

TO INVENTORS.

An experience of more than thirty years, and the preparation of not less than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

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.

Sutton's Patent Pulley Cover.—If you are losing power, get it again by using these covers. Calculate how much power you are losing and find the gain you will make in your work by adopting a positive remedy. Send for a circular. Address Joseph Woodward, proprietor and manufacturer, P. O. Box 5419, New York.

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.

The Railway Record, a journal of practical engineering and railway news, 28 pages, sent postpaid one year on receipt of price, \$2. Address, The Railway Record, 87 Park Row, New York.

Valves and Hydrants, warranted to give perfect satisfaction. Chapman Valve Manuf. Co., Boston, Mass.

Kimball's Catarrh Cigarettes, an instantaneous relief and a pleasant smoke. They contain no tobacco.

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

Partner Wanted.—A suitable party with limited capital can open negotiations with a view to partnership, by addressing The Des Moines Linsseed Oil Works, Des Moines, Iowa.

Renshaw's Ratchet (short spindle) uses taper and square shank drills. Pratt & Whitney Co., Hartford, Ct.

The Globe (Miner) Street Lamp; most durable; none better. Address J. G. Miner, Morrisania, N. Y. City.

"The best Article we ever had," is the (almost unanimous) verdict of those who fully test Downer's Improved Anti-Incrustation Liquid. It removes scale; it prevents its formation; it is not injurious; does not cause the water to foam. A trial will establish the above claims. A. H. Downer, Proprietor, 17 Peck Slip.

Mans. of Cracker Machinery and Ovens address F. S. & A. C. Wertz, Reading, Pa.

Wanted—Improved Stump Puller, with description and price. Address J. P. Rylander, Clarkdale, Miss.

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

For best, low priced Electric Bells, and other Electrical Apparatus, address Jerome Redding & Co., 30 Hanover St., Boston, Mass.

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

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

The Asbestos Roofing is the only reliable substitute for tin, it costs only about one half as much, is fully as durable, and can be easily applied by any one. H. W. Johns Mfg. Company are the sole manufacturers.

Wanted—A Second-Hand Bolt Cutter, to cut from 3/8 or 1/2 inch up to 1 1/8 or 1 1/2 inch, and tap nuts for same. Address P. O. Box 55, Hazelton, Pa.

Want to know if any one manufactures a Machine to twist Drills or Augers. Address P. O. Box 56, Hazelton, Pa.

Wanted—New or 2d hand Engine Lathe, 8 ft. x 18 in. swing. Address, with lowest cash price, H. H. Perkins, Kewanee, Ill.

Dead Stroke Power Hammers; cheapest and best for general forging and die marking. Phillip S. Justice, Philadelphia, Pa.

Wanted—A Machine for Cutting a Hide into a Continuous Strip preparatory to running it through the tubes for sewing machine belts. Address Edmund Hill, 531 Jefferson St., Philadelphia, Pa.

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 hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

For Punches, Patent Bending Rolls, Radial Drills, and Angle Iron Shears, Hiles & Jones, Wilmington, Del.

Belcher & Bagnall, 25 Murray St., N.Y., have the most economical Steam Engines, Boilers, Pumps, in market; also improved wood and iron working machinery.

17 and 20 in. Gibed Rest Screw Lathes. Geo. S. Lincoln & Co., Hartford, Conn.

New Pamphlet of "Burnham's Standard Turbine Wheel" sent free by N. F. Burnham, York, Pa.

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

Gaume's Electric Engine. 171 Pearl St., B'klyn, N.Y.

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

Clipper Injector. J. D. Lynde, Philadelphia, Pa.

Bevins & Co.'s Hydraulic Elevator. Great power, simplicity, safety, economy, durability. 94 Liberty St., N.Y.

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

American Watch Tool Company, Waltham, Mass. Lathes for Jewelry Manufacturers.

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

THE RAILWAY BUILDER, a handbook for estimating the probable cost of American Railway Construction and Equipment, by W. J. Nicolls, C. E., of 231 pages, printed on fine toned paper, bound in morocco; sent on receipt of price, \$2.00. Address, The Railway Record, 87 Park Row, New York.

