

(31) S. U. says: We have a cast iron sectional steam boiler, for heating. As soon as the steam gauge commences to indicate pressure, the water leaves the boiler and goes off in the supply pipes. Can you tell us how to remedy this? A. As we understand you, the water goes from the boiler to the heating pipes, and then returns. We presume this is what is intended. If not, it is probable that the insertion of a valve will prevent the escape of the water.

(32) M. M. C. asks: 1. Which is best for annealing cast iron—charcoal or bituminous coal, and why? A. Charcoal, generally, as it contains less impurities. 2. What is the formula for calculating the tensile strain on the iron of a boiler shell, diameter of boiler, thickness of shell, and pressure of steam being given? A. See Van Buren on the "Strength of the Iron Parts of Steam Machinery." 3. How many square feet of heating surface in a boiler are generally required for a horse power? A. We do not know what is meant by the horse power of a boiler. 4. Is an oblique cone, that is, a cone whose axis is inclined to the plane of its base, measured by the area of its base into 1/2 the perpendicular height? A. Yes. 5. What is the formula for finding the volume of a cylinder? A. Area of base multiplied by altitude.

(33) G. T. P. says: 1. I have a glass tube 1/4 inch inside diameter. How many inches shall I have to raise the mercury in it to equal 1 lb. pressure? A. Height of column 2 1/2 inches. 2. How much mercury shall I use? A. Volume of mercury, about 1/16 of a cubic inch.

(34) F. L. asks: 1. Could I boil about 45 gallons of linseed oil in a large copper vessel, by having the steam and the steam pipe running into the oil, or would the water from the condensed steam affect the oil? A. No; some of the steam would condense in the oil. 2. Do you think it would take any more than one or two barrels of oil (of 45 gallons each) to varnish a 40 foot balloon, giving it three or four coats of the varnish? A. The quantity would be amply sufficient. 3. Would linseed oil, that is sold already boiled, do for a balloon varnish, just by painting it on the balloon when it is cold, or should I warm it up to some degree? A. No. 4. Do you think it improves linseed oil varnish to put beeswax in it when boiling, say about 1 1/2 ozs. to the gallon? A. No. Boil the oil with the addition of 1/2 lb. of borate of manganese (in powder), and about 5 lbs. of beeswax to the barrel, and apply to the cloth slightly warm. 5. Is it best to varnish the muslin once before it is cut, and once after the balloon is made, to cover the needle holes, or to put no oil on the muslin until it is all made up? A. Give it one coat before and one or two afterward. 6. Would the black gum waterproofs, that the ladies wear in damp weather, do for making balloons? A. The material will not answer.

(35) N. V. says: I have been trying to make ink according to the recipe on p. 250, vol. 34, SCIENTIFIC AMERICAN, and found that it washed off. I thought that perhaps there was too much of the sulphate of indigo, and I increased the quantities of nutgalls and coppers one half; but it still washes off. What is the difficulty? A. If we understand you, the ink in question was not intended to stand washing with water. Judging from your letter, you have nothing to complain of, as the ink as made by you from the recipe mentioned compares very favorably with the best inks of this character in the market.

(36) W. S. asks: In building a residence, is there anything that is of value as preventing conflagration from sparks on shingle roofs? A. There is an asbestos paint that is said to answer the purpose very well.

(37) A. E. R. says: 1. I desire to burn some of the old style burning fluid. How can I make it? A. Use alcohol mixed with one fifth of turpentine or benzene. 2. Will it be dangerous to use with a blow-pipe? A. It is not dangerous when used in suitably constructed blowpipe lamps.

(38) G. H., Jr., asks: 1. How would hard blue burnt brick, set endwise in cement mortar, answer for a public street with heavy traffic, if the brick resists a crushing power of 5,000 lbs. to the square inch? A. It is not resistance to crushing so much as resistance to impact that is required in a good paving material, and the latter quality is not possessed even by the hardest brick. The hammering process that the pavement of a busy thoroughfare undergoes would be fatal to the permanency of brick construction—the effect upon the brick being to pulverize its surface. 2. What effect would the hot and cold weather have on a layer of cement 1 inch thick under the brick, and 1/4 inch all round the sides of them, built in arch shape? A. When the cement is once set, it would not be materially affected by temperature.

