

Business and Personal.

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600 New and Second-hand Portable and Stationary Engines and Boilers, Saw Mills, Woodworking Machines, Grist Mills, Lathes, Planers, Machine Tools, Yachts and Yacht Engines, Water Wheels, Steam Pumps, etc., etc., fully described in our No. 12 list, with prices annexed. Send stamp for copy, stating fully just what is wanted. Forsaith & Co., Machine dealers Manchester, N. J.

Reliable Oak Leather and Rubber Belting. A specialty of Belting for high speed and hard work. Charles W. Army, Manufacturer, Phila., Pa. Send for price lists.

Shaw's Noise-quieting Nozzles for Escape Pipes of Locomotives, Steamboats, etc. Quiets all the noise of high pressure escaping steam without any detriment whatever. T. Shaw, 915 Ridge Ave., Philadelphia, Pa.

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

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

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

Lead Pipe, Sheet Lead, Bar Lead, and Gas Pipe. Send for prices. Bailey, Farrell & Co., Pittsburgh, Pa.

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.

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

Help for the weak, nervous, and debilitated. Chronic and painful diseases cured without medicine. Pulvermacher's Electric Belts are the desideratum. Book, with full particulars, mailed free. Address Pulvermacher Galvanic Co., 292 Vine St., Cincinnati, Ohio.

Split-Pulleys and Split-Collars of same price, strength and appearance as Whole-Pulleys and Whole-Collars. Youc & Son, Drinker st., below 147 North Second st., Philadelphia, Pa.

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All nervous, exhausting, and painful diseases speedily yield to the curative influences of Pulvermacher's Electric Belts and Bands. They are safe and effective. Book, with full particulars, mailed free. Address Pulvermacher Galvanic Co., 292 Vine St., Cincinnati, Ohio.

Diamond Planers. J. Dickinson, 64 Nassau St., N. Y. More than twelve thousand crank shafts made by Chester Steel Castings Co. now running; 8 years' constant use prove them stronger and more durable than wrought iron. See advertisement, page 78.

Emery Grinders, Emery Wheels, Best and Cheapest, Hardened surfaces planed or turned to order. Awarded Medal and Diploma by Centennial Commission. Address American Twist Drill Co., Woonsocket, R. I.

Reliable information given on all subjects relating to Mechanics, Hydraulics, Pneumatics, Steam Engines, and Boilers, by A. F. Nagle, M. E., Providence, R. I.



C. H. W. is informed that we cannot find the address he mentions.—Will A. D. T. in "Minerals" of June 16, send his address to C. H. Wise, Boston, Mass?—A. K. Q.—Your question is too indefinite. We do not understand what you wish to know.—A correspondent writes a card from Primrose, Wis., but the ink is so pale we cannot read it. Will he write again?—J. W. is informed that we know of no method of using mercury as a lifting power. He must ascertain by experimenting.—J. T. G. is informed that there is no rule applicable to setting idler pulleys. His judgment must dictate the place to put them.—J. H., of Canada.—We cannot turn to the item you refer to. The recipe has

been tried and was not satisfactory. You had better apply to a chemist, who can give some good recipes.—C. D.—We could not republish the diagram. If you cannot find the number containing it, it is probably one of the missing ones which we can perhaps supply.—A. M. S.—If you will give us the number and year of the paper containing the article we can probably send it to you.—E. C. H. is informed that the method of balancing cylinders of threshing machines which he mentions is the one in general use, and is, perhaps, the best that could be employed.—T. F. R. asks for a depilatory, and is referred to Cooley's "Cyclopedia of Practical Receipts," under the head of "Depilatory."

(1) G. R. asks: What sized boiler do I need for a small engine, 1 1/4 inch bore and 3 inches stroke? Would it run a circular saw 7 inches in diameter to saw 1 inch pine? A. To do this work you will need a boiler with from 18 to 20 square feet of heating surface.

(2) S. E. says: Please give a rule for calculating the capacity of smoke stacks, which are found in practice to give the best results? A. A good proportion for the chimney is to have its cross section about 1/2 of the grate surface, and its height from 40 to 50 feet. Some chimneys having a cross section of only 1/3 the grate surface give good results when the boiler is carefully set, but the first figure is safer for general practice.

(3) G. W. K. asks: 1. Is there a way to determine the amount or power a motor will furnish by means of a friction lever brake, giving the number of feet the pulley will run and the number of lbs. pressure on friction bearing, the pulley to be smoothly turned? A. Multiply the unbalanced weight in lbs. by the circumference in feet that the point of attachment would describe if free, and by the number of revolutions of the motor per minute. Divide the product by 33,000. 2. I have a water wheel running on cast step with cast toe. It wears well; is there unnecessary friction? A. We think not. 3. What speed should a 30 inch top runner burr have under 15 horse power for grinding corn? A. About 400 revolutions a minute.