Use D. L.'s new soldering flux; solid sticks; superior substitute for acid; no tarnishing or corroding; easy to apply; cheap. Address, D. L., Box 79, Bristol, Conn.

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

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

Hydraulic Elevators for private houses, hotels, and public buildings. Burdon Iron Works, Brooklyn, N. Y.

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.

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.

Portland Cement.—Roman & Keene's, for walks, cisterns, foundations, stables, cellars, bridges, reservoirs, breweries, etc. Remit 25 cents postage stamps for Practical Treatise on Cements. S. L. Merchant & Co., 63 Broadway, New York.

Needle Pointed Iron, Brass, and Steel Wire for all purposes. W. Crabb, Newark, N. J.

Galland & Co.'s Improved Hydraulic Elevators. Office 206 Broadway, N. Y. (Evening Post Building, room 22)

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

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

Mill Stone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau St., N. Y.

C. M. Flint, Fitchburg, Mass., Mfr. of Saw Mills and Dogs, Shingle and Clapboard Machines. Circulars.

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.

Eagle Anvils, 9 cents per pound. Fully warranted.

Walrus Leather for Polishing Agricultural Implements and all kinds of metal. Greene, Tweed & Co., N. Y.

Rubber Hose, Suction Hose, Steam Hose, and Linen Hose; all sizes. Greene, Tweed & Co., 18 Park Pl., N. Y.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

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.

The 1879 Pennsylvania Lawn Mower.—Light draught and easily adjusted. Machines warranted. See illustrated editorial, Sci. Am., No. 14. Lloyd, Supplee & Walton, Philadelphia, Pa.

Electro-Bronzing on Iron, Philadelphia Smelting Company, Philadelphia, Pa.

Special Notice.—Send for Electroplater's Catalogue and Price List to Partridge & Carter, Philadelphia, Pa.

Improved Steel Castings; stiff and durable; as soft and easily worked as wrought iron; tensile strength not less than 65,000 lbs. to sq. in. Circulars free. Pittsburg Steel Casting Company, Pittsburg, Pa.

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.

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.

Notes & 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) G. R. P. asks: What is the best manual for field assaying and mineralogical handbook for one with some theoretical knowledge of the subject? A. Consult the works of Professor Blossom and P. de P. Ricketts, School of Mines, Columbia College, New York.

(2) R. A. F. asks what the size of the ports leading from the steam chest to the cylinder of an engine should be, 2 1/4 inch bore, 4 inch stroke. A. 3/8 inch by 3/8 inch long.

(3) S. A. B. asks: Is there anything that prevents hard water from foaming in the boiler? A. Introducing a small quantity of oil or petroleum has a temporary beneficial effect.

(4) C. H. & G. W. H. ask for the rule for calculating the horse power of an engine. A. Multiply the area of the piston by the average pressure per square inch, and that product by the speed of the piston in feet per minute, and divide by 33,000; quotient is the horse power.

(5) F. C. S. asks: 1. What kind of rubber is used for rubber stamps, and how is it prepared to receive the impression? A. Purified gum rubber (caoutchouc) is softened by gentle heat, and while in that condition about 5 per cent of sulphur is thoroughly incorporated with it by a kneading process. 2. Will the rubber used by dentists answer the purpose? A. No; it usually contains an excess of sulphur.

(6) "Subscriber" writes: Sunday night, March 16, a hard rain fell in this section of country. The next day and for several days after there could be seen a yellow substance very much resembling pulverized sulphur. A few pronounced it eggs. Your opinion is desired. A. It is the pollen of the white pine (Pinus strobus).

(7) B. asks if there are any compressed air engines manufactured in the United States, and if so where and by whom? A. If you mean engines driven by compressed air, there have been some built by way of experiment; we know of no party who makes a business of building them.

(8) W. K. H. writes: We have a 10x24 engine, driving wheel 9 1/2 feet, saw pulley 1 1/2 feet, diameter of saw 56 inches, 15 teeth with 1 1/2 inch feed; with 80 lbs. steam ought we to have power to use same saw with 30 teeth and 2 1/4 inches feed in cypress timber; or is there too much leverage against the engine? A. If your cutting instrument (the saw) cuts with equal effect in both cases, the power required will be nearly double with 2 1/4 inch feed, that for 1 1/2 inch feed.

