

AN OLD CONCERN, RE-ESTABLISHED.

Horace Waters & Son, dealers in musical instruments in this city, made an assignment not long ago to secure their creditors. Mr. Waters, Sr., after thirty years' experience, hopes, by enterprise, economy, and fair dealing, to re-establish his business and to retain his old customers. To this end, he has opened a store a No. 40 East 14th St., and acts as agent for a number of leading musical instrument manufacturers.

Business and Personal.

The Charge for Insertion under this heading One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

There is no delay, no firing up, no ashes, no extra insurance, and no coal bills, for manufacturers using the Backus Water Motor. It is the most economical power known for driving turning lathes, scroll saws, grinders, printing presses, sewing machines, etc. Four horse power at 40 pounds pressure. It is noiseless, neat, compact, steady, and, above all, very cheap. Will work at any pressure above 15 pounds. Send for circular, addressing the manufacturers, The Backus Water Motor Company, Newark, N. J.

The best results are obtained by the Imp. Eureka Turbine Wheel and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa.

Catechism of the Locomotive, 625 pages, 250 engravings. The most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for a catalogue of railroad books. The Railroad Gazette, 73 Broadway, New York.

Best Turkey Emery in bbls., kegs, and cases. Special rates for large quantities. Greene, Tweed & Co., 18 Park Place, New York.

Solid and Opening Die Bolt Cutters, Screw Plates, and Taps. The Pratt & Whitney Co., Hartford, Conn.

Wanted—A 2d hand Stationary Engine, about 15 to 20 H.P. J. Davis, Limestoneville, Montour Co., Pa.

Wanted—Engineers and others to sell Barr's "Combustion of Coal." \$5 a day made after working hours. Address Yohn Bros., Indianapolis, Ind.

The advertisement of the Aultman & Taylor Company, which attracted so much attention last week, will appear again in the next issue.

Bunnell's Dynamo-Electric Machine for Gold, Silver, Copper, and Nickel Plating. An improved, reliable, and powerful machine, for \$75. Bunnell, Electrician, 112 Liberty St., New York.

Makers of Engines, Lathes, Jig Saws, etc., for amateur use, send circulars to 310 York Ave., Phila., Pa.

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

For Sale.—One Corliss Engine, in first-class order, having been used but little; cylinder 10 in. diameter, 24 in. stroke. Kelly & Ludwig, 722 Filbert St., Philadelphia, Pa.

Wright's Patent Steam Engine, with automatic cut-off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

Rubber Belting, Packing, Hose, and all kinds of manufacturers' supplies. Greene, Tweed & Co., 18 Park Pl., N. Y.

The address of John Byrne, maker of the 4 1/2 in. telescope, with which the companion of Sirius was recently seen, is 314 East 21st St., New York city.

Sawyer's Own Book, Illustrated. Over 100 pages of valuable information. How to straighten saws, etc. Sent free by mail to any part of the world. Send your full address to Emerson, Smith & Co., Beaver Falls, Pa.

For Sale or Royalty.—Goodwin's Music Leaf Turner. Patented March 4, 1879. No. 212,846. Address O. H. Goodwin, P. O., San Francisco, Cal.

The H. W. Johns Mfg. Co., 87 Malden Lane, New York, are sole manufacturers of the Genuine Asbestos Liquid Paints, Boiler Coverings, Fireproof Coatings, etc.

Gears.—All kinds and sizes. New list. Light machine work, models, etc. Geo. B. Grant, 98 Beverly St., Boston, Mass.

Slate, Barrel, Keg, and Hoghead Machinery a specialty, by E. & M. Holmes, Buffalo, N. Y.

Improved Blind Staples. B. C. Davis, Binghamton, N. Y.

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

H. Prentiss & Co., 14 Day St., New York, Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in. Swing. Address Star Tool Co., Providence, R. I.

The Horton Lathe Chucks; prices reduced 30 percent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phoenix Iron Works, Hartford, Conn.

Boilers ready for shipment. For a good Boiler send to Hilles & Jones, Wilmington, Del.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2318 Frankford Ave., Phila.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Linen Hose.—Sizes: 1 1/2 in., 20c.; 2 in., 25c.; 2 1/2 in., 29c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

Linen Hose.—All sizes, with or without couplers, in any quantity. Greene, Tweed & Co., 18 Park Pl., 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.

Band Saws a specialty. F. H. Clement, Rochester, N. Y.

American Fruit Drier Mfg. Co., Chambersburg, Pa.

Sheet Metal Presses, Ferracote Co., Bridgeton, N. J.

Eclipse Portable Engine. See illustrated adv., p. 414.

Eagle Anvils, 9 cents per pound. Fully warranted.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa.

