar ink: Dissolve 4 parts of aniline black in 16 parts by weight of alcohol, with 60 drops of strong (pure) hydrochloric acid, and dilute the dark blue solution with 90 parts by weight of water in which 6 parts of gum arabic bave been previously dissolved.

(2) M. S. asks: 1. Please give a receipt for preparing a good gold colored bronze for use on japanned work? A. Verdigris. 8 oz.; tin oxide (putty powder), 4 oz.; borax and niter, each 2 oz.; corrosive sub limate, 1/4 oz.; make all into a thick paste with oil, and fuse together. 2. Can you tell us of a good way to reproduce faded photographs, faded paper prints? A. feet: will the highwater retard the flow enough so that The following method is simple and in most cases quite effective: Put the card in warm water until the paper are compelled to put in our water motor on first floor, print may be removed from the card backing without and we do not want to put in motor unless we can get Feed Pump. I. B. Davis' Patent. See illus. adv., p. 110. injury. Hang up the paper in a warm place until perfectly dry, and then immerse it in a quantity of melted fast enough so as not to inconvenience us or overflow. white wax. As soon as it has become thoroughly impregnated with the wax it is pressed under a hot iron to remove excess of the latter, and rubbed with a tuft of cotton. This operation deepens the contrasts of the picture and brings out many minor details previously invisible, the yellowish whites being rendered more transparent, while the half tones and shadows retain their brown opaque character. The picture thus prepared may then be used in preparing a negative which may be employed for printing in the usual way.

(3) E. W. F. asks: Can you give receipts for the dips used in imparting light fancy or vari-colored tints (or bronzes) on iron, zinc, copper, and brass? A. Dissolve 4 oz. hyposulphite of soda in 11/4 pints water, and add a solution of 1 oz. lead acetate in 1/2 pints of water. The metals to be colored are placed in this liquid, which is then gradually heated to the boiling point. This treatment produces on clean iron a light steel blue color, zinc becomes bronze, and copper or brass become successively red, scarlet, deep blue, light on outside, but larger on the inside. Can I fill it with

For Heavy Punches, etc., see illustrated advertise. This dip has little effect on lead or tin. By replacing the acetate of lead in the solutionby sulphate of copper The Medart Pat. Wrought Rim Pulley. See adv., p. 109. brass becomes first of a rosy tint, then green, and finally an iridescent brown color. Zinc does not color in this liquid; it reduces and precipitates the copper as a dark brown sponge, but if boiled in a dip containing both the lead and copper salts, it becomes covered with a black adherent crust, which may be improved by coating with a thin wax lacquer. Sometimes these liquids are thickened with gun tragacanth and applied to the plates with a brush to form designs, etc., and plunged into one of the hot caths, by which a variety of effects are produced.

> (4) I. M. McP. asks for a receipt for coat-A To make one gallon of the paint take 10 oz. of pulverized and sifted pumice stone, 6 oz. powdered rotten stone (or infusorial silica). 3/1b, of good lampblack, and must be well rubbed and ground together. Then dissolve 14 oz. of shellac in the remainder of the gallon of alcohol, by digestion and agitation, and finally mix this varnish and the paste together. It is applied to the board with a brush, care being taken to keep the paint well stirred so that the pumice stone will not settle. Two coats are usually necessary. The first should be allowed to dry thoroughly before the second is put on. The second coat should be applied so as not to disturb or rub off any portion of the first. One gallon of this paint will ordinarily furnish two coats for sixty square yards of blackboard. When the paint is to be put on plastered walls the wall should be previously coated with glue size -glue, 1 lb.; water, 1 gallon; lampblack q. s. to color; put on hot.

> (5) B. W. S. writes: I wish to draw water from a sixteen foot head, through hydrant, the connection between the two being 1¼ inches—lead pipe of the kind known as "extra light." Will this pipe stand the pressure without fear of bursting? A. Your pipe would stand the pressure of 16 feet head, but probably would not stand in connection with a hydrant, when the current will be started and stopped many times a day, and subjecting the pipe to shocks or "water hammer." If the pipe is to be thus used we would advise a stronger one.

> (6) J. T. asks: 1. Does a glass water gauge sustain full boiler pressure? If so, why does it not burst? A. Yes. It does not burst because the tube is small and thick. 2. Is there any difference in efficiency between one gallon of water raised to 100 pounds steam and 100 gallons raised to same pressure? A. Under the ame conditions the work should be nearly in propor tion to the water evaporated.