(9) C. B. asks: How may I separate nitrate of silver from nitrate of copper so that I may procure the nitrate of silver? A. Add excess of muriatic acid to the warm solution, gather the precipitate on a filter, wash it with fresh water, dry, mix with a little powdered borax and rosin, and heat strongly to fusion in a small crucible; cool, break the crucible, batter the button of silver, dissolve it in warm nitric acid, evaporate the solution nearly to dryness in a porcelain dish, and dissolve the residue (nitrate of silver) in distilled or rain water.

(10) F. W. B. writes: Engine 27 on this road has a diameter of piston of 14 inches and exhaust 2 1/4 inches. Engine 76 has a diameter of piston of 16 inches and exhaust 3 inches. Which engine has the greatest area of exhaust in comparison with its area of piston surface? A. The 16-inch cylinder with 3 inch exhaust; the difference is very small.

(11) F. C. R. asks: 1. What is the horse power of an engine, the cylinder of which measures 3 1/2 inches, thickness of piston 3/4 inch? A. Power would depend upon pressure of steam and number of revolutions per minute. 2. Would such an engine have power enough to propel a small boat, say 16 feet long and 3 wide, weighing about 80 lbs.? A. No.

(12) C. F. F. wants to know (1) if ordinary river water will do as well for reducing alcohol for vinegar as rain water? A. If the water is suitable for drinking purposes, yes; otherwise no. 2. Is water from the ice of a river better for this purpose than water taken from the same river? A. Ordinarily, yes. 3. Also about what amount of rain falls per annum upon a foot of surface in this state (Iowa). A. Consult the meteorological reports of your State; we have not the statistics at hand.

(13) R. & T.—It consists chiefly of lime carbonate, iron oxide, alumina, silica, and organic matter. Use a feed water heater, and blow off frequently.

(14) D. K. E. F. asks (1) whether a small screw propeller steam engine could be put into an ordinary row boat of 16x3 1/4 feet without much difficulty or cost. A. About 3 horse power nominal. 2. Also about what the engine would cost and how many miles per hour it would run a boat of this size? A. Cost about \$550; speed 5 to 6 miles per hour.

(15) R. G. asks (1) for a simple rule for finding the gear wheels for cutting different threads on the usual compound gear lathes. A.

$\frac{T \times S}{t \times s} = N$; $\frac{t \times S}{T \times s} = S$. T represents the number of teeth in wheel on traverse screw; S, number in stud wheel gearing in mandrel; t, number in wheel upon mandrel, and s, number in gearing upon stud pinion, gearing in T; I, number of threads per inch upon traverse screw; N, number to be cut. 2. What is the horse power of an engine, the cylinder being 10 3/8 inches diameter, stroke 24 inches, number of revolutions per minute 63, mean pressure 60 lbs.? Also the same cylinder and stroke, with 66 revolutions and 85 lbs. pressure? A. See reply to C. H. on this page.

(16) F. R. asks how to find the horse power a belt will pull, when the width and speed are known. A. A simple and safe rule is, 1 inch width of belt running 600 feet per minute equals 1 horse power, hence multiply the width in inches by speed in feet per minute and divide by 600—result is the horse power.

(17) H. H. C. asks for the rule for finding the tonnage of a flat bottom boat. A. For carpenter's tonnage multiply together length, breadth, and depth in feet, and divide by 25.

(18) D. K. asks: What will make a good article for quickly removing the black coating from human teeth? A. The black coating is tartar, a concretion consisting of salivary mucus, animal matter, and lime phosphate. The best method is to have it removed by a dentist. The use of acids for this purpose is injurious, since the enamel is also affected.

(19) O. B. asks: Is there often or ever any commotion of the water in a steam boiler while carrying an ordinary working steam pressure? A. Always after ebullition commences.

(20) J. S. writes: I have a No. 2 Blake pump; I had occasion to take off the steam chest, and pump by hand, but pump would not throw until I covered the ports air tight. I would like to know why pump will not throw until ports are covered. A. The pump took in air through openings. 2. I am using sulphur and copperas water. What would be a good preparation to use, to save my boiler? A. The introduction of a small quantity of soda (dissolved) or lime water would be beneficial.

