

Chief Engineer's Office, U. S. Navy Yard,
WASHINGTON, November 18, 1874.
Commodore Thos. H. Patterson, U. S. N., Commandant:
SIR:—In obedience to your order of October 5th, 1874, to carefully test the **EMPIRE PORTABLE FORGE**, manufactured at Troy, N. Y., I have the honor to submit the following report:

This is a very excellent and convenient forge. It works easy and with but little noise, and the power being applied with a lever, it can be worked without interfering with the manipulation of the fire.

I can recommend it as a very useful tool for work on ship board or shop use.

Very respectfully, your obedient servant,
[Signed] EDWIN FITHIAN,
Chief Engineer, U. S. N.

Business and Personal.

The Charge for Insertion under this head is \$1 a Line.

Agricultural Implements, Farm Machinery, Seeds, Fertilizers. R. H. Allen & Co., 159 & 191 Water St., N. Y.

Magic Lanterns, Stereopticons of all sizes and prices, for Parlor Entertainment and Public Exhibitions. Pays well on small investment. Catalogues free. McAlister, Man'g. Optician, 49 Nassau St., N. Y.

Thomas's Fluid Tannate of Soda never fails to remove Scale from any Steam boiler; it removes the scale-producing material from all kinds of water; cannot injure Boiler, as it has no effect on iron; saves 20 times its cost both in Fuel and repairs of Boiler; increases steaming capacity of Boiler; has been tested in hundreds of Boilers; has removed Bushels of Scales in single cases. It is in Barrels 500 lb., ½ Bbls. 250 lb., ¼ Bbls. 125 lb. Price 10 cents per lb., less than ½ price of other preparations, and superior to all others. Address orders to N. Spencer Thomas, Elmira, N. Y.

Makers of all kinds of Ice-Making Machines, send address to A. J. Davis, Watertown, Jefferson Co., N. Y.

For price of small copper boilers to drive small steam engines, address, with dimensions, and enclose stamp to Geo. Parr, Buffalo, N. Y.

For Sale—A Patent for Family Use. Address Asa F. Tarr, Lockport, Mass.

We will sell the right to U. S., or less, for the best Carpet Stretcher in the world. Cheap. Now is the time to introduce it. Address "Patent," Room 1, No. 159 Dearborn Street, Chicago, Ill.

We wish to communicate with a first class man, who can sell, legitimately, State rights to an invention tested satisfactorily five years. No competition, and needed in every house, new or old. Universally praised. Sells rapidly. Profitable. Cannot handle all U. S. Engaged in publishing. Capital locked up elsewhere. Will bear strict investigation. Wilson, Pierce & Co., 182 Clark Street, Chicago, Ill.

Geo. P. Rowell & Co., of New York, are eminently respectable and honorable advertising agents with whom this establishment, as well as similar ones in the country, have transacted business for years with mutual profit and pleasure. From meagre beginnings, Rowell & Co. have built up an extended business, and are evidently still prospering. Indeed, their success has bordered on the marvelous. (Journal, Lockport, N. Y.)

Wanted—Parties to manufacture a first class Sectional Safety Boiler. Terms liberal. Profits large. Address S. T. Russell, Springfield, Ohio.

The Whitmore Engine, 4, 5 and 10 H.P.—Cheapest, best, and safest. Vertical Tubular Boilers, all sizes, at reduced prices. Lovegrove & Co., Philadelphia, Pa.

Wanted—To correspond with parties wishing an experienced Machinist to take charge of their works, as Foreman or Master Mechanic. Address Machinist, 32 Union St., Indianapolis, Ind.

For Sale—Entirety or State Rights of Patent for first rate, practically tested Ice-creper. Address G. F. Lemmon, Long Branch Boat, Pier 8, N. R., New York.

Largest Lot Lathes, Planers, Milling Machines, Screw Machines, Drill Presses, Edging Machines, Gear Cutters, Grinders, etc., built for Sewing Machine Business, for Sale. Visits solicited. Hull & Belien Co., Danbury, Ct.

Wanted—A Foreman to superintend an Iron Foundry. Must understand all its branches and the management of men, and bring unexceptionable references to J. S. L. Wharton, S. E. cor. 15th & Wood Sts., Phila. Pa.

Wanted—Catalogues of Manufacturers of Philosophical and Chemical Apparatus. Address St. Stanislaus College, Bay St. Louis, Mississippi.

