

lower levels, the air always seeking the highest points in the system of mains. This is called an air trap.

(510) E. L. B. asks: How many ohms of resistance will one volt of E. M. F. overcome? I can read up all about one unit and all about the other unit, but cannot ascertain the relation between the two.

(511) C. T. H. asks how to calculate the size of wire on armature and field magnets of electric motor with any given E. M. F. A. For a peripheral speed of armature of about 1,500 feet per minute, and as an approximation, for every yard of wire in its winding, one volt E. M. F. may be allowed for.

(512) V. M. C. asks: How must I proceed to obtain a cast of solid metal, say of silver, of a bug, beetle, or similar insect? The idea is to embed the object in some plastic refractory material, then burn it out, and pour the molten metal through holes provided.

(513) M. C. J. and L. J. S. ask how marble that has become stained so that it looks dirty can be whitened. A. Scrub it with ground pumice stone and water.

(514) H. N. asks how table oil cloth may be made. A. Size it with weak glue solution and paint with best lead paint, mixed with a little varnish.

(515) A Subscriber asks why they don't use emery paper on an electric motor. A. Emery is a bad material to use on any frictional surfaces or bearings in any class of machinery, as it beds itself in the metal and cuts the journals, etc.

(516) J. H. A. writes: I wish to take a plaster cast from a plaster ornament, but have trouble in separating same. Can you tell me what to use on the original so that they will admit of free separation? A. Oil the mould with olive or similar oil.

(517) T. O. M. asks: Will the telephones described in SUPPLEMENT, No. 142, work a distance of ten miles? A. No; you will need a microphone transmitter.

(518) N. W. H. writes: In your SCIENTIFIC AMERICAN of February 18, 1888, you give the population of London, England, for 1888, 3,955,819. Swinton's geography gives the population of same city for 1880, 4,764,000. Has the city decreased in population, or have you made a mistake? A. Our figure was correct.

(519) E. H. J. asks: 1. Please give origin and history of three golden balls as a pawnbroker's sign. A. The coat of arms of Lombardy contained three spheres, and is said to have been the origin of the pawnbroker's sign.

(520) J. S. writes: I have constructed an eight lamp (16 c. p.) dynamo-electric machine, according to instructions given in SCIENTIFIC AMERICAN

SUPPLEMENT, No. 600, by G. M. Hopkins, but have failed to generate any current from it. The instructions given have been strictly followed. The machine runs well as a motor with four Grove cells.

(521) F. B. W. writes: Will you kindly inform me through your paper the process of making blue print paper—body white, lines blue? I have seen it in your paper, but cannot turn to it.

(522) J. G. W. writes: I am building an eight light dynamo as described in SUPPLEMENT, No. 600. 1. I wish to use it for an arc light; which is the best winding for it—series or shunt? A. For arc lamp wind in series.

(523) J. V. L. P. writes: Can you tell me what has been found efficacious for removing mildew from brickwork? A brick building near here has presented about 100 square feet of mildewed surface on one of its gable ends ever since it was built, some eighteen months since.

(524) A. L. K. writes: A shunt-wound incandescent dynamo, voltage 1,200, current 5 amperes, furnishes light for 100 16 candle lamps, wired in series. Each lamp has 2 1/4 ohms R. and consumes 1 1/2 volts.

(525) "Reader" asks: Is not the field for invention nearly exhausted? Do you know of any opportunities still open for one with an inventive turn of mind? A. The opportunities are endless; the field is rather increasing than diminishing.

(526) P. V. M. asks whether common pine wood or any wood could be made to answer for cores in casting Babbitt or lead. If not ordinarily, could it be made good by any solution? A. Boil the wood for a few minutes in a strong solution of sulphate of iron, dry, and whitewash with lime and again dry, for each cast.

(527) A. A. asks if there is any method to separate alkali from water to make it suitable for drinking. A. Distillation is the only efficient method.

(528) B. & Co. ask for the best methods of quickly bleaching ivory. A. Treat with solution of binoxide of hydrogen. Exposure to the sun while immersed in spirits of turpentine is said to be efficacious.

(529) H. A. W. asks: Kindly state between what zodiacal constellations and the sun are the planets Saturn, Uranus, and Neptune when passing the perihelion point of their different orbits.

