RECENTLY PATENTED INVENTIONS.

Engineering.

STEAM BOILER.—Philip J. and Fred. W. Doll, La Salle, Ill. This is an upright tubular boiler, with tubes leading from the fire box in the lower part of the casing to a smoke box in the upper part below the water line. The smoke box is shaped like the frustum of a cone, and supports a conoidal bonnet of cast iron, which does not radiate much heat and may be easily removed when burned out, the smoke box proper being protected by the water, and the products of combustion therein assisting to generate steam. The boiler is designed to be inexpensive, extremely durable, and very effective.

FURNACE DOOR.—Charles W. Reneau, Meridian, Miss. The door opening, according to this invention, has a lining provided with transverse ribs on its sides, whereby air spaces are formed between the sides and the wall of the opening, and the door itself has an air inlet and an air space opening into the air spaces at the sides of the lining, a shield covering the interior opening of the lining. The sides and ends of the door lining are made separate, to facilitate replacing any of the sections as they may be burned out, without disturbing the others.

MOTOR.—Frank W. Clark, Mount Desert, Me. A vertical shaft connected with the machinery to be driven has a forked upper end supporting a plate engaged by a shaft provided with a weighted arm and adapted to swing, the upper end of the latter shaft being journaled in a swinging lever and pressed upon by springs. The device is designed to uniformly transmit motive power, through a continuous rotary motion, from the driving machinery to machines to be driven.

VALVE.—Thomas P. Ford, Brooklyn, N. Y. This is an improvement on a former patented invention of the same inventor, providing a valve of simple construction which works automatically to introduce a lubricant when the pump is running. The invention comprises a valve carrying a piston controlled by fluid pressure, and a lubricator having a valve controlled by the piston, so that when the valve is seated the lubricator is shut off, and when the valve is unseated the lubricator feeds the lubricant.

Electrical.

CONDUIT FOR BUILDINGS.—James J. Powers and Robert Van Buren, Brooklyn, N. Y. This is a conduit of baked clay forming an integral part of the wall, floor, or ceiling, and is of built-up sections, each having apertures to receive wires, collars around the apertures at one end of a section being received in recesses at the opposite end of each section. The conduit may be placed in a building and the wire omitted for any length of time, the sections being made of suitable proportion for laying along with the brick in a wall, and left unglazed on the exterior, with a rough surface to adapt it to receive and hold mortar. The construction admits of readily changing the wiring when necessary.

ELECTRIC BELT.—Adolf Stephenson and Jonas Backstrom, Stromsburg, Neb. This is a belt to be worn on the person for remedial purposes, and is formed of elastic webbing, with a lining of flannel, provided with a series of studs or buttons of copper and zinc, the metals alternating with each other, and the larger portions of the buttons being in contact between the flannel linings and the elastic webbing. The shoulder straps connected with the belt are also provided with similar buttons, the convex portions of which are in contact with the skin when the belt is worn, and there being electrical connections to complete the circuit.

Miscellaneous.

TREATING REFRACTORY ORES.—Charles J. Fauvel, London, England. This is a method of treating ores having precious and other metals, to oxidize and eliminate the associated sulphur, arsenic, antimony, and tellurium compounds, by subjecting the crushed ore in a fine, free-falling stream to increasing degrees of radiant heat and a reversely flowing current of hot air and steam, out of reach of contamination with the furnace gases, the particles of incandescent ore being then quenched in cold water to split up the particles, remove scale, and generate steam to assist the oxidizing and desulphurizing action of the air. The improved process is preferably carried out by means of a furnace formerly patented by the same inventor.

MAKING SULPHURIC ACID.—Francis B. Hacker, Charleston, S. C., and Peter S. Gilchrist, Baltimore, Md. A sulphuric acid apparatus is provided by this invention with improved connections between the several lead chambers, the lead chambers and the Glover tower and between the chambers and the Gay Lussac tower, to reduce the usual chamber space and cost of plant, increase the quantity of acid, carry off the excessive heat caused by the mixing of the gases, and provide for the quick and thorough mingling of the gas molecules as they pass from chamber to chamber.

SHUTTER WORKER.—Thomas N. Lupton, Winchester, Va. This invention provides a simple and compact construction whereby the shutter may be opened or closed from within the room, and locked and unlocked in both its open and closed positions without requiring the window to be opened. A shaft extending through the window frame, and provided with a handle within the room, has a connection with the hinge of the shutter involving a novel construction and combination of parts, whereby the shaft may be easily turned to open or close the shutter. The construction is such that the shutter may be easily lifted off when necessary.

WOOD TILE FLOORING.—Antonio Salvatico, Garessio, Italy. The tile, according to this improvement, is preferably of wood, and may be of any desired shape or thickness, the tiles being laid close to one another at their upper faces, and tongued and grooved on their edges, and also grooved or channeled on their lower faces in such manner as to receive a cement or glue to hold the blocks firmly on any bed prepared to receive them, the engagement between the tiles and their support being such that the floor will be practically soundless.

