Business and Lersonal.

The Charge for Insertion under this head is 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.

Portable and Stationary Engines; Boilers of allkinds; 45 Cortlandt St., N. Y. Erie City Iron Works, Erie, Pa. Small Automatic Cut-Off Engines-10 to 100 Horse Power specialty-power, economy, and governing guaranteed. Buckeye Engine Co., 87 Liberty St., New York, will recognize that experience as his own, and feel a

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Assays of Ores, Analyses of Minerals, Waters, Commercial Articles, etc. Technical formulæ and process Laboratory, 33 Park Row, N. Y. Fuller & Stillman.

Alcott's Turbine received the Centennial Medal. "Economy" Gas Cooking Furnaces. Cool kitchen,

cheap fuel. Circularand treatise free. A. W. Morton, 104 John St., N. Y.

For New and Second Hand Boilers, send to Hilles & Jones, Wilmington, Delaware Door Bolt Patent. Simple, Cheap, Effective. For

sale, or to manufacture on royalty. Address D. A. Robinson, Union Springs, N. Y.

Friction Clutches for heavy work. Can be run at high speeds, and start gradual. Safety Elevators and Hoisting Machinerya specialty. D. Frisbie & Co., New Haven, Ct.

Wanted, a 2d hand printing press and type. C. Root, Cato, N. Y.

Wanted-a Situation by a Draughtsman and Mechanical Engineer of practical experience in the workshop. Salary no object. Address Engineer, 135 E. Wash. St., Indianapolis, Ind.

By the new Churn patented by George Sprague, Rock ford, Iowa, butter is made in from 2 to 10 minutes; salted and washed in the Churn.

Novel Gyroscope Top. Patent (allowed) for sale or royalty. T.S.Brown, 206 N. 3d St., St. Louis, Mo.

Polishing Tools and Supplies. Send for new price list. Greene, Tweed & Co., 18 Park Place, N. Y.

Supplies for Telephone and other electrical experiments. Jerome Redding & Co., 30 Hanover St., Boston,

For Mill Gearing, Shafting, Pulleys, and Hanger, sad dress T. B. Wood & Co., Manufs. Chambersburg, Pa. for price.

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

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsaith & Co., Manchester, N.H. Wrenches.-The Lipsey "Reliable " is strongest and

best. Six inch sample by mail 60 cents. Roper Caloric Engine Manufacturing Co., 91 Washington St., N. Y. Cornice Brakes. J.M. Robinson & Co., Cincinnati,O.

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

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H. The Cameron Steam Pump mounted in Phosphor

Bronze is an indestructible machine. See ad. back page Painters' Rapid Graining Process. J.J.Callow, Clev'd, O.

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

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J. Safety Linen Hose for factories, hotels, and stores, as protection from fire. Greene, Tweed & Co., 18 Park Place, N. Y.

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

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

Solid Emery Vulcanite Wheels-The Solid Original Emery Wheel-other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Pack-ing Company, 37 and 38 Park Row, N. Y.

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

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

Diamond Tools. J. Dickinson, 64 Nassau St., N.Y. Machine CutBrass Gear Wheels for Models, etc. (New List.) D. Gilbert & Son., 212 Chester St., Phila., Pa. Boilers & Engines cheap. Lovegrove & Co., Phila., Pa.

Skinner Portable Engine Improved 21-2 to 10 H P

NEW BOOKS AND PUBLICATIONS.

THE FARMER'S AND MECHANIC'S MANUAL. By W. S. Courtney. Revised and En-larged by Geo. E. Waring, Jr. Sold by Subscription. E. B. Treat, 805 Broadway, New York city.

Colonel Waring says that in hunting through libraries or books giving data for various simple problems relating to farm work, he found plenty of volumes which contained almost everything except just what he happened to want to know. Any one who has searched for every day mechanical data in mechanical text books prepossession in favor of the present work, in which the author says he has endeavored to place an immense amount of just that kind of practical information which working farmers need ready at hand at all times. To particularize all that is embodied would take much more space than is here available. There are chapters on measures of all kinds, on hydraulics, on fuel, on fences, on the horse and other farm animals, on keeping accounts, strength of materials, drainage, mechanism, painting, building, and so on through a long, varied, and useful category: All descriptions are plain and simple, an excellent index is provided, and there are over six hundred illustrations.