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

Acme Lathes.—Swing, 7 in.; turn, 19 in. long; back geared; screw cutting. Send 3 cent stamp for circular and price, to W. Donaldson, southwest corner Smith and Augusta, Cincinnati, Ohio.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

The best Friction Clutch Pulley and Friction Hoisting Machinery in the world, to be seen with power applied, 95 and 97 Liberty St., New York. D. Frisbie & Co., New Haven, Conn.

For Sale.—9 pieces 2 7-16 turned shaft, 11 feet long; coupled; good as new. Frisbie & Co., New Haven, Ct.

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

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Wood-working Machinery, Weymouth Lathes. Specialty, Wardwell Patent Saw Bench; it has no equal. Improved Patent Planers; Elevators; Dowel Machines. Rollstone Machine Company, Fitchburg, Mass.

Forsyth & Co., Manchester, N. H., and 213 Centre St., New York. Specialties.—Bolt Forging Machines, Power Hammers, Combined Hand Fire Engines and Hose Carriages, new and 2d hand machinery. Send stamp for illustrated catalogues, stating just what you want.

The new "Otto" Silent Gas Engine is simple in construction, easy of management, and the cheapest motor known for intermittent work. Schleicher, Schumm & Co., Philadelphia, Pa.

Dead Pulleys that stop the running of loose pulleys and their belts, controlled from any point. Send for catalogue. Taper Sleeve Pulley Works, Erie, Pa.

The Twiss Automatic Engine; Also Vertical and Yacht Engines. N. W. Twiss New Haven, Conn.

NEW BOOKS AND PUBLICATIONS.

CAPTAIN LILL'S GRAPHICAL METHOD. By Lieutenant William H. Bixby, U. S. A. West Point, N. Y.; printed for author. Paper, pp. 16. Price 20 cents.

This graphical method for finding the real roots of numerical equations of any degree, if containing but one variable, was first exhibited by Captain Lill, of the Austrian service, in 1867. Lieutenant Bixby presents it for the first time in English, and adds a demonstration of its correctness.



HINTS TO CORRESPONDENTS.

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

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.

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 SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) J. B. T. asks: Does the horseshoe magnet lose its power by use, and where it is used in frequent contact with the steel parts of a machine will it so magnetize those parts as to render the magnet useless? A. A magnet by constant use is enfeebled, but it may be readily recharged.

(2) B. B. B. writes: Vol. XL., No. 22, p. 348, "Answers to Correspondents" (17), to R. J. F. Are you quite sure? The resistance increases with the square of the velocity, and a bullet with a heavy charge of powder may be flattened by firing it vertically down against the surface of a pail of water. A. The penetrating force increases as the square of the velocity; the resistance is not so increased, but is determined by the character of the resisting material. "The measure of the penetrating force is stated by all authorities to be the weight of the shot, multiplied by the square of the velocity at the moment of impact." Now as the velocity is greatest at the instant the projectile leaves the gun, the nearer the resisting material the deeper it must necessarily be penetrated.

(3) J. G. B. writes (1) whether it is not better to use a stripping solution in nickel plating; if so, should it not be made stronger than the regular plating solution? A. Good nickel platers consider such a solution unnecessary. 2. Am I right in using the carbon battery in nickel plating? A. Carbon (bichromate) batteries are often used, but the best plating is done with a battery of lower electro-motive force—such as that of Smee. 3. I have tried to dissolve platinum with 1 part nitric and 2 parts muriatic acids without success; please tell me why. A. Use more hydrochloric acid (1 of nitric to 3 of hydrochloric), and apply a moderate heat, decant the solution, and add fresh acid until all (if the metal is free from osmium and iridium) is dissolved. Platinum does not dissolve very rapidly. 4. How is bright gilding done? A. Without knowing something as to the surface you propose to gild, we cannot give the required information.

(4) E. N. asks (1) how to proportion a safety valve. A. See rule for calculating safety valves in answer (29), p. 267, vol. 40, SCIENTIFIC AMERICAN. 2. How to calculate the strength of boilers? A. We must refer you to rules published by Haswell, Clark, Molesworth, and other authors. A note to cover the whole question would be too long for our "Notes and Queries."

(5) L. B. asks how to preserve insects. A. Laboulière recommends plunging the insects, in the fresh state, into alcohol which has been saturated by digestion with arsenious acid (1 1/2 pint will take up about

14 troy grains of arsenic). The living insect put into this preparation absorbs about 0.003 of its own weight. When soaked in this liquid and dried the specimens are safe from the ravages of moths, *andrenus* or *dermestes*. This treatment does not affect the color of blue, green, or red beetles, if dried after soaking for 12 to 24 hours. *Hemiptera* and *orthoptera* can be treated in the same way; also the nests, cocoons, and chrysalides of insects.