(39) R. C. asks: How many degrees of Fahrenheit does it require to hatch chickens' eggs? A. From 104° to 106° Fah. is the proper temperature. You will find an article on this subject on p. 549 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 54.

(40) B. A. asks: Can you tell us the best method of making concentrated lye from ashes? A. Collect the ashes of well burnt wood, place them in a suitable vessel, and leach with water for several days, with occasional stirring. Then transfer the clear liquid to a suitable clean iron vessel, and boil off the water. Collect the impure carbonate of potash thus obtained, mix it with half its weight of slaked lime and 15 parts of warm water, stir for a few minutes, allow to settle, and pour off the liquid. This liquid constitutes common caustic lye. A lye may also be obtained by treating ordinary pearl ash or carbonate of soda (sal soda) with lime and water, as stated.

(41) J. A. L. asks: How can I make a photographic camera? A. The simplest form is a box with a pinhole in one end and the photographic plate at the other. The next higher order is to insert a convex lens in the end (where the pinhole is) with a focus equal to the length of the box. From this to as many as six lenses are used to constitute the optical part, these being arranged with diaphragms, rack and pinion, etc. The boxes (from the above simple form) have an endless variety of forms: the bellows, the swing front, the elevating front, the swing back in several varieties, then the multiplying box, in which from one to one dozen pictures

may be made at one sitting; and the shield which holds the plate has many modern improvements.

(42) E. D. F. says: I am constructing a filter of 11 pipes, made of cedar wood, packed very solidly with fine powdered charcoal, sand, and gravel. The water passes through 121 feet of filtering material which is arranged in sections which can be cleaned or renewed every month. Our river water is the worst in the United States, extremely muddy for six months in the year; but it comes through the charcoal as clear as from a mountain spring. I want to put a tank above the filter, square or oblong in shape. What metal shall I line it with, or of what material shall I make it? A. A cast iron tank would answer your purpose. Plates 18 by 18 inches and 18 by 9 inches are kept in stock for this purpose; they are provided with flanges around their edges, by means of which they are put together with bolts.

(43) S. G. says: Why is it that sewer gas finds its way through the traps into houses? Is it because the traps siphon? If so, what is it that causes the trap to siphon? Or does the pressure of the sewer gas force the water out of the trap, or forces its way past or through the water? A. To remedy the pressure of sewer gas, which forces itself through the water in the traps into the rooms of your house, let the main waste pipe extend without obstruction from the sewer up through the roof to discharge its surplus air into the atmosphere there. Then let the several articles of plumbing have branch waste pipes, and each one be trapped as near to its opening as possible. The upper part of said main waste pipe being only an air pipe, may be of much less diameter than the lower part, which it is necessary to have of larger dimensions.

(44) T. B. says: I recently had to put on a false valve seat on a locomotive. There had been one on before, but I put the new one on differently, leaving three of the old holes in the cylinder. I filled these with Babbitt metal hammered carefully; and I made the metal flush with the surface, put on the seat, and took all precautions to make a good job. When the engine went on the road she "blowed" badly, and continued to get worse, so much so that I had to take the seat off again; and when off, I found the Babbitt metal raised above the surface of the old seat fully 1/2 of an inch. Two of the old holes were between set screws 1/4 inches apart, and one between screws 2 1/2 inches apart, and the two were considerably higher than the one. Is it possible for the metal to expand so much as to cause that seat to leak? A. No doubt the leak was caused by the expansion of the Babbitt metal.

(45) R. M. says: I wish to sink a well in order to provide myself with wholesome water. At what distance must I keep from a privy well in rear of my house? The soil is very stiff clay, and I dug my privy well 16 feet deep to secure good soakage. A. Locate the well as far as possible from the cesspool, at least 50 feet from it. Let the well be 3 feet diameter in the clear after it is stoned up, and provide at the top two lengths of well-curb, 3 feet high each, to keep out the surface water. The depth of the well will depend upon the depth at which clear water runs in the ground in your locality. You had better employ a professed well-digger, who will contract to dig your well and stone it up at a certain price per foot in depth. The cucumber pump is highly spoken of.