THE ANEROID BAROMETER: ITS CONSTRUC-New York.

A valuable little handbook compiled from several authoritative sources, and quite fully covering its subject. be coralline, a dye derived from phenol or carbolic It forms No. 35 of Van Nostrand's Science Series. a dye derived from phenol or carbolic acid. It costs about 90 cents an ounce. The violet

WOODWARD'S DRAWING STUDIES. Price \$6. Published by the American News Company.

An excellent collection of lithographed models prepared by competent artists and well suited for study in schools. All of the drawings are repeated in outline and shade so as to adapt them to all ages and all conditions of progress. The collection is well suited for the use of art students and schools.



S. C. A.-See pp. 241 and 284, vol. 37; and SUPPLEMENT, No. 49, p. 770.-A. H.-A coating of hydraulic cement will be the cheapest remedy to apply.-C. E. B.-The weight of the water must be added to the pressure on the lower gauge.-V. N.-See p. 299, vol. 37, answer No. 16.-B. E.-Your question is too general. The best distribution of the steam must be determined from a consideration of the size and character of the engine, the piston speed, and the steam pressure.-H. W.-Regarding bar magnets, see answer No. 16, p. 299, vol. 37. The question of infringement depends upon the mode of construction.-W. B.-A heating apparatus such as you describe could probably be fitted up by any good plumber.-F. S.-Consult Willard's "Practical Dairy Book" and Cowen's 'Cook's Receipt Book."-L. H.-Send to any of the booksellers who advertise in the SCIENTIFIC AMERICAN. has yet to be published, so far as we are aware.-A. D.-Probably any good carriage builder will furnish either the article or the plan.-E. N.-We see no difficulty in the proposed arrangement.-P. P., Jr.-There should be no difficulty with the boiler, and all the machinery will probably answer very well.-The correspondent writing from Charlestown, Mass., who forgot signature, will find the information desired in SCIENTIFIC AMERICAN of January 19, 1878, answer No. 37.-E. F. Y.-We incline to an affirmative answer to all your questions .- L. M. B.-See vol. 33, p. 339, for general instructions. There are some special forms in the market which are well spoken of .-- W. B. -- See p. 232 of SCHENTIFIC AMERICAN, April 13, 1878. It appears to us that there is no doubt as to the utility of the application of the telephone to diving and submarine work.-W.C. S.-It appears that you have obtained a result which is as good as is usually obtained with the instrument in its present form .-- J. O'M .-- It is a fact that coal exposed to the weather deteriorates to a considerable extent.-S. W. S.-It might be well to arrange the slats so that the sail would form a warped surface. See p. 241, vol. 32.-A. A.-The electric circuit through so many instruments has no doubt great resistance, and it may be necessary to use as many as 60 cells of Hill's battery to properly overcome it.-B. T. C.-We think you can suspend the zinc in the boiler without any injurious effect upon the water.

(1) P. E. L. asks: What are the best solutions for tempering mill picks? A. Most blacksmiths use clear water, but some add 1/2 lb. of salt per gallon of water.

(2) A. C. C. writes: I have been surveying and making maps of property, and cannot make the landmarks and compass bearings as laid down in the deeds agree with the present bearings. What is the variation or deviation of the compass for the past 25 years? A. You will probably have to obtain this information from old maps and deeds, and from the notebooks of former surveyors, if they are accessible. It often happens that in old deeds the bearings of lines are given, which lines are also referred to existing land marks. A recent publication entitled " Magnetic Variation in America," by J. B. Stone, may possibly contain the information you require.

(5) F. B. asks: 1. Will it do as well to have the valves of an air pump open in the side as upward (as in diagram)? A. The valves as shown will answer very well, 2. How large should the air chamber of a pump 11/2 inch bore and 3 inches stroke be, in order excess of the demand. First class draughtsmen can to raise water 6 or 7 feet in a ½ inch tube? A. Make the capacity of air chamber at least as great as dis placement of pump piston per stroke.

