

Business and Personal.

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.

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.

Telephones repaired, and parts of same for sale. Address P. O. Box 205, Jersey City, N. J.

Book Cover Protector. (See this paper of March 1.) Sales 25,000 first month. Patent for sale, or can be made on royalty. Address Way & Rankin, 62 Fulton Street, Brooklyn, N. Y.

Atmospheric Hammers, for sale, two, very cheap. Hill, Clarke & Co., Boston, Mass.

Improved Dynamo-Electric Machines for Electroplaters and Stereotypers. Price \$75 for 150 gallon machine. Equal to the best, at half cost of the cheapest. J. H. Bunnell, Electrician, 112 Liberty St., New York.

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

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

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

H. Prentiss & Co., 14 Dey 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 per cent. 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.

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

Bradley's cushioned helve hammers. See illus. ad. p. 29.

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

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

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

Vertical Burr Mill. C. K. Bullock, Phila., Pa.

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

Eagle Anvils, 9 cents per pound. Fully warranted.

Diamond Saws. 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.

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.

No gum! No grit! No acid! Anti-Corrosive Cylinder Oil is the best in the world, and the first and only oil that perfectly lubricates a railroad locomotive cylinder, doing it with half the quantity required of best lard or tallow, giving increased power and less wear to machinery, with entire freedom from gum, stain, or corrosion of any sort, and it is equally superior for all steam cylinders or heavy work where body or cooling qualities are indispensable. A fair trial insures its continued use. Address E. H. Kellogg, sole manufacturer, 17 Cedar St., New York.

Wanted, the address of parties who manufacture steel tubing; also iron tubes. Address L. F. Standish & Co., New Haven, Conn.

Noise-Quitting Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

Type Writer, \$45. W. Main, Piermont, N. Y.

Makers of Engines, Lathes, Jig Saws, etc., for amateur use, send circulars to 300 York Ave., Phila., Pa.

Steam Engines, Automatic and Slide Valve; also Boilers. Woodbury, Booth & Pryor, Rochester, N. Y. See illustrated advertisement, page 29.

Tight and Stock Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus'd adv. p. 30.

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

For Sale—Light draught stern wheel Steamboat, 25 ft. long; cheap. Haase Bros., Oak Park, Ill.

Factory Fire Hose.—A large lot good Cotton Hose for sale cheap. W. F. Corne, Agent, 117 High St., Boston.

Stave, Barrel, Keg, and Hothead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

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

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

The American Watch Tool Company, Waltham, Mass., can cut standard Taps and Screws from 1-100 of inch diameter upward, of any required pitch.

The immense Printing Establishment of Messrs. Harper & Bro. is now being painted with H. W. Johns' Asbestos Liquid Paint.

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.

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

Deoxidized Bronze. Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

Drop Hammers, Die Sinking Machines, Punching and Shearing Presses. Pratt & Whitney Co., Hartford, Ct.

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

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Circulars on application. Pittsburgh Steel Casting Company, Pittsburgh, Pa.

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

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

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

NEW BOOKS AND PUBLICATIONS.

LEFFEL'S WATERWHEEL BOOK. Springfield, Ohio: James Leffel & Co. 1879-1880.

The James Leffel turbine water wheel may fairly be accounted one of the great prime movers of American mechanical industry, there being over 8,000 of them in successful use, giving nearly 500,000 horse power. One recently built for a mining company runs under a head of 300 feet, the highest head thus far utilized in this country. The descriptive book in hand is a new and improved edition, handsomely printed and full of information of use to owners of water powers of every description.

ILLUSTRATED MANUAL OF THE BOOKWALTER ENGINE. Springfield: James Leffel & Co.

The manual of the Bookwalter Engine is more pronouncedly a descriptive price list. It is worth consulting by any one contemplating the purchase of a small portable engine and boiler.



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) S. T. C. asks (1) for directions for making a good ice box. A. Make the box and cover with hollow walls, which may be simply filled with air. The cover should fit well, and the box should be lined throughout with zinc. 2. Which makes the best of the following: Three thicknesses of good board or two thicknesses of board filled in with charcoal? A. The latter.

(2) L. 6 H. asks: Is it possible to well metallize by galvanoplasty, a large piece of clay or terra cotta work, such as a bust, natural size, or a group or statuette, and if so please let us know if there is a more efficient way to prepare it than the use of plumbago? A. It is difficult to impart a uniformly adherent coating of metal on such ware. A good method is to coat the ware with a varnish composed of shellac 6 parts, borax 1 part, boiling water q. s. to form a thick sirup. When this is nearly dry it is thickly and uniformly coated with a metallic bronze powder and thoroughly dried to about 110° Fah., before suspending in the "striking" bath. It is essential that the first film be thrown on expeditiously. After plating the articles may be placed for a short time in water heated to about 200° Fah.