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

G. H. M.—It contains pyrolusite (oxide of manganese).—H. B.—It is clay slate.—H. M. A.—It appears to consist principally of wood pulp, chalk, a little Vandyke brown, and glue.—J. F. I.—It consists principally of copper with some zinc. You should send larger specimens.—J. L. R., Jr.—It is marmolite, a variety of serpentine. It contains silicate of magnesia, magnesia, a trace of iron, and water. It is of common occurrence. It has been employed in the manufacture of Epsom salts, and, when in large, perfect pieces, as material for ornamental vases.—W. H. C.—It is galena—sulphide of lead—a valuable lead ore. It contains about 80 per cent of available metal.

COMMUNICATIONS RECEIVED.

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

- On Micro-Photographs, etc. By C. M.
On Combustion in Lamps. By A. K. S.
On Aerial Propulsion. By L. C.
On Squares and Cubes. By E. H. B.
On Lightning Rods. By J. M. M.
On the Ball and Jet Puzzle. By H. G. W.
On Kerosene Lamps. By E. B. W.
On Boiler Explosions. By D. R., and by G. B. B.
On Mountains in the Moon. By P. E. S.
On Steam Engine Economy. By W. A. M.
On the Gyroscope. By J. M. A.

Also inquiries and answers from the following: H. M.—P. W. C.—E. P. S. A.—W. H.—J. C. S., Jr.—C. J. K.—G. C.—G. M.—C. M.—F. R. N.—A. J.—N. J.—A. B. C.

HINTS TO CORRESPONDENTS.

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 rolls thin plates of spring steel, of large size and without flaws? Who makes castings to order? Whose is the best theodolite? Who makes the best recording pressure gauge? Who makes the best steam engine for running small machines? Who sells horse power pumps?" 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
March 20, 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, including Alarm and register, J. Corbett; Album, A. Foerster; Asphaltum, liquid, A. K. Lee; Bag fastener, H. Redden; Baggage check, R. F. Livermore; Bail ear, bucket, C. D. Seys; Bail ear for pails, etc., P. Miles; Bale ties, S. N. Drake; Bale tie, J. S. Durning; Bale tie, J. H. Fisher; Bale tie, J. M. Pollard; Bale tie, cotton, W. M. Smith; Baling press, W. S. Coates; Barrels, head lining for, L. Reed; Bed bottom, spring, Ogborn & Kendrick; Bedstead, sofa, F. A. Coleman; Bedstead, invalid, J. P. Beaman; Bench plane, Traut & Richards (r); Bill file, C. C. Chamberlain; Binder, temporary, L. Richoux; Blacksmith's machine, J. C. Tobin; Blast furnaces, charging, C. Himrod; Blue glass sun bath, H. M. Beidler; Boiler tube plug, T. R. Hand; Book binding, F. E. Schmitz; Box trimming machine, C. Bopp; Boxes, manufacture of, F. Zuenkeler; Brick, etc., coal slake for, B. H. Warburg; Bridge joint, T. Ruick; Brush, J. P. Poland; Buckle, B. F. Melton; Button tab, A. Berndt; Calendar, E. P. Morse; Can, metallic, R. T. Bush; Can