For Sale, Cheap—Patent Right for best Horse Hay Fork out. Address Lock Box 17, Sharon, Pa.

The Lightning Screw Plate does the work of a Bolt Threading Machine. Wiley & Russell Manufacturing Co., Greenfield, Mass.

For the cheapest and best Small Portable Engine manufactured, address Peter Walrath, Chittanooga, N. Y.

The Baxter Steam Engine, 2 to 15 Horse Power. Simple, Safe, Durable, and Economical. "The Best are always the Cheapest." Over One Thousand in use, giving entire satisfaction. Address Wm. D. Russell, 19 Park Place, New York.

File-cutting Machines. C. Vogel, Fort Lee, N. J.

Engines, 2 to 8 H.P. N. Twiss, New Haven, Ct.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

Diamonds and Carbon turned and shaped for Scientific purposes; also, Glaziers' Diamonds manufactured and reset by J. Dickinson, 61 Nassau Street, N. Y.

Tin Manufacturers, who have waste strips, pieces, or round blanks to sell, address—giving sizes—Norton Bros., 41 & 46 River St., Chicago, Ill.

Housekeepers, House Furnishers in Tin, Tinmen, send Postal Card to J. R. Abbe, Providence, R. I.

Zero-Refrigerator with Water Cooler. Best in the World. Send for Catalogue. A. M. Lesley, 221 W. 23d Street, New York.

The Lester Oil Co., 183 Water St., N. Y., Exclusive Manufacturers of the renowned Synovial Lubricating Oil. The most perfect and economical lubricant in existence. Send for Circular.

For small size Screw Cutting Engine Lathes and Drill Lathes, address Star Tool Co., Providence, R. I.

For Sale, or Partner Wanted for Patent on Canal Boat Propeller. Address G. Heyrich, New Elm, Minn.

To Machinists.—For Sale, Cheap—A partially finished Engine Lathe, 11 feet bed, 28 inch swing. For further particulars, call on or address Clark, Smith & Co., Fort Plain, N. Y.

Wash Stands, New Styles, Marble Tops, can be used in any situation. Prices very low. Send for catalogue. Bailey, Farrell & Co., Pittsburgh, Pa.

Grindstones—4,000 tons. Berea Stone Co., Berea, O.

The "Scientific American" Office, New York, is fitted with the Miniature Electric Telegraph. By touching little buttons on the desks of the managers signals are sent to persons in the various departments of the establishment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$6, with good Battery. F. C. Beach & Co., 263 Broadway, New York, Makers. Send for free illustrated Catalogue.

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

Buy Boulton's Paneling, Moulding, and Dove-tailing Machine. Send for circular and sample of work. B. C. Mach'y Co., Battle Creek, Mich., Box 227.

Small Tools and Gear Wheels for Models. List free. Goodnow & Wightman, 23 Cornhill, Boston, Mass.

For Sale—One "Cottrell & Babcock" Water Wheel Regulator, in good order—by D. Arthur Brown & Co., Fisherville, N. H.

For Surface Planers, small size, and for Box Corner Grooving Machines, send to A. Davis, Lowell, Mass.

Hotchkiss Air Spring Forge Hammer, best in the market. Prices low. D. Frisbie & Co., New Haven, Ct.

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

"Book-Keeping Simplified." The whole system in a few pages. Cloth, \$1. Boards, 75 cents. Sent, postpaid. D. B. Waggener & Co., 424 Walnut St., Philadelphia, Pa., Publishers "Waggener's Trial-Balance Book."

Faught's Patent Round Braided Belting—The Best thing out—Manufactured only by C. W. Arny, 301 & 303 Cherry St., Philadelphia, Pa. Send for Circular.

Temples and Oilcans. Draper, Hopedale, Mass.

For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

Mechanical Expert in Patent Cases. T. D. Stetson, 23 Murray St., New York.

All Fruit-can Tools, Ferracute, Bridgeton, N. J.

Peck's Patent Drop Press. Still the best in use. Address Milo Peck, New Haven, Conn.

Genuine Concord Axles—Brown, Fisherville, N. H.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass. Send for sample and price list.

Power Hammers and Bolt Forging Machines—Nine sizes of the former and two of the latter, guaranteed the most economic tools of their kind known. For price and cuts, address S. C. Forsath & Co., Manchester, N. H.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street New York.