(4) P. W. N. asks: 1. How much more water will run through a gateway in a dam 10 feet wide and 30 feet high than will run through one 10 feet high and 30 feet wide. A. About 3 2/3 times as much in the first case. 2. Also the weight of 1 cubic foot of water? A. See p. 184, vol. 32.

(5) S. B. says: Some of the users of steam engines in this city (Portland, Me.) practice putting salt water in small quantities into the boilers to form a scale to prevent the action of Sebago water on the iron, claiming that the water, being very soft, has too much action on it. Is it a good practice? A. If the feed water is pure, we think the action is questionable.

(6) W. E. M. asks: If I confine steam in a hemisphere, will its force be centrifugal or centripetal? Can there be a motor made on this principle? A. The steam will press outward.

(7) B. F. T. says: What is the effective actual horse power (not therefore nominal) of a non-condensing engine 14 inches cylinder, 24 inches stroke, 100 revolutions per minute, 70 lbs. steam? I am endeavoring to obtain some simple formula by which correct results may be obtained, and that can be explained to persons not educated machinists or engineers, in connection with our business in furnishing water for horse power. The formula furnished by the SCIENTIFIC AMERICAN ought to be considered standard and satisfactory. A. The effective horse power of a particular engine cannot be exactly determined by a general rule, but must be found by experiment. It would be impossible to give an approximate rule of any value for the data sent. Such a rule that would answer tolerably well for one class of engines might be useless for another.

(8) C. D. H. says: A customer wishes me to siphon the water from a well 50 feet deep, having 30 feet of water in it. I have a fall 150 feet. I tell him I can only lessen the depth of water about 12 feet, when the siphon will cease to work. He claims it will empty the well. Which is right? A. You have the right idea.

(9) J. G. asks: Which will make the louder report, a gun with a perfectly straight bore, or one that widens a little toward the muzzle? A. Some of the patriots who have recently celebrated the anniversary of the nation's birthday will doubtless be glad to throw some light on the subject.

(10) C. D. O. says: The engine I am running has slipped its eccentric. The owner in setting it placed it so that it is a little back of the quarter stroke. I claim that it ought to be set a little ahead of the quarter. Which is right? A. We imagine that your view of the case is the more correct of the two.

(11) W. K. asks: 1. Whether a boat 30 feet long and 6 feet beam, run by steam, just for sporting purposes, would require a government test and license? A. It does, according to the law. 2. How large a wheel does it require for two engines with 2 1/2 inch by 4 1/4 inch stroke? A. Diameter 26 to 28 inches, pitch 3 feet.

(12) J. A. R. asks: Can a person see light or the object through the aid of light? A. Light, according to Watts, "is the agent which makes us acquainted with the existence of bodies through the organ of sight."

(13) J. B. T. asks: If two bodies, one weighing 1 lb. the other weighing 10 lbs., both being equal in bulk, if let fall from the same height, will strike the ground at the same time? A. Yes.

(14) I. P. F. says: To F. G. W.'s inquiry you say do not put flues in your boiler as small as 1 inch. I have just completed a boiler with nine 1 inch flues, heads of cast iron, 1 inch thick and 10 inches diameter, 30 inches long, to be set on a stove, and we can get no draught. I have made them of the same dimensions with one 4 inch flue, and they work well. A. We would be glad to hear from our readers who have been using boilers with flues of this size. So far as our experience goes, they generally give satisfactory results.

(15) O. C. writes: I wish to construct a vertical boiler and engine attached to back to develop 1 horse power at a pressure of 50 or 65 lbs. Please give me dimensions of cylinder and boiler, and if I use steel

for boiler shell what thickness? If I put in tubes, how many and what diameter? A. Cylinder 2 x 3, boiler 20 inches diameter, 3 feet high. Steel shells 1/4 of an inch thick. Tubes 1 1/2 or 2 inches in diameter. 2. Do you think it practicable to drive a carriage on a good road by steam engine and boiler located on the same and carrying its own coal and water, to travel a distance say of ten miles? A. Yes, if properly constructed.

(16) A. D. S. says: In making experiments with small vessels to try the resistance they suffer in passing through or over water, how much should be the allowance for adherence or friction? A. We think you will find full particulars in Mr. Froude's papers, published in the *Transactions of the Naval Architects*.

(17) W. D. M. O. says: Can you tell me the best work on air, and all its properties, such as motion, resistance, use as a motive power by compression, and similar mechanical uses? Also a work on the generation of gas for power purposes, and compounds which are used to produce gas by contact in a reservoir, and the best work on ballooning? A. Rankine's "Treatise on the Steam Engine" contains a summary of the laws relating to air and various gases. You will find numerous examples of the application of these principles in the files of technical periodicals. There is an aeronautical society in England, and we imagine their transactions contain the kind of information you desire. There are also numerous valuable papers in our back numbers.

(18) W. E. S. asks: Is the fulcrum point on a vessel's mast below or above deck when she heels or inclines by the pressure of wind while sailing? The object vessel is 65 feet on the water line, 20 feet breadth of beam, about 48 tons new burden, 10 feet draught, and ballasted with 27 tons of iron and lead, with about 55 feet hoist of sails. A. It is a good question for young philosophers to answer.