(21) E. E. C. asks: Does common sulphuric nitric or other mineral acids attack white rubber tubing and stopples? A. If concentrated, yes.

(22) "Worker" writes: I wish to fasten cloth or leather on an iron wheel (the iron is planed, not polished); the wheel runs 5,000 turns per minute. I cannot use a wooden wheel for the work. A. If possible lap the strip several times around, roughen the periphery of the wheel, warm it, and fasten the strip with a melted mixture of equal parts gutta percha and black pitch. Allow the cement to thoroughly harden before using the wheel. If the strip is not tightly lapped it will be difficult under the circumstances to hold it firmly in position.

(23) B. asks: 1. Is there any oil cheaper than alcohol to run toy engines that gives as little smoke? A. No. 2. What power and what will be the cost of engine, boiler, and hand pump to run a row boat that will carry 3 or 4 persons at say 6 or 7 miles per hour? A. About 3 horse power; cost about \$550.

(24) E. P. writes: I have a quantity of bones, about 10 bushels, which I would like to reduce to a state suitable for fertilizing. What shall I use to dissolve them? A. Ground bone or "bone dust" is extensively used for fertilizing purposes. The ground bone may be converted into so-called ammoniated superphosphate by mixing it thoroughly with about 40 per cent of common sulphuric (oil of vitriol), somewhat diluted with water, and permitting the mixture to stand for a week or more that the reaction may be complete. Warm hydrochloric acid will dissolve the bones, but this is not used, as a solution is not required.

(25) J. A. F. writes: I am putting up a steam engine and boiler, and in putting in the pipe for the water-glass and gauge cocks, I wished to have the pipe that came from the steam dome larger than the one that came from the water in the boiler. The proprietor held that they should be the same size. Who is right? A. It makes no difference whether of same size or not; but they should be large enough to keep free at all times. 2. He holds that if a gauge were placed in the bottom of the boiler and one in the dome, they would both show the same pressure; I say that the one in the bottom of the boiler would show the weight of the water the most. Am I right or wrong? A. You are right.

(26) M. A. B. writes: While riding on a locomotive, several days ago, I noticed small flakes pass up and down in the glass water gauge. On asking the engineer about this he said that they were small pieces of glass that kept peeling off. This, he said, goes on until the glass gets quite thin, when it finally breaks. Is there something in the glass or water, or is this always the case? A. Water gauge tubes usually decay or wear away at the ends in the stuffing boxes; we have never seen or heard of such flaking off as you describe. If any of our subscribers have noticed such action upon tubes, we shall be glad to hear from them.

(27) J. A. C. writes: I have read your article on Peter Cooper's life with great interest. I wish you could extend it. But to my mind it suggests a question not directly mentioned by you; the loss of time and effort in learning three trades and the doubts and difficulty in learning any. Can you show how a boy may know whether to learn a trade or not, and how he may know what trade to learn? A. The boy had better learn the trade he fancies; or, if he has no preference, the trade which he can undertake under the most favorable conditions. Whatever his ultimate occupation may be, the learning of any trade in youth will be an advantage to him; by trade we mean of course some form of manual labor whereby a man may earn an honest living. The greater the intelligence and skill involved in its mastery, the better, if the boy has the physical and mental capacity for it. In every case boys should be encouraged to learn a trade, as a necessary part of a man's education.

(28) M. M. W. writes: Please answer through the columns of your paper the following question: Which has the easier draught, a wagon with a small wheel or one with a large wheel? A. The latter.

(29) F. J. R. asks (1) how to make a calculation on a safety valve, so that I may set it, and tell how much steam I have in case I have not a steam gauge. A. Multiply weight in lbs. by its distance in inches from fulcrum, divide the product by the distance in inches from the fulcrum to the bearing point on the valve, divide this quotient by the area of the valve in square inches, the result is pressure per square inch; this does not take into consideration the effective weight of the lever and the valve, but the error is small and may be neglected. 2. Will you also recommend me some good books, that will explain machinery, and where I can buy them? A. Haswell's Pocket Book will be useful for you. It can be purchased from dealers who advertise in our columns.