CLOTHES POUNDER.—Samuel and Frederick G. Davis, Las Vegas, New Mexico. This is a device having a circular, apertured, bell-shaped body, not to be used as a pounder, but to be alternately pressed down upon and raised from the clothes, forcing and drawing the water through them, the action being facilitated by the arrangement of the air chamber and holes, so that a brisk circulation is kept up as long as the device is operated, thus washing or rinsing the clothes without injuring them.

OVEN DOOR.—Walter R. Webster and James Hamilton, Pine Grove, Cal. This is a door with a window, especially designed for stove and range ovens. It is so made that the edge of the glass will be kept comparatively cool, and the whole body of the glass will be evenly heated, and thus prevent breaking. With this view the glass is supported and held in an asbestos or other non-conducting flexible packing, in such manner as to allow for its expansion and contraction, while a free circulation of air is provided for around the edges of the glass, which nowhere comes in direct contact with the metal.

REED PUFF FOR FURNITURE.—Charles Bush, Newburg, N. Y. A strong, durable, and inexpensive ornament for furniture is provided by this invention. It is a reed puff fabric made by clamping a series of reeds around a former to bend them into proper shape, and while the reeds are so clamped beveling their inner faces at the ends, finally flexibly connecting the beveled ends of the series. The construction is such that a piece of the fabric of suitable length may be made to inclose a rod or other part of a piece of furniture and form an ornamental puff or figure thereon.

HOLDER FOR CUFFS, ETC.—Richard Katzer, Brooklyn, N. Y. This is a compact case of durable construction more especially designed for the use of travelers, for conveniently holding cuffs, collars, scarfs, neckties, handkerchiefs, etc. Supported on its folding or bellows sides is a series of longitudinal partitions forming separate compartments for the articles to be stored, which are thus kept in a flat condition, room being provided for a large number of articles without rendering the holder bulky.

BICYCLE.—George F. Case, Medina, N. Y. A spring-cushioned connection between the frame of the machine and the driving wheel is provided by this invention, to render the riding more comfortable over a rough road, while the driving wheel is held at all times in proper alignment with the frame with which it is connected.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

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Notes & Queries

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References to former articles or answers should give date of paper and page or number of question.

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(5355) P. J. L. writes: I am making an instrument in which I wish to use a magnetic force of some distance attraction. It is desirable to have this attractive force of as even draught as possible. I find that by removing the core from a magnet (coil) I have a magnetic force exerted upon a piston head of soft iron working through this core hole which observes the center of the coil hole, but the force is weak. Will you inform me whether I can increase this force by use of a hollow iron core, and how this core should be made? Should it be a complete cylinder or be slotted or severed in the side? Should it have head on closed end? A. In Thomson's "Electromagnet" you will find the subject of obtaining a long range for a magnet discussed. In general terms use a loug magnet core. The easiest way is to employ equalizing levers or cams. We can supply the book, small edition, $1; last edition, enlarged, $6 by mail.

(5356) B. C. W. says: I have an amount of steel fittings that I have to braze with brass spelter, and I have great difficulty in cleaning the borax off afterward, that I use as flux, as the work is of an awkward kind to get at. Is there any other kind of flux that can be used, or is there any kind of acid that will soften the borax in any way? A. There is nothing so good as borax for brazing. The borax can readily be dissolved and removed by boiling the articles in sulphuric acid pickle, 1 part acid, 4 parts water, in a copper pan for a few minutes, then wash with clean hot water and dip in hot soda or lime water to keep the articles from rusting.

(5357) H. C. L. asks: 1. I have heard that there is a new metal which expands more than any other. What is it called? How much would 36 inches expand to a degree of heat? A. Zinc is the best accessible metal for expansion by heat. A bar 36 inches long will expand 0·0006 inch per degree. 2. What is the price of lithium per pound? A. $1 per grain, or $7,000 per pound. 3. What is the rule to find the fifth root of a number? A. Take the square root of the cube root. It is better to do it by logarithms.

(5358) Deutsche Continental-Gas-Gesellschaft in Dessau write: Please tell us in Notes and Queries of your valuable paper the relation between the B. T. U. of heat and the calorie as being in general use in this country. We learn from an article in your contemporary, *American Gas Light Journal*, that the Pittsburg gas has a heating power of 434·3 B. T. U. of heat per cubic foot. Now, what we want to know is, how much is that in calories per cubic meter? Is it that the B. T. U. of heat means the quantity of heat needed to raise the temperature of one pound avoirdupois of water 1° Fah.? Also the relations between the electrical units used in the United States and our ohm, kilowatt, farad, and others? A. The calorie in terms of the British unit is 1·8° Fah. and $2\frac{2}{10}$ pounds water, or a ratio of 1 to 1·222. Then a cubic meter being 35·31 cubic feet multiplied by 434·3 B. T. U. per cube foot $= \frac{14880 \cdot 133}{1 \cdot 222} = 12136$ calories per cubic meter. The B. T. unit being 1 pound of water raised 1° Fah. The electrical units are identical for all countries.

(5359) W. S. W. asks (1) if there is such a thing as vegetable ivory. A. Vegetable ivory is part of a nut; the nuts are a regular article of importation. 2. What can be used to dissolve it? A. It cannot be dissolved.