(19) F. E. asks: Is there any difference in the power required to operate stamps, with short armed or long armed cams, provided the stamps have the same lift and fall in distance, are of the same weight and have the same number of drops per minute? A. There should be no difference, if the resistance due to friction is the same in each case.

(20) C. E. L. asks: Can you give me a rule to cut paper for a tissue paper balloon 10 feet high, so that when paper is pasted together the balloon will be in good proportion? Also what size should the ring at bottom be? A. You will find directions in Blinn's "Tin, Sheet Iron, and Copper Plate Worker."

(21) G. P. H. asks: 1. If I build a boat 16 feet long and of 4 feet beam, of good model, how much power, and what size of a screw propeller must I put in to realize 8 miles per hour in low water against the current in the Ohio river? A. Cylinder 3 x 4, propeller 22 inches diameter, 3 feet pitch. 2. Is a boat of the above dimensions, drawing when well ballasted, 2 feet, capable of crossing the Gulf from New Orleans to Cedar Keys? A. At certain seasons of the year, when the weather is generally calm, such a voyage might be made.

(22) J. R. G. says: I have got an aquarium with a cast iron bottom; what can I put on it that will keep it from rusting and not injure the fish? A. Dry the iron thoroughly and give it a good coating of melted paraffin. A layer of fine white sand may be sprinkled over this as it cools.

(23) R. G. asks: How can I make a strong extract of tonka bean? A. Take 1 lb. of the beans, reduce to a coarse powder, and percolate with alcohol to make 1 gallon.

(24) W. C. L. says: I desire a liquid preparation to close the pores of eggs to preserve them. It should be cheap, dry rapidly, and not color the shell. A. Thin gum arabic solution is commonly used for this purpose. Eggs are often packed in charcoal. A good method is to store the eggs in water containing about 50 grains of salicylic acid to the gallon. The Germans use linseed oil, which seems to answer the purpose admirably. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 65, p. 1030.

(25) W. B. says: A doctor asked a chemist what iron was composed of. The chemist said that iron was an element, and could not be divided. And the doctor thought it must be composed of something. Which is right? A. The chemist was right; iron is an elementary substance.

(26) W. E. T. asks: Where are open hearth steel works located? A. Open hearth furnaces are in operation at Boston, Mass., Providence, R. I., Nashua, N. H., Trenton, N. J., Beaver Falls, Pittsburgh, Nicetown, Philadelphia, and Harrisburgh, Pa., Cleveland and Canton, Ohio, Springfield, Ill., and Hartford, Conn.

(27) W. B. asks: Can you give the recipe for making the Etruscan color in gold? A. Alum and fine table salt each 1 oz., powdered saltpeter 2 ozs., hot rain water sufficient to make solution. Add sufficient muriatic acid to produce the color desired. The solution is best used warm. After coloring wash in soft water, then in alcohol, and dry in clean sawdust.

(28) J. G. L. asks: 1. How many vibrations per second are required to produce the musical tone known as middle C? A. 264.

Can I make a fine finish on wood by rubbing on boiled linseed oil repeatedly, allowing each coat to dry thoroughly? A. Not what is termed a fine finish.

(29) C. E. D. asks: I would like to know how to get rid of a small red mite on canaries? A. Try any of the insect powders found in the market.

(30) M. A. B. asks: Does your SCIENCE RECORD contain "Practical Mechanism," by J. R.? A. No. It is published in book form under the title of "Complete Practical Machinist."

(31) E. C. H. asks: How can I melt cast iron in quantities ranging from 10 to 15 lbs.? A. In a small furnace having a good blast. Is there such a thing as a demijohn cupola, and how is it constructed? A. We never heard of it.

On my lathe, driving wheel is 30 inches diameter, and pulley 3 3/4, making 8 to 1. I wished to use another

speed of 4 to 1, with same belt, and calculated size of pulleys the following way, made the sum of one half the circumference of pulleys (pulley and driver) in each set the same, but it did not work at all. Will you please inform me how I can get the size correctly? A. You will find rules for calculating cone pulleys in "Wrinkles and Recipes."

(32) L. E. M. asks: Will you give me a practical rule for finding gearing for compound geared lathes? A. You will find the information in No. 7, vol. 34, p. 107, that we think will be what you require.

(33) G. P. asks: Will a spring of the following dimensions, 4 inches long, 1/4 inch diameter, and 1/4 inch pitch, made out of 1/4 inch steel wire, enclosed in a chamber subject to 70 lbs. of steam to the square inch, keep its rigidity under a bolt screwed at 25 lbs.? A. Yes. 2. Will the steam affect its rigidity? A. No; but if it comes in contact with steam in moisture it could be nickel plated.

(34) E. H. M. asks: Will you give a plain rule or reference to some book plainer than Haswell, to ascertain the pitch of teeth in pattern making? A. The information you desire will be shortly published in "Practical Mechanism."