top with opener, A. E. Whitehead; Car axle lubricator, H. Gardiner; Car, freight and stock, J. R. Maitland; Car coupling, J. A. Hinson; Cars, extension step for, C. W. Perkins; Cars, running gear for, L. T. Pyott; Carburizer, Pierce & Smiley; Card rack, J. P. Lamoree; Casting car wheels, W. Wilmington; Chandelier, extension, L. Hull (r); Check rein spread, etc., D. Schoonmaker; Check rower, W. Flaherty; Chimneys smoking, preventing, J. R. Bowers; Cigar bundler, I. A. Wilson; Cigarette mouth piece, J. R. Saunders; Clutch shaft gearing, W. Arianace; Coal washing machine, S. Stutz; Coin detector, counterfeit, J. Wiarda; Coin, means for packaging, H. Croggon; Coin tester, G. M. Hopkins; Collar box, metallic, G. K. Snow; Convicts' shackles, J. L. Quackenbush; Copying press, R. E. Kidder; Corn planter, M. O. Skree; Corn planter, Tatlock & Newby; Corn row marker, T. A. Cole; Corset, S. F. Follette; Corset, M. W. Henius; Cotton press, W. Golding; Cradle, G. Buchanan; Cultivator, Ellwood & Pitcher (r); Curtain fixture, J.-H. Strothman; Curtain roller, A. F. Temple; Ditching machine, T. N. & S. Turner; Door hanger, barn, J. H. Lawrence; Draft equalizer, Fowler & Flag; Draft equalizer, H. L. Phelps; Elevator bucket, F. C. Barber; Engine gearing, H. Stibbs; Eraser tip and pencil protector, G. W. McGill; Evaporator, I. W. Parmenter; Evaporator, salt water, H. C. Bowers; Faucet, H. Bradley; Feather renovator, J. C. Divers; Fence picket, corrugated, B. F. Miller (r); Fence wire, barbed, Glidden & Vaughan (r); Filter, V. Dordet; Fire arms, tool for, W. G. Rawbone; Fire escape, Lyness & Dunne; Fire kindler, O. A. Trevallee; Fishing trap, S. M. Davis; Flour chest and bread table, W. A. Baines; Fluting and smoothing iron, Crocker & Farns; Fluting machine, J. E. Wilson; Foot scraper and cleaner, Ellis & Willis; Fruit can, J. F. Merrill; Furnace for thawing leaders, W. R. Ostrander; Furnace feeder, E. F. Littlepage; Furniture spring, H. H. Holmes; Furrowing ground, N. C. Hammell; Gas, making, A. C. Lippitt; Gas retort, G. W. Todd; Gasoline burner, F. Marquart; Grain binder, E. Heath; Grain separator, H. Kurth; Grinding apparatus, etc., J. J. Lancaster; Hame fastener, C. F. Whipple; Harness breast plate, W. Dyer; Harrow, N. Burnham; Harrow, J. Garrett; Harvester reel, Weed & Bell; Hat, adjustable, I. Y. Cassiano; Heat, etc., storing, Hittell & Deitzler; Heater, E. Chadwick; Hinge, spring, J. M. Jones; Horse collar, C. H. Stevens; Horse hay rake, S. Ritty; Horse power, W. H. House; Horses, detaching, N. Dexter; Horses, hitching, A. B. Wroth; Horseshoe, J. B. Going; Hydrant, J. Richardson; Injector for steam boilers, J. Westley; Ironing apparatus, H. E. Smith; Knitting machine, C. H. Landenberger; Lamp, J. C. Mairs; Lamp, L. H. Olmsted; Lamp, C. Reistle;