(6) J. T. asks: At what date was our present system of figures invented, and by whom was it first introduced? A. The Arabs, through whom the existing system reached Europe, are said to have obtained it while it may be continually moving forward with refer-from Hindostan in the 10th century. The date of the ence to some point on the ground. original invention and name of the inventor are not known

(7) W. P. R. asks: Could a steel spring be made powerful enough when wound up to propel a boat 20 feet long? A. While we could hardly recommend increase the power to almost any desired extent.

(8) C. E. H. writes: Please explain the way in which the following formulærelating to steam vessels are used: $\frac{V^3 \times D_1^3}{I.H.P.}$ and $\frac{V^3 \times \text{mid. sec.}}{I.H.P.}$ A. The of slip of a screw propeller with a boat having a fine rease with the number of revolutions? A With formulæ are used to compare the performance of differ-

stants. (9) S. C. D.-The scarlet color appears to

acid. It costs about 90 cents an ounce. The violet compares well with Hofmann's " R," or methyl " R B." (10) F. C. asks: How can I make an effective filterfor muddy water? A. Conduct the water into the bottom of a large cask or hogshead half filled with washed silicious gravel, grading finer towards the top; then a thick layer of well burned, coarsely granular charcoal well covered with small gravel, thus nearly filling the vessel. Where a larger quantity of water is required than can be properly filtered in this manner, it is generally more satisfactory, within reasonable limits, to increase the number rather than the size of such filters. See also answer No. 39, SCIENTIFIC AMERICAN, p. 251, October 17, 1874.

(11) J.B. asks: What power engine and gine.

very fine Florida bathing sponge, without injuring it in any way? A. You may try soaking in sulphite of soda solution and subsequently washing thoroughly in water. See Supplement, No. 38, p. 606,

(13) T. W. I. asks: How can I thin some very thick boiled linseed oil, for use in polishing wood? A. Mix spirits of turpentine with it.

What is the best color to temper fine drills to? A. A clear purple.

What is meant by the "pitch " of a screw propeller? for circular.-G. F. W.-The information you desire A. The degree of twist in the blades, like the pitch of a screw thread.

> How can I render light cotton cloth waterproof? A. Moisten the cloth, on the wrong side, first with a weak solution of isinglass, and, when dry, with an infusion of nutgalls. Or use a solution of common bar soap instead of the isinglass, and another of alum in place of the galls.

using a battery? A. See answer No. 19, p. 155, Scien-TIFIC AMERICAN, March 9, 1878.

iments, by independent investigators, confirm the statement that the maximum density of water is reached at a temperature of about 39° Fah., so that expansion takes forms; washing and drying the precipitate at 250° Fah., place whether the temperature is decreased or is raised above this point.

(15) T. S. asks: What is the formula for finding the horse power of a stationary engine? A. Find how many foot lbs. of work the engine performs in one minute, and divide this quantity by 33,000. The quotient is the horse power of the engine.

(16) I. P. H. asks: 1. What battery do you consider the best for plating and electrotyping for an amateur to use? A. Smee's, or some simple form of sulphate of copper battery. 2. What material do electrotypers use for making moulds for letter work? A. Beeswax.

(17) L. D. asks: How many cells of Bunsen's or Grove's batteries' are required to produce an electric light capable of lighting a room 20 x 25 feet? A. About 20.

How can I make a telephone? A. See answer No. 19.

(19) "Constant Reader."—Drawing is taught at all technical schools. Free instruction is given at the Cooper Institute in this city. The supply of ordinary draughtsmen is at present, we think, rather in generally find employment, at a good price.

(20) T. E. M. asks: Does the piston of a ocomotive, when running, come back in the cylinder the same as in a stationary engine, or is its motion al-ways forward? A. The piston moves backward and forward with reference to any point of the cylinder,

(21) L. H. J. asks: Can clockwork, acting through the medium of a spring or the force of gravity, be considered as a prime mover or a transmitter? My friend contends that the elastic force of the spring and difficulty will be in winding up the spring, as by in-from the definition of that term. I hold that it is increase the power to almost any desired entry of the spring are the power to almost any desired entry of the spring are the force of gravity on the weight are true forces of nature, expended upon it as is given out. A. We think your view of the case is the correct one.

(22) T. P. F. asks: 1. Does the percentage run increase with the number of revolutions? A. With TION AND USE. Price 50 cents. D. Van entsteamers, by substituting proper values for power, slip for a considerable variation of speed. 2. What is Nostrand, Publisher, 23 Murray St., midshipsection, etc., and calculating the resultingcona well designed screw, there is not a great difference in yacht? A. From 7 to 8 per cent, we believe. 3. What is the greatest number of miles ever made in one hour by a 50 foot steam yacht without tide or current to help? A. There are no reliable records of continuous speed for such vessels higher than 20 or 21 miles an hour. Some of the new English steam torpedo boats are credited with a speed of 27 knots an hour, probably measured over a short course, and the distance per hour computed from the rate thus acquired.

(23) G. V. B. asks: What will prevent the steel parts of drawing instruments from rusting? A. Clean them occasionally with an oiled rag.

(24) L. S. T. writes: 1. In the early part of the winter I filled a small keg with cider that had been made in the fall. From this keg I filled a small glass bottle which was perfectly clean. They were both placed in the same cellar, the bottle being corked tight, and the keg having the bung out; at this time the cider what size and pitch of screwwill a boat 40 feet long and in the keg is about the same as it was when put in, 13 feet beam require; boat to be used for fishing and while that which was put in the bottle is a No. 1 vinehunting purposes, flat bottom, and as light draught as gar with a very high color. What caused the cider in practicable? A. If a very light draught is needed, it the bottle to make vinegar in such a short time? A. It may be well to use two screws, from 18 to 20 inches in was probably due to impurities from the bottle, cork, diameter, and you can drive them both with a 7 x 9 en- or funnel used in filling. 2. Is there anything injurious to vinegar about lead pipe, that is, if vinegar be run (12) N. S. B. asks: How can I bleach a through the pipe? A. Vinegar quickly corrodes lead, forming soluble lead acetate (sugar of lead), which is very poisonous. 3. What would be the result if block tin pipe were used? A. Vinegar has little, if any, effect on pure block tin pipe.

> (25) W. S. asks how to make gold lacquer. A. 1. Shellac, 3 ozs.; turmeric, 1 oz.; dragon's blood, 14 oz.; alcohol, 1 pint. Digest for a week, with occasional stirring, decant and filter. 2. Digest in separate portions of wood naphtha or wine spirits an excess of turmeric and dragon's blood; dissolve shellac in 5 parts of alcohol or wood naphtha (methylic alcohol), and color with the above tinctures (filtered) to suit.

(26) M. H. T. & Co.-The sample sent us consists principally of a solution of resin and oil or resinous alumina soap in oil of turpentine and benzine or kerosene. Pale alcoholic shellac would doubtless answer as well. You may try also: 1. Gum caoutchouc dissolved in a mixture of carbon disulphidewith six per Can I make a telephone of a short circuit without, cent of strongest alcohol. 2. An aluminons soap dissolved in turpentine oil. The latter dries quite slowly, the former rapidly at ordinary temperatures. The alu-(14) In answer to H. L.-Numerous exper. minous soap is prepared by adding to a dilute, boiling solution of common yellow (resin) soap, solution of aluminic sulphate (alum cake) as long as a precipitate and dissolving it in warm oil of turpentine.

> (27) R. C. asks: What is the method employed in testing the hardness of metals and alloys? A. If by hardness is meant the power of resisting abrasion, we do not know that there is a standard scale in use other than that of Mohs and Breithaup, usually employed by mineralogists. In this talc is taken as No. 1 and the diamond as No. 10; the intermediates being: 2, gypsum (cryst.); 3, calcspar (transparent variety); 4, fluorspar (cryst.); 5, apatite (transp.); 6, orthoclase (white, cleavable); 7, clear quartz; 8, topaz (transp.); 9, sapphire (cleavable). No. 3 is of about the hardness of pure copper; it scratches and is scratched by the latter. No. 7 is about as hard as file steel. Fine gold = 2.5 to 3. Silver has nearly the same hardness as gold. Zinc=2. Lead=1.5.

> (28) A. F. asks: Can a magnet be made strong enough to lift a cubic foot of solid iron or steel from the ground, if the magnet be placed from 2 to 3 feet above? A. This would require a combination of aboutfour U-shaped electro-magnets, each having a hollow iron core 6 inches in diameter and 30 inches long.

Skinner & Wood, Erie, Pa.

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

Lansdell's Steam Siphon pumps sandy and gritty water as easily as clean. Leng & Ogden, 212 Pearl St., N.Y.

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

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

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

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

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass. For Power&Economy, Alcott's Turbine, Mt. Holly, N.J.

Bound Volumes of the Scientific American.-I have on hand bound volumes of the Scientific American, which I will sell (singly or together) at \$1 each, to be sent by express. See advertisement on page 300. John Edwards, P. O. Box 786, N. Y.

(3) L. G. S. writes: I wish to put a flagstaff made of wrought iron pipe on a building, say through the center of the roof. The telegraph wires are within 100 yards of the building. Would there be danger from lightning? A. It might be well to connect the iron flagstaff with the lightning rod.

feed water heater.

. 155, current volume.

Why are the zincs in a battery connected with the carbons, when there are more than one cell, and not the zinc to zinc? A. They may be connected in either way. If it is desired to produce an intense current of electricity. the pairs are connected in the first way you mention; but if a quantity current is desired, then all the zincs are connected as one zinc, and all the carbons as one carbon, and a wire joining the two will conduct a current of quantity electricity.

(18) O. B. M. writes; 1. I have constructed an acoustic telephone by taking two tin cylinders, each having one sheepskin head. A small hole is made in each head, and a string run from one to the other. I can hear distinctly 50 feet, but the string must not touch anything between. A. The string which joins the instruments may be stretched a long distance and around corners, if supported at each corner by a short (4) In answer to H. L. B.: Generally, if the venient object. 2. If I take wire can I carry sound 500 mon wood charcoal answer for the carbon in a Bunsen fire is well covered, and the damper partly closed, the yards by having it directly attached to the necks of bot- cell? A. Not properly; it is too light. The gas coke, steam pressure does not rise. In regard to the scale, tles as telegraph wires are? A. Using the instruments obtained from the retorts used in the manufacture of you may derive some benefit from the use of a filtering you describe, most if not all of the sound vibration common illuminating gas, is the proper material for this would be lost at the bottle neck supports.

(29) F. M. M. writes: In your answer to the inquiry of G. F. F. in regard to premium offered by the State of New York for a steam canal boat that would not wash the banks, you stated that the premium had been awarded. Please state to whom the premium was awarded, amount of award paid, and on what device the award was made. A. Wm. Baxter received \$35,000, David P. Dobbins \$15,000, and Theodore Davis \$5,000. You will find full accounts of the boats for which the awards were made in the Reports of the Commission appointed to investigate the subject.

(30) L. P. C. asks: 1. How many 2 quart cells of Daniell's battery will it require to give shocks? piece of string fastened to a tree or post, or other con- | A. 100, unless an induction coil is used. 2. Will compurpose.

(31) A. W. writes: I wish to become a locomotive engineer, but have had no experience in that direction. What will be the best course for me to pur-glass tumblers under the bedposts of the beds they sleep sue? A. If you are a good mechanic, try to obtain a in. The theory is that the glasses prevent the electricity position as fireman, and work your way up. If you from escaping. Has the plan any merit? A. It can

300

(32) "Wisconsin" writes: 1. I have a stationary engine having an 8 x 20 cylinder that was bored out in good shape 4 years ago, and fitted, as I supposed, with two springs or rings in the piston follower. The engine became less powerful all at once, and on examining the piston I found it was solid, with a groove in the face, evidently intended for common packing. It did good service for one year. I now use hemp packing, and it lasts two or three days only. What should be done? A. From your account we think it would be well to refit the piston, and either put in new rings set by their own elasticity, or add springs to the present ones. 2. Where should a blower for producing an artificial draught be attached, in the smoke stack or under the grates? A. It usually does not make a great deal of difference.

(33) K. K. writes: The ceiling of our cellar is very low, being only about a foot above the top of oil of vitriol), 2 quarts; strong malt vinegar, 2 quarts; the furnace, and the draught pipe is between the ceiling \min and digest; then add with constant stirring coarse and the top of the furnace. The ceiling is lath and plaster. We are afraid that it will take fire some time when the furnace is hot. What remedy is advisable? A. It would be well to interpose a screen of some uninfiammable material; but, if the other arrangements would permit, it would be safer to excavate a space in the floor of the cellar of dimensions sufficient to accommodate the heater, and increase the interval between its top and the ceiling by at least 2 feet.

(34) J. C. B. writes: 1. In a recipe for a process of preparing gelatin plates for making stearine relief pictures, I am told to "mix about 3 drops to the 100 cb. m." Is that correct? A. Read 100 cubic centimeters, 2. What is the length of time required for drying the plate before exposure? A. An hour to an hour and a half suffices; but it is better to let itstand a day or more if possible. 3. How should the plate be washed after exposure? A. Use hot water, changing it several times if necessary.

(35) In answer to J. G.: A well built cistern, properly faced with genuinePortland cement, will hold water tight for years. The walls should be laid in cement and, unless quite thick and in a firm clayey soil, faced on the outside as well as inside with the cement. For small rain water cisterns the brick work is occasionally laid in a mixture of equal parts of red and white lead tempered with oil; such require no cement facing, and are very strong. The materials must be dry. Water from such a reservoir must not be used for drinking purposes or in preparing food.

(36) J. S. A. asks how to stain wood in various colors, A. Brown: Concentrated solution of potassium permanganate in water. Red: Boil 1/4 lb, of logwood and ½ oz. of soda in a pint of water; apply hot, and then go over the work with strong aqueous solution of alum. Rose: Potassium iodide in 12 parts of water for first bath; as second, mercuric chloride (corrosive sublimate) in 40 parts of water. Indigo solutions give blue washes. Wood dipped in concentrated hot solution of copper sulphate, and then in solution of washing soda, becomes light blue. Verdigris dissolved in 4 parts of vinegar imparts a good green color to dry wood. Turmeric dissolved in wood naphtha produces a yellow wash. Aqua In dluting actas for battery purposes, how much water regia (nitro-muriatic acid), when diluted with 3 parts of do you use? A. About twelve parts of water to one part water, though somewhat destructive, is often used on light woods for a strong yellow.

(37) F. P. H. asks: 1. What battery do you consider best for small electrotypes and also for silver plating? A. Either Daniell's or the gravity battery. 2. Can I make a solution of German silver in the same way as plain silver? A. Treat the German silver as you would treat the metal nickel in making a bath for nickel plating. 3. I have a small Daniell's battery and also a decomposition cell; the battery is composed of a strip of copper, a porous cup and jar. I have been making small electrotypes of copper. I have lately found that the strip of copper has increased in weight, so that now it is about three times as heavy as when I first commenced to use it. What is the cause, and how can it be avoided? A. The formation of metallic copper on the positive pole is a natural result of the proper action of this form of battery. When the electric cir. merged? I do not want it to project below the bottom cuit is closed the sulphuric acid of the sulphate of copper solution, with which the battery is charged, unites with the zinc, for which it has a superior affinity, and thus induces galvanic action, by which the copper of the sulphate of copper solution is deposited on the copperplate or positive pole of the battery. With the arrangement described, we do not know of any positive book which says that the relative divisor of 12 per cent remedy.

electric bell to be used in connection with a telephone be used in obtaining the interest for one day, or 31 of over a wire line about 500 feet in length, over which a year. Thus at 12 per cent the interest for one day is line I have not been able to obtain any answer by the $3\frac{1}{60}$ of $\frac{19}{100} = \frac{1}{300}$ use of an electro-magnet wound with 50 feet insulated wire using 1 cell of a gravity battery. Which shall I increase, the magnet or battery power, or both; and how much shall I increase them to obtain a good stroke upon the bell? A. Use four 1 gallon cells of gravity battery, with the magnet that you have

(42) J. L. writes: I have heard that it is beneficial to persons troubled with rheumatism to place have no shop experience it would be well to acquire hardly do any harm; but we are somewhat skeptical in some before going on the road. regard to the benefit. regard to the benefit.

> rowboats waterproof along the joints. A. Fill the spaces with (pure) white lead and linseed oil, mixed to a thick consistency, and allow time to dry and harden thoroughly before using the boat. White lead already mixed can be purchased in small tins. If the seams are wide, calk with oakum, driving it in solidly.