(6) M. M. A. writes: In discussing the answer to question No. 30, of May 17, 1879, page 316, a few inquirers could not reconcile your answer with the principle that the "pressure of water increases as the depth." Would you kindly clear up the difficulty? A. A pipe to hold three times the quantity must have three times the area, or be 10 1/4 inches diameter nearly; now as strength of a pipe is inversely as the diameter, it is evident that if the strength were but just sufficient for a pipe 6 inches diameter, it would be entirely too weak for one 10 1/4 in. diameter.

(7) G. W. B. asks for instructions as to the proper kind, size, shape, etc., of furnace, that will be inexpensive to build, suitable for the economic melting of zinc in say fifty or hundred lb. lots. A. An ordinary cast iron melting pot, of sufficient capacity, seated on brickwork over a shallow furnace with a moderate draught, answers very well.

(8) G. H. H.—You may consult Britton's "Treatise on Dry Rot, and the Means of Preserving Timber from Destruction by Sea Worms, Beetles, Ants, etc."

(9) "Hercules" asks for an explanation of the difference between a "flue" and a "tubular" boiler. A. Formerly the distinction was between a welded tube drawn through dies and flues of so large a diameter that they were riveted together; but within the past 4 or 5 years the tube makers have enlarged their machinery, so that now welded and drawn tubes (or flues) are made up to 18 or 20 inches diameter, so that the line of distinction between the tube and flue is in a measure wiped out; probably in engineering language, flues of 6 inches diameter or less would be termed tubes, and larger diameters, flues.

(10) J. G. D. asks: 1. Suppose we place a gun perfectly level, 3 feet from the ground, and have force enough behind the ball to cause it to go 100 yards over a level plane. The question is, will the ball rise above the starting point, or can a ball be forced that distance without its rising above the level of the gun? A. It will not rise higher than the starting point. 2. Suppose we have the gun in the above position, and so arranged that the same spring that causes the first ball to start will also cause a second ball to fall from the same point to the ground. The question is, which ball will strike the ground first? A. If we understand your question, they will both fall in the same time.

(11) B. E. H. asks for the right ascension and declination of Mercury, Venus, Mars, Jupiter, and Saturn, for the 13th day of June, 1860. A. The following are the positions of the planets named at the time of transit at Washington, on the 13th of June, 1860, Washington mean time:

Mercury	... R. A.	6h 6m 07.0s	Dec. N. 25° 7' 28.5"
Venus	.....	8h 15m 57.16s	21° 14' 50.1"
Mars	.....	20h 13m 24.28s	23° 58' 8.7"
Jupiter	.....	7h 35m 12.13s	21° 17' 20.0"
Saturn	.....	9h 37m 56.22s	15° 34' 3.6"

2. How is right ascension and declination of the planets found for the past or future if it is known for any one time? A. That all the planets move in elliptical orbits is Kepler's first law, and that a line drawn between the centers of sun and planet sweeps over equal spaces in equal times is his second law, and answers your second question; but a complete elucidation of this would occupy too much of our space.

(12) D. F. writes: I read in one of your back numbers that if 14 grains of bichromate of potassium were dissolved in one ounce of gelatine and poured upon a ground glass plate, and dried in the dark, by placing a negative over the dried bichromate surface and exposing it to the rays of sunshine for a few minutes, then ink it over with printer's ink and place it in a water bath, after which the water will cause all parts that the light did not come in contact with to float away, leaving the image standing in bold relief, from which any number of prints could be taken by merely using it as a dye, upon plain paper. I did just as the paper said, and made a sad failure. So that you may thoroughly understand me, I have given you the process in full. Can you give me further information? A. Like many others you have misinterpreted the necessarily brief instructions, and have attempted the process without informing yourself as to its rationale. You will find much useful information respecting photo-printing processes in Vogel's "Chemistry of Sight and Photography," and in the back numbers of the SCIENTIFIC AMERICAN.

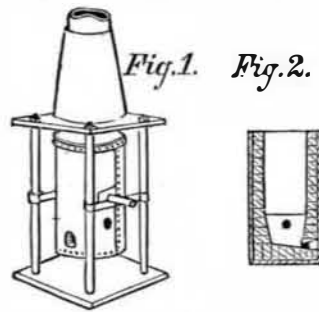
(13) C. W. H. asks: How are postage stamps printed: what kind of ink is used? A. They are printed in sheets of 200 each in heavy presses, with fine copper plate inks. The precise composition of these inks is not made public by the government printers or bank note companies. The colors are: blue 1 cent stamp, ultramarine—sulphide of sodium and iron and silicate of alumina; red 2 cent stamp—vermillion—sulphide of mercury; red 90 cent stamp—carmine; green 3 cent—Prussian blue with chrome yellow.