(30) G. A. H. asks: Which will create the better draught, a seven inch pipe over a six inch flue or a six inch pipe over the same flue? A. Difference ordinarily in favor of the 7 inch pipe.

(31) P. J. writes: 1. At this place large quantities of sawdust, chips, and similar refuse from planing mills are being deposited in the shallow water at the shore here. What is going to become of this in time, and what are the sanitary effects of the material while the changes are going on? A. It depends much upon the nature of the soil or drift—if undisturbed it may ultimately pass into a variety of brown coal or lignite. Under the circumstances we think the slow process of change will not very materially affect the health of near residents. 2. Are any injurious effects to health likely to arise from accumulations of sawdust, shavings, etc., in a backyard exposed to the weather? A. Probably not to any extent. It would, however, be advisable to remove it occasionally.

(32) J. A. L. asks: How are the marks of a boxwood rule put on, and how are they colored black? A. They are regularly printed from a steel die, which indents the wood and leaves the ink.

(33) J. D. C. asks for a rule for calculating the power of a double toggle joint press, the toggles being operated by a right and left hand screw passing through nuts in the middle joint of the toggle. A. By the principle of virtual velocities: the power applied to the handle of the wheel on the screw, multiplied by the travel of the handle in a (small) unit of time, the product divided by the movement of the platens in the same time; the result, less the friction of the machine, will give the pressure on platens in that particular position, but the power is constantly changing with the change in the angle of the links. This rule is not strictly accurate, but will answer practical purposes.

(34) "Squirrel" writes: A hunter discovers a squirrel upon the trunk of a tree. As he follows it around the tree the squirrel keeps on the opposite side of the tree. The hunter is supposed to go a greater distance in circling the tree than the squirrel. Does or does he not go around the squirrel in making a circle of the tree? A. He goes round the squirrel. (1) He goes round everything within the circle of his course, whether the included objects are at rest or in motion. It makes no difference whether the squirrel keeps the tree between himself and the hunter all the time, or part of the time, or none of the time, the hunter goes round him. 2. It is admitted that the hunter goes round the tree. If he does not also go round the squirrel on the tree, he must, at some stage of the journey, go between the squirrel and the tree, which is contrary to the conditions of the case.

(35) F. asks: 1. What instruments are used in making perspective drawings? A. The camera obscura, the camera lucida, and the perspective line. 2. And what is the best instrument for describing an ellipse? A. The trammel and the ellipsograph.

(36) W. S. G. asks if there is any cheap means of deodorizing carbon or ground oil. A. It cannot be completely deodorized, but the unpleasant odor may be nearly destroyed. Violently agitate it for some time with about three per cent of sulphuric acid, and after settling draw off from the scum and impurities; agitate for half an hour or more with clean water containing a few per cent of chloride of lime (calcium hypochlorite), settle, draw off, and agitate with weak aqueous carbonate of soda solution. Finally, agitate with powdered quicklime, and let it stand until it becomes perfectly clear.

(37) J. F. writes: A friend of mine says that the driving wheels of a locomotive should be made as light as possible, and that the best place to put the weight is in the boiler and frames. I say that the best place to put the weight is in the wheels, for then there is less required on the journals. Who is right? A. Your friend is right; weight placed below the springs is much more injurious to the rails than the same weight above the springs, hence, the wheels, axles, boxes, and eccentrics should be as light as consistent with their work.

(38) W. F. C. asks: 1. How long will a U magnet retain its power? A. If provided with an armature and not jarred or suddenly separated from its armature it will retain its magnetism indefinitely. 2. Where can I get a good magnet? I don't see anything of the kind advertised in your columns. A. Dealers in philosophical instruments keep them, and they may usually be purchased from dealers in general hardware. 3. What metal is most easily attracted by the magnet, or on what substance has the magnet the most power to attract or repel? A. Another magnet. 4. How can I make a powerful electro-magnet? A. By bending a bar of round iron into a U form and placing on each limb a bobbin of insulated copper wire. The power of a magnet depends on its size, upon the size of the battery in connection with which it is used, also upon the size of the wire used and the number of convolutions of the bobbins.