(35) A. W. asks: Is it advisable to grease cog gearing, and the reason why? A. It is best to grease cog gearing in cases in which the wheels can be kept from becoming clogged with dirt, etc.

(36) M. M. M. asks: 1. What is a suitable metal or composition for making castings for an oscillating engine 2 x 4 inches, the castings to be made in a smith fire? The blacksmiths tell me that I cannot cast iron as it will "burn." A. Make your castings of a mixture of 6 parts copper and 1 part tin. Or use old composition metal such as bell metal, and add one tenth its quantity of tin after the mass is melted. 2. How large should the steam and exhaust ports be? A. Make the steam ports 1/3 the area of the cylinder, and the exhaust 1/2. 3. Would plaster of Paris be suitable to cast in? A. Cast in a sand mould faced with plumbago. 4. How could I burnish the castings after I had them made? A. Polish with file, scraper, and emery paper.

(37) R. D. H. says, in answer to query (7) July 21, as to the time when the first movable steam fire engine was used? I know of a very powerful one to have been in use in Berlin, Prussia, as early as 1838, may be earlier. Its great defect was that it took hours before it was ready for service, so that it was jokingly remarked notice of the occurrence of a fire should be given some hours ahead. When finally at work it could throw a number of streams, it was said seven, and by concentrating its full force upon one stream, threw down stout walls. It was contemplated to be sent, if not actually done, to the large Hamburg conflagration in May, 1841.

(38) C. M. B. says: A very cheap and serviceable door spring can be made as follows: Take an old hoop skirt and place it in the fire, keeping it there just long enough to burn the cloth off the wires; remove from the fire and plunge it into cold water. Press and bend the springs together so as to form a bundle or rod a foot or more in length. Secure one end of the bundle to the door frame, twist it very tight, and, keeping it twisted, fasten the other end to the door above the end fastened to the frame, and the door spring is complete. By twisting the springs one way, they will keep the door shut; and by twisting them the other way, they will keep it open.

(39) W. F. W. says: I wish to build a dry house 50 x 50 feet square, to be divided into four rooms. I have a steam boiler 44 inches in diameter, 13 feet long, that I wish to use as a heater. What is the cheapest and best way to construct the heating part? I wish to use the house for drying green ash, and want to get heat up to 190° to 220°. A. See SCIENTIFIC AMERICAN, p. 123 vol. 34, February 19, 1876, paragraphs (30) and (42); also p. 107, vol. 36, paragraph (1); also, p. 123, vol. 36, February 24, 1877, paragraph (6).

(40) G. W. W. asks: Why is it that sap of sugar maple at the right season, boiled down, produces dry, brittle, grainsugar; but as soon as the weather gets warmer so as to swell the buds, the product is wax, that is, it will not grain. A. This is due to the presence of a free acid in the juice. Stir in a little solution of carbonate of soda, boil down, run into a wooden tub with a bung in the bottom, and, when solidified, remove the bung and let drain.

(41) G. H. E. asks: 1. What is the most sensitive and accurate test of the presence of fusel oil in liquors distilled from various grains? A. Evaporate the alcohol down to a small bulk over a water bath, add an equal volume of ether, agitate for a few minutes, and then add an equal volume of water. The ether will dissolve any amyl alcohol (the basis of fusel oil), and the ethereal solution separate into a layer distinct from the diluted spirit. This solution should be drawn off with a pipette into a small dish, and allowed to evaporate in the air. To a portion of the residue in the dish add a few fragments of iodide of potassium, and gently agitate. In the course of a few minutes, if the original spirit contained any fusel oil, a distinct yellow color will appear. This color is distinctly visible in a solution containing 0.2 per cent of the oil. The reaction is due to the volatile acids of the oil, and not to the amyl alcohol. Mix another portion of the residue with 1 1/2 parts of concentrated (pure) sulphuric acid; a red viscid liquid (amyl-sulphuric acid) indicates amyl alcohol. When digested with sulphuric acid and acetic acid or an acetate, fusel oil yields acetate of amyl, having the odor of pear oil. Fusel oil has a strong characteristic odor, and an expert can readily detect very small quantities of it in spirits by evaporating a small quantity of the spirit on the palm of the hand, when the less volatile oil remains after the alcohol has evaporated, and is recognized by the sense of smell. 2. What is the present plan in distilleries, employed to get rid of fusel oil? A. Retainers, made of wire gauze filled with coarsely powdered charcoal, are fitted in the helm of the still so that the distillates pass directly through them; the charcoal retains the oil.