(5360) H. W. D. writes: Will you please inform me in your Notes and Queries the candle power of the light used in the largest of the search lights on the Manufactures and Liberal Arts building at the World's Fair, Chicago? A. The large search light on the Manufactures building gives a light equal to 45,600 candles.

(5361) B. & H. ask: Will you kindly inform us through the columns of the SCIENTIFIC AMERICAN how paper is made that the atmosphere will cause it to change color? A. Saturate paper with a solution of cobalt chloride. The color will change with the change of moisture in the air.

(5362) S. G. S. writes: 1. Please tell me what makes my well pump squeak and howl so. I am using an all-brass cylinder and only a stuffing box at top of connecting pipe, instead of a pump standard. It is attached to a windmill, and in spite of all I can do it howls whenever it moves. I thought it was in the stuffing box, but I at last located it in the cylinder. The rod that connects plunger of pump and mill is perfectly straight and no crooks in side of pipe. It has been told me that the brass being sonorous caused this noise in some kinds of water. A. The squealing of deep well pumps is generally due to the pressure of the cupped leather packing against the sides of the cylinder and possibly to hard water for the lubricant. A long connecting rod also adds to the noise by its elasticity, giving a jerky motion to the piston. 2. Can a 2½ inch cylinder draw water 1,500 feet through a 1 inch pipe when the rise is only 15 feet? A. The 2½ inch pump cylinder should draw the water through 1,500 feet of 1 inch pipe if well charged with water to start with. No more than 3½ gallons per minute can be drawn through it, from the increased head due to friction. We recommend a larger pipe, 1¼ or 1½ inch. 3. I have a range boiler back of my stove, and the tank that supplies said boiler is only about 5 feet above the top of boiler, and an air trap has formed somewhere, so at times I get no hot water in bath room. The pipes are air tight. How does this air get in and how can I get it out? How high should my supply tank be above the boiler in order to have pressure enough to overcome the air trap? A. The air in the boiler is liberated from the incoming fresh water by heat and probably accumulates in a siphon leading to the bath tub. The tank is too low and does not give pressure enough to overcome the air trap. No details of the run of the pipe being given, we cannot decide as to proper height of tank to overcome the air trap. 4. Where can I get suitable tables or books to give me the amount of friction of water in the pipes? A. Haswell's "Engineer's Pocket Book" gives details of computation for friction in water pipes, $4 mailed.

(5363) J. G. H. writes: I have a launch, hull 22 feet over all, 19 feet l. w. l., 4 feet 10 inches beam, and about 18 inches draught. I wish to fit her up for steam and would like to know the following: What horse power will I require to get a fair speed out of her, and what speed do you suppose I will get with the horse power recommended? What should be the size of engine, simple slide valve, and also size of steeple compound? I have a 4×4 simple slide valve offered me, but I did not know what horse power would be required. Also would you recommend one of the boilers mentioned in SUPPLEMENT, No. 702, which one, and how much larger it would have to be made to get the horse power required? Also the diameter and pitch of propeller for this size boat and about the number of revolutions. Also about the weight of the boiler recommended, and about what would be the extreme weight allowable for this size boat, for boiler and engine. As the boat is made of galvanized sheet iron, would ask if the hull will affect the compass? If so, how can I remedy the same? A. For power you will need 4 indicated horse power with steam at 100 pounds pressure to make 8 miles per hour. Single cylinder, 3¼ inches diameter, 4 inches stroke, making 320 revolutions per minute, propeller 20 inches diameter, set as low as possible or just under water at light load. Pitch of propeller 36 inches, 3 blade. We do not recommend a compound engine for so small a boat. It is too complicated for comfort. The 4×4 will be a good engine, if it is light and compact. It will give the required power with less pressure than 100 pounds. The boilers in SCIENTIFIC AMERICAN SUPPLEMENT, No. 702, if made large enough, would occupy too much room. A submerged vertical tube boiler, 22 incnes diameter, 36 inches high above the base, 33 tubes 1½ inch, weighing about 330 pounds, which with the engine and water in boiler will bring the weight up to about 650 pounds. The iron hull and machinery will deviate the compass to a considerable extent, which will be counteracted by setting the compass within an iron ring.

(5364) Conductor, Galveston, writes: Will you kindly give a receipt for making a dip for renewing uniform brass buttons that have become tarnished? A. Remove all traces of lacquer and dirt from the buttons with strong caustic soda water. Wash in hot water and dip in strong nitric acid for from 3 to 6 seconds and immediately dip in boiling hot water, dry and lacquer while hot with thin shellac varnish.

(5365) W. G. R. asks: What horse power boiler will be required to heat a house 45×38 and ell 18×30, two stories high, and two rooms in attic 14×18? Also amount of steam pressure. How do you compute the above? Is there any way of maintaining a pressure on water pipes so as to have running water in second story without having a supply tank overhead? If so, what is it? A. Assuming that your ceilings average ten feet high and for the winter climate of Vermont, you will need a 5 horsepower boiler having a fire heating surface of 75 square feet. From absence of details we assume the house to contain 50,000 cubic feet of space, which requires one square foot of radiating surface in rooms for each hundred cubic feet of space, variable according