(39) R. C. writes: In a recent number of your valuable paper, I read a notice about observations made in England for ozone. Could you tell me where any regular observations are made in this country, and what method they use? A. Few systematic observations upon atmospheric ozone have been prosecuted, or, if carried on, have rarely been published. You will find an exhaustive article on this subject in No. 154 of the SCIENTIFIC AMERICAN SUPPLEMENT.

(40) H. S. H. asks: 1. What is Ohm's "law," or where can I find it? A. Ohm's law is as follows: The strength of the current is equal to the electro-motive force divided by the resistance. You will find Ohm's law in almost any work on physics. 2. Which of the following batteries will do the most work at the least expense: Daniell, Grove, Carbon, or Leclanche? A. It depends much on the kind of work required. For open circuits the Leclanche is best; for closed circuits the Daniell is best. 3. Will it in any way affect the working of any of the above, to close them up water tight? A. Most batteries generate gas, which must have an escape. 4. Will the Leclanche battery be affected by any motion (say that of a small boat) that will cause the disturbance of the liquid enclosed? A. We do not think that motion would seriously affect the working of the Leclanche battery.

(41) H., I. & Co. ask: When running a high pressure engine on 80 lbs. steam and exhausting into an

Improved condenser, condensing with cold water at 60° temperature Fah., how many times the volume of condensed steam will be required in cold water at 60° in order to procure 1 lb. vacuum? Also how much to procure 10 lbs. vacuum? A. Compute the temperature of the water of condensation by rule in Haswell's Pocket Book, page 577; from this temperature ascertain from a table of temperatures the back pressure, and deduct this from 14.7 lbs., the result will be the amount of vacuum obtained. Note that your 80 lbs. pressure is above the atmosphere, and its temperature is 323° Fah.; the temperature due to 1 lb. vacuum is 307°, and that due to 10 lbs. vacuum 160° Fah.

(42) B. M. A. asks if there is a flux that will make tinmith's solder flow as freely on cast iron as it does on tin. A. A good flux for this purpose is made by putting zinc into muriatic acid until bubbling ceases.

(43) D. B. L. asks how the precious metals are separated from each other and from the base metals where carried on on a large scale. A. Consult "Elements of Metallurgy," by J. A. Phillips, London, 1874.

(44) W. H. C. writes: I contemplate making a lightning rod by riveting strips of sheet copper together and nailing the same to my house, using proper points. Is there any danger of shingle being set fire by lightning passing down the same, or other objection to a rod constructed on the above plan? A. If the copper strip were of liberal size and the ground connections good it would be efficient.

(45) R. E. H. asks: 1. Will a steel spring give back as much force in the recoil as was spent in compressing it, and if not what is the waste? A. Yes, if not strained so as to effect a "set." 2. Will air if compressed and then allowed to expand give back as much force in the expansion as it received in the compression? A. Yes.

(46) W. S. writes: 1. We use plaster of Paris moulds for pottery and earthenware. What can be added to the plaster to improve it, as it soon pits and chips? A. Try a hot solution of alum and water glass. 2. What work will give me the most information on the different metals and clays used in the industrial arts as to their fusing points, manufacture, and cost? What is the best work on the analysis of clays, soils, etc.? A. You may consult Wagner's "Chemical Technology," Cook's report on New Jersey clays, and Caldwell's "Agricultural Analysis."

(47) C. B. F. asks: 1. What is the best and cheapest water motor for running a sewing machine on a low water pressure? A. Consult our advertising columns. 2. What will take linseed oil and putty stains out of a marble washstand? The above materials were used to cement water basin to the marble slab. A. Mix up a quantity of the strongest soap suds with quicklime, to the consistency of milk, and lay it on the stone for twenty-four hours; clean it afterwards by using fine putty powder and water.

(48) J. M. H. asks: In a well eighty feet deep where should the cylinder be placed, at the top or at the bottom—depth of water 20 feet? A. Place the pump not more than 30 to 25 feet above surface of water.

(49) W. B. C. asks whether a liquid tight packing for piston has ever been discovered. If there has been such a packing used, what is it? A. The best liquid tight packing, is a cap packing of either leather or India rubber.