(42) S. N. B. & Co. say: We desire to pipe steam from our boilers to dry houses that are 200 feet

away, and then return the condensation back to boilers, both feed and return pipes to be carried underground. What fall will be necessary to return the water? Also, will it be necessary to have the feed and return pipes laid with expansion joints, and what is the best material to cover with? A. Very little fall is necessary to the pipes to return the water of condensation to the boiler. A few inches will be sufficient in the distance you mention. The inclination of the pipes of the coil in the dry house ought to be about half an inch in ten feet. The pipes do not need to be connected with expansion joints. Some persons declare they are more plague than profit. If necessary, provide for expansion and contraction by a U bend. The material used for covering pipes is generally calcined plaster of Paris, and often mixed with asbestos. To use the plaster, mix with water and apply before it hardens. As it is liable to crack and peel off, it would be well to cover it with some kind of box or jacket. A method is in use here in New York city which is to encase the steam pipe in a larger pipe, made of sheet iron or cast iron; the steam pipe is supported centrally in the large pipe by means of disks of wood through which it passes. These disks can be sawed from long pieces after they are bored. Slip these disks on the steam pipe as it is being connected, and then encase in the outer pipe. It will be necessary to have the outer pipe airtight.

(43) L. S. D. says: I am about getting up a design for a poorhouse, and desire to heat it with steam or water and steam. How large an apparatus do I want to heat a building 40 x 75, two stories high, and cut up in suitable rooms? A. See SCIENTIFIC AMERICAN p. 123, vol. 34, of February 19, 1876, paragraph (32); also, p. 74, vol. 34, January 29, 1876, paragraph (13); also, p. 123, vol. 36, February 24, 1877, paragraph (7).

(44) N. H. D. says: I am about to make a small windmill, the wheel of which will be 30 inches in diameter, having 8 equal arms, the broad part being 9 inches wide at the top, 6 inches at the bottom, 9 inches long, the wheel and its shaft being geared to a perpendicular rod, and small gear wheel being 1 inch, large one being 1 1/2 inches. Give the size of water pump that can be used, and size of air pump. A. See SCIENTIFIC AMERICAN, vol. 32, No. 15.

(45) A. W. C. says: I have a 20 foot x 50 inch tubular boiler, iron chimney 42 feet high, size 28 inches. My draught is poor. I am about to put on a fan blast over my water butt; will it increase my draught sufficiently to attach a pipe to the fan and connect it to the chimney? If not, what length of chimney will I have to put in, in order to insure a good draught? A. The details are not sufficient to enable us to form a definite opinion. It seems probable, however, that the boiler is imperfectly set. 2. What shall I use in my boiler to remove scale? A. If you can freshen the water by the use of a heater with sediment collector, the scale will be gradually removed. The third question seems to be a query for judicial decision.

(46) L. P. M. says: 1. I have a Daniell's battery and am trying to do a little electrotyping, but not with very good success. I have set up my name and residence with type and taken a wax mould of it, and have covered the letters with good plumbago and connected it with a battery. The copper deposits thick on the wire and the smooth part of the mould, but does not take hold of the letters, or only a thin film around them. Can you tell me the reason? A. See that every point of the matrix is covered uniformly with an unbroken film of the plumbago, and then, after blowing out the excess of dust with a small hand bellows, lay the mould face upward, pour a little water over it, and see that the water enters freely every crevice; careful manipulation with a small camel's hair brush will remove air bubbles. Then immerse in the bath and proceed with the plating. 2. In "Muspratt's Chemistry," issued by Mackenzie, p. 799, in speaking of Daniell's constant battery, says: "m and n are brass rods fixed longitudinally over the trough; to the former, m, are suspended the moulds, to the latter, n, sheets of copper exactly facing the moulds. The zinc of the battery is connected with the rod, n, and the copper of the battery with rod, m." The diagram shows the reverse of this. Which is correct? A. Join the cathode or rod to which the moulds are affixed to the zinc pole of the battery; a wire then joining the coppers of the battery with that of the bath properly completes the circuit. 3. On p. 788, in charging the battery, it says the copper cylinder is filled with sulphate of copper acidulated with 1/2 of bulk of sulphuric acid. Would not the latter have a tendency to eat the copper? A. It is not advisable to add sulphuric acid; a little sulphate of zinc is commonly used instead, or, what is better, after charging with copper sulphate, short circuit the battery for a few hours, at the expiration of which time it will be found to have attained its full power.

(47) T. M. says: I. I. says large reservoir, 20 feet deep, 200 feet fall, 2 pipes equal in size and length, one at bottom the other near top (does not say how near top), which will discharge most water 2 miles distant. Suppose we drop the 250 feet fall, insert the pipes one at bottom and the other at 6 inches below the surface enough to be sure and fill the upper pipe and a constant head. It is plain, without calculation, which will discharge with the greatest velocity, and of course the greatest quantity; now we will add the 200 feet fall by laying the pipes to the town. The extra fall cannot, it seems to me, decrease the velocity of water at bottom of reservoir; now does not the lower pipe have the advantage of an initial velocity, due to the head of 20 feet at reservoir; and discharge at the town a correspondingly greater quantity? A. In case of the pipe near the surface, it would be necessary to add to the 200 feet fall the difference of level between the two pipes.