(530) E. J. K. writes: Will you give formula for adhesive plaster that is unaffected by moisture and is as inert, medicinally, as possible? What is wanted is something that will stick to the body well.

(531) F. H. S. writes: At any time during clear weather, when the temperature is below the freezing point during the night, but not sufficiently

low as to "freeze over" the water of a river or creek, at no time before sunrise can a particle of ice be seen upon the surface of the water, while in a short time after sunrise, the stream, as if by magic, is filled from shore to shore with floating particles of ice, commonly called slush ice.

(532) J. S. B. writes: To settle a dispute, will you please tell me, if you should pass an electric current through a chemically pure copper wire, would there be any difference in composition (i. e. would it still be chemically pure) or structure? I think that an electric current would not alter the composition or structure, unless the wire was so small as to cause heating.

(533) E. H. D. writes: Is there anything in benzine that will injure the teeth? If not, it is certainly a great cleanser. How can it be purified from its peculiar taste and smell? A. Benzine will not injure the teeth, but is not adapted for cleaning a wet surface, and its vapor, if inhaled, would tend to produce toxic symptoms.

(534) G. S. D. asks: 1. Why is it that you can place your hand on the bottom of a boiling tea kettle and it will not burn you, only feeling warm to the naked hand? A. If the bottom of the kettle is coated with a non-conducting substance, such as lamp-black, the heat will be prevented from reaching the hand in some measure.

(535) H. B.—Condensation of natural gas to a liquid is impracticable on the large scale, and cannot be accomplished on the small scale without extreme reduction of temperature.

(536) S. H. M. writes: Please be kind enough to explain the following phenomena of the water hammer: 1. When friction is applied to the tube, the bulb at the upper end being full of water, all but a bubble, a sort of boiling takes place through the contracted tube immediately below the bulb?

(537) M. K. writes: Considerable annoyance is caused in our bleaching works by the soda imparting to the materials to be bleached a reddish tinge, which is very positive in its resistance to the bleaching agent—chloride of lime solution.

Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

TO INVENTORS.

An experience of forty years, and the preparation of more 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 unequalled facilities for procuring patents everywhere.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

March 5, 1889,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions such as Air brake, Pritchard & Templon; Amalcamator, electric; Ammonia as a motive power in engines; Ankle supporter, R. H. Golden; Axle, vehicle, C. B. Brown; Bag holder, W. R. Burrage; Ballot box, C. M. Taylor; Bath; Battery; Beer, apparatus for the pasteurization of, C. F. Koehler; Belt fastener, J. Snow; Bicycles, luggage carrier for, H. S. Credlebaugh.