(14) S. A. J. asks (1) if there is any way to clean or keep clean the roof of the furnace of an upright tubular boiler where there are no hand holes. I have used locomotive and stationary boilers, but this is the first upright, and I am at a loss to keep it clean. A. You should have some small cleaning holes at the level of the crown of the furnace to clean and wash off the plate. 2. Also, where should the gauge cocks be? I have noticed in short boilers they are nearer the furnace than long ones: is there a rule for them? A. There is no rule; they should be low enough to leave sufficient steam room.

(15) J. T. B. asks: 1. How far up from the entrance of flue into a chimney ought a steam jet be introduced to increase draught? A. It depends upon

the height of chimney and pressure of the escape steam; the jet should be able to drive the whole column of air in the chimney at a rapid velocity. 2. In what form should jet be fixed in chimney? A. A cone with the end of opening bell shaped. 3. Will it injure materially a brick stack? A. No, if the temperature of gases in chimney is sufficient to prevent condensation.

(16) C. O. M. asks how to make a small furnace suitable for melting from 10 to 25 lb. of cast iron; what to use to produce sufficient blast. A. The accompanying figures will give a very good idea of a small cupola for melting iron. Fig. 1 being a perspective view, and Fig. 2 a section of the cupola. The body is made of heavy sheet iron, lined with fire brick, and provided with trunnions by which it is supported on cross bars in a frame composed of two iron plates about two feet square, separated by four 1/2 foot columns of 3 inch gas pipe, the whole being fastened together by four long bolts which pass through both plates and through the columns. The upper plate has a large opening and a flange or collar for receiving the base of the chimney. The cupola has openings on opposite sides to receive the blast nozzles or tuyeres, and a tap hole in front. It should be about 3 feet high, and 14 inches internal diameter. The base of the chimney should have a door through which to charge the cupola. The blast may be supplied with a large bellows, but a small fan blower will answer much better. For the quantity of iron mentioned a cupola two thirds the size given would answer.



(17) C. E. S. asks: What are the ingredients used in making the copper ruby stain for ornamenting the common glass petroleum lamp cisterns and cheap vases? A. Use a soft (lead) glass containing about 3 per cent of protoxide of copper. Stir the pot occasionally with a stick of green wood, or add a little tartar, to prevent higher oxidation of the copper, which would then produce a greenish glass. The proper color appears only upon annealing.

(18) N. W. asks: How can I cut a round hole in a pane of glass and save the pane—do not care about saving the inside; want to cut a hole 6 inches in diameter; have tried a diamond without success? A. Use a copper tube of the size of the required hole; remove it in contact with the glass, and supply it with emery and water.

(19) G. P. asks: 1. Can eggs and pears be preserved by being kept in rarefied air or in air-tight jars? A. No, not practically. 2. Can eggs preserved with lime be changed so as not to show it? A. Dip them momentarily in acetic acid, then in cold water, and let dry in the air. 3. What is the most successful way to preserve apples and pears? A. Either by thorough desiccation, or in sugar sirup or glycerine from which the air has been expelled by boiling.

(20) R. D. K. asks: 1. What is the specific heat; specific gravity (in liquid and gaseous state respectively); caloric of fluidity or latent heat; volume at boiling point under pressure of atmosphere; point of congelation; point of liquefaction under given pressure; and atomic weight of each of the following substances, stating unity—Chloride of methyl, ether, nitrous sulphurous oxide, ethyl chloride, methyl bromide, aldehyde, methyl forminate, ethyl bromide, methyl iodide, carbon disulphide, bromine, acetic ether, hydrogen, and ammonia? A. Specific heat—1.2266, nitrous oxide 0.3447, sulphurous oxide 0.3144, ethyl chloride 0.6096, ethyl bromide 0.7026, carbon disulphide 0.4122, bromine 0.3040, acetic ether 1.2184, hydrogen 0.2354, ammonia 0.2996. Specific gravity—ethyl ether +20°, 0.713; 0°, 0.736. Nitrous oxide 1.525, sulphurous oxide 2.21, ethyl chloride 0.874, methyl bromide 1.66, aldehyde 0.807, ethyl bromide 1.47, methyl iodide 2.22, carbon disulphide 1.27, bromine (liquid) 2.976 (vapor) 5.54, hydrogen 0.0693, ammonia 0.589. Latent heat (steam = 1)—methyl formate 0.219, methyl iodide 0.086, carbon disulphide 0.162, bromine 0.085, acetic ether 0.173. For other data required consult "Constants of Nature," published by the Smithsonian Institute, Washington.

(21) J. B. writes: My house is at the bottom of a hill; after a heavy rain the water bursts in through cellar walls and bottom. How can I prevent it? Would cement answer the purpose? The house is too near the line of another's land to admit of digging a drain. A. Doubtful if cementing would be effective; better carry a drain below the cellar bottom.

(22) F. C. S. asks: 1. What is the power of an engine with (7) seven inch stroke, (6) six inch bore, running (120) one hundred and twenty revolutions per minute, with (60) sixty pounds of steam? A. See p. 267 (4), current volume of the SCIENTIFIC AMERICAN. 2. Is the steam pipe 1 1/2 inch (outside measure), large enough to supply steam for such an engine? A. Yes.

(23) J. J. S. asks how to determine, without a test, which will be the north or south pole of an electro-magnet. A. In electro-magnets, the south pole is always found at that end where the positive current enters a righthanded helix. See forms of electro-magnets, with 51 engravings, in SUPPLEMENT, No. 182.

(24) J. R. asks how it is that dynamite is said to exert a greater force downward, and gunpowder upward when they explode? A. This is a misconception. Nitroglycerine (the explosive agent in dynamite) yields on exploding about 900 times its volume of gas; gunpowder but 300. This gas, suddenly liberated, must displace a portion of the atmosphere, which presses with a weight of about 9 tons upon each square yard of surface. To lift such a weight in the exceedingly short space of time occupied in the explosion of a charge of nitro-

glycerine (in the form of dynamite or otherwise) would require a force greater than to split a rock, and the rock yields. Gunpowder yields but 1.3 as much gas on exploding, and the complete combustion of its grains requires an appreciable amount of time. Nitroglycerine explodes all but instantaneously.

(25) W. B. asks: 1. Have Zamboni's dry piles ever been made of silver and zinc, and why do they not frequently make them so? A. We do not know that Zamboni's dry piles have ever been made of zinc and silver plates. Probably the reason why they are not made in this way is because an unnecessary amount of metal would be used; the silvered or tinned paper is found sufficient. 2. How long will they give an electrical current? A. They will give a feeble current which may last for years. 3. Can I do plating with Zamboni dry piles? A. No, the current is too slight. 4. Why must the gravity battery copper wire be enclosed in rubber or gutta percha? A. To prevent a short circuit.

(26) R. W. D. writes: I use the water pipes running through our house for a ground wire on a local telegraph wire. Is there any danger of lightning doing any damage to the house? If so, what danger is there? A. If the wire connected with your water pipes is of sufficient size we think there is no danger; however, we advise the use of a lightning arrest. 2. How often should Callaud batteries working a telegraph wire on a closed circuit and never cut out, be cleaned? A. The Callaud battery, if properly cared for, will not need cleaning until the zinc is exhausted.

(27) R. W. R. asks for a recipe for making a good cheap mucilage. A. Add British gum (dextrine) to a quantity of hot water until a sirupy liquid is obtained; then add a few drops of clove oil and cool for use. See also receipt on p. 347 (7), current volume.

(28) A. L. asks if there is anything that will stop (superfluous) hair from growing? A. See p. 75 (36), 91 (1), volume 39 of SCIENTIFIC AMERICAN.

(29) J. B. R. writes: I wish for a recipe for making water pens, the kind to dip in water in order to write. A. Moisten one of the soluble aniline blues or violets with thin gum water to form a paste, which will harden sufficiently on drying.

(30) E. E. G. asks: 1. Have paper wheels for cars ever been tried without a tire of iron or steel? A. No. 2. Are paper wheels now in use? A. Yes. 3. If so, where? A. On many railroads, including the Metropolitan Elevated in this city. 4. Have they iron tires? A. Yes, iron or steel. 5. How are the wheels fastened to the axle? A. By iron hubs or centers.

(31) R. H. & C. M. A.—We are offered an engine which has a cylinder 10 inches bore, 20 inch stroke, which we are recommended to use with 75 lb. steam as shown on gauge on boiler, and to make 150 revolutions per minute. By your rule for calculating horse power, this would seem to give us 89 1/4 horse power, which seems to us to be overrated. A. If the average pressure on the piston be 75 lb., your result is correct; but a deduction of say 15 per cent should be made for friction.

(32) R. D. B. asks: What length, thickness, and kind of charcoal ought to be used to produce an electric light on the plan as mentioned in SCIENTIFIC AMERICAN SUPPLEMENT, No. 162, page 2577, Fig. 29, equal to the light of two (4 foot) gas burners; and also how many batteries (Grenet style with carbon plates 4x9 inches) it would take to run said light? A. You will find the small pencils of carbon made expressly for electric lights, much better than charcoal. The pencil should be about 3/4 inch in diameter and 1/2 to 3/4 inch long. Eight cells of the size given should afford a fine light, but with the Grenet battery the light will be temporary.

(33) W. A. P. asks: 1. What is it that carriage makers use for setting the boxes in the hub with some kind of cement? A. The boxes are usually secured by wedges. We do not know of a cement that would answer the purpose. 2. What means will I use to get a fine finish on a buggy bed before varnishing: is it best to grind paint that I get in tin can, before using? A. After applying the several coats of paint, including the priming, the rough coat—which is rubbed down—and the final coats giving the color, apply a coat of good rubbing varnish, and when it becomes thoroughly dry, smooth and polish it first with finely pulverized pumicestone and water, and second with rottenstone and water. Finally apply a flowing coat of fine copal varnish.