(3) G. A. H. asks: 1. Will the gravity battery keep best on an open or on a closed circuit? A. The closed circuit is best. 2. Will tin on one side of the copper spirals make any difference? A. There should be no tin on the copper. You may remove the tin by heating the copper red hot and plunging it into water.

(4) H. H. C. asks: 1. Can two or more of the electric machines described in No. 161, SCIENTIFIC AMERICAN SUPPLEMENT, be worked together to advantage by foot power? A. No, it is not an easy matter to drive a single one. 2. Should the wires of the first connect with the magnet of the second? A. The wires might be connected in this way, but it would be better to make a single machine of double the size.

(5) C. B. B. asks: 1. How can I polish fancy woods? A. Take rather thick alcoholic shellac varnish 2 parts, boiled linseed oil 1 part, shake well together before using. Apply with a rubber and rub

briskly until the varnish is hard and bright. 2. Could not a boat only large enough to carry one person be run by clockwork, and if not, why? A. Yes, but it would economize power by applying it directly to the propelling mechanism. 3. I intend making a barometer; how can I make the scale and have it correct? A. The barometer scale is simply a scale of inches, divided into tenths.

(6) H. R. M. asks the process by which the gloss is produced upon photographs, and whether the same process can be employed with what is termed heliotypes or artotypes, as published in some of the illustrated papers of New York, and if not, explain the means employed; also please state the difference between the two latter named terms. How can art or heliotype be mounted on cardboard suitable for albums? A. For albumen prints the warmed burnishing press used by photographers is all that is required, we believe. A rather weak solution of white wax in absolute alcohol is sometimes used as well for artotype or heliotype as for ordinary solar prints. It is simply sponged over the mounted print, which is then passed through the warm burnishing press, by which the fine gloss is imparted. Solution of bleached shellac in alcohol (1 to 10) is also occasionally used. Good starch paste is very generally used for mounting. For a description of heliotype processes consult Vogel's "Chemistry of Light and Photography." The artotype process so-called was patented by Johann B. Obernette, of Munich, in 1878 (208-14). It consists in forming first on a transparent or non-transparent plate a coating or film of albumen and soluble glass, and adding to this the sensitive film. The first coating is composed of: albumen 7 parts, soluble glass 3, water 8. The second or sensitizing bath is composed of: gelatine 50 grammes, fish glue (isinglass) 50, ammonium bichromate 15, water 1 liter. Filter for use.

(7) O. E. P. writes: In your issue of June 21, "Notes and Queries," (30), D. J. W. asks for a receipt for blue writing ink. I make it by dissolving the common preparation sold in every grocery, known as "Sawyer's washing blue," in clear water. It dissolves instantly, does not give much trouble by thickening, and never fades. Any desired shade may be had by varying the quantity of water. I have used it for measure lines on mechanical drawings made 10 years ago, and it is as bright now as when put on.

(8) O. A. R. asks: 1. Has there ever been an invention made to work two telegraph instruments at once on the same line? A. Yes, and it is common to transmit four messages simultaneously over a single wire. 2. How can I take the rust off the brass of an instrument? A. You should remove it with fine emery paper or crocus cloth or paper. 3. How many jars will it take to run telegraph line with a loop of 1,800 feet wire—900 each way, size of wire No. 18, soft iron? A. It depends altogether on the resistance of your instruments. No. 18 wire is too small; use No. 10.

(9) C. A. V. asks if gutta percha and India rubber can be dissolved and mixed by boiling together in any liquid. A. Caoutchouc and gutta percha are both quite soluble in naphtha, benzole, and carbon disulphide. The latter, when mixed with about six per cent of absolute alcohol, is one of the best solvents. The solution is performed in the cold (best in the open air), as it would not be safe or economical to heat these volatile and inflammable liquids. Exposed to the air the solutions soon evaporate, leaving the gums in their original condition.

(10) B. M. asks how many Tom Thumb batteries, made in the manner described on page 101 of the SCIENTIFIC AMERICAN Reference Book, would it take to raise 1/2 inch of No. 40 platinum wire to a red heat. A. About forty.

(11) W. W. B. asks: What can I use to remove rust from small watch pinions that will not cause the pinion to rust after applying? A. Soften with oil and apply a little emery flour.

(12) S. T. asks (1) if water becomes purified by freezing. A. Water is purified from most contaminating substances by crystallizing (freezing). 2. Will it purify itself by running a few miles? A. It depends very much upon the nature of the soil or bed; over a gravelly bed, usually yes.