Price only \$3.50.—The Tom Thumb Electric Telegraph. A compact working Telegraph Apparatus, for sending messages, making magnets, the electric light, giving alarms, and various other purposes. Can be put in operation by any lad. Includes battery, key, and wires. Neatly packed and sent to all parts of the world on receipt of price. F. C. Beach & Co., 263 Broadway, New York.

Send for Circular of a very Superior Boiler Feed Pump. D. Frisbie & Co., New Haven, Conn.

W. Campbell's Self-Acting Shade Rollers. The Trade supplied, 87 Center Street, New York.

Notes & Queries

J. S. & Co. will find directions for utilizing mica scraps on p. 42, vol. 25.—J. D. F. will find directions for manufacturing ice on p. 54, vol. 31.—L. F. L. will find instructions for preventing the percolation of water through a brick wall on p. 75, vol. 32.—R. H. D. will find a recipe for Worcester-shire sauce on p. 281, vol. 26.—A. C. A. will find some particulars as to the manufacture of aluminum on p. 91, vol. 31.—J. H. will find directions for preparing buffalo hides on p. 266, vol. 28.—J. M. C. will find a formula for ascertaining the contents of a cylinder on p. 281, vol. 25, and for the proportions of a safety valve on p. 107, vol. 31.—E. S. T. will find a recipe for indelible ink on p. 112, vol. 27.—H. R. W. will find a recipe for wood filling on p. 347, vol. 31.—L. F. S. will find directions for making rubber hand stamps on p. 156, vol. 31.—B. A. S. will find directions for making and using a pantagraph on pp. 99, 179, vol. 28.—F. G. T. should consult, as to his diet, a physician who is acquainted with his case.—C. S. R. will find a recipe for a dip for brass goods on p. 282, vol. 29.—W. F. R. and others can solve the problem of the length of the hypothenuse by the method illustrated on p. 187, vol. 32.—W. B. will find directions for calculating the proportions of gear wheels on p. 187, vol. 29.—F. B. will find directions for removing clinkers from stoves on p. 187, vol. 32.—A. B. will find the dimensions of the Great Eastern on p. 346, vol. 31.—J. R., Liège, Belgium, and others will find a description of a wood-splitting machine on p. 73, vol. 28.

(1) H. M. asks: Please explain the anti-septic action of common salt, and also of sugar. A. In the case of salt, the albumenoid and other putrifiable matter goes into solution in the brine; sugar or sirup acts by preventing the access of atmospheric oxygen to the substances immersed in it.

(2) H. D. D. and others.—One process for utilizing tin scrap consists in first cutting it in a suitable machine into comparatively fine chips, and then placing it in a revolving cylinder so arranged as to constantly shower the chips with mercury, with which the tin unites; and the two may afterward be separated by distillation, or by the oxidation of the tin.

(3) W. C. asks: Can heat enough be obtained in a small furnace to melt brass without the aid of a pair of bellows? A. Yes.

What will dissolve chemical paint out of a brush? A. This depends wholly upon the composition of the paint. Most of the common pigments find solvents in either water, turpentine, alcohol, ether, or oil.

(4) J. H. asks: In pressing quicksilver through buckskin to extract the impurities or gold, is it injurious to have the hands in contact with it? A. We do not know of any trouble originating in this way; but as mercury is slightly volatile at common temperatures, extreme care should be taken not to inhale the vapors, as it is liable, otherwise, to produce salivation.

(5) J. McM. asks: Why is an inverted image seen when one looks upon the concave side of a burnished spoon, and a erect image when the convex side is turned towards the face? A. In the case of a concave mirror, the reflected rays of light approach and cross each other before reaching the eye, thus producing an inverted image. In the case of convex mirrors, the convex surface simply causes the rays to diverge.

(6) D. H. S. Jr. asks: 1. Has ozone ever been used as a bleaching agent? Yes. 2. Can it be produced by the discharges (into atmospheric air or pure oxygen) of the electricity generated by the glass plate or cylinder electrical machine? A. It can, but in exceedingly minute quantities in comparison with the bulk of the gas operated upon. 3. Is there any work extant which treats minutely upon the production, properties, and uses of ozone? A. Read the work by Cornelius B. Fox, entitled "Ozone and Antozone," published by J. A. Churchill, London, England.