(50) M. F. L. asks at what point the exhaust should enter a tank, whether above or below the water line, and is it necessary that the egress opening should be larger than the ingress to the tank. A. If the exhaust is merely blown into the tank, above the water, the egress may be somewhat the smallest if you wish to use the water quite hot.

(51) P. F. S. writes: A is running an engine 14 inches diameter, and 24 inches stroke, with exhaust 2 1/4 inches diameter. B is running an engine 16 inches diameter, and 24 inches stroke, with 3 inch diameter exhaust pipe. A contends that his exhaust is larger in proportion to his cylinder than B's. B contends that his exhaust is larger than A's, in proportion to the cylinder. Which is right? A. The proportion of exhaust in B's engine is the largest.

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

C. M. M.—It consists chiefly of quartz and orthoclase and talcose schist, with a small quantity of ferruginous matters. The rock probably contains a trace of silver. "Exeter."—It is mispickel or arsenical pyrites—arsenic 48.0, sulphur 19.6, iron 34.4.—H. S.—The water contains much aluminum and iron sulphates. The styptic taste is due chiefly to the latter salt. It is not fit to drink. The brown precipitate is iron oxide.—J. M.—The orthoclase rock contains micaceous or specular hematite (iron sesquioxide) and ilmenite—titaniferous iron.—G. T. B.—We think your specimen is not meteoric iron.—W. C.—It is graphic granite. Besides graphite (plumbago or blacklead) it contains much iron sulphide—pyrites—and hornblende.—G. L. R.—The vermillion contains much oxide of mercury, which probably reacts upon the oils used and upon the sulphide of mercury, forming a basic sulphate.

COMMUNICATIONS RECEIVED.

On a New Use for Petroleum. By J. S. M. On the Siphon. By J. E. H.

English Patents Issued to Americans. From March 18 to March 21, inclusive.

Axles, H. Watkeys, Syracuse, N. Y. Candlestick, A. J. Smith et al., Ukiah City, Cal. Clutch mechanism, T. W. Capen, Stamford, Conn. Engine, hot air, H. W. Sherrill, Jersey City, N. J. Gas checks for ordnance, B. B. Hotchkiss, N. Y. Millstone driver, P. H. Childress, Waynesboro', Va. Pumping machinery, E. J. Molera, San Francisco, Cal. Railway switch, J. S. Riverton, N. J. Screws, C. C. Dayton, Plymouth, Mass. Sewing machines, G. McKay, Boston, Mass.

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending March 18, 1879, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city.

Table listing various inventions with their corresponding patent numbers and dates, such as Addressing machine, Ammoniacal gas, Annunciator, Automatic press screw, Axle lubricator, Bag holder, Baling press, Barrel and caek scrubber, Barrel cover, Bellows valve, Bird cage support, Bit stock, Boiler, Book cover, Boot and shoe soles, Boot strap, Bottlesoppy, Bow, archery, Brick mould, Butter package, Button fastening, Cakes, coating with sugar, Can case, Car brake, Car coupling, Car sleeping, Car ventilator, Cars, mechanism for driving fan blowers in railway, Cars, safety guard for street, Carbureter, Card or ticket holder, Carpet sweeper, Carriage step, Carriage top, Casting stereotype plates, Cement, Chimney cleaner, Churn, Churn, A. K. Morse, Churn, Older & Megow, Cigarette, medical, Clock dial, Clothes stick, Cocks, box and protector for underground stop, Coin package, Collar, horse, M. Turley, Copper from its solution, apparatus for obtaining metallic, Corset, Cotton chopper, Cotton press, Cultivator, Curtain fixture, Cut-off for steam engines, Dental salivajector, Dovetailing machine, Draught equalizer, Drawer pull, Drawers, Evaporating pan, Feed water apparatus attachment, Fertilizer distributor and seed planter, Fifth wheel, Fire escape apparatus, Fireplace heater, Garden roller, Garment shapers and presser, Gas generating furnace, Gas regulating burner, Gearing, variable speed, Glass furnace, Governor for steam engines, Grain ex vacuo, process of and apparatus for reducing, Grain, etc., separator, Grain separator, Grain spout, Gunstock, Harrow tooth, Hay rack and fence, Hide stretcher, Hoisting drum and clutch apparatus, Hose armor, Hub attaching device, Inlaying metallic ornaments in wood or stone, Kilt for carbonizing street refuse, Knitting machine, Lamp fixture, extension, Lamp, hanging, Lantern, Lap joint for boilers, Letter clip and file, Leveler, road, Lightning rod, Lime, oyster shell, Locomotive variable exhaust, Mail bag deliverer and receiver, Match safe and candle holder, Metals, coating, Middlings separator, Miller's proof staff and red staff, Mowing machine, Muclage holder and distributor, Musical instrument, mechanical, Musical instrument, mechanical, Mustache cup and glass, Nose bag for horses, Nozzle, noise quieting, Nut lock, Ore separator, H. Hochstrate