(13) W. J. R. writes: In your answer to query No. 36, to "Student," page 380, current volume, June 14, you say his engine 8x12 in. is "badly proportioned" to produce the power estimated by him, namely "100 lb. pressure, 100 revolutions—245 horse power." Will you please state why? A. Because of the loss at every stroke by the clearance and waste spaces.

(14) B. P. C. writes: I am running an engine of about 6 horse power, 8 inches stroke, driving wheel 30 inches, makes 200 revolutions per minute, belted to a 48 inch wheel on shaft which makes 130 revolutions per minute. Am about to change to an engine of 12 horse power, 12 inches stroke, with driving wheel of 48 inches. What size wheel do I want on shaft, and what number of revolutions of engine, to produce the same result, namely, 130 revolutions of shaft? A. If you run your new engine 130 revolutions per minute you need not change your wheel; as you have equal diameter on both shafts, the driven shaft will run same speed as the engine.

(15) "Medicus" asks: When water and other bodies are freezing, heat is given out, and when water or the same bodies are thawing, cold is given out. Some of our elementary text books upon natural philosophy teach this. Is it true, and what is the *modus operandi*? A. Condensation is accompanied by an elimination of heat; liquefaction by an absorption of heat (from surrounding bodies). Consult Professor Tyndall's "Heat as a Mode of Motion."

(16) W. M. writes: In nearly all works referring to the computation of indicated horse power of steam engines from indicator cards of the same, the rule for finding the mean effective pressure during any stroke of piston assumes that the back pressure during that stroke is shown on the same card as shows the initial pressure. Should not the pressure on the opposite side of piston be obtained for the opposite card, and

the mean effective pressure computed therefrom? A. Yes.

(17) W. H. M. asks: 1. Is it necessary to level an engine (portable) both ways, across and parallel with the valve seat? A. No, the necessity for leveling is that the heating surfaces of the boiler may be properly covered. 2. In lining up a cylinder of a portable engine, where the slides are attached to the front cylinder head, how would you line it up—line the slides or the other parts first? A. Line everything by the center line of the cylinder in one direction, and by center of shaft in the other. 3. Would it be necessary to have front cover upon the cylinder and then stretch line? A. No.

(18) J. G. writes: F proposes to put a windmill wheel on an ordinary hand car and gear it from said wheel, and contents it will propel the car against the wind, size of wheel optional. Opposition say no. Please decide. A. F is right, if he uses properly proportioned gearing, but the speed will be low.

(19) G. A. D. asks for the process of making lime water. A. Agitate an ounce of pure caustic lime in a pint bottle nearly filled with water, and after the lime has subsided decant the clear supernatant liquid. It must be kept in well stoppered bottles.

(20) J. R. L. asks: What is the best way to get water up a hill 28 feet rise and 60 feet distant? If suction pump, what size? We want water to supply steam engine on top of hill. A. You can use a pump driven by your steam engine, or if you have a sufficient reservoir on top of the hill, a pump driven by a windmill. Size of pump depends upon the quantity of water you wish to raise.

(21) J. D. M. asks how to test water to ascertain if there is lead in it. A. Evaporate a sample of the water nearly to dryness, and mix the remainder with a small quantity of sulphureted hydrogen water (hydro-sulphuric acid). The formation of a precipitate or of a dark precipitate or cloud indicates lead. 2. To find out whether there is any decaying substance in my well? A. Treat one sample of the water with a cold saturated solution of tannic acid, another with enough dilute solution of potassium permanganate to produce a faint color; if a slight gelatinous precipitate forms in the first, even after 24 hours' standing, or if the latter quickly loses the color imparted by the permanganate, the water should not be used.

(22) A. M. writes: It is stated that in a boiler (with all the flues and crown sheet covered with water) where the fire is direct and intense the water assumes a spheroidal form and is not in contact with the plates at all. It is said that the master mechanic of some Eastern railroad had proved it by inserting a small pipe in the smoke arch end of a locomotive until it reached the flue sheet of the fire box, and nothing issued but blue steam, and he got no water until he drew it away from the fluesheet for half an inch, and in another case a pipe was introduced through the top of return flue boiler until within three eighths of an inch of the bottom sheet, and upon opening the cock a small quantity of water (that had stood in the pipe) came forth and then nothing but steam, nor did he get any more water until he removed the lower end of the pipe three quarters of an inch from the bottom of the boiler. It does not look likely. What is your opinion on the matter? A. This is a point that must be determined by the temperature of the fire and the conducting power of the metal. That the water can be driven from the metal surface has been frequently shown, but it does not occur under the ordinary conditions of a steam boiler, except when so badly designed that there is no proper circulation. In a locomotive boiler too small for its work and forced by a sharp jet the repulsion may occur.

(23) F. W. B. asks: 1. Would an engine 3x1 1/2 (three by one and a half) inches be large enough to run a boat fifteen feet long by thirty inches in width? How large a boiler would it require? A. Yes, at a moderate speed. 2. Would a boiler made of No. 17 copper, with 4 1/2-inch flues, made on the vertical plan, furnish sufficient steam? A. No. 3. Which is preferable for running on creeks and other shallow places, a screw or paddle wheel? A. For so small boats a screw running partly out of water.

(24) F. T. asks: Should any kind of oil be used on belts for elevators or driving machinery; if so, what kind? A. Neat's foot oil.

(25) G. O. L. D. writes: I have some soft rubber and "gold rags," containing gold leaf. By what process can I get the gold out of the rubber and rags? A. Incinerate on a hot iron plate, mix with about 2-3 its weight of a mixture of equal parts salt and carbonate of soda, and submit to a white heat in a Hessian crucible for about twenty minutes, adding a small quantity of niter occasionally; cool in the crucible—the button will be found at the bottom.

(26) T. H. K. writes that he has discovered that smoking coffee will cure consumption. [The active alkaloid (caffeine) in coffee suffers more or less complete decomposition under the circumstances, but the products yielded have little or no therapeutic value in this connection, as far as known. Smoking coffee berries will not cure pulmonary consumption, though it would doubtless prove a comparatively harmless if not pleasant substitute for tobacco.]

(27) C. H. M. asks: Why are not electro-magnetic machines used instead of galvanic batteries for telegraphing purposes? Can they not be so used? A. They are largely used for private lines.

(28) E. K. asks how to coat whitening and give it a gold color so that it can be burnished and leave some parts matt or dead gold color? A. Coat with gold size, and when this is nearly dry, apply gold leaf or a suitable brown powder.

(29) E. H. asks for a recipe for removing the gloss imparted to fine diagonal cloths after they are slightly worn. A. The glossiness cannot be permanently removed, since it is due to the loss of the nap. It may be temporarily remedied by the use of a little ammonia water.

(30) W. H. asks: What is the process of making solid emery wheels, and if there is more than one process, and if they are patented? A. Many of the best wheels are cemented with vulcanized rubber, borax, or zinc chloride (or oxychloride), and barium carbonate; other materials, such as felspar and clay, alkaline silicates, litharge and japan, shellac, and other resinous and gummy matters, albumen and lime, etc.

(31) G. A. W. writes: I am working at electroplating and gold plating, and as it has been some years since I worked at it, my memory has failed me in some things. 1. My solutions (silver) striking and plating are composed of the following: namely, striking to 1 gallon of water, 1/2 ounce silver (chloride), 1 lb. cyanide potassium (fused), 4 ounces of sal soda. Plating to 1 gallon water, 1 ounce silver, 1/2 lb. of cyanide potassium, 4 ounces of sal soda, and a little white caustic potash in each. Now I would like to know if these are all the necessary ingredients; if not, please enlighten me. A. Yes, the soda and potash are not essential. 2. If bisulphide carbon will make silver solution plate bright, will it answer for gold; if not, what will, and how used? How are the various colors obtained? A. No. See article on page 2540, No. 160, of SCIENTIFIC AMERICAN SUPPLEMENT. 3. What preparation is used for coating work to be sectional or spot gilt, and how prepared and removed? I have been using asphaltum, but in removing it with turpentine it has a tendency to stain the work and will not work well in the solution either hot or cold. A. Asphaltum varnish or paraffine. 4. I am using Smee's batteries for plating. I see some account of carbon sheets being substituted for the platinized silver; are they immersed in the same liquid (diluted SO2), if so are they cheaper and less trouble? A. Yes. 5. What acids, and the proportions, used to dissolve platinum, and can a sheet of silver be coated by being merely passed through the hot solution? How is the best and most permanent way of platinizing silver sheets? A. Hydrochloric acid, 3 parts; nitric acid, 1 part; heat to about 160° Fah. Attach the clean plate to the zinc pole of a weak battery and immerse in the cold solution somewhat diluted. 6. In my Bunsen batteries I use nitric acid in the porous cups with the carbons, am I right? A. Yes. Solution of potassium bichromate and moderately strong sulphuric acid solution may be advantageously substituted.

(32) H. F. G. asks: 1. What is the weight of a bushel of bituminous coal? A. 76 to 80 lb. 2. How much water will a bushel of such coal evaporate burned in an ordinary locomotive furnace? A. Ordinarily from 6 to 7 1/2 lb. per pound of coal.