(7) L. N. P. says: 1. I am thinking of putting electric bells into a house. Is there any likelihood of the batteries or any connections ever setting fire to easily inflammable things? A. No. 2. Is there any chance of batteries in a closet forming gas liable to catch fire? A. No.

(8) F. G. N. ask: 1. Suppose that I take a permanent magnet, and surround its armature with a helix, would not a feeble current be generated every time the magnet and armature were united and separated? A. Yes. 2. If the ends of the helix are connected with a Rhumkorff coil, would not the feeble current of electricity generated induce a stronger one in the other wire of the coil, so that, by connecting several wires successively, we might finally obtain a current indefinitely stronger than the one we started with? And if we connected the last coil with a helix surrounding a soft iron horseshoe, would not the current of induced electricity transfer it into a much stronger temporary magnet than the permanent one we began with? A. If properly constructed, it would. 3. Would the induced current differ from the generating current otherwise than in being stronger? A. That would depend upon the construction of the machine. 4. If this is true, does it not overthrow the idea that one force cannot produce a greater one without a corresponding loss in time or distance? A. Not at all. If the results you suggest were to follow your premises, they would not tend to overthrow the idea mentioned. In this case it would be simply a transfer of mechanical force (the moving of the armature) into electrical energy, and the amount of the energy would be proportioned, other things being the same, to the rapidity of the movement of the armature.

(9) D. H. L. H. says: In your answer to W. E. D., you give directions for making a Callaud battery; can I nickel plate steel with such a battery? A. Yes.

(10) P. R. H. asks: Is there any battery that will produce electricity continuously, without being touched or renewed after once being completed and put to work? A. No.

(11) I. H. asks: How can I plate with nickel without a battery? A. Use a magneto-electric machine.

(12) M. P. asks: What is the best method of removing gold that has been deposited on brass by galvanic battery, so as not to destroy the brass in the operation? A. Place the articles in strong nitric acid, and add some common salt in crystals. After coming out of the acid, the articles must be polished.

(13) E. M. asks: Will you please suggest the simplest way that I can produce rotary motion by electricity? I have a small battery and electro-magnetic telegraph. But I want to show to my pupils how a wheel may be turned. Being poor, I cannot buy an electric engine. Any cheap and simple way by which I can make rotary motion by the battery, at home, that is what I want. A. Suppose you attach four soft iron keepers to the circumference of a wooden wheel, so that in turn they approach the poles of an electro-magnet. Let the circuit of the electro-magnet be closed as each keeper approaches the poles and opened as soon as it comes opposite. The method of making a circuit closer will occur to any ingenious mind.

(14) W. D. H. asks: 1. How can I electroplate in bronze? In what solution shall I immerse the articles to be bronzed? A. Make a solution composed of 50 parts carbonate of potash, 2 parts chloride of copper, 4 parts sulphate of zinc, 25 parts nitrate of ammonia, and use a bronze plate as the positive electrode. 2. Which is the best battery for the purpose, Smee's or Leclanché's? A. The Smee.

(15) L. K. asks: 1. How many feet of air does one grown person require to keep him in good health for six hours? A. The average amount of air inspired and exhaled at each respiration is 30 cubic inches, and the average number of respirations 20 per minute, so that 500 cubic feet of air pass through the lungs in 24 hours. The amount of carbonic acid exhaled is variable, and is interesting as an index of the rate of internal change. The more energetic the circulation, the larger the quantity of carbonic acid; it is less during sleep than while awake, and less during fasting than after a full meal. 2. Is it best to have a constant change of air from the outside into a room in which we are sleeping? A. A sleeping apartment should always have adequate ventilation while in use.

(16) O. D. asks: I have heretofore worked the burglar alarm apparatus in my house by the Leclanché battery, of which I use 6 cells. But this winter they stopped working. I then put in 6 new cells of the same; still they did not work. I then substituted the ordinary sulphate of copper battery, and have had no trouble since. Now can you tell me what probably was the matter with the Le-

clanché? Did the cold weather produce any mischief? A. No. The Leclanché battery will stand as much cold as the sulphate of copper. Did you test your Leclanché cells separately on short circuit to see if the connections were good?

(17) H. M. asks: What chemicals are used to render paper sensitive so that you can photograph directly on it? A. Chloride of ammonium 40 grains, gelatin 20 grains, water 20 ozs. Dissolve by the aid of heat and filter when cold. Take 10 or 12 sheets of thin clear paper, and, having marked the rightside, immerse them bodily in the liquid one by one, taking care to remove air bubbles; then turn the batch over, and remove them singly, beginning with the sheet immersed first. Render the paper sensitive by a solution of ammonio-nitrate of silver, 60 grains to the oz. of distilled water.

Is there any chemical that I can insert in the bark or sapwood of trees, that will kill them? A. Try a strong solution of chloride of zinc.

(18) J. W. L. asks: Can I light gas by electricity? A. Put on a pair of dry slippers, and walk briskly over a carpet. You will thus charge yourself with electricity, and may light the gas with your finger in dry cold weather.

(19) P. J. N. asks: 1. To what pressure persquare inch can air be subjected by means of the air pump? A. A maximum of condensation has not been reached. It depends altogether upon the strength of the pump, its valves, and the power and velocity with which it is driven. 2. What work is the best on pneumatics? A. Ganot's "Physics."

(20) E. L. F. asks: Why does a distant light scintillate like a star? A. Because of the interposed changing layers of air of different densities. The diverging rays are caused partly by the irregular figure of the crystalline lens of the eye, and are partly owing to the pull of the six muscles which move it.

(21) W. B. H. asks: 1. How many Grove cells are required to operate a line half a mile in length, using No. 14 common iron wire, with a relay at one end of 100 ohms, and at the other a relay of 120 ohms? A. Two cells. 2. How can I charge a main line Grove battery of 10 cells? A. Cover the zincs with quicksilver. Put 16 parts water to 1 part sulphuric acid for the outer solution, and use pure nitric acid of commerce for the porous cup. 3. How often should it be replenished? A. Replenish the nitric acid every day and the solution once a week. Brush the zincs every day.

(22) C. W. asks: Which is the heavier, a cubic foot of water or of ice, and what is the difference? A. The water is the heavier. If one cubic foot of distilled water at 39° Fah. weigh about 62¼ lbs., one cubic foot of pure ice will weigh about 58½ lbs.

(23) A. C. asks: What acid is used to mix with urine to detect Bright's disease of the kidneys? A. Nitric acid. Urine when mixed with nitric acid and boiled should coagulate if the person is suffering from Bright's disease.

(24) J. D. W. asks: 1. Is the Leclanché battery inodorous and constant? A. Yes. 2. Do the contents of the porous cups ever have to be removed and renewed? A. Yes. 3. What are the proportions of sal ammoniac and water to a quart cell? A. Two thirds full. 4. What is the reaction? A. Ammonia is set free at the negative pole, while the nascent hydrogen from the ammonium reduces the peroxide of manganese to sesquioxide. The zinc unites with chlorine, forming chloride of zinc.

(25) W. H. B. asks: Is there a solution which, mixed with pure white quicklime, will harden it into stone in 24 hours? A. Soluble glass, or silicate of potash or soda, is used for this. You will find it advertised in our columns.

(26) R. M. C. asks: What is the latest and best work on electro-metallurgy? A. "Manual of Electro-Metallurgy," by James Napier.

(27) D. X. asks: What are the powers and focal lengths of the two largest equatorial refractors? A. That at Washington is 28 inches clear aperture, weighs 180 lbs., and was nine months correcting. The new McCormick telescope is a trifle over 26 inches aperture, was eight months correcting, and weighs 170 lbs. Both are of about 33 feet focus, and their highest power is 2,000 diameters. The objectives alone are worth \$25,000 each. The government equatorial cost \$46,000 currency, the McCormick \$38,000 gold.

(28) H. H. asks: 1. What battery, and how many cells, would be the best for electroplating and making an electric light? A. For electroplating, 2 cells of Smee's battery. For electric light, 50 cells of Bunsen's. 2. What solutions should I use for gold, silver, nickel, and copper plating? A. Gold solution, 1 grain of gold and 10 grains of cyanide of potassium in 200 grains of water. For silver, 2 grains of cyanide of silver and 2 parts of cyanide of potassium in 300 grains of water. For copper, a saturated solution of sulphate of copper. For nickel, see p. 346, vol. 31.

(29) C. J. W. says: 1. I have made a Morse sounder, key, and battery for telegraphing. I made my horseshoe magnet by winding the covered wire round in the usual way, only I wound both poles to the right and then joined the wires. I made another by screwing two cores into a flat base, and wound one pole to the right and the other to the left. This has a neater appearance. Which is the best in your opinion? A. They must be so wound that the current shall flow in the same direction in both. 2. Does it make any difference to a magnet if the wires from the battery are first applied in one way, and then (by mistake) reversed? A. No. 3. How is the electric bell made? A. The armature lever closes an electric circuit when the spring draws it back, and opens it when the magnetism draws it forward. 4. What meant by positive and negative poles of a bat-

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tery? A. The copper pole is positive and the zinc negative. 5. What are the right proportions of sulphuric acid and water for the Bunsen battery? A. One acid to 19 water. 6. What are the proportions of bichromate of potash and sulphuric acid for the porous cup? A. Two ounces of bichromate of potash to 20 water and 10 sulphuric acid. 7. Is the Bunsen a good battery for telegraphic purposes? A. Yes. 8. How many cells should I have for 100 feet of very thin copper wire? A. One cell.

(30) C. B. L. asks: What cement will do for cementing emery together to form wheels? A. Try oxychloride of zinc.

(31) S. & S. ask: Does distilled water contain any vegetable, mucilaginous, or albuminous substances? A. It should not when distilled in proper vessels, and dust excluded.

What substance is best to use to test oils for mucilaginous or albuminous matters? A. Strong oil of vitriol should produce a stain by carbonizing mucilaginous matter, etc.

(32) B. & S. ask: Is there any preparation for coating the seams of large wrought iron tanks so as to prevent the leakage of alcohol? The tanks are for storing it; they are perfectly watertight, but the spirit, being of a much less specific gravity than water, oozes out. A. Try cotton cloth soaked in glue, and cold rivet with this between the plates. Let us know if this succeeds, and also the results of other expedients tried by you; and we may be better able to inform you of a mode of procedure.

(33) P. W. asks: How could I make my cider foam like ale, and at the same time be clear and bright as wine? A. Try adding a little sugar to the bottled cider.

(34) G. F. C. asks: What is the reason that coal oil freezes at 3° below zero? It is almost white after being frozen. A. Coal oil is composed of numerous compounds, whose volatility and melting points vary greatly. Your oil is probably rich in some of these denser bodies, such as paraffin, which congeal before attaining a very low degree of temperature.

Can rosin from the bow be removed without injury to a varnished violin? It may be removed by a little ether; expeditiously applied.

(35) C. G. says: I am a distiller of virgin turpentine in a copper still of about 800 gallons. By what process can I so clarify the turpentine as to make window glass rosin? I think that the dregs or particles of bark, wood, etc., prevent the rosin from being transparent after distillation. A. Common rosin or colophony essentially consists of pinic acid mixed with a little sylvic acid. Its dark color is traced to pinic acid. White rosin is obtained from Bordeaux turpentine by digesting the powdered rosin, six parts of cold alcohol, and one part of ether, and the residue is treated with boiling alcohol. This solution is next evaporated down, and the residue melted and allowed to cool, yielding a colorless glass as clear as crystal.

(36) C. R. W. asks: How can four messages pass over one wire at the same time? A. There are various methods of doing it, but the method employed by the Western Union Telegraph Company is probably the best. This is simply a modification of Stearns' duplex, by the addition of a current reversing key and a polarized relay to his bridge plan. The polarized relays are worked by a change of polarity in the battery, and the Morse relays by an increase of potential. Some knowledge of the more advanced methods of telegraphy is required to understand the details of the arrangement, but the above outline will convey a correct and intelligible idea of the general principle upon which the apparatus depends for its successful operation.

(37) M. A. B. asks: If we have two cisterns each 20 feet deep, one filled with hot water at 200° Fah., and the other with cold water, will there be any difference in pumping the water with pumps of equal size? A. The power required will be that which is necessary to lift the water. The weight of a cubic foot of water at 60° Fah. is 62½ lbs., while at 200° it is 60½ lbs.; the cold water, therefore, will be the hardest to pump. If the piston of the hot water pump is above the surface of the water, it will not pump water but steam; for as soon as the pressure of the atmosphere is removed from the water in the pump, steam will form and fill the vacuum, and so balance the atmospheric pressure upon the surface outside the pump. At 15 lbs. to the square inch pressure, water will boil when it contains 212° of heat, at 11½ lbs. pressure it will boil at 200°, and at ½ of a pound pressure it will boil when heated to only 100°. Thus it is seen that steam is easily formed in the pump, in proportion as the pressure is reduced; and steam will be pumped instead of water in the case of the hot tank.

(38) A. E. S. asks: 1. Can there be a mixture of lard and kerosene made, that would be safe to burn at 212° Fah.? A. No. The inflammability of the mixture will depend upon the burning point of the kerosene, which will not be rendered higher by mixture with the lard oil. 2. Please give me a recipe for making signal oil. A. Use lard oil.

(39) J. McK. asks: I contend that no steel can be made without carbon. My friend claims that chrome steel, by the introduction of chrome ore into the crucible with ordinary iron, secures the different grades in proportion to the amount of chrome used. I claim further that the result of such a process is not steel, but an alloy or chromate of iron. Which is right? A. It may be steel, because the iron itself contains carbon, the presence of which is, as you say, essential to the formation of steel. The chromium enters, like manganese and other metals, as an alloy, and modifies the properties of the steel.

(40) J. B. G. asks: What is the difference between a high pressure and a low pressure engine? A. In one the steam is condensed, in the other it is exhausted into the atmosphere.

What is the average temperature at Peru and at Rio de Janeiro? A. About 75° Fah. in each case. How many miles of railroad are there in Brazil? A. Between 400 and 500.

(41) A. P. A. asks: Can compressed air give the same amount of power as steam, used in a common engine, the compressed air and steam having similar pressure? A. Yes, if worked under the same conditions.

(42) D. K. J. Jr. asks: How can I ascertain the heaviest blow which a steam hammer of given dimensions is capable of giving? A. It could only be ascertained by experiment.

(43) F. E. H. says: I have made a large wooden trough to hold a silver solution for electroplating. With what shall I cover the inside, so that the solution would have no effect on it? A. Marine glue.

Would an engine of 2 inches bore x 4 inches stroke furnish power enough to run a polishing lathe? A. Yes.

(44) A. J. B. asks: What is meant by 6 to 1, or 3 to 1, or 1½ to 1, which we see on architects' details? A. It means that, of the two things compared, one has 6, 3, or 1½ times the measurement of the other. Thus, if the lengths are as 6 to 1, the length of the first is 6 times that of the second. The expression is used similarly of area, volume, hardness, strength, velocity, etc.

(45) C. L. G. asks: At what place in the United States was the first steam railway built? A. The Baltimore and Ohio Railroad; it was commenced in 1828. Fifteen miles were opened in 1830, horses being used until 1831, when a locomotive was brought into use.

(46) F. H. D. asks: 1. If a small quantity of nitro-glycerin were exploded in a vessel strong enough to withstand the shock, how long would the gas thus formed retain its pressure? A. Probably the pressure would commence to diminish at once, as the gases cooled down. 2. How much pressure would 1 oz. if exploded as above, exert if confined within a cylinder 12x24 inches? A. This is a matter that could only be settled by experiment. It is supposed that one volume of nitro-glycerin produces about 10,000 volumes of gas after explosion; but if it were rigidly confined, complete explosion might not take place. 3. Would there be any shock or noise following the burning of nitro-glycerin in such a vessel? A. We presume not, if the vessel were perfectly rigid. We advise you to turn from idle speculation of this character to something of practical importance.

(47) E. A. P. asks: 1. What pressure per square inch will a column of water 90 feet high exert? A. This column will require a pressure of 40 lbs. by steam gage to sustain it. 2. Will a steam boiler pressure (by the gage) sustain the column? A. This will depend on the size of pipes, bends, etc. Under average conditions, you could expect to get a height of 50 or 60 feet.

(48) G. W. H. asks: 1. What would be the loss, by friction and other causes, in the conveyance of compressed air at 60 lbs. per square inch to a distance of 1,600 feet? The pipe is to be about 1½ inch gas pipe. A. Two or three lbs. pressure per inch. 2. What would be the loss in pressure of steam under similar circumstances, the pipes being well protected? A. Double the above.

(49) A. M. says: My friend says that a stove with thin plates requires more fuel than a stove with thick plates. I say the contrary. Which is right? A. You are.

(50) N. P. B. says: 1. My small cast iron castings are too hard. How can I make them soft enough to drill and file nicely? A. It would be well to use a better quality of iron. 2. What can be used for the purpose of bedding one rough piece of casting to another, besides putty or plaster of Paris? The extent of the surface is 6x12 inches, and the openings range from ¼ inch to the least thickness. A. See a forthcoming article on "Glues and Cements."

What is the best way by which large grindstones are trued up when worn out of truth? A. The common method is to use an iron tool with a hooked point.

(51) J. J. W. says: I am a blacksmith by trade, and am bothered with my swage iron becoming bare and exposed to the fire. I have been using common yellow clay to bed it with. Is there anything which will stand the fire and not crumble away as the clay does? A. Try firebrick, set in fire clay.

(52) J. S. B. asks: How is music made on glass goblets, and how are they tuned? A. By moving the moistened finger around the rim, which puts the material of the goblet into vibration, after the manner of a bell. They can be tuned by having different quantities of liquid in them, or by grinding them until they produce the right note.

How are the magnets of a telegraphic sounder constructed? A. See p. 379, vol. 30.

(53) W. C. K. asks: Can a piece of steel be refined and made to stand as good a temper, by pressing it into shape by machinery, as a similar piece forged by hand, using the same style of die? A. In general the hammered steel will be the best.

(54) J. F. B. asks: What would be gained by applying a condenser to an engine of the following dimensions: Diameter of cylinder 22 inches, length of stroke 4 feet, with automatic cut-off balanced poppet valves, gridiron slide valves, and exhaust open full length of stroke, running 60 turns per minute under from 60 to 80 lbs. of steam? The engine is scarcely ever called on for more than half her power, about 60 or 70 horse. A. As a general rule, if an engine is in good order, a condenser makes a saving of at least 25 per cent. As you will see, however, by the article on the subject, p. 256, vol. 31, you do not send enough data.

(55) W. D. G. asks: Which of the following metals will best stand exposure to heat without warping, sheet steel, sheet iron, cast iron

from ¼ to ⅝ of an inch in thickness? A. All metals will be liable to warp, if exposed to high temperature in the form of large and thin sheets. Probably cast iron will answer as well as any other.

What are the largest sized sheets of mica that can be had for use in blowers for fire grates? A. About 8 by 10 inches.

(56) A. D. B. says: 1. In building a large brick cistern lined with cement, would it be of service to brush over the cement with water glass? A. The use of water glass solution is of doubtful policy. 2. Is Portland cement enough better than Rosendale for lining cisterns to pay for the difference in cost? A. Yes, if you get the best kind of Portland cement. It is not always uniform in quality.

(57) H. Y. N. says: I have an engine of 36 inches stroke, with plain slide valve, having 2¾ inches travel. It cuts off steam at ⅓ of the stroke and exhausts at ⅞. The exhaust port is open ¼ inch before it takes steam at the other end. Is not ¼ inch more clearance than is necessary? If I arrange to cut off at 20 inches, should I make the clearance less? A. It would not be well to decrease it.

(58) A. E. P. asks: 1. How many horse power can I get from an engine, the cylinder of which is 4¾ inches in diameter by 9 inches stroke, with 80 lbs. steam? A. From 4 to 5 horse power, under favorable conditions. 2. Is said engine powerful enough to run a circular saw, 18 inches in diameter, for sawing shingles? A. Yes.

(59) R. M. asks: Why is it that a greater number of drivers are used on locomotives designed for heavy draft, since the adhesive friction is not dependent upon the extent of surface contact? A. To avoid bringing excessive weight on any one driver.

(60) J. P. N. says: On a very cold day I had to keep the cold water faucet in the kitchen dripping constantly in order to prevent freezing. About sunset I noticed that our girl had shut the water off, and the sink (a cast iron one) had become dry. I opened the faucet full and suddenly, when the instant the water touched the iron, an explosion occurred at that point, sounding very like a gun cap, only louder. Can you explain this? A. We have often noticed the expulsion of air under such circumstances, accompanied by a kind of explosion. We have never, however, witnessed precisely what you describe, and without further information must confess that we cannot explain it.

(61) A. C. asks: 1. Is it practicable to line a water reservoir (to hold 1,000,000 gallons) with plate iron from ½ to ⅝ of an inch thick? A. Yes, perfectly. 2. Is there any material good for coating the iron with to prevent rust? A. Pitch would make a good material for coating the iron, or the plates might be galvanized.

(62) X. Y. Z. says: A. claims that the air is lighter when smoke does not rise. I say that it is heavier. Which is right? A. Sometimes the smoke does not rise because the barometer is low, that is, the pressure of the air is diminished. At other times, as in damp weather, the smoke is cooled down, and will not rise, even though the pressