

The Asbestos Roofing is the only reliable substitute for tin. It costs only about one-half as much, is fully as durable, is fireproof, and can be easily applied by any one. H. W. Johns Manufacturing Company, 87 Maiden Lane, New York, are the sole manufacturers.

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. Portable Railroad Sugar Mills, Engines and Boilers. Atlantic Steam Engine Works, Brooklyn, N. Y.

Wanted—Parties to Purchase Right or Manufacture on Royalty, \$10 "Self-Playing Organ Attachment," Eastern or Middle States. Address E. F. O'Neill, Storm Lake, Iowa.

Gear Cutting Attachment for Lathes, Fine Tools, Lace Leather Cutter, Belting, etc. Jackson & Tyler, Boston. Steam Launches. W. J. Sanderson, Syracuse, N. Y. Brass or Iron Gears, list free. G. B. Grant, Boston. Silent Injector, Blower, and Exhauster. See adv. p. 237.

Fleetwood and Dexter Scroll Saws, Tool Chests, etc. Send for circular. Jas. T. Pratt & Co., 53 Fulton St., N. Y.

For a thorough practical education in the duties of steam and mechanical engineers and firemen, apply to the National Institute, Stamford, Conn. For pamphlet and particulars, address H. R. Foote, C.E., Director.

The best Centrifugal Machine in the world for all purposes, can be seen in operation at S. S. Hopworth & Co.'s, 11th Ave. and 27th St., New York.

Tapping Water Main Pipes.—Machines for tapping pipes under pressure, for sale by Wm. Young, Easton, Pa. Files recut. Passaic File Works, Paterson, N. J.

The surprising results in saving of fuel by the use of Asbestos Steam Pipe and Boiler Coverings are worthy the attention of every one using steam. H. W. Johns Mfg. Co., 87 Maiden Lane, New York, sole manufacturers of genuine asbestos materials.

Steam Cylinders bored from 3 to 110 inches. L. B. Flanders Machine Works, Philadelphia, Pa.

Steam Traps; best and cheapest in use. No blowing through to start. T. Sault, New Haven, Conn.

The Friction Clutch that is doing work in many places satisfactorily, that has never been done by any other can be seen at Institute Fair, New York. D. Frisbie & Co., New Haven, Conn.

H. W. Johns' Asbestos Liquid Paints are strictly pure linseed oil paints, and contain no water. They are the best and most economical paints in the world.

For Sale.—Agricultural Engine, 8 horse power, cheap. S. J. Benedict, East Randolph, N. Y.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, Importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Steam Excavators. J. Southern & Co., 12 P.O. Sq. Boston.

The Secret Key to Health.—The Science of Life, or Self-Preservation, 300 pages. Price, only \$1. Contains fifty valuable prescriptions, either one of which is worth more than ten times the price of the book. Illustrated sample sent on receipt of 6 cents for postage. Address Dr. W. H. Parker, 4 Bulfinch St., Boston, Mass.

The Baker Blower runs the largest sand blast in the world. Wilbraham Bros., 238 Frankford Ave., Phila., Pa.

Forsyth & Co., Manchester, N. H., & 213 Center St., N. Y. Bolt Forging Machines, Power Hammers, Com'd Hand Fire Eng. & Hose Carriages, New & 2d hand Machinery. Send stamp for illus. cat. State just what you want.

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.

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

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

Bradley's cushioned helve hammers. See illus. ad. p. 206.

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

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

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

Patent Steam Cranes. See illus. adv., page 222.

Telephones repaired, parts of same for sale. Send stamp for circulars. P. O. Box 205, Jersey City, N. J.

Vertical Engines. F. C. & A. E. Rowland, New Haven, Ct.

Draw'g Insts. & Mat. Woolman, 116 Fulton St., N. Y.

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

Noise-Quitting Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa. Stave, Barrel, Keg, and Hoghead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

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

The New Economizer, the only Agricultural Engine with return flue boiler in use. See adv. of Porter Mfg. Co., page 206.

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

Cut Gears for Models, etc. (list free). Models, working machinery, experimental work, tools, etc., to order. D. Gilbert & Son, 212 Chester St., Philadelphia, Pa.

Walrus Leather and Bull Neck for Polishing all Metals. Greene, Tweed & Co., 18 Park Place, New York.

Oak Tanned Leather Belting, Rubber Belting, Cotton Belting, Polishing Belts. Greene Tweed & Co., N. York.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

Pays well on small investments; Magic Lanterns and Stereopticons of all kinds and prices; views illustrating every subject for public exhibition and parlor entertainments. Send stamp for 80 page Illustrated Catalogue. Centennial medal. McAllister, 49 Nassau St., New York.

Fine Taps and Dies in Cases for Jewelers, Dentists, and Machinists. Pratt & Whitney Co., Hartford, Conn. Deoxidized Bronze Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

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

Hand Fire Engines, Lift and Force Pumps, for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y. and 93 Liberty St., N. Y. city, U. S. A.

Steam and Gas Fitters' Tools a specialty. Send for circulars. D. Saunders' Sons, Yonkers, N. Y.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N. Y. Wm. Sellers & Co.

NEW BOOKS AND PUBLICATIONS.
REPORT ON PRELIMINARY INVESTIGATION OF THE PROPERTIES OF THE COPPER TIN ALLOYS. Washington: Government Printing Office. 1879.

This report of the committee on metallic alloys embraces the results of the first complete and systematic researches ever made upon copper tin alloys, the most important of all the alloys of the useful metals. The investigation was entered upon under a resolution of the United States Board to test iron, steel, and other metals, passed April 17, 1875. The special work of the committee was begun in 1877, under the direct supervision of the chairman of the committee, Professor Robert H. Thurston, who edits this report. The work, which determined approximately the mechanical properties of all alloys of copper and tin, was done in the Mechanical Laboratory of Stevens Institute of Technology, Hoboken. The aim of the committee has been to ascertain the practical value of commercial metals to the brassfounder and the constructor, when treated in the ordinary manner, the investigation of the effect of various kinds of fluxes and methods of fluxing, and of special methods of treatment of the alloys after casting, being reserved for future research. Six plates show photographs of fractures of copper tin alloys; and twenty-one plates are devoted to graphical representations of the physical properties of the same alloys; and fifty-four plates give facsimiles of the autographic strain diagrams of tests by torsion. There is appended a number of selected papers on the metallic alloys; a review of the earlier researches on the properties of the metallic alloys, with lists of authorities in the department of research; and translations of the elaborate researches of Alfred Riche and M. G. Wertheim.

ZEITSCHRIFT DES ARCHITECTEN UND INGENIEUR. Vereins zu Hannover. Vol. 25, No. 3. Hannover: Carl Rümpler. 1879.

The third number of the 25th volume of the above publication is now before us. It contains the plans of the new building for the Technical High School at Hanover. The same was to be the residence of the former king, but as it was never finished, the Prussian government had the same reconstructed and transformed into one of the most handsome of college buildings. It is built entirely of light sandstone, is about 520x330 feet, has four towers, and is 3 stories high. The drawings, details of construction, estimates, and description of the Carola Bridge which spans the river Elbe at Schandau, Saxony, are also given. This handsome bridge is arranged for a railway, vehicles, and pedestrians, and consists of 3 semi-parabolic wrought iron trusses resting upon stone abutments and piers. A detailed article on the different means for the prevention of rust on iron, by Dr. J. Treumann, and extracts from all technical and patent journals, constitute the remainder of the work.

DETERMINACION DE LA LONGITUD DEL PENDULO DE SEGUNDOS Y DE LA GRAVIMAD EN MEXICO. Por Francisco Jimenez y Leandro Fernandez. Mexico: 1879.

The determination of the length of the seconds pendulum has two applications of the greatest importance; first, to find by various methods of comparison, the law of variation in length of several synchronous pendulums in different places, and to deduce therefrom the level of the terrestrial spheroid and consequently its form; and second, to determine the force of gravity, this being calculated at double the space described in the first second of its motion by a body falling in vacuo from a state of rest. Notwithstanding the importance of the determination of the length of the seconds pendulum, no observation of this kind has been made in Mexico until quite recently, when it was undertaken by the two engineers, Señores Jimenez and Fernandez. The results of the labors of these two gentlemen are recorded in the pamphlet before us, which forms one of the series of the valuable scientific memoirs that are being issued from time to time by the Mexican government. Without following the authors into the intricate calculations which are given in extenso in their memoir, we may state as the result of their labors, that the length of the seconds pendulum at the sea level was found to be 0.99153 m. and at the observatory 0.99109 m.; force of gravity at the sea level 9.7860 m., and at the observatory 9.7816 m. The geographical position of the observatory at the city of Mexico was thence found to be as follows: Latitude, 19° 26' 1 7/8" N.; longitude east from the meridian of Greenwich 63.36m. 26.67s.; height above the level of the sea 2,283 meters. The authors state that their results are of so much the more interest in that the pendulum experimented with was more than 12 meters in length, something uncommon in pendulums designed for this class of experiments.

ETUDE SUR LES ALLIAGES DE PLOMB ET D'ANTIMONE. Par F. de Jussieu, Autun (France), 1879.

A brief but complete study of the alloys of lead and antimony, giving their compositions, and describing their physical and chemical properties, and their phenomena of liquation and supersaturation. The study of the subject of liquation (the causes of which are here satisfactorily explained) is so much the more interesting in that the phenomena connected therewith often prove a source of trouble, vexation, and unsucce to type founders, stereotypers, and others who are accustomed to manipulate the alloys in question. To the latter class of readers, therefore, the pamphlet will prove especially valuable.

Hints & Queries

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) H. H. C. asks: Can books be obtained giving instructions in lithography or photo-lithography, or both; if so, where? A. Yes, address the booksellers who advertise in this paper.

(2) I. F. R. asks (1) whether any kind of battery is necessary in using the telephone. A. Batteries are used where a transmitter is employed. 2. Which is best for a small engine, a common upright tubular boiler or a simple coil boiler made of 3/4 inch gas pipe? Is there any danger of the coil getting stopped with sediment. A. An upright tubular boiler. The 3/4 inch coil pipe will be liable to stoppage and burn out.

(3) E. J. T.—You will oblige by giving the best receipt for making violin varnish. A. Coarsely powdered copal and glass, each 4 oz.; alcohol, 64 o. p., 1 pint; camphor, 1/2 oz.; heat the mixture, with frequent stirring in the water bath so that the bubbles may be counted as they rise, until solution is complete, and when cold decant the clear portion. When oil varnish is used it is made as for artists' virgin copal.

(4) H. J. writes: I have a lot of silver plated spoons. I would like to take the silver from them. How can I do it and save the silver? A. Dissolve 1 lb. of saltpeter in about 8 lb. of sulphuric acid by aid of heat. This (hot) solution will strip or dissolve off the silver plate. The silver may be recovered from its solution by the addition of salt, which precipitates it as chloride, and this, dried and fused with a small quantity of carbonate of soda, or borax and niter, gives pure metallic silver.

(5) G. J. McK. asks: 1. Can you give me a satisfactory process for waterproofing cloth? A. Saturate the fabric with a strong hot aqueous solution of soap, press out excess, and transfer to a second bath consisting of a strong aqueous solution of sulphate or acetate of alumina or acetate of lead, for several hours. Repeat if necessary, press out excess of liquid, and dry, not too rapidly, in the air. 2. Can you give me a process for determining quantitatively the presence of cinchonidine as an adulterant of quinine? A. Five to ten grammes of the mixed alkaloïds are mixed with 50 grammes of ether, and the mixture, after well shaking, left at rest until next day. By this operation the alkaloïds are separated into two parts: one soluble in ether, and another insoluble in that liquid. The part soluble in ether contains the quinine, while the insoluble part contains the cinchonidine. These two parts are separated by a filter, the insoluble part washed with some ether, and the ethereal solution evaporated. This insoluble part is now mixed with 40 parts of hot water, and converted into neutral sulphate by careful addition of diluted sulphuric acid, so that a solution is obtained having a slight alkaline reaction upon red litmus paper. To this solution a solution of tartrate of potash and soda is added in sufficient quantity to convert the sulphates into tartrates, and after stirring with a glass rod, allowed to remain for 24 hours. If cinchonidine be present in appreciable quantity, its tartrate will be found separated in crystalline form. The tartrate of cinchonidine is collected upon a filter, washed with a little water, and dried on a water bath. One part of this tartrate represents 0.804 part of cinchonidine.

(6) W. M. E. writes: In your issue of September 20, No. 25, "Tropic" asks for something to absorb the moisture in dry room and run it out. Suppose he places coils of gas pipe, like steam heating, and place a gutter under bottom, and then force cold water through the pipes, would not all the moisture be condensed upon the pipes and drop into the gutter and run off? Could not chemicals be used in pipes instead of water to keep them cold? A. The plan proposed would mitigate the evil. Chemicals might also be used, but they would probably require too much attention and be expensive. 2. My engine exhaust pipes are 10 feet long, with 3 inch bore, run nearly on 70 to 80 lb., with 100 to 120 revolutions per minute. My sawyer says he can run 1 1/4 inch pipe from the feed pump around and through both exhaust pipes and then into boiler and heat the water so as to save fuel. Will it do so? Would it interfere with the proper action of the exhaust steam? A. The plan proposed by your sawyer would be successful, but the same result can be obtained by using the ordinary coil heater, and we think be less expensive.

(7) J. H. writes: I have Roper's book on the steam engine. I wanted to calculate the horse power of an engine, 16 inch cylinder, 2 foot stroke, making 100 revolutions a minute, steam boiler pressure being 100 lb. to square inch. I was somewhat puzzled. Will you give an explanation? Cylinder, 16 inch; area of cylinder, 201.6624; velocity of piston in feet, 400; mean pressure on piston, cut off at half stroke, 79 lb. A. You say the boiler pressure is 100 lb. Is the initial pressure in the cylinder 100 lb.? If so, then 201x79 lb. = 15,879 lb. pressure on the piston, moving at 400 feet per minute, 15879x400=6351600 and 6351600 33000 = 192 4 less 385 = 153.7 horse power.

(8) J. M. G. writes: In your last issue, one of your subscribers asked for information as to size of discharge pipe for a hydraulic ram. I have found that it depends a great deal upon the distance the water has to be forced, the amount of pressure in the supply pipe, etc. It is obvious that where there is considerable pressure in the supply pipe, and only a short distance to drive the water, a much larger discharge pipe will be required than if these conditions were reversed. There is a very simple contrivance for increasing the capacity of a hydraulic ram, which I do not think is generally known. It is this: Drill or file a small hole, say 1-32 of an inch in diameter, in the supply pipe, about a foot above the place where it enters the ram. At every stroke of the ram a small stream will be discharged from this orifice. This at first sight would seem to decrease the power rather than augment it, but when the reaction takes place in the pipe there seems to be a small quantity of air sucked in, and this air is probably liberated from the water when it reaches the air chamber, thus increasing the pressure. At least this seems to me the most feasible explanation. Certain I am that I have repeatedly tried this plan and find it to increase materially the power of the ram.

(9) J. A. S. asks: 1. What would be the best and cheapest piping for conveying strong salt water, say 5 or 6 inch stream, for a distance of 5 or 6 miles? A. Wood tubing, also enameled iron conduits, are in practical use for such purposes, and have, we believe, proved most economical. 2. Is there a work published giving the different systems of water works: if so, where can it be had and what would be the cost? A. There are a number of good works on this subject. Address for catalogues the book dealers who advertise in these columns.

(10) C. E. R. asks: How can I cover copper wire with gutta percha, suitable for use in a gravity battery? A. By wrapping the wire with a thin strip of gutta percha. The wire should be warmed.

(11) J. P. writes: I want a cheap paint varnish or other coating for the insides of paper boxes, so that they will hold a compound containing linseed oil. Glue is too brittle. Also, a cheap coating for such boxes whereby they will hold water, or one that will hold either water or oil; a somewhat elastic coating is desirable. A. You may try the following: Borax, 1 part; shellac, 4 parts; water, q. s. Boil to form a sirupy liquid. Apply hot. This may be used alone or mixed with the glue solution and a little glycerine.

(12) T. D. M. writes: We have a short telegraph line (about one and a half miles) between our office and factory, which connects telephones. It is often impossible to hear, from the crackling noise in the telephone from earth currents, or it may be a too near proximity to various police and fire telegraph lines which we cross on the road. Is there any way in which we could empty our line of electricity so that we can hear with the telephones we have (Duquet's)? We use an electro magnetic machine for signaling. A. Use one of the forms of carbon transmitter in connection with an induction coil.

(13) J. T. N. asks: What are the best non-conductors of heat? What I mean is something that, placed in contact with heated metal, will not heat (a stove pipe for instance) nor crack. A. Plaster of Paris and sand; asbestos; a metallic jacket filled with sand; terra cotta.

(14) A. C. gives the following receipt for preserving cider sweet: Make cider of good sound apples, let stand about three days, rack off, strain through flannel or charcoal and sand, put in clean barrel, and to each barrel add one quart grated horse radish, being tight; this will keep it sweet, and after three or four weeks it will have a very pleasant flavor; you will scarcely notice the horse radish taste in it. [A much smaller quantity of horse radish will suffice. Sulphite of lime (calcium sulphite) is now used instead.] See article on "Preservation of Cider," p. 81, current volume of SCIENTIFIC AMERICAN.

(15) H. W. asks: 1. Why was the distance from the pole to the equator chosen as the basis of the metric system, in preference to some certain sized (that is, certain timed) pendulum, or the quadrant of the equator? A. Because the English had previously adopted the pendulum standard. 2. Is there any other natural basis for a system of measures except the pendulum and the size of the planet? A. Many nations have adopted standards based on the human body or its members. 3. What, according to the latest measurements, is the distance from the pole to the equator, expressed in meters? A. 10,001,850 meters. The original French survey gave a distance equal to 10,000,000 meters; that is 1-10,000,000 of the calculated distance was called 1 meter. More extended geodetical measurements have proved the length of the meridional quadrant to be as above. The meter is 1-5400 short.

(16) M. L. B. writes: A friend has a new steam engine, 8x12, 150 revolutions, 70 lb. pressure; I tell him it is a 25 1/2 horse power engine. But he only runs a small lathe under these conditions. He ships on a planer and something else, and the revolution is slowed down to 75 revolutions. I then tell him it is a 12 3/4 horse power engine; but he then ships on more machinery, and its revolutions are only 37 1/2. I have now to confess that, by the rule, it is only a 6 1/2 horse power engine, that is, the more work it does the less capable of doing work it is supposed to be; or, in other words, when it shows itself to be most powerful the lower it is rated. What is its horse power? A. The amount of power

exercised by a steam engine depends upon the resistance opposed to it and not upon the pressure of steam in the boiler. When your friend is running his small lathe only the pressure required on the piston is probably less than 10 lb. per square inch; when he adds the planer it may be 15 or 20 lb. per inch; and so with every increase of resistance the pressure on the piston, hence also the power is increased. You will find this clearly explained in "Pambour's Theory of the Steam Engine."

(17) R. F. M. asks: Is there any formula for calculating the power of the "hydraulic ram," if so, what is it? (Ram for lifting water.) A. The manufacturer's rule is: Multiply the quantity supplied by the spring (in gallons per minute) by 65. Multiply the product by the head or number of feet fall, then divide this product by 100 times the height to which the water is to be elevated; the result will be the quantity of water raised per minute.

(18) H. W. asks how to make a fulminate suitable for coating the inside of a toy so that if it is struck with a pointed instrument it will explode. A. Mercury is dissolved in 12 parts of nitric acid of 35° to 40° B., and to the clear solution is gradually added 11 parts of alcohol at 0.86. The crystals of fulminate, which separate after the reaction is completed and the liquid cooled, are washed with cold water, allowed to drain until the mass contains about 20 per cent of water and then cautiously mixed with 3.5ths its weight of niter, by means of a soft wooden muller, to form a paste, in which form it should be applied in the cartridge and allowed to dry. It is an exceedingly dangerous substance to handle on account of its explosibility, and the greatest caution has to be observed to avoid accidents.

(19) J. W. G. asks: 1. What gases escape up the chimney of a furnace burning soft coal? A. Carbonic acid, carbonic oxide, water, and various hydrocarbons, besides sulphurous acid and nitrogens. 2. Has any attempt ever been made to utilize them again as fuel? A. Yes, there have been a number of devices patented, and a few are in successful use. 3. What proportion of the heat in soft coal is converted into force with the best constructed furnace and engine? A. About 11 per cent. 4. What proportion of the loss goes up the chimney? A. The loss is variable.

(20) D. H. writes: I have a steam yacht hull, 32 feet long, 7 feet beam, which draws 3 feet 2 inches. What size engine and screw do I need? A. 4 1/4 inch cylinder by 6 inch stroke. Screw 32 inches diam. 2. What kind of a boiler will be best for salt water? A. Horizontal tubular. 3. Are the coil boilers practical? A. Coil boilers are not good for constant use.

(21) M. E. J. asks for an inexpensive method of oxygenating water. A physician here advertises to treat patients with it, but I believe the process he employs is not patented. He calls his compound "oxygen aqua." A. It is probably a dilute solution of peroxide of hydrogen.

(22) H. J. H. asks for a good receipt for cleaning gilt frames. I am a constant reader. A. Clean with a soft sponge moistened (not too well) with spirit of wine. Allow to dry by evaporation; do not use a cloth, and avoid friction.

(23) J. F. S. asks: What chemicals can be used (in cold or warm water) to soften yarn, which has become hardened by being worked on a knitting machine, without injuring the color of the yarn? A. Probably, try a little ammonia water.

(24) C. A. C. asks for a receipt for solvable glass for using on decorative pottery. A. Mix well together 2 parts fine sand and 6 parts of carbonate of potash (or 3/5 of carbonate of soda) in a crucible capable of holding 4 times as much. Carbonic acid escapes, and the contents fuse together to form a glass. Pour this on an iron plate, and when cold dissolve it in boiling water to form a sirupy liquid.

(25) F. S. writes: 1. I would like to know how to preserve natural flowers without taking the color out. A. See p. 409 (7), Vol. 40, SCIENTIFIC AMERICAN. 2. A cement for bottles? A. See recipe No. 22, p. 2511, No. 158, SCIENTIFIC AMERICAN SUPPLEMENT.

(26) R. A. J. asks: 1. How many primary or simple elements are there in nature? I claim over sixty; a friend of mine says that only four exist, namely, oxygen, nitrogen, hydrogen, and carbon; who is right? A. About 60 elementary bodies have thus far been discovered. 2. Can air be weighed without a vacuum? A. As we understand you, no. 3. I have an old soda fountain, cast of brass and soldered together in the center; would it be safe to use it for a steam boiler for a model engine? A. It would not make a safe boiler.

(27) A. C. F. asks (1) how to make a Grenet battery. A. A Grenet battery consists simply of one or two plates of battery carbon and a plate of amalgamated zinc, plunged in a solution consisting of bichromate of potash 2 parts dissolved in 20 parts of hot water; and sulphuric acid 1 part, to be added after the solution becomes cool. See SUPPLEMENTS, 157, 158, and 159. 2. Why is the wire curled like a spring where it connects the battery? A. To render it more flexible. 3. How can I make a simple armature? A. Any piece of soft wrought iron makes an armature.

(28) H. F. G. asks whether or not the steamers descending the rapids of the St. Lawrence river shut off steam and go by means of the current alone; if so, how do they steer the boat? A. At some of the rapids the pilots do shut off steam partially but not wholly; they still have progress enough through the water to give them steering control.

(29) C. H. H. asks: 1. Is a good locomotive engineer capable of performing the duties of an engineer on our Western river steamers? A. If his experience has been confined to locomotives, no. 2. Does an engineer necessarily have to have an understanding of algebra or geometry, or is a good understanding of arithmetic (higher) sufficient? A. For what is called a running engineer, arithmetic is sufficient, but for the higher grades of engineers, algebra and geometry are almost a necessity.

(30) H. D. asks what proportion the grate surface should bear to the heating surface of a steam boiler. A. 1.25 to 1.50.

(31) C. B. M. writes: 1. I want to make an electro-magnet of 150 ohms; how much of No. 30 copper magnet wire will be required? A. Of No. 30 by B. W. G., you will require 1,100 feet. 2. Is there any rule by which I can tell the number of ohms in a magnet, knowing the size and amount of wire in magnet? A. It cannot be accurately determined by rule, as the resistance of different samples of wire varies. The readiest means of obtaining the resistance approximately is to use the tables given in most works on electricity.

(32) J. A. S. asks: 1. What is the best and cheapest piping for conveying a 5 or 6 inch stream of strong salt water, say a distance of 5 or 6 miles, to avoid rusting and corroding? A. Use wooden pipes or enameled iron tubes. 2. Is there a work published on water systems; if so, where can it be had and what is the cost? A. For such works as you require address publishers who advertise in our columns.

(33) W. M. asks: 1. How much will air expand by heating; for example, force into a boiler 40 lb. of air to the square inch, how many lb. to the square inch will it be when the fire is 212° F? A. Air expands about 1.490 for each degree of increase of temperature.

(34) A. J. B. asks: 1. What is the greatest depth from which sunken vessels have been raised, time it took, cost, and by what means raised? A. Perhaps some of our readers can furnish the information. 2. Please tell me how to make a simple microphone. A. See SUPPLEMENT, No. 163.

(35) E. W. writes: A friend and myself intend to build a small stern wheel steambot, and wish you to assist us if it is in your power. The dimensions of boat are: 25 feet in length, 7 feet wide at deck, and 4 feet wide at bottom (flat), and 3 1/2 feet deep. What size boiler, tubes, number and size, will be required to propel this boat not less than 8 miles an hour. Would the following proportions do: size of wheel about 5 feet diameter, and 3 feet wide; engines, 2x4 inches; with gearing of 1 to 2, connecting shaft of cog wheel to shaft of driving wheel, by connecting rods, with cranks set at right angles? A. We judge from your letter that you intend a side wheel boat; if so, and one engine geared 2 to 1, it should be at least 3 inches diameter by 6 inch stroke. The wheels need not be more than 24 inches wide. If you have two engines, they may be 2 1/2 inch by 6 inch stroke; work with a power on crank shaft into a spur wheel on wheel shaft. Your boiler should have about 75 to 80 feet surface.

(36) F. De C. writes: 1. Suppose you have a perfect balance; on one scale you place a cylinder filled with steam, 10 atmospheric pressures; on the other you put a weight equal to this cylinder, so that the equilibrium shall be re-established. Now, by some means you open an aperture one inch square which is at the top of the cylinder, allowing the steam to escape during one second (of course you close the aperture after the second has elapsed). Will the reaction power, of the escaped steam during one second lift the other scale? A. At first instant of time, yes, but very soon the loss of the steam will turn the scale the other way. 2. Could you state what amount of steam has escaped in this one second? A. The amount of steam could be calculated, but full data would be required.

(37) S. G. S. asks for the best way to temper drills for drilling granite rock. A. See directions for tempering your picks, p. 219, Vol. 39 the same process will apply to your drills.

(38) A. W. P. asks: 1. How much lead should the cut-off valve have on a small engine, 8 horse, cylinder 5x12, cut-off at full stroke, 200 revolutions per minute? A. If a single port cut-off valve, 1-16 inch; if a double port valve, a little less than 1-16 inch. 2. Is an instrument to be had that will assist in finding hidden valuables, such as gold or silver; if so, where to be found? A. No.

(39) W. asks how to make a good quality of shellac varnish. A. Take shellac, any quantity, put it in a glass jar or tin vessel, and add alcohol to just cover the shellac. Set in a warm place, beside a stove or even in the sunshine, and in two or three days it is fit for use. If too thick add alcohol. It is not necessary to strain, as impurities will settle to the bottom of the vessel. Keep covered to keep out dust. If closely corked, evaporation of the alcohol will be very small. It can be used for wood, brass, iron, paper, etc. Experience will determine the proper thickness of the varnish.

COMMUNICATIONS RECEIVED.

On the Use of Brimstone in Fastening Iron to Foundations. By F. W. B.
On the Classification of the Protista. By H. M. D.
On Jupiter's Spot. By J. A. B.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were
Granted in the Week Ending
September 16, 1879,
AND EACH BEARING THAT DATE.
[Those marked (r) are reissued patents.]

Table listing inventions with names and dates, including Albumen from fish spawns, Axles, machine for cutting and screw-threading vehicle, A. L. Lincoln, Bake pan, C. Jackson, Bale pressing and sacking device, W. P. Groom, Bale tie, W. Hill, Bale tie, J. W. & J. H. Simmons, Basins, discharge plug for wash, J. S. Gilbert, Beehive, Dixon & Ferron, Beer, etc. air pressure apparatus for forcing, Becker & Pitts.

Large table listing inventions with names and dates, including Belting, F. H. & J. E. Underwood, Belting, leather, F. H. Underwood et al., Bilge water gauge, J. Sekhoff, Binder for papers, temporary, P. H. Holmes, Binder, temporary, A. M. Graves, Bit brace, J. S. Fray, Bookbinder's combined evening-up and compressing table, J. W. Jones, Book cover, removable, L. P. Allen, Boot sole, rubber, C. H. Beach, Bottle, soda water, B. Hegele, Bottle stopper, C. G. Hutchinson, Box fastener, W. D. Frost, Box fastener, E. McKinney, Box fastener, C. L. Page, Box partition, G. L. Jaeger, Brick machine, C. E. Gregory, Brush and fan, fly, J. Young, Brush, shoe, C. Herold, Buildings, bent for frame, Van Riper & Seely, Burial casket, W. S. Hassall, Button, R. Liebmann, Button holes, securing, J. Watters (r), Car propeller and brake, D. Hurley, Car roof, J. C. Wands, Cars, steam motor for propelling street, W. S. Salisbury, Carbureter, M. P. Fleming, Carbureter, W. Morehouse, Carriage top, child's, W. H. VanDyck, Chairs, settees, car seats, etc. seat and back of, J. K. Mayo, Chandelier, extension, L. Brauer, Check rower, M. J. Barron, Churn, C. M. Sparks, Churn dasher, S. R. Kuckel, Cigar mould press, N. Du Brul, Coal breaker, P. H. Sharp, Cock, gauge, H. Poe, Coffin, metallic, C. Mattoni, Colter, rolling plow, N. P. Bowsher, Corn safe, seed, B. Goodyear, Couch, B. F. Dare, Crane, traveling, J. B. C. Gougeul, Cultivator, Gibson & Cowden, Curtain fixture, J. W. Macy, Distillates, process and apparatus for the production of, E. T. Jenkins, Ditcher, W. Stacy, Door bolt and check, W. S. Burnham, Drag, sulky, L. V. & S. R. Sikes, Earth closet, R. W. Riddle, Egg carrier, A. D. Rock, Egg carrier, J. L. Stevens, Electric light, T. A. Edison, Elevator, W. Fellows, Enameling wood, compound for, J. C. Schmidt, End board, wagon, A. G. Woodbury, Farmgate, J. Hagerman, Fastening strip or clasp, J. H. Weaver, Fence panel fastening, portable, L. Whitney, Fence post, R. H. Eddy, Filter, L. Raeeke (r), Filter and cut-off, self-adjusting, A. W. Morgan, Fire escape, H. Taylor, Fire extinguisher, Morison & Anker, Flour, apparatus for manufacturing buckwheat, D. D. Brewster et al., Flue cleaner, boiler, C. Castle, Forge, portable, J. F. Holt, Fruit jar top, H. C. Fowler, Furnace grate bar, boiler, J. C. Bobzien, Galvanic battery, D. H. Fitch, Gas generator, J. T. Guthrie, Gate, L. Wilkins, Gem setting, C. F. Quinley, Gems, fastening, J. Schwehr, Glass pattern, J. Rees, Grader, road, J. T. Currier, Grain binder, C. L. Travis, Hair clip, W. F. Beck, Harvester cutting apparatus, T. E. Page, Hassock and foot warmer, J. A. Folsom, Hatch cover, automatic, J. J. Hartman, Heel lifts and cutter for cutting the same, method of producing, G. James, Heel stiffeners, machine for cutting leather board for, W. N. Sprague, Hinge, spring, T. Rowe, Hoes, manufacture of, A. Reese, Horse detacher, G. F. Outten, Horseshoe power, H. Flynn, Horseshoe power, L. D. Le Nord, Horseshoe, W. Eynon, Horseshoe bar, J. Fritz, Horseshoe bar and blanks, roll for, L. G. Claude, Horseshoe machine, Claude & Ball, Horseshoe, supplemental, J. Spencer, Hose or tubing, E. L. Perry, Incrustation preventive, F. Leporin, Jewel casket, W. L. Martin, Jewelry, manufacturing plated stock for, Murray & Bent, Knife, compass, etc., Leimer & Kempf, Knitting machine and tubular knit fabric, R. F. M. Chase, Ladder, extension, O. Marshall, Lamp, E. S. Drake, Lamp, W. Staehlen, Lamp burner, E. B. Regua, Lamp, car, C. Gordon, Lamp chimney, Greenfield & Fry, Jr., Lamp, electric, W. E. Sawyer, Lamp, vapor, J. S. Kellogg, Lantern, H. Iden, Last, J. Morrell, Lath sawing machine, J. Black, Lead washer, white, W. H. Gregg, Lifting jack, Blackburn & Brosius, Lifting jack, J. S. Kirkwood, Liquid outage gauge, G. & T. Koch, Lubricant, J. M. Lippincott (r), Machinery, device for driving, E. F. Landis, Measuring strip for packaged fabrics, A. B. Hayden, Meat, preserving, F. Hofmann, Medical compound, G. S. Coleman, Metallurgic gas furnace, W. Swindell, Milk receptacle, M. P. Allen, Motor and apparatus for utilizing it, W. S. Colwell, Mower and reaper, C. N. Pike, Mowing machines, pawl and ratchet mechanism for, H. A. Dean, Nut lock, G. W. Goodwyn, Nut lock, A. C. Vaughan, Nut lock blank, W. Dunn, Oatmeal machine, S. F. Butts, Oils, making lubricating, J. M. Lippincott (r), Ore crusher, A. F. W. Partz (r), Ore furnace, Reamer & Anderson, Ore roasting furnace, M. P. Boss, Ore roasting furnace, W. E. Gifford, Pan wring machine, R. J. Stirrat.

TRADE MARKS.

Table listing trade marks with names and dates, including Dental rubber, gold pellets, amalgam, teeth, and cast varnish, L. S. Smith, Fever tonic, Meyer Brothers & Co., Ginger ale, lemonade, soda water, seltzer water, kall water, and sarsaparilla, W. A. Ross & Co., Granulated soap, The Granulated Soap Company, Lime juice sirup, Douglas Brothers, Lubricating oils, Eclipse Lubricating Oil Company, Lubricating oil, Camden Consolidated Oil Company, Medicinal compound or liniment, H. G. Farrell, Shirts, J. C. Duffe & Co., Steam engines and boilers, Skinner & Wood, Whiskies, H. Mueller & Co.

DESIGNS.

Table listing designs with names and dates, including Badge, G. Wolf, Bracelet, T. G. Brown, Carpet, H. Horan, Pencil cases, Le Roy W. Fairchild.

English Patents Issued to Americans.

Table listing English patents issued to Americans with names and dates, including From September 5 to September 9, 1879, inclusive. Berth for ships, T. O. L. Schrader, New York city, Bottle stopper, N. Thompson, Brooklyn, N. Y., Dental burr sharpener, M. A. Richardson, Bridgeport, Ct., Electric lamp, W. E. Sawyer, New York city, Fishways, M. McDonald, Lexington, Va., Mail bags, T. A. Dennis et al., Newark, N. J., Metal tube cleaner, W. C. Allison, Philadelphia, Pa., Spark arrester, Mary E. Walker, New York city, Telegraph recording apparatus, R. K. Boyle, N. Y. city, Telegraph signal, S. W. Francis, Newport, R. I.