(33) E. J. O. asks: What will remove coal tar from hair cloth, such as chair bottoms, without injuring it? A. Naphtha, benzole, or carbon disulphide. Use a stiff brush if necessary.

(34) A. U. L. asks: 1. Would the rail of a railroad track make a good conductor for a telephone for reasonable distances? A. No. 2. Must the wires leading into the house be insulated? A. Yes. 3. What kind of a battery is the best, say for a distance of three or four miles, and how many cells of same? A. No battery is requisite. 4. I have recently seen such articles as glass and porcelain cemented together so as to sustain a weight of several hundred pounds, by a cement sold under the name of stratina, or London cement. Can you tell what its composition is? It seems to be very effective. A. Dissolve glue in warm strong acetic acid to form a sirupy solution.

(35) H. H. W. asks (1) if brick is ever used in covering locomotive boilers? A. No. 2. If not, please give the name of some cheap covering that would do. A. Asbestos covering; a mixture of clay and cow hair; or hair felt, or even old carpets or blankets.

(36) W. H. W. asks: Will sound travel faster in a dense than in a rare atmosphere, and why? A. The velocity of sound is not materially affected by the density of the air. Its intensity is diminished by increased atmospheric density. It has been determined that the velocity of sound decreases with the temperature about 1 1/2 feet for every degree.

(37) G. C. asks: 1. Please give me a rule for compounding gear for a lathe.

A.  $\frac{TS}{I} = N$ ;  $\frac{t}{I} = S$ . T representing the number of teeth in traverse screw wheel; S, number in stud wheel gearing in mandrel; t, number in wheel upon mandrel, and I, number in gearing upon stud pinion, gearing in T; I, number of threads per inch upon traverse screw; N, number to be cut. 2. Please tell me how to make a cheap telephone. A. See full directions for making telephones in SUPPLEMENT, 142.

(38) J. H. W. asks: Can you inform me why a hazel switch will turn in the hands of some persons, who claim to be able to discover water or mineral by this means? A great many declare that it will not turn. I used to think so myself until I tried it last summer, and found that there were certain places in which the rod would turn in spite of me. I held it so tight that the bark peeled off. I cannot account for it myself, and have been laughed at for asserting that there is some truth in the claims of men who call themselves diviners until I am tired of it. Have never seen the matter explained. A. The rod is moved by the voluntary or involuntary muscular action of the hands of the operator, and not by any mysterious external influence, as many suppose.

(39) C. C. A. asks how to make a compound with which to insulate wire. A. Shellac varnish will do very well, providing the wire is wound before the varnish becomes thoroughly dry.

(40) J. A. W. writes: I would inquire through your paper of the M.D.s if a connection between the aorta and pulmonary artery where they cross is common. I found in examining the heart of a calf that was sold in market for veal a phenomenon of this kind; if it occurred in one instance might it not in another, and what would be the physical results of such a case? The opening was as large as the carotid artery; no appearance of any valves, but the tissue was very thick and firm.

(41) Y. & O. ask: 1. How ought a cheap ice house to be built on top of ground? A. See SUPPLEMENTS 55, 59, and 116. 2. How can I construct a lightning rod which will answer all the purposes, and cost less

than those sold by dealers? A. See p. 348, (10), current volume of the SCIENTIFIC AMERICAN.

(42) W. B. W. writes: Seeing an article in SCIENTIFIC AMERICAN by Dr. Rollin R. Grigg, of Buffalo, N. Y. I ask for information ("The Cause of Consumption"): What will heal the mucous membranes and the stopping of the waste of albumen? A. The author of the article referred to has kindly given us the following: There is no one medicine that can cure all cases of irritated and abraded mucous membranes and stop the waste of albumen. A variety of remedies is required to do this, in the different cases, and the treatment must be governed to a great extent by the peculiarities of constitution, and by the condition and the symptoms of each patient at the time the case is taken in hand. Furthermore, this is a diseased condition, where every case should be under the care of an educated, judicious physician, as much as severe cases of typhoid fever, diphtheria, or any of the other most intricate diseases. I will say, however, for the encouragement of all, on this now almost hopeless subject, that there is a series of most reliable physiological facts bearing directly upon the curability of all cases in the first stages, and which shows that of all tissues the mucous membranes are the most quickly and easily healed of any by proper treatment.