> (44) F. W. D. asks: How many leaves of gold (such as used by bookbinders) would make ablock 1 inch high, if firmly compacted? A. About 160,000.

> (45) C. M. B.-The recipe referred to is not satisfactory; lampblack alone is not a suitable basis for blacking, and a large quantity of glycerin is likewise objectionable. The following recipe will probably give better results: Boneblack (best dried from sugar house filters), 30 lbs.; sulphuric acid (commercial brown sugar, 11 lbs.; molasses (average New Orleans), 30 lbs.; sperm oil, 2 gallons. The ingredients must be wellcommingled by trituration, and allowed to act upon each other for several days before using. If too dry, a little water may be added.

> (46) J. C. M. asks: 1. How is dextrin made? A. Commercial dextrin, or "British gum," is obtained by heating dry potato starch to a temperature of 750° Fah., in sheet iron trays or revolving iron or copper drums, similar to those used in coffee roasting, whereby it is transformed into semi-transparent, brownish lumps, which are converted into a pale yellow powder by grinding between millstones. It is completely soluble in cold water, from which it may be precipitated by addition of excess of strong alcohol. 2. Is potato starch the best substance from which to prepare it? A. Potato starch is generally used, but starch from other sources will answer. 3. What are the best tests to ascertainits purity? A. Agitate briskly a few grains of the dextrin in a test tube with fifty times its weight of pure cold water; then set it aside for 10 minutes. Pure dextrin dissolves completely in cold water to a clear solution. If not all dissolved pour off the solution, add a littlewater to the residue, heat to boiling, let cool, and add a few drops of iodine water; a blue color indicates starch.

(47) J. W. S. writes: 1. If I should construct a battery on the following principles, would it be a success? Take a one gallon glazed crock, put inside zinc cylinder as high as the crock (cylinder open at one side); then use for porous cup a common unglazed plant jar, used for house plants ; have inside the latter a strip of copper; then use around the zinc a solution of salt and water, and with the copper a solution of blue vitriol. A. Yes. 2. For strength of current how would it compare with a Grove's cell? A. It would have about one fifth of the power of the Grove's cell. 3. How many Grove's cells combined, ordinary size, will it require to operate successfully an electric lamp, or a light with carbon points, to be used for purposes of illustration in experiments in electricity? A. From 30 to 50 cells, according to their condition, will give a good light. 4. of acid. 5. How long does a solution of acid last in the Grove battery without renewing? A. About 48 hours, if the zincs of the battery are thoroughly amalgamated with mercury. 6. Which would you advise one to us for experimental purposes, considering expense and usefulness, Grove's or a bichromate battery? A. Grove's

would perhaps be the most suitable for your purpose. Please give a recipe for mending broken glassware. A. Heat the glass and rub the surfaces that are to be united with shellac.

(48) J. W. S. writes: I am building a small steam yacht. It is to draw only about 1 foot of water. I propose using a propeller 1 foot in diameter and 16 inches pitch, but to obtain 6 miles per hour I shall have to run the screw at about 400 revolutions per minute. Will it give good results running so fast? If not, can I use a larger screw and not have it wholly sub-Or, can I increase the pitch without increasing the diameter? A. There is no objection to running the propeller at that speed. You can increase the pitch to 20 inches if desired.

(49) E. H. R. writes: I have an interest (38) F. M. S. writes: I am constructing an tive divisor, and how obtained? A. It is the divisor to

-It is sulphide of iron-marcasite.-T. O'N.-The sam ple was too small to admit of positive tests, powder appears to consist principally of a lime salt, probably the sulphate (plaster of Paris), a salt of zinc, and the powder of a roct containing tannin.-W. E. Theigneous rock contains crystals of tourmaline and quartz, and a little chlorite.—A. R. Q.—The samples in the wooden box consist of a clay slate containing much (43) W. M. M. asks how to render light iron sulphide, mica schist, and a ferruginous marl. They are not of value, -A, B. T. - The two light colored specimens are sandstone conglomerate containing mica schist and hornblende; the other is an argillaceous sandstone with seams of lime carbonate.

COMMUNICATIONS RECEIVED.

The Editor of the Scientific American acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Cinders in the Eye, By W. S. N. Locomotive Strokes. By J. A. H. Aerial Navigation. Liverpool Engineering Society. By W. B. The Science of Life. By J. R. H.