(34) H. E. P. asks: Do dead centers ever occur in vertical, direct acting engines, or, in fact, any kind of a single engine, whether vertical or horizontal, with fly wheel or direct acting? A. The term dead center applies to all reciprocating engines; it is that exact point from which the direction of movement of the piston is changed, or that point where the pressure exerted upon the piston has no effect upon the rotating motion of the crank and shaft. The set of valves, point of cut off, or any other of the details of the arrangement of the engine, have nothing to do with it.

(35) T. G. asks (1) what the so-called fire kings use toruban their skin to protect them from being burnt with the red hot iron they use in their performances. A. Water alone is commonly used, we believe. 2. What is the composition of aqua vitæ or water of life? A. Aqua vitæ—brandy, spirit, alcohol.

(36) C. W. asks: 1. What size and how much wire will I need in each spool to make an electrical gyroscope, as illustrated in SCIENTIFIC AMERICAN, No. 22, volume 38, and what length and thickness of core? A. The dimensions of the gyroscope referred to are as follows: Diameter of wheel, 2 1/2 inches; rim, 5-16 inch square; diameter of magnet cores, 1/4 inch; length of magnet cores, 1 inch; between centers of magnet cores, 1 1/2 inch; width of armature, 1/4 inch; thickness of armature, 1/8 inch; magnets wound with 6 layers No. 20 silk covered wire. 2. How much battery is necessary to work the same? A. 4 Bunsen cells in good order will run it, but 6 cells would be better. 3. Will ordinary zinc and copper cell do, of one quart capacity? A. Yes, but it will require from 12 to 15 of them. 4. Can I use a pair of Bell telephones for microphone experiments, by substituting a soft iron core in place of magnets? A. Yes. 5. How much battery will I need to work a line say of less than 300 yards in length? A. 2 or 3 Fuller cells.

(37) D. C. W. asks how to clean grave-stones without acid. A. Use stiff wire brushes of different sizes, and plenty of water.

(38) J. H. asks what are the uses of mica, and what is its value. A. Clear sheet mica is chiefly used for lights in the doors of stoves and furnaces, for lanterns, lamp chimneys, and transparencies, and in the manufacture of various toys, etc. Put up in pound packages itself for from 40 cents to \$2.75 per pound, according to size and quality of the sheets. Untrimmed sheets are generally unmerchantable. It has been used successfully for roofing purposes.

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

J. J. K.—1. Gypsum—sulphate of lime—used for manufacturing plaster of Paris and as a fertilizer. 2. The fragments are probably of meteoric origin.

COMMUNICATIONS RECEIVED.

- On Patent System. By J. W.
On the Hypothesis. By T. F.
On Smoking Coffee for Consumption. By T. H. K.
On Yellow Fever Manual and Squaring the Circle. By A. J. M. T. O. C.
On the License System. By J. H.
On Ventilation. By C. J. B.
A Mechanic's Theory of the Solar System. By W. W.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

May 27, 1879.