(43) E. W. C. writes: The screws in our cheese presses are 1 1/4 of an inch in diameter. From the center of the screw to the end of the lever it is 2 feet and 5 inches. Five turns of the screw move it 1 inch. How many pounds pressure will 150 pounds weight applied to the end of the lever produce? What is the rule for finding it? A. Theoretically, 136,800 pounds, but there should be a large deduction for friction. The weight (150 pounds) x distance moved through (76 feet = 912 inches) divided by distance through which the screw moves (1 inch) =  $\frac{150 \times 912}{1} = 136,800$  pounds.

(44) H. H. asks: 1. Would it be possible or practical to run a small light boat, say 2 1/2 feet wide, 12 feet long, with a spring motor similar to those used for small toys? A. Yes, but the power required to wind up the springs had better be applied direct to oars. 2. Could an electric engine be used instead of the above, how would the cost compare with steam engine? A. Yes. The cost of the electric engine would be greater than that of a steam engine, and the cost of running it would be about fifty times as much.

(45) J. T. asks (1) how saw blades are tempered. A. They are usually heated in a reverberatory furnace and hardened and tempered in oil. 2. Can temper be taken out by heating a saw in the fire? A. Yes, but the saw will be ruined. 3. Where an iron mandrel runs in wooden bearings, what kind of wood is best for bearings? A. Hard birch or maple. 4. Which is best, pine or hickory? A. Hickory.

(46) O. L. P. asks: Will it require more power to work an elevator perpendicularly than it will to operate a similar one on an inclined plane at 45 degrees? If so, what is the rule to find difference of power required? A. The power will be the same, not taking friction into consideration.

(47) V. A. N. asks for the size of steam ports in a cylinder 2 by 3 inches. Is 3-16 by 1 1/4 inch too large? A. 3-16 by 1 inch is sufficient.

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

J. N. J.—The sample of ore is quite rich in copper (copper glance) and contains also traces of silver. A chemical analysis or assay will be necessary to ascertain the proportions of these and the value of the ore. The property is valuable.—H. J. P.—1. A serpentine rock—it contains no copper. 2. Talcose slate.—C. H. M.—It is quartzite.

COMMUNICATIONS RECEIVED.

- On Boiler Explosions. By S. P.
On the Collared Peccary. By J. R. G.
On the Movement of Light in Space. By A. S.
On Theory of Creation. By W. P. T.

[OFFICIAL.]

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States Were Granted in the Week Ending June 10, 1879, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

Table listing inventions and their dates, including Ammonia, making sulphate of, H. Grouven, 216,323; Animal trap, W. McArthur, 216,340; Animal trap, F. W. Milby, 216,337; Auger, earth, A. H. Botsford, 216,372; Automatic ventilator, F. J. Crouch, 216,313; Axle, vehicle, E. D. Ives, 216,276; Bag fastener, G. Ernst, 216,385; Bags, etc., compound for preventing the destruction or rotting of, E. Osgood, 216,290; Baling press, F. J. Gardner, 216,392; Baling press, I. T. McIntyre, 216,431; Balls out of leather scraps, etc., machine for making, S. Brown, 216,305; Basket splint, L. F. Wilcox (r), 8,747; Beehive, J. Truax, 216,475; Blacking box, G. C. Furman, 216,390; Blast furnace tops, apparatus for opening and closing, J. Thomas (r), 8,751; Boiler furnace, steam, C. D. Smith (r), 8,750; Bolt blanks, etc., machine for rounding iron for, O. W. Stow, 216,469; Book cover, C. Eckhard, 216,318; Book, etc., holder, Young & Goeller, 216,484; Book, etc., holder, Young & Goeller, 216,484; Boot, M. M. Clark, 216,269; Boot and shoe, rubber, F. E. Hall, 216,380; Boot and shoe sole, J. W. Claron, 216,261; Bottle stopper fastener, W. P. Ayres, 216,367; Bottling machine, J. J. Allison, 216,300; Bread for baking, setting, R. Adam, 216,307; Brush, blacking, E. N. Andrews, 216,301; Brush head, A. Shaffer, 216,296;