Table listing inventions with patent numbers and names of inventors, including Lamp burner, A. Angell; Lamp chimneys, crimping, A. Harcum; Lamp fountain, W. A. Butler; Lamp, miner's, J. J. Weibel; Land roller, L. M. Stegner; Lapping machines, J. Batty; Lawn sprinkler, J. S. Heacock; Lever clamp, V. Yantis; Lifting jack, carriage, etc., G. S. Jones; Light house signal, C. G. Van Otter; Line fastener, J. Thomas; Lock and chain fastening, C. Parham; Loom shuttle, C. W. Anderson; Loom shuttle, A. Wright; Loom temple, Porter & Clark; Loomshuttle box motion, J. Long, Jr.; Lounges, J. J. Coburn; Lubricating compound, P. M. Papin; Magazine fire arm, J. W. Keene; Mangle, H. E. Smith; Mechanical movements, J. A. House; Metal working machine, R. Bandhauer; Milk strainer, J. A. Preston; Millstone dress, diamond, Wilhelm & Davis; Mitering machine, Mosher & Pennington; Motor, E. McCaffrey; Mucilage holder, S. S. Newton; Oil cabinet, J. A. Wright; Oiler nozzle, S. S. Newton; Ore feeder, quartz mill, G. A. Church; Oven, A. Crumlie; Packing, hydraulic, C. E. Boardman; Packing for man holes, etc., A. Powell; Paper, buffing roll for, A. D. Pool; Paper pulp washer, G. L. Lovett; Paraffin wax, purifying, F. X. Beryley (r); Pavement, concrete, L. S. Filbert; Pavement, concrete, A. K. Lee; Peggingawl handle, A. U. McDonald; Pencil, pocket, D. M. Somers; Piano action, Wessell, Nickel & Gross; Pianofortes, stringing, P. Brenner; Pick eyes, forming, Jordan & Kenold; Plaiting board, Young & Calvert; Planter, L. Scofield; Plow, E. D. French; Plow, E. Wiard; Plow, gang, H. H. Canaday; Plow shoe, M. H. Walker; Pocket book clasp, S. F. Clement; Post office box, J. B. Harlow; Potato vines, sprinkling, J. Williams; Preserving meat, etc., T. Sim (r); Privy seat, R. A. Van Court; Pruning shears and saw, T. S. Diston; Puddling furnace, rotary, J. I. Williams; Pump, Olsen & Thuesen; Pump, L. D. Rallsback; Pump, J. J. Stuart; Railway chair and tie, N. S. White; Railway gate, S. P. Boston; Railway rail, J. Foster; Ratchet brace, W. B. Smith; Reefing sails, O. W. Atwood; Refrigerating shipping box, H. A. Duc, Jr.; Refrigerator, G. A. Banta; Refrigerator, J. J. Bate; Refrigerator, H. E. Fuller; Refrigerator and filter, A. McClain; Rein holder, W. Callaway; Rice cleaning machine, J. Carter; Roaster and warmer, H. S. Graham; Rolling metal, W. Bunton; Rolling mill, P. McGann; Salt boilers, rake for, J. E. Secord; Sash holder, H. C. Gladding; Scales, weighing, H. Willard; Scissors, A. W. Coates; Screw, J. Pleukharp; Screw cutting die stock, J. Hochheimer; Screw tap, M. C. Johnson; Seaming machine, W. Hipperling; Sewing machine, O. S. Hazard; Sewing machine, D. Porter; Sewing machine glove, H. P. Henriksen; Sewing machine needle, L. Loeske; Sewing needles, pointing, P. M. Beers; Shears and scissors, A. Delkescamp; Shirt, O. H. Keep; Shirt, G. P. Marvin; Shoe bottoms, etc., forming, E. M. Dickinson; Sickle grinder, W. S. Ingraham; Sickle sections, tempering, S. F. Reynolds (r); Signal lantern, H. E. Pond; Sink and sewer trap, J. H. Mackie; Skirt supporter, C. V. Richards; Skylight, Specht & Spieler; Slate and scholar's companion, W. D. McCormick; Sleigh runner, wagon, T. Grissinger; Smoke consuming furnace, H. Young, Jr.; Snap hook, E. P. Brennan; Spice box, H. J. White; Steam generator, H. C. Bowers; Stone composition, M. Nolan; Stone, compound for, C. Schaffer; Stove cover, G. N. Bacon; Stove drum, J. Hacker; Stove for heating sad irons, R. Martin; Straw cutter, Larsen & Olsen; Stump extractors, A. McKenney; Suppository mould, H. W. Comstock et al.; Suspenders, J. Betts; Textile material, etc., cutting, A. Warth; Thill coupling, Farrell & Borst; Thill coupling, Owen & McIntock; Time lock, L. A. Haines; Tire tightener and jack, Comstock et al.; Tobacco and cotton press, A. Talbot; Tobacco hanger, J. G. Hester; Tobacco pipe cover, G. Havell; Toilet washing powder, R. Sommers; Toy, educational, E. S. Fisher; Toy, jumping, G. Boeringer; Toy money box, L. C. Hoffmeister; Truck safety car, D. E. Dutrow; Tubing, armor for flexible, H. Wakeman; Valve, relief and safety stop, C. P. Wiggins; Vehicle axle, P. F. White; Vise, W. E. Sneider; Wagon bed and hay rack, J. M. O'Neill; Wagon dumping, R. A. Reed; Wash board, J. H. Lapham; Wash board, W. Serviss; Washing machine, P. H. Cooney; Washing machine, J. Kiehle; Washing machine, G. D. Luce; Washing machine, J. Taylor; Water closet, H. J. Bailey; Welding chain, die for, Schinneller & Fitzpatrick; Wind wheel, J. A. Allen; Wood polishing machine, Bridgman & Perry; Work box, W. Huntress; Wrench, J. A. Dodge;