(48) J. F. says: I am running or have charge of a stationary boiler of the locomotive type. The water I am feeding the boiler with is very hard, leaving a scale on the tubes and crown sheet from 1/8 to 1/4 thick, and so hard that it will take a very sharp chisel and a smart blow with the hammer to pierce it. At one time I put a box of concentrated lye in the boiler to see if it would have effect on the scale. It did not even make the boiler prime, and on examination the scale was about the same as before. Since then I have been putting "Cataqua" in, pumping it in with the feed. It makes the water prime or foam, but not so as to deceive

me. One week ago I examined the scale in the boiler. In places on the crown sheet I found broken pieces 1/8 and 1/4 of an inch thick. Was it the strong action of the fire at times, or was it the sudden contracting of the iron after all the water was blown out, that caused the scale to break off in places? A. Probably the scale was broken off by sudden contraction. It is a bad plan to blow off a boiler as soon as the fire is hauled. Let the water remain in the boiler until it has become quite cool, and then run it out. By pursuing this course the scale will frequently be softened so that it can readily be removed.

(49) J. B. says: What is the best and cheapest method of making axle grease? A. One part of fine black lead, ground perfectly smooth, with four parts of lard.

(50) A. G. S. asks: Is there any way to color meerschaum pipes otherwise than by continued smoking? A. See SCIENTIFIC AMERICAN No. 12, vol. 35, p. 185 (40).

(51) W. M. asks: What will make a good black paint for painting boiler heads, smoke stacks, etc.? Is there a fireproof cement for laying brick in lining furnaces? A. See No. 3 present volume SCIENTIFIC AMERICAN, p. 43 (45), and No. 4, p. 59 (14).

(52) T. B. S. asks: Will you give me some information regarding the "Rose of Jericho"? A. This name is given to an oriental plant which is found in northern Africa, Syria, and Arabia. It is an annual and grows in sandy wastes. The stem is very short, with branches a few inches long spreading in all directions. After the plant has flowered, and when the pods begin to ripen on the approach of dry weather, the branches drop their leaves and begin to curl inwardly, and in time the whole resembles a ball of wickerwork at the top of a short stem. When the rain falls, or the plant is placed in moist situations, the curled and dried leaves unbend, and become as a green plant. In its native country it is surrounded by various superstitions. In Palestine it is called *rosa Mariae* and *raf Maryans* or *Mary's flower*. It is sometimes called the Resurrection Plant.

(53) W. T. asks for information about making soap, and says: I undertook the manufacture of common washing soap for clothes. I succeeded in making a soap of good quality, but altogether too soft, and not capable of hardening although exposed to the air for a long time? A. If you were to obtain "A Practical Treatise on the Manufacture of Soaps," published by John Wiley & Son, New York city, or "A General Treatise on the Manufacture of Soap," by Professor Dussauce, published by H. C. Baird, Philadelphia, you would find all the information you require.

(54) T. C. asks for information about making black ink: A. The following recipe is said to make a very fine and durable ink: Aleppo galls (bruised) 12 lbs.; soft water, 6 gallons; boil in a copper vessel and add water to make up that lost by evaporation; strain, and again boil the galls with 4 gallons water for half an hour; strain and boil the third time with 2 1/2 gallons water. Mix the liquors and while hot add 4 1/2 lbs. coarsely powdered green copperas and 4 lbs. gum arabic. Agitate until dissolved, and strain for use. Product, 12 gallons fine and durable ink.

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

J. S.—It is galena—a sulphide of lead. Galena usually contains a little silver.—R. F. G.—(Minerals in red box). It is marcasite or white iron pyrites. See article on p. 7, vol. 35.—J. M. G.—It contains silicates of alumina, soda and alumina, and sulphate of lime. It may be used in the manufacture of pottery, etc., and on the farm.—C. B. K.—This substance is nearly pure metallic lead. It is possible that the small granules (some of which approach crystalline form) may be native lead—a substance almost unknown. It is, however, far more probable that they were at one time musket balls. The coating is plumbic carbonate and sulphate. You should send larger quantity if possible.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On an African Continental Railroad. By A. W.
On Sizes of Safety Valves. By R. H. T.
On a Simple Way to Make Ice. By —.
On a Thread Snake. By A. B. A.
On the Divining Rod. By J. L. H.
On Carrying a Bar of Iron. By S. B. E.
On Speed of Rafts, etc. By C. G. C.
On Snakes Catching Fish. By W. S. B.
Also inquiries and answers from the following:
E. T. L.—J. M., Jr.—A. M. S.—C. H. W.—E. T. L.—C. P. W.—H. P.

HINTS TO CORRESPONDENTS.