Table listing inventions such as Billiard tables, device for leveling, H. C. Berry; Bin; Blankbook tool, J. C. Forman; Block; Book, combination bank, W. H. Benson; Book, receipt and record, H. Loewenbach; Boot or shoe, G. F. Butterfield; Boot tree, J. D. Spiller; Bottle stopper, W. P. Crary; Bottle stopper, R. Henkman; Box, See Ballot box; Paper box. Tobacco box; Box fastener, J. W. Shaw; Braces or suspenders, S. Frank; Brake; See Air brake; Vehicle brake; Brake block, R. H. Lanyon; Brake shoe, G. Westinghouse, Jr.; Brick machine attachment, P. G. Benson; Brick mould, A. McLean; Bridge, trussed suspension, G. M. Weldin; Broom maker's thimble, D. W. Albert; Bung, Schwemberger & Groeschel; Burner. See Gas burner; Vapor burner; Butter cutter, H. M. Cain; Buttonhole strips, making, H. W. Lyon; Cable conduit curve, W. Haddock; Cable grip, W. Haddock; Calculating machine, coin-operated, F. W. Brooks; Camera shutter, Shakespeare, Jr., & Low; Car coupling, T. O. McMurtry; Car driving mechanism, street, J. McLean; Car, electric, H. W. Smith; Car heater, railway, W. Burnett; Car ventilator, automatic, W. G. Creamer; Carpet fastener, T. D. Hammond; Carpet sweeper, W. J. Drew; Carriage tufts, machine for making, L. P. Warner; Carrier. See Cash and parcel carrier; Hay carrier; Package carrier; Wood carrier; Cart, road, E. R. Lawrence; Cartridge, S. H. Emmens; Case. See Clock case; Vaporizing case; Cash and parcel carrier, Clark & Crossley; Cash indicator and register, C. E. Lord; Cash indicator and register, Schickner & Marty; Cash registering device, O. C. Retsloff; Chair. See Convertible chair; Folding chair; Cheese presses, attachment for gang, W. L. Beaton; Chimneys, ventilating top for, T. J. Nicholson; Chisels, die for making, J. Swan; Cigar lighting device, electric, Tag & Smith; Cigar moulds, die for stamping metallic, G. D. Elges; Cigars, filler material for, R. A. Bright; Cigars, preparing filler material for the manufacture of, R. A. Bright; Clay pulverizer and conveyer, J. Evans; Clock case, A. D. Tyrill; Clock, electric alarm, Kahana & Craven; Clock, self-winding electric, F. W. Brainerd; Closet. See Water closet; Cobalt matte from cobalt ores, producing, W. Brandreth; Coin adjuster, G. McLoughlin; Column, plate metal, Mesker & Edwards; Comb. See Curry comb; Comb, H. G. Guild; Convertible chair, B. C. Odell; Conveying apparatus, J. C. Martin; Conveying grain, ice, coal, etc., device for, McBride & Fisher; Copies of writings, apparatus for obtaining duplicate, C. A. Thompson; Cotton, ginning, J. C. Osborn; Cotton openers, etc., evening mechanism for, J. C. Potter; Coupling. See Car coupling; Thill coupling; Crock press, F. Bennett; Cultivator, C. H. Gage; Curd mill, R. H. Casswell; Curry comb, W. R. Davis; Curtain fixture, J. Steinhagen; Cut-off and reversing gear for engines, C. Fox; Cutter. See Butter cutter; Dental tool, combination, J. J. R. Patrick; Dental tooth regulating screw, E. H. Angle; Display frames, rest for, R. Faries; Distilling petroleum, G. H. Perkins; Door handle, sliding, Scheer & States; Door spring and check, Ayton & Hill; Draught regulating device for stoves or furnaces, M. Schneider; Drag and harrow, J. R. Goodman; Drawing apparatus, D. K. Wade; Dress form, F. W. Brown; Drill. See Rail drill; Drill, E. L. Frantz; Drilling machine, multiple, R. Hammond; Dust pan, R. F. Bailey; Dye, making a yellow, J. Walter; Edge setting machine, J. E. Drake; Egg crate, Smith & Firestone; Electric circuit interrupter, L. E. Lecoultré; Electric current regulator, J. W. Balet; Electric machine, dynamo, J. H. Robertson; Electric machine, dynamo, W. L. Silvey; Electric machine regulator, dynamo, J. F. Kester; Electric motor, O. Lugo; Electric regulator, F. C. Wagner; Electric switch, L. W. Dillon; Electrical distribution, regulation for systems of, L. B. Stillwell; Electrical distribution, regulator for systems of, L. B. Stillwell; Electrical treatment, couch for applying, Schmalz & Faulkner; Elevator. See Rotary elevator; Elevator speed regulator, W. E. Nickerson; Engine. See Ammonia vapor engine; Hydraulic engine; Pulp engine; Rotary engine; Steam engine; Engine shafts, electric signal for, J. C. Micketson; Farm gate, G. N. Ball; Fastener, A. L. Colton; Feathers for dusters, machine for preparing, J. J. Sands; Feed regulator, J. Dawson; Feed water heater, J. L. Hunter; Feed water purifier and heater, W. H. Smith; Felt hardening machines, cone or former for, J. & D. Pendergast; Fence, E. Potter; Fence making machine, W. A. Hawley; Fence post, T. Dailey; Ferric carbide, purifying, H. Rimmer; Fifth wheel, J. M. Williams; Filter, H. W. Grelle; Firearm, breech-loading, L. H. Smith; Firearms, luminous sight for, H. H. Grenfell; Fire clay heater, G. W. White; Fire escape, C. M. Fowler;