Table listing various inventions with their corresponding patent numbers and dates, such as Packing, piston rod, Padlock, Pattern plate for draughting garments, Petroleum rectifier, Picture frame, Pill feeder and counter, Pillow, mattress, etc., ventilated, Planter, corn, Planter, seed, Planters, checkrower for corn, Plow, Plow, G. L. Girford, Plow, C. W. Twigg, Plug, safety, Poke, animal, Portable bath, Printing, photo-chemical, Puddling gas furnace, Pump, Pump, W. C. Wilcox, Pump for vessels, bilge, Pump, oil, E. Rew, Pump or engine, portable, Pump, windmill, Punching press, Railway switch, Railway switch, B. Rice, Refrigerating and making ice, Rein, check, Root and stump puller, Rotary engine and pump, Rotative furnace lining, Sad iron, Saddle, riding, Safe, fire and burglar proof, Salt from its solution, process and apparatus for separating common, Sash holder and lock, Saw, circular, Saw gummer, Scale beam, Scow, dumping, Semolino, etc., cleaner and sorter, Sewer pipe and trap, Sewing covered nuts, Sewing machine, button hole, Sewing machine looper, Sewing machine treadle, Shafts, lateral adjustment, Shingling bracket, Shovels, spades, and scoops, handle socket for, Shutter, Sign, open, Sled, Smokestack, locomotive, Soldering machine, Speed indicator for shafts, Stamp, canceling, Stamp mill ore feeder, Starch, manufacturing, Steam boiler, Steam boilers, muffler for, Stockinet seaming machine, Stove back lining, Stove, heating, Sun helmet, Tablet, artist's, Telegraph conductor, Telegraph key, Telephone, speaking, Tenoning machine, Testing machine, Thill coupling, Thill coupling, R. Houghtaling, Thill coupling, M. L. Winans, Tire tightener, Toaster and broiler, Toilet case, Tongs, pipe, Banister & Lovrien, Toy, E. P. Roberts, Trunk, A. J. Walrath, Tube cutter, Mamer & Wallerius, Tube expander, Umbrella crown piece, Upholstering tuft, Upholstery, stuffing for, Valve gear, steam engine, Valve, pressure regulating, Varnish, Vehicle, side bar, Vehicle spring, Vehicle spring, W. H. Stickle, Vehicle step cover, Wagon wheel, Violin tail piece, Wagon bodies, bed plate for, Wagon brake, Wagon elevator and unloader, Wash board, Watch movement box, Water closet, Water closet valve, Window ventilator, Wire colling machine, Yoke attachment, neck

TRADE MARKS.

Table listing trade marks such as Banned and liver pills, Canned salmon, Cathartic medicine resembling fig paste or medicated figs, Cheating and smoking tobacco, Clothing such as overalls, blouses, etc., Cordage, Hams and bacon, Medicinal preparation for the cure of kidney diseases, Mining candles, Remedy for dyspepsia, liver complaint, etc., Salves, ointments, etc., Shingles, Long & Co., Smoking and chewing tobacco, cigars, cigarettes, and snuff, Tackle or pulley blocks, Wax or mining candles, White Lead, Collier White Lead and Oil Company, Wines, C. F. Ecardard

DESIGNS.

Table listing designs such as Carpet, H. Horan, Carpet, W. L. Jacobs, Carpet, McNaair, Carpet, E. Pyne, Coffin handles, W. M. Smith, Clock case, L. W. Culver, Spurs, A. Buermann, Umbrellahandle, T. W. Ball