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 fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells instruments for mining engineers? Who sells long staple cotton gins?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending June 26, 1877, 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 inventions with patent numbers and names of inventors. Includes items like Accordion, Animal catcher, Axle box, Baby walker, Bale tie, Bale tie, W. A. Wright, Bar for jails, Barrel cover, Barrels, Bee hive, Beer cooler, Blowpipe, Boiler furnace grate bar, Boiler, Barber & Porter, Boot and shoe machinery, Boot and shoe counter, Mann & Rankin, Booting jack, J. Buzzell, Brick machine, W. L. Gregg, Bridge, T. Mullin, Bucket ear, J. Wasmer, Buckle, D. V. Bradley, Buckle, E. M. Kinne, Building, A. W. Louth, Butter carrier, W. H. T. Dulaney, Butter worker, W. Johnston, Camp chest, B. M. Descombes, Car axle box lid, G. W. Morris, Car coupling, Dowling & Perry, Car coupling, C. Hall, Car coupling, F. P. Shorey, Car coupling, W. J. Trimble, Car frame, metallic, B. J. La Mothe (r), Car starter, J. R. Johns, Card screen, S. S. Getchell, Ceiling, W. E. Worthen, Chair, W. Lovell, Chair, A. B. Stevens, Chest garment, C. A. Fuller, Chimney, etc., L. B. Silver (r), Chisel, E. Carney, Churn, A. F. Morgan, Churn, A. J. Stoll, Cider mill, H. & S. M. Willson (r), Collar box, J. Levine, Colter and jointer, G. K. Smith, Cooking cereals, L. S. Chichester, Copper, separating, W. B. Young, Corn crib, B. F. Bedwell, Corn flour, A. L. Murdock, Corn marker, H. C. & W. T. Sharp, Cotton boll separator, J. A. Smiley, Cradle, C. Barlow, Crape, restoring, A. J. Shriver (r), Crucibles, H. Wile, Crucibles, Park & Hay, Cuff, E. S. House, Cultivator, J. Sherrill, Cultivator, G. Storm, Cultivator tooth, G. D. Rowell, Cultivator, J. Poetz, Door and draw plate, F. H. Seymour, Door threshold, R. B. Hamor, Doors, sliding, A. K. Rider, Dress supporter, G. Schwab, Drying machines, R. J. Walker, Earth auger, W. Shaw, Electromagnetic apparatus, E. F. Card, Elevator way, A. J. Judge, Elevators, H. S. Lansdell, Engine, rotary, R. Vaile, Envelope, A. Christey, Envelope, C. K. Marshall, Evaporating pan, G. T. Jones, Exercising machine, W. M. Marshall, Fence, C. A. Root, Fence supporter, J. R. Gorby, Fence, barbed, T. D. Stetson, Fence wire tightener, G. Duffey, Fire escape, I. H. Allen, Fire escape, J. P. Duncan, Fire escape, F. E. Goble, Fire escape, L. Meyer, Fire escape, A. Warth, Fire escape, J. Welch, Fire place heater, C. M. Coulter, Flanging machine, Morgan & Godley, Fluid pressure apparatus, G. F. Deacon, Fruit drier, C. W. & E. A. Jones, Fruit jar, H. Purdy, Fruit jars, etc., Hirt & Mahler, Funnels, S. M. Preston, Furnace blower, T. J. Hickey, Furnace, smelting, Sturdy & May, Gas and air carbureter, W. H. Winn, Gas apparatus, W. W. Upp, Gas or water stopcock box, A. W. Morgan, Gate, W. Rinehold, Gate, farm, S. & J. G. Sherman, Gate, flood, N. J. Sweeney, Glass furnace, G. W. & C. W. Foster (r), Glass, F. Siemens, Grain binder, J. P. Johnson, Grain separator, J. F. Hatfield, Grain separator, W. T. McCulla, Grasshopper catcher, Wilson & Rhode, Hair dressing, N. Helmer, Harness maker's machine, Berger & Shoup, Harness tug, etc., H. R. Woodcock, Harrow, F. Barnes, Harrow, J. W. Carpenter, Harrow, J. Weber, Hides, fleshing, T. W. & W. K. Appleyard, Horse collar pad, W. Dippert, Horse rake, Herchelrode & Schenacker, Horseshoe, E. Murraine, Hose reel, C. W. Tremain, Hydrant, W. Kaiser, Hydrant, S. W. Lewis, Hydraulic jack, Weaver & Noble, Toe machine, E. Fixary, Ingot, soft center, J. Park, Jr.