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions and their patent numbers, including Amalgamator, Auger, Bag fastener, Bale tie, Baling press, Basin, Basin cleaner, Bed, spring, Bedstead, Billiard cue rest, Boot, Boot and shoe heel plate, Boot and shoe toe stretcher, Bottle cage, Bottle cork fastener, Bracelet, Braid package clasp, Bran packer, Brick, etc., Brick burning kiln, Brick machine, Buckle, Buckle, trace, Butter and egg package, Butter case, refrigerator, Butter mould, Butter package, Button and stud, Button card, Calendar support, Candle, Carding machine, Carpet fabric, Carriage, Caster, Casting hubs, Casting ornamental figures, Chain, driving, Chair leg tenoner, Chair seat and back, Churn, W. L. Allegree, Churn, M. R. Wheelchel, Churn dasher, Cider mill, Cigar package, Clay grinder and mixer, Clocks, making wires and arbors of lock work for striking, Cocks, operating stop, Coin assorter, Coin package, Copying press, Cotton and hay press, Crochet needle, Cultivator, Cultivator, O. A. Crain, Curtain fixture, Dental hand piece, Desk, A. De Bary, Desulphurizer, Diamonds, mounting, Dish washer, Distilling petroleum, process and apparatus for, Distiller, wood, A. Knobloch, Door check, Door sheave, Doubling and winding machine, Easel, F. S. Frost, Eave trough, Egg packing box, Electric lighter, Electrical switch wires to binding posts, attachment, J. E. Hamilton, Electrolater, H. & H. W. Lovejoy et al (r), Envelope, A. Christey, Envelope or double postal card, Fan, automatic, Farm gate, Farm gate, automatic, Farm gate support, Faucet joint, Fence, J. W. Legore, Fence wires, machine for barbing, Fencing, barb for wire, Filter, E. W. Kidney, Firearm, G. W. Cilley, Fire escape, Flywheel, Fruit drier, Furnace for reducing oxide ores, Galvanic battery solution, Carbage cremating furnace, Gas apparatus for the production of illuminating, C. Marchand, Gas works, jet exhauster for, Gate, J. A. Knickerbocker, Glass jar mould, Glassware finisher, Glove, A. Harris, Grain conductor, Grain drill fertilizer attachment, Grain drill fertilizing attachment, Grain transfer, Gridiron, Guard finger, Hame fastener, Harrow, S. F. Reynolds, Harrow, sulky, Harvesting rake, Hats, ventilating, Hay rack, C. Graham, Hay rake, horse, Hay rake, horse, W. C. Kingsnorth, Hayricker and stacker, Hides, machine for ascertaining the area and weight of, Hoe, J. Gilmer, Holdback, vehicle, Hoppole puller, Horse clothing, Horse detach, Horse detach, Horse detach, Horse detach, Horseshoe, Moebs & Landschneider, Horseshoe nail forger, Hose coupling, Hub, vehicle wheel, Hydraulic elevator, Hydro-pneumatic engine, Incense coal, compound for, Injector, Fulton & Proeger, Injector and ejector, Instrument case and dental engine, combined, B. M. Wilkerson, Invalid chair, adjustable, Knitting machines, knocking over bit for, Labels, pictures, etc., machine for varnishing, gumming, and sizing, Ladder hook, adjustable, Ladder, platform, Lamp, E. Blackman, Lamp, E. M. Löyden (r), Lamp attachment, Lamp bracket, Lamp chimney, C. L. & C. Bartholomew, Lamp chimney, globe, Lamp, electric, W. Gilman, Lamp shade, P. K. Guild, Lasting machine, Copeland & Woodward, Lathe, grinding, Lawn sprinkler and hose reel, Levees, constructing, Lifting handle, Line holder, Load binder, Mail bag dropper, Mashing grain, apparatus for, Mash tub, G. Young, Measure and funnel, Mechanical movement, Mechanical movement, C. Tyson, Metal bar reducer, Metal shearing machine, Microscope, Milk cooler, Ford & Butler, Milk pan, C. Fairlamb, Milk setter, Moth proof fur case, Motion converter, Mowing and reaping machine, Musical instrument, mechanical, Nut lock, G. W. Rhines, Nut lock, J. D. Van Benthuyzen, Oil, etc., can for, Oils for illumination, heavy hydrocarbon, Ore pulverizer, Ore pulverizer and separator, Ore roaster, revolving, Organs, pedal attachment for reed, Orrery, A. Mang, Oven, domestic, Pails, removable cover or front for, Paper box cover machine, Paper machines, automatic feed for, Paper pulp from wood, making, Paper vessel, Pen, fountain, Pen, fountain, G. Wells, Pianoforte action, Picture, A. F. Craig, Pitman connection and crank pin, Plaiting machine, Planter, corn, Planter, corn, Taylor & Rice, Plaster and pad, Plow, E. O. Beach, Plow, sulky, T. E. Jefferson, Plows or harrows, farm truck or draught attachment for, M. Harris, Polisher, tumbling, J. W. Hyatt, Porcelain, box and cover for firing decorated, E. M. Ford, Post driver, Printing, autographic, Printing machine sheet deliverer, Printing surfaces, embossing metal for, Propulsion of vessels, pneumatic, Puddling furnace, I. Beanland, Pulp, making wood, Pump, C. G. Grove, Pump plunger, Pump, submerged, Pump valve, Pumping engine, steam, Pumping engine, G. H. Corliss, Punch, leather cutting, Quartz crusher, Radiator, steam, Rail joint, Railway switch, Railway track, portable, Refrigerator, Ribbon clasp or clip, Rivet, tubular, Roll for forming metal articles,