> (7) H. M. asks: 1. How high will 50 pounds pressure to the inch in a force pump throw water from a quarter inch nozzle? A. A quarter inch nozzle, about 44 feet. 2. Or what size stream from nozzle under 50 pounds pressure reaches the highest? A. The larger the stream the higher the jet, if the pressure be maintained. If the nozzle were three-quarters inch the height would be about double that from a quarter inch nozzle:

> (8) E. F. T. would like to know if it is necessary for a steam pump to have a vacuum chamber explain? A. It is not necessary. The air chamber is put on to prevent shocks or "water hammer" in the suction pipe.

> (9) M. S. asks: 1. Would it be safe to run our 18x36 inch engine 80 revolutions per minute-fly wheel 14 feet diameter, 6 tons weight; engine is now running 70 revolutions? How much more power would we get: steam 90 pounds, 5 inch steam pipe, 6 inch exhaust? A. Yes; if well proportioned and balanced. With same pressure of steam the increase of power is in proportion to revolutions.

> (10) D. D. asks: 1. What is the proper proportion and area of steam and exhaust ports for a 2 inch by 4 inch steam cylinder, 80 pounds steam, boiler pressure 200 revolutions per minute? A Steam ports one-tenth area of piston, exhaust one-sixth to oneseventh area of piston. 2. What area steam pipes and exhaust pipes should have to area of cylinder? A. Refer to rule in SUPPLEMENT No. 253.

(11) D. F. H. asks: What kind of barometers are used by the Signal Corps, U. S. A.? A. Both mercurial and aneroid

(12) J. K. & S. write: The length of my drain is 165 feet, total fall is 8 32 feet; the question we wish answered is this: our creek is often full from bank to bank, and we want to know if the water escaping from, say, a half inch pipe, with a pressure of 160 pounds to the inch, will flow away through a 4 inch sewer pipe with fall of 832 feet when creek is full? The fall to top of bank, or when our creek is high, is 4:25 the 4 inch pipe will not take it away fast enough? We the waste water as it flows from a Tuerk's water motor A. Yes; your 4 inch drain will carry off the water with 4.25 feet fall in 165 feet.

(13) H. S. N. asks: What cause or causes might produce a collapse of a flue in a steam boiler? A. The flue not being a true cylinder, or different thickmight cause it. Flues as usually made are not per- clean the surface of the metal, and relacquer it. fectly true cylinders, therefore extreme pressure will produce collapse.

small to generate sufficient steam to pull the load at the speed desired. The cylinders have two inches clearance at each end. Can I fill a portion of this space by attaching pieces to cylinder heads, say 1 inch or 11/4 inches thick, and thus save steam? A. Yes. 2. One of joins the chest, three-sixteenths by half an inch in size blue, bluish white, and finally white with a tinge of red. | the material of which rust joints are made (salammo-deep.

niac and iron borings), and make a durable job? A No. Can you not drill out the hole and put in a top screw or bolt?

(15) H. E. writes: I would like to ask you if common wrought iron will do for the magnets in an electric bell, and what size wire is used? A. Common iron will do if well annealed. Use No. 22 wire.

(16) W. A. P. asks: 1. Can vou give me a scheme for making volumetric estimations of silica or silicates in lead and iron ores? None of the works at the plates are then heated to 21% Fah., and rinsed or hand give any information on this subject. A. We kr.ow of no good practical way of determining silica by the volumetric method. Silica is usually estimated gravimetrically. Consult Thorp's "Quantitative Chemi-2. I am using charcoal fuel and a comcal Analysis." mon water jacket furnace. What are the reactions, and why is limestone used in the following charges: Orelead sulphide, 2 per cent; arsenic, 1 per cent; zinc lead, 74 per cent; silica, 5 per cent; charge-ore 100 lb.; alcohol enough to form with these a thick paste, which limestone, 24 lb.; iron ore (perox ide, 62 per cent iron, 3 per cent silica), 68 lb.; charcoal, 40 lb.? A. Lime (or limestone which becomes lime in the furnace) is an alkaline flux combining with and rendering fluid the silicates and silicious earths contained in the ore and fuel, thus releasing the metallic burden and aiding the reduction by the iron and carbonic oxide. According to the analysis given the lime charge in this case seems to be considerably in excess of the requirements.

(17) W. S. asks: Can you tell me the way to make scagliola, an imitation of marble? A. See answer to M. N., next page.

(18) P. D. asks: 1. What does gas tar owe its preserving qualities to? A. Chiefly to the presence in it of small quantities of carbolic acid or phenol, creosote, and similar substances. 2. What late elementary works on chemistry do you recommend? A. Consult Fownes' "Elements of Chemistry," Barker's "Text Book of Chemistry," Youman's "Class Book of Chemistry," Cooke's "New Chemistry." Address the book dealers who advertise in this paper.

(19) J. H. & Son ask: How can we remove from ordinary rubber tubing its objectionable smell? A. Boil the tubing for a few minutes in water containing about 5 per cent of caustic potash, rinse well in hot water, and then immerse for about half an hour in cold water containing 3 per cent of hydrochloric acid. Finallyrinse thoroughly in running water.

(20) G. H. asks: What can be used in mortar to prevent it freezing in cold weather? Salt does not appear to "fill the bill." Will the substance called chymogene (about which I know nothing) do this? A. We know of no practical substitute for salt in this connection. Glycerine would prevent the freezing if used in sufficient quantity, but it would be apt to greatly retard the setting. Chymogene is a very light distillate of petroleum, and could not be used in mortar as pro-

(21) E. J. E. writes: 1. I wish to silver the outside of a lot of lamp globes, so as to make mir rors of them. Can you tell me how silvering on such glass surfaces is done? A. You will find explicit directions for silvering glass in Supplement, No. 252. 2. Cannot the electric light be produced from a galvanic battery? If so, why are dynamo machines used? A. A battery can be used for purposes of electric lighting, but it is vastly more expensive to maintain than the dynamo, and does not afford as constant a current.

(22) H. P. asks: Can you tell me how sulphur can be deodorized? A. The characteristic odor of snlphur developed by heat cannot be removed.

(23) H. L. K. asks: Can you give me a receipt for the preparation of a cement or paste to unite leather and paper to iron? A. See receipts for marine glue, and other cements, page 2510, SUPPLEMENT No.

(24) E. H. R. asks: 1. Can you tell me of an expeditions and efficient way to clean the inside of the barrels of a breech-loading shot gun? A. If the piece is quite dirty use a small cylindrical brass wire scratch brush (obtainable in the market), then apply a little oil and fine emery with a rag and steel or wooden rod, wiping out occasionally with a clean slightly oiled rag. Finally remove as much of the oil as possible with a clean dry rag. 2. What is the best way to remove rust and prevent its formation on such a piece? A To remove the rust (if the metal has not been badly eaten into) rub the parts well with emery flour and good sperm oil on a cloth or chamois leather. The use of acids cannot be recommended. To prevent rusting clean the piece thoroughly, warm it, rub over every part pure refined spermoil, then wipe asclean as possible with a dry cloth, and keep dry. 3. Will coal oil injuriously affect the barrels of such a gun? A. Not if the piece is well wiped afterward.

(25) E. N. H. asks: 1. What is a good waterproof varnish for brass models, something that will dry quickly? A. Try the following: Shellac, 3 oz.; alcohol, 1 pint; dissolve by digestion and agitation in a covered vessel, and dilute with alcohol if not thin enough for use. Warm the metal and apply the varnish quickly. 2. What would you recommend to clean fine mathematical instruments? A. The unlacquered parts may be brightened by rubbing them with a piece of chamois leather and jeweler's rouge: the lacquered parts (sometimes) by using the skiu with a very little warm alcohol. When lacquered brass or iron work has become badly discolored it is usually necessary to remove nesses of iron used in the different parts of the flue all the remaining lacquer by hot potash water oral cohol;

(26) R. E. R. writes: The beams under the floor of my room (second story) are 3 inches by 8 inches, (14) W. F. L. writes: 1. I have charge of a and are 16 inches apart and about 18 feet long. I delocomotive engine, cylinder 8x16. The boiler is too sire to place a lathe in the middle of the floor (standing length way with the beams), which, with appurtenances, will weigh about 700 pounds. Will the floor such weight easily? How much will it sustain? Will the vibration caused by the treadle motion make any difference as to the safety? A. Yes; the floor will carry it the steam chests has a hole in it where the stuffing box if there is not much other load, but will be likely to vibrate or shake very much under the action of the treadle. Your girders should be not less than 12 or 14 inches

- weight, one running on a two foot gauge track and the other on a four foot gauge? A. On four foot gaugeas the running gear will be heavier and the friction greater-with same size of wheels.
- (28) W. P. T. writes: We have four boilers, 20 feet long and 48 inches in diameter, set in a battery with steam drum, carrying 80 pounds steam. We have two engines coupled together on one shaft and supplied with one steam pipe and one governor. The steam pipe branches, after passing the governor, one branch running to each engine of course. The engine cylinders are each 16 inches in diameter and have 20 inch stroke of pisgine, i. e., 3 feet, but is 53 feet from the governor to the steam drum, with two square turns between the governor and steam drum. The engines have common slide valves, and run 160 revolutions per minute. The steam feed pipe is 5 inches in diameter and governor is a 5 inch one, made by Allen Governor Company. Now the question is: Is the feed pipe large enough to supply the engines fully in hard labor, or do we lose power in putting the steam through so small a steam pipe? And how large should the steam pipe be to get the best result? A. If you use a cut-off on your engines, the pipe is large enough. If you work whole stroke, it would be necessary to apply an indicator to determine whether the pipe is too small. Your loss of power, if any, must be small.
- (29) J. H. R. asks (1) how far apart steam outside in order to obtain the best results from the fire (soft coal). A. You do not state whether the fire is outside or inside the tubes. If outside, they can be placed at such a distance as necessary for draught, and this will depend upon arrangement of flues. If inside, not less than 3/4 inch, and would be better if 7/8 or 1 inch. 2. How much higher should the end of a twelve foot pipe be at one end than at the other to allow the steam to escape freely? A. A rise of one inch to the foot will ing-probably not. answer well. But more would be better if there is intense fire. 3. At which end of the pipes should the fire be placed, the highest or the lower end, to get the best effect of the fire? A. Lowest end. 4. What is the greatest pressure it would be sate to carry steam in lapwelded boiler tubes, 21/2 inches outside diameter, tube weighing 234 pounds to the foot? A. 200 to 250 pounds per square inch. 5. How many pounds is about the greatest strain threads will bear in Seller's system of screw threads and nuts? A. The strength of the thread is intended to equal that of the bolt, if the nut fits well and is equal in thickness to the diameter of the bolt.
- (30) J. C. L. asks: Do you know of any material or substance that is perfectly transparent (similar to glass) yet impervious or so reflective of the sun's rays as to prevent its usual fading effect on a delicate alkaline color? A. We know of no such substance
- (31) C. J. asks: Which would afford the greatest amount of power at the same pressure of steam, say 60 lb. to square mch, two engines, 31/2 by 8 mch stroke, both connected to one shaft, or one engine 7 by 8 inch, to work from same shaft? What would be the difference in the power and also in fuel? The boiler is 54 inches long by 32 inches diameter; 34 two inch tubes; locomotive type. A. The 7 inch cylinder by 8 inch stroke would give double the power (with same pressure and speed) that would be given by two cylinders 31/2 by 8 inch, stroke, and with slightly greater economy of
- (32) J. L. writes: I should like a receipt for a cement that will do for kerosene lamps. Can you give me a receipt through your columns? I have tried plaster of Paris and various other things, but without success. A. Plaster of Paris made into a paste with a sirupy solution (aqueous) of water glass, and used immediately, makes a very good cement for containing films of mica and a small quantity of iron this purpose. Hot soft soap is used in connection with sulphide—of no value.—T. B. H.—The liquid will replaster in a similar manner for this purpose. See "Cements," page 2510, SUPPLEMENT No. 158.
- (33) W. G. B. asks: Will you kindly tell me how to make the common liquid ammonia and alcohol of commerce; also camphor in small quantities? A. Dissolve about 10 pounds of sugar in 5 gallons of water; add a little yeast, and set aside in an open vessel in a, cool place to ferment. As soon as the fermentation subsides put the liquid in a retort and apply heat. When the liquid begins to boil attach a coil of small copper pipe so as to receive the steam or vapor, and immerse this coil in a tub of cold water so that the vapors will be condensed within it, and drip out the lower end into a receiver. The spirit thus obtained will contain much alcohol. It is rectified by careful redistillation, and called alcohol. To make liquid ammonia mix 10 pounds powdered sal-ammoniac with about 6 pounds pure lime (previously dry slaked); put this mixture into an iron retort, and apply a moderate heat. Pass the ammonia gas given off through a series of bottles half filled with cold water; the water will absorb the gas, and when enough of the gas has thus been absorbed the water in been the case that it is commonly accepted as a truth the bottles becomes aqua ammonia (ammonia water). practically demonstrated that a well fed, capable, pro-Consult Wagner's "Chemical Technology" and the United States Pharmacopæia.
- (34) C. H. B. asks: What can be used as a substitute for glycerine in printer's rollers besides sugar or molasses? A. We know of nothing that food. The masses do not eat meat simply because they could be used with advantage as a substitute for these
- (35) H. A. L. asks: 1. How shall I go to work tomake an electric light? A See "Simple Electric Light Apparatus," in Supplement, No. 159. 2. What chemical will soften silver enough to join two pieces together? A. We know of no chemical that will soften silver so that it may be joined. Silver solder is usually employed for joining pieces of the metal. 3. Will common sweet oil do in place of olive oil for that phosphoric oil as described in No. 318? A. Yes.
- cal light I have been to considerable expense in mak—their food—may perhaps be attributed in large measure and it, but I can only get a very dim light, and the to the prominent place given to highly nitrogenous about no highly nitrogenous nit

- (27) G. W. I. writes: Please state the dif-1 smoke is very hard to get rid of, there being so much of 1 plants of the class known as leguminous. More than ference of draught of two cars of same dimensions and it. 1 used oil of vitriol, supposing it to be sulphuric forty varieties of peas and beans are cultivated. The acid. Will you please advise me as to what the trouble richly nutritive soy bean properly supplements the rice, is, and how I can improve the light? A. The apparatus which plays so large a part in the national diet. After referred to is not designed to produce a very brilliant rice the cereals most cultivated are in order-barley, light. The faint blue flame, however, possesses sufficient miller, wheat, rye, and Indian corn. The sweet potato actinic power to make it, in some cases, serviceable for takes the first place among tubers, the annual product photographic purposes. A glass chimney can be made being sixteen million bushels. This crop is rivaled by to confine and conduct the smoke to a flue. The greater that of the large white and highly odorous radish known portion of the products of combustion are readily ab- as "daikou." Carrots, turnips, parsnips, and the like sorbable in moist slaked lime. Common sulphuric acid are very largely eaten. The entire list of food plants is commercially known as oil of vitriol.
- (37) M. N. writes: I want to make a large slab of artificial marble. Can you inform me of a comton. The governor is the same distance from each en-position for such which will become as hard and strong as marble itself? A. Try the following: Reduce marble dust or white limestone to a very fine powder by granding and sifting, mix with it intimately about one fourth its weight of zinc oxide (zinc white) and oneeighth its weight of Portland cement, and mix thoroughly into a thick paste with a sufficient quantity of a hot aqueous solution of water-glass, containing about 40 per cent of the glass. Mould the paste under pressure while warm, and expose the moulded form for a week or ten days to warm dry air, before finishing. See Water-glass," page 16, vol. xlv.
- (38) J. A. H. asks: 1. Can soapstone ground fine be moulded into different shapes by mixing with some ingredient, and hardened for bricking or ornamental purposes, such as mantels, table tops, etc.? A. Soapstone powder mixed with water-glass (see Supplepipes 21/4 inches in diameter should be from outside to MENT No. 317; can be moulded when moist into various forms, which, when dried, become quite hard and closely resemble the natural stone. This artificial stone does not, however, stand heat as well as the native rock. 2. From what quarries do the New York dealers procure their soapstone? A. Chiefly from Vermont and the Carolinas. For the other information you should address some dealer in soapstone. 3. Will the quarry widen as you go down? A. We have no means of judg-
 - (39) D. J. C. asks: Will you please state what are the proper ingredients and proportions and how to mix and apply them to brick work, to stain the latter to represent red brick? A. The color is clear red ocher or Indian red, and the vehicle a thirty-five or forty per cent aqueous solution of good soda water glass (see Supplement, No. 317). The pigment and vehicle must be well ground together. It is preferably used
 - (40) R. E. N. asks: How can I make oxygen to use with the appliance described in Supplement No. 20, 1876, under the head of "Soldering." by George M. Hopkins? A. See page 5013, SUPPLEMENT, No. 314.
 - (41) D. L. asks: Will you kindly give me a receipt for making printer's composition rollers for power cylinder presses? A. An equal quantity of concentrated glycerine and good glue are weighed out; the glue is softened by soaking it over night in a little cold water, and then dissolved in the glycerine by aid of heat over a waterbath. The heating is continued for several hours to expel the water taken up by the glue in softening, and then poured into the oiled metal moulds. A small quantity resin soap is added to the composition by same makers, and sometimes part of the glycerine is substituted by molasses.

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

A. A. St. J .- We cannot undertake to analyze the substance-it is a complex mixture of drugs and organic substances.-M. B.-The crystals are calcitebonate; the rock is dolorite trap.-F. F. & W. F.-1. Barium sulphate or heavy spar-used to some extent by paint manufacturers. 2. An impure quartzone quire an analysis. We cannot tell what it is composed of by an examination.—A. E. A.—It appears to be chiefly composed of cork dust, chalk, plaster of Paris, water glass, and cologne spirits.

NEW BOOKS AND PUBLICATIONS.

THE FOOD OF THE JAPANESE PEOPLE. By Thomas B. Van Buren, U. S. Consul General of Japan. Yokohama. 1881.

Among the many reports returned to the State $\mathbf{D}\mathbf{e}$ partment at Washington by our consular agents abroad. this report on the food of the Japanese people is of exceptional interest. The subject has been investigated with athoroughness which makes the report a scientific monograph of no mean order; and the subject itself has especial interest in its bearing on the question how far the characteristics of national life are determined by a people's food. It has happened that most if not all of the more forceful and active nations of the west have been large consumers of meat. So markedly has this gressive people must of necessity consume a large proportion of animal food. It gives this theory something of a set-back to learn that the most progressive of oriental nations, the Yankees of the East, as they have been called, are almost exclusively eaters of vegetable cannot afford to eat it. Beef cattle are scarce, and mutton and pork still scarcer. Domestic poultry and wild fowlare so costly that even the well-to-do partake of them sparingly and only on special occasions. Fish are comparatively plentiful and are more largely eaten; so that it is estimated that half the people eat fish every day; one-quarter two or three times a week; the rest perhaps once or twice a month. Nevertheless the food of the masses is nine parts out of ten vegetable. Yet the Japanese are well fed, and though of small stature. are well developed physically, and capable of sustaining severe and long-continued mental and bodily labor. (36) C. A. C. writes: On page 208 of Their physical and intellectual superiority to the rice-Science Record for 1875 is a description of a new artific eating Bengalese—so far as determined by the nature of cial light I have been to considerable expense in mak-their food-may perhaps be attributed in large measure

covers a dozen long columns. Most of them have no western equivalents, though many of them no doubt might be profitably introduced among us. The manner of preparing a number of the leading articles is given according to the practice of the chief cook of a native eating establishment. The value of the copy of the report transmitted to us by Mr. Van Buren has been greatly augmented by extension. It has been interleaved with numerous photographic illustrations of Japanese life, which give one, so to speak, an inside view of the industrial and social life of the agricultural peasantry, the artisan classes, the merchants, doctors, teachers, professional storytellers, and the rest. Among the characteristic features of these views of the Japanese at home, in the field, journeying or pleasure taking. one cannot but notice the general expression of good humor upon the faces of the men, however ugly they may seem to our western eyes; the amiability, sometimes real beauty, of the women folk; and the comfortable open-eyed serenity of the babies.

THE UNIVERSAL CALCULATOR, WITH DIRECTIONS FOR USING IT. By W. H. Wythe. Red Bank, N. J.

 \boldsymbol{A} very simple and ingenious application of the principle of the slide rule to a circular chart of several scales with two movable arms. One arm is fixed to a central disk, against which the other arm bears with friction enough to cause it to be retained in any desired position relative to the first arm, while both arms are moved together around the concentric scales. By simple and obvious applications of the rules of proportion all arithmetical problems involving multiplication, division, even powers and roots, percentages, and so on-in short the vast majority of the problems that come before the artisan or the business man, can be quickly solved by an easy mechanical process. Any one who has much figuring to do would be likely to find it a very helpful time and labor saving instrument.

CAWKER'S AMERICAN FLOUR MILL DIREC-TORY FOR 1882. Milwaukee. Wis.

The intelligence and care with which Mr. Cawker's work is done was attested in the directory of flour mill owners prepared by him last year. This edition he considers an improvement on the last. It gives the names and post office addresses of all the flour mill owners in the United States and Canada. The total number of addresses approaches twenty-three thousand

THE USE OF TOBACCO. By J. I. D. Hinds, Ph.D. Lebanon, Tenn. Private print. 16mo, cloth, pp. 38.

An exceptionally temperate discussion of the tobacco habit, historically, commercially, physiologically, and socially considered. The tone of the argument against the use of tobacco is calm, and more than usually cogent in that it avoids extravagant assertion and rant. It is good book to put into the hands of youth.

[OFFICIAL.]

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FOR WHICH

Letters Patent of the United States were Granted in the Week Ending January 31, 1882,

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[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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