Large table listing various mechanical inventions and their dates, including Brushes, vulcanized rubber face for metallic, E. A. Hill, 216,408; Buggy sulky attachment, A. H. Morse, 216,436; Button, C. Brandt, 216,255; Caboose for freight cars, C. L. Heywood, 216,403; Cake machine, J. W. & A. Ruger, 216,461; Car coupling, S. H. Lasswell, 216,420; Car coupling, J. G. Stigers et al., 216,356; Car doors, weather strip for, J. L. Towne, 216,473; Car moving device, W. B. Newlon, 216,441; Car replacer, A. Rutherford, 216,350; Car starter, C. L. Heywood, 216,407; Car step, C. L. Heywood, 216,405; Cars upon the track, replacing, C. L. Heywood, 216,404; Carving engine feeder, W. C. Bramwell, 216,373; Carpenter's combination tool, Gifford & Alden, 216,267; Carriage top brace, C. F. Odell, 216,343; Carriage top, child's, L. Schmetzer, 216,402; Chain link, E. W. Skinner, 216,355; Churn, J. L. Sprague, 216,466; Churn washer, M. Ray, 216,456; Cinder mill, R. C. Darrow, 216,314; Clothes mangle, J. S. Fox, 216,320; Coin blank reducer, F. X. Cicott, 216,308; Collar, horse, S. D. Reynolds (r), 8,746; Colloid, solid, Tribouillet & De Besaucele, 216,474; Compressing apparatus, F. J. Wehner, 216,364; Corn separator, Indian, T. R. Taylor, 216,472; Cornice truss, window, J. W. Campbell, 216,376; Cradle, V. A. Menuez, 216,432; Cuff holder, C. F. Doring, 216,383; Cultivator, H. S. Mead, 216,283; Cultivator, G. W. Peterson, 216,449; Dental engine, W. H. Gates, 216,321; Desk, school, O. D. Case, 216,307; Door sheave, sliding, A. G. Safford, 216,351; Drawing apparatus, perspective, G. Rosquist, 216,400; Drilling machine, C. W. Coe, 216,381; Drilling machine, metal, E. W. Fawcett, 216,264; Egg carrier, G. M. Huston, 216,413; Elastic fabric, W. E. Jefferson, 216,328; End gate, wagon, A. M. Smith, 216,464; Extension table, J. Stephens, 216,467; Feathers for clusters, preparing, G. M. Richmond, 216,366; Feed water heater, S. G. Munn, 216,439; Fence, W. H. Seat, 216,353; Fence and gate, chain, S. June, 216,417; Fence, barbed wire, N. G. Ross, 216,294; Fence post, E. L. Case, 216,378; Fence wire, barbed, F. Swan, 216,358; Fermenting vat, F. Ljtmann, 216,335; Fertilizer distributor, T. J. Carter, 216,377; Finger ring adjuster, C. H. Wells, 216,492; Fire kindling blocks, machine for dipping and coating, R. B. Whitzel, 216,480; Flower pots, making, E. A. Couch, 216,311; Garment pattern, J. H. Brooke, 216,257; Gas fixtures, brake for extensible, J. McHenry, 216,282; Gate, O. F. Fuller, 216,388; Gate, H. Peiry, 216,447; Glove, swimming, C. Primbs, 216,455; Grain, nuts, etc., cleaner, J. Johnson (r), 8,749; Gun lock, C. E. Best, 216,370; Gun machine, W. Gardner, 216,266; Hame attachment, J. Hudson (r), 8,748; Harness box loop, Brichtman & Burrell, 216,256; Harrow, A. F. French, 216,387; Harrow, spring tooth, A. S. Baker, 216,302; Harvester reel, J. F. Appleby, 216,253; Hat brims, curling, R. Eickemeyer, 216,319; Hats, stiffening, A. Solmans, 216,482; Hay, straw, and fodder cutter, G. T. Murray et al., 216,486; Hinge, W. H. Hart, 216,399; Hog holder, Wilson & Baker, 216,482; Hog ring and ringer, A. St. Mary, 216,468; Hoisting machine, endless chain, T. A. Weston, 216,298; Hose support, E. S. & S. M. Hinks, 216,409; Hot bed sash ventilator, E. C. Seaman, 216,487; Hydraulic elevator, H. Snowden, 216,465; Hydraulic lift, W. B. Hyde, 216,326; Hydrocarbon furnace, R. S. Robertson, 216,459; Hydrometer, Blattner & Adam, 216,304; Ice implement, D. N. B. Coffin, 216,310; Insect exterminator, J. Z. Walker, 216,476; Ironing board, bosom, C. W. Hilton, 216,274; Ironing stand, H. R. Summers, 216,297; Journal bearing, car axle, G. R. Meneely, 216,285; Knitted hood, F. W. Henson, 216,402; Knob, door, G. Jones (r), 8,743; Ladle for pouring metals, F. Shickle, 216,354; Last, G. M. Wells, 216,491; Latch, J. W. Day, 216,316; Lock, J. J. Dinnan, 216,260; Locomotive engine, W. B. Hosford, 216,275; Lubricator, D. P. Baldwin, 216,303; Magnetic separator, Cook & Thayer, 216,258; Measurer and saver, liquid, C. Pfanne, 216,450; Mechanical movement, S. Y. Love, 216,425; Medical compound, B. G. Du Rette, 216,317; Medical compound, C. Heaton, 216,401; Medicine, veterinary, N. & A. Rosenthal, 216,348; Metallic can, G. H. & J. H. Perkins (r), 8,744; Meteorological instrument, A. J. Myer, 216,440; Middlings separator, C. F. Keller, 216,333; Mining flume, portable, Howe & Waite, 216,325; Musical instrument attachment, Matthews & Richardson, 216,429; Napkin holder, L. S. Weed, 216,478; Necktie, W. A. Laverty, 216,421; Newspaper folding machine, C. Kahler, 216,332; Nut and collar, sectional, E. M. Morgan, 216,338; Nut lock, L. Spain, 216,489; Oil, treating, W. A. Adamson (r), 8,741; Oiling vessel, E. T. Jones, 216,416; Overcoat, W. Sweatman, 216,359; Packing, steam, G. C. Phillips, 216,451; Paper box machine, Strieby & Rankin, 216,357; Pessary, voltaic, J. J. Looney, 216,281; Photographic background, L. Moberly, 216,435; Pianoforte music rack, G. W. Lyon, 216,428; Picture frame back brace, J. Rice, 216,347; Planter, corn, C. G. Everet, 216,386; Planter, corn, J. Selby, 216,295; Planter, corn, T. F. Tanner, 216,471; Planter, hand seed, R. R. Lewis, 216,423; Plow, Harrington & Merrill, 216,271; Plow attachment, sulky, M. Brown, 216,375; Plow, hill side, G. W. Peterson, 216,448; Plow, sulky, T. E. Jefferson, 216,415; Plow, sulky, E. W. Newton, 216,442; Plow, swivel, Nourse & Howe, 216,443; Plumber's trap, J. K. Miller, 216,288; Potash from ashes, separating, J. & R. H. Woodrum, 216,483; Preserving compound, H. Jannasch, 216,414; Printing machine, plate, A. Hamilton, 216,397; Printing machine, plate, E. Hewitt, 216,273; Propelling apparatus, vessel, A. E. Tangen, 216,470; Pump, C. E. Drake, 216,384; Pump bucket, chain, J. F. Secora, 216,463; Pump, oscillating, D. Palacios, 216,444; Radiator, steam, W. M. Fuller, 216,389; Radiator, steam, T. P. Hardy, 216,400;