LISTS AND SPECIFICATIONS OF PATENTS.

A circular issued from the Patent Office at Washington states that, the appropriation made by Congress for printing and binding having been exhausted, the publication of the Official Gazette (containing the lists of patents) has been suspended; and the printing of specifications has been stopped for the same reason, which will necessarily delay the regular issue of patents. We are therefore without our usual lists this week. It is believed that the suspension will only be temporary, as a deficiency bill is now pending before Congress Whenever this appropriation shall become available, the work of printing and issuing the regular Patent Of fice documents will be resumed at once.

English Patents Issued to Americans, March 26 to April 8, inclusive

Aerial machine,-F.A. Lehmann et al., Washington, D.C. Baling hoops.-J. B. Gould, U. S. Consul at Birmingham, Eng. Checkvalve trap.—G. Waring, Newport, R. 1

Gas lighter.—G. H. Kitchen et al., Rye, N. Y. Hot blast apparatus.—S. C. Salisbury, New York city. Inhalingapparatus.—L. E. Felton et al., Potsdam, N. Y.

Lamp.—R. S. Merrill, Boston, Mass. Lawn mower.—W. J. Lloyd *et al.*, —

Measure for liquids.-B. Fitts. Worcester, Mass

Ordnance.-G. Paulding, Cold Spring, N. Y. Railway truck.-E. R. Esmond, N. Y. city.

Reaper .- Wood Mowing and Reaping Mach. Co., Hoosick

Falls, N. Y. Refrigerator.—N. Wheeler, Bridgeport, Conn

Regulating electric motors.-H. C. Spalding, Bloomfield

Rollers for wringing machines.-G. P. Clark, Windson

Locks, Conn. Spinning machinery.—J. W. Wattles, -Steam, hydraulic, etc., press. -J.W.Hyatt, Newark, N.J. Steam boiler.-B. T. Babbitt, N. Y. city. Straw braid sewing machine.-M. P. Carpenter, New

Vork city. Cool sharpening machine.-A. K. Rider, Walden, N. Y.

Vapor burner.-F. A. Brown et al., Newton, Mass Water meter.-C. C. Barton, Rochester, N. Y. Waterproofing .- H. A. Clark, Boston, Mass.



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(39) W. R. asks: What will remove ink from law binding, yellow leather or morocco? A. Fil-tered solution of calcium hypochlorite in acetic acid.

(40) E. W. asks: 1. How can small cast ings be nickel plated? A. See Scientific American, June 30, 1877, p. 408; and April 6, 1878, p. 209. 2. How can I bronze the castings in case I fail to nickel plate them satisfactorily? A. Varnish the castings with acids.—J. K. M.—No. 1 is smithsonite (calamine)—na-clear shellac varnish, and before the varnish dries dust tive zinc carbonate—of some value. No. 2 (small spethe castings with copper bronze powder.

(41) R. B. R. asks: What is the simplest iron ore-a variety of hematite.-A. M. K.-It is fire or water proof, or both, without causing the water drinking? A. We are inclined to think that this problem has never been fully solved,

MINERALS, ETC .- Specimens have been reexamined, with the results stated:

J. A. McK.-It is asbestos (amianthus), used exten. the publishers. sively for boiler felting, fire proof paints, etc. See address of dealers in our advertising columns.-H. L. C. -Minerals not received.-J. W. K.-Principally impure amorphous silica, probably from the decomposition of a soluble alkaline silicate-as water-glass. Not of considerable value unless occurring in large deposits .-- L N .- The syenite contains much iron sulphide-not otherwise metalliferous.-J. E. H.-It contains lime, magnesia, alumina, and potassa, combined with organic cimen) noble or precious serpentine. No. 3 is magnesite-magnesium carbonate,-M. F. C.-It is lenticular

and least expensive mode of rendering shingled roofs kaolin, of good quality, and if properly freed from gritty matters by washing, would be of value.-H. P.collected from such roof to be injurious or unfit for We cannot judge of the coating from the small sample We cannot judge of the coating from the small sample sent. A number of such varnishes have been patented. -O. B.-Earthy limonite-a poor iron ore.-W. E. W. Row, New York.

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