Table listing inventions and their patent numbers, including Roller and pulverizer, Roofing, metallic, Rotary engine, Sad iron, Saddle tree, Sauce, making solidified, Sash fastener, Sawing box stuff, machine for, Sawing machine, drag, Scale beam, Sewer gas stopper, Sewer pipe, Sewing machine, Shade supporter, Shafting coupler, Sheet metal can seam, Shingle bolts, mill for sawing, Ship's hull, R. H. Tucker, Shirt front or dickey, Shoe clasp, King & Hammond, Shoes, button hole for, Sickie, etc., holder, Sink valve, Crossman & Somes, Skate, roller, Skid, W. H. Douthy, Sled, R. T. Ogden, Sled propeller, Smoke and dust excluder, Snow plow, Spinning machine spindle, Spooling guide, Spools, thread fastening, Stall for vessels, cattle, Stamp, cancelling and dating, Stamp mill cam, Steam boiler, tubular, Steam engine beam, Steam engine, compound, Steam engine cylinder, Steam generator, Steamer and drier, grain, Stencils, producing autographic, Stirrup, saddle, P. A. De LaNux, Stool, D. B. Reynolds, Stove, cooking, Stove, heating, Stoves, long center and reservoir cover for, Straw cutter, J. Dick, Jr., Sublimating apparatus, Surf boat, Surveying instrument, Swine holder, Tag fastener, Tapping pipe fittings, machine for, Teaching arithmetic, device for, Teeth, artificial, Telephone switch, Tether, Fox & Cottrell, Thill coupling, H. F. Gaines, Thill coupling, R. W. Hawes, Thrust block, Tile moulding for holding tiles, Time lock, Toy pistol, Tumbling rod knuckle, Umbrella frame, Valve gear, steam engine, Valve, steam engine exhaust, Vapor burner, Z. Davis, Vehicle dashboard, Vehicle spring, Spalding & Wiede, Velocipede, Veneer sander and smoother, Vent, automatic air, Ventilator, G. R. Buffham, Ventilator, L. J. Wing, Wagon, beer, Wagon, buck board, Wash board, F. Freleigh, Weather strip, I. Bennett, Weather strip, H. L. Hyre, Wind engine, Windmill, J. Desjardins, Wire drawing, lubricating material for use in, Yoke coupling for vehicles, neck,

Table listing inventions and their patent numbers, including Capsuled medicine, Cigars, cigarettes, smoking and chewing tobacco, Cigars, cigarettes, smoking and chewing tobacco, and snuff, Cigars, cigarettes, and smoking tobacco, Straiton & Storm, Dyspepsia cure, Fertilizing compositions or compounds, The Chesapeake Guano Company, Flour, Rolston, Hall & Co., Flour, Thomas & Co., Kerosene oil, R. W. Forbes, Lard, W. J. Wilcox & Co., Laundry soap, Allison Brothers, Liniment, F. F. Brailard, Lotions for the skin and hair, Petroleum for illuminating and lubricating purposes, Mather Brothers, Pills for cure of chills and fever, W. W. Brownfield, Preparation of corn starch, A. Erkenbrecher, Smoking tobacco, J. R. Day & Bro., Starch for laundry use, A. Erkenbrecher, Skirt braid, S. B. & M. Fleisher, Troches or lozenges, Hall & Hodgman, Wax or mining candles, W. T. Coleman & Co., Wood barrels, kegs, well buckets, and pails, F. Vogt & Bro.

TRADE MARKS.

Table listing trade marks and their owners, including Capsuled medicine, S. Limousin, Cigars, cigarettes, smoking and chewing tobacco, Goodwin & Co., Cigars, cigarettes, smoking and chewing tobacco, and snuff, H. Welsh, Cigars, cigarettes, and smoking tobacco, Straiton & Storm, Dyspepsia cure, J. C. D. Curtiss, Fertilizing compositions or compounds, The Chesapeake Guano Company, Flour, Rolston, Hall & Co., Flour, Thomas & Co., Kerosene oil, R. W. Forbes, Lard, W. J. Wilcox & Co., Laundry soap, Allison Brothers, Liniment, F. F. Brailard, Lotions for the skin and hair, A. A. Heaton, Petroleum for illuminating and lubricating purposes, Mather Brothers, Pills for cure of chills and fever, W. W. Brownfield, Preparation of corn starch, A. Erkenbrecher, Smoking tobacco, J. R. Day & Bro., Starch for laundry use, A. Erkenbrecher, Skirt braid, S. B. & M. Fleisher, Troches or lozenges, Hall & Hodgman, Wax or mining candles, W. T. Coleman & Co., Wood barrels, kegs, well buckets, and pails, F. Vogt & Bro.

DESIGNS.

Table listing designs and their owners, including Billiard table, H. W. Collender, Carpet, W. McCallum, Combined rose and descutecheon, G. S. Barkentin, Dish handle, S. Stevens, Door knob, G. S. Barkentin, Gimp, J. H. Thorp, Handles of spoons and forks, W. C. Beattie, Ornamental chain, W. T. Chamberlain, Rubber mats, G. Woffenden, Stands for sad irons, etc., L. & W. H. Berger.

English Patents Issued to Americans.

From May 30 to June 3, inclusive.

Table listing English patents issued to Americans, including Filtering machine, G. C. W. Belcher, St. Louis, Mo., Gas burner attachment, W. V. Bachelder, N. Y. city, Grain binders, F. Randall, Mich., Tramway cars, J. Stephenson, New York city.