TRADE MARKS.

Table listing trade marks and their dates, including Canned fruits, vegetables, oysters, and meats, J. E. Stansbury, 7,407; Cigars, Kalman Brothers, 7,397; Cigars, C. R. Becker, 7,398; Cigars, cigarettes, and smoking and chewing tobacco, Bondy & Lederer, 7,394; Cigars, cigarettes, and smoking and chewing tobacco, R. C. Brown, 7,395; Cigars, cigarettes, and smoking and chewing tobacco, H. Cranall, 7,396; Cigars, cigarettes, and smoking and chewing tobacco, D. Frankel, 7,403; Fertilizing compositions or compounds, W. Peters, 7,399; Fresh oysters, J. E. Stansbury, 7,406, 7,408; Lard and tallow for druggists' use, F. K. Edwards, 7,402; Silk and half silk goods, E. Niepmann & Co., 7,405; Stringed musical instruments and strings, J. F. Stratton & Co., 7,401; Whisky, G. Simmonds, 7,400; Whisky, W. Lanahan & Son, 7,404;

DESIGNS.

Table listing designs and their dates, including Bracelet, H. Unger, 11,237; Carriage door fasteners, Ward & Pettit, 11,243; Center piece, S. Kellett, 11,233 to 11,235; Eyeglass cases, C. Seeger, 11,242; Face plates for locks, R. Christesen, 11,239; Font of printing types, R. Smith, 11,241; Ornamental funeral plates, C. H. Learned, 11,236; Rim lock case, R. Christesen, 11,240; Seal presses, W. E. Banning, 11,232; Standards for weighing sea-fishes, L. P. Bell, 11,244; Tumblers, C. Conrad, 11,238;

English Patents Issued to Americans.

From June 13 to June 17, inclusive.

Table listing English patents issued to Americans, including Barrel machinery, H. W. Palmer, Brooklyn, N. Y., 216,397; Barrel trussing machinery, H. W. Palmer, B'klyn, N. Y., 216,470; Burnishing machinery, C. D. Rogers, Providence, R. I., 216,384; Clasp, B. Greig, New York city, 216,463; Printer's galleys, T. McNeil, Allegheny, Pa., 216,444; Shrapnel and fuses, H. Beran, 216,389; Skates, G. McCord, New York city, 216,400; Wire machinery, C. D. Rogers, Providence, R. I., 216,400;