Table listing inventions with patent numbers and names of inventors. Includes items like Inhaler, J. B. De Guise, Journal box, J. S. Atkinson, Knob fastener, O. Mayo, Knobs, M. C. & S. S. Niles, Lamp lighter, J. A. Plant, Lamp post, W. De Lany, Lathes, tool holder, S. Gissinger, Leather straps, machinery, S. B. Randall, Letter sheet, etc., W. T. Berry, Lifting jack, G. W. Hunter, Lifting jack, J. G. Winters, Loading etc., apparatus, J. W. Castleman, Lock for satchels, etc., R. Flocke, Locking latch, J. J. King, Locomotive fire box, J. C. Hayward, Loom, D. E. Keating, Loom picker, J. W. Barlow, Low water alarm, B. R. Singleton (r), Lubricator, G. Lysle, Jr., Lubricator, P. Bloomsburg, Lumber, trimming, T. J. Frazier, Millstone balancing, L. Read, Mower knife sharpener, Z. Frost, Oil can, J. F. Coppel, Package holder, J. H. Randall, Pail bottoms, etc., machine, G. W. Parker, Paper box, A. D. Schaeffer, Pavement, Rock & Phillips, Pen holder, S. B. Ladd, Pencil, C. Walpuski, Picture exhibitor, H. E. Hezekiah, Picture frame, J. W. Fleischmann, Pictures, W. T. Murphy, Pipe plug, R. H. Dalrymple, Piston, R. M. Beck, Plane, bench, C. L. Adancourt, Planing machine, W. P. Brewster, Pneumatic tube, W. P. Lewis, Postmarking, T. Leavitt, Pressure gage, B. M. Johnson, Printing machines, Hoe & Tucker, Pruning implement, J. R. Hunter, Pump valve, J. Gates, Push pin and watch key, Fisher & Lucas, Reflector, H. O. Baker, Refrigerator, H. Siegelstyl, Rein holder, etc., C. T. Ellsworth, Roadscraper, J. T. Currier, Roll, sectional, A. B. Seymour, Roofing tile, P. Pointon, Rounding and straightening rods, J. S. Seaman, Rowing gear, J. W. Melcher, Ruling machine, J. McAdams, Sash balance, Kolb & Osberghaus, Sash fastener, D. T. Gerrish, Sash fastener, S. Rush, Saw circular, S. N. Pool, Jr., Sawing machine, J. S. Baker, Scaffolding, H. Batt, Seal, F. C. Hamilton, Seed sower, J. W. Gamble, Sewing machine, C. Turner, Shears, Foltz & Miller, Sheet metal can, H. Miller, Sheet metal machine, T. W. McKeever, Shutter, A. G. Hanmann, Sled, G. F. Shaver, Sleigh, G. H. Laub, Sleigh shoe, B. F. Sweet, Smoke house, H. T. C. Kraus, Soldering furnace, J. Burgess, Soldering cave troughs, J. Huth, Sorghum, mill, E. A. Withers, Spindle, G. P. Whitman, Spindle and bobbin, G. Draper, Spinning machinery, B. Saunders, Spinning ring holder, W. F. Draper, Spool holder, etc., J. M. Montgomery, Jr., Spooling machines, F. Fearon, Stanchion, Z. W. Smith, Steam generator, J. A. Reed, Steam pipes, covering, G. B. Wiestling, Stock holder, G. Sax, Stopcock, E. Hoxie, Stove door, J. Martin, Stove, W. P. Brophy, Stove pipe damper, H. B. Todd, Stump elevator, Dunnebach & Linen, Sugar cane apparatus, J. Bromley, Sugar cubes, cutting, C. Raetz, Sugar, manufacture of, L. E. Schmalz, Suspenders, S. B. Sharp, Tellurian, F. Howes, Textile fabric, H. D. Dupee, Thill coupling, F. G. Arter, Trace fastener, H. H. Schroeder, Trunk catch, H. Vogler, Tunnels, shield for, T. Jeynes, Tuzere, I. S. Van Winkle, Umbrella, H. Falcina, Valve attachment, W. H. Garrecht, Valve gear, Scott & Roth, Valve gear, E. N. Dickerson (r), Valve, G. M. Weinman, Vanilline, F. Tiemann, Vehicles, C. J. Ellsworth, Velocipedes, E. H. Turner, Vent bung, Pentlarge & Hirsch, Wagon end gate, E. Rowland, Wagon hound, etc., C. F. Whipple (r), Wagon spring, A. W. McKown, Washing machine, F. N. Griffith, Watchman's time detector, W. Imhaeuser, Weather strip, E. T. Ingalls, Whip, W. H. Millikin, Windmill, W. A. Guzeman, Window blind, T. A. Smits, Wire-straightening machine, I. A. Kilmer, Wool-combing machine, L. Smith, Wrench, tap, C. Elterich.

DESIGNS PATENTED.

- 10,068.—CASKET HANDLE LUGS.—C. Barmore, Cincinnati, Ohio.
10,069.—CASSIMERES.—O. F. Chase, Thompson, Conn.
10,070.—TOBACCO BAGS.—W. J. Cussen, Richmond, Va.
10,071.—CARPETS.—E. Daniel, Paris, France.
10,072 and 10,973.—ORGAN CASE.—S. Hayward, Boston, Mass.
10,074.—COVERS FOR SMOKING PIPES.—J. Kirschbaum, Waterbury, Conn.
10,075.—CRADLES.—L. E. Minott, Sheboygan, Wis.
10,076.—GROUP OF STATUARY.—John Rogers, New York city.
10,077.—MILK JUGS.—T. C. Smith, Greenpoint, Brooklyn.
10,078.—FUNERAL ORNAMENT.—W. M. Smith, West Conn.

[A copy of any one of the above patents may be had by remitting one dollar to MUNN & Co., 37 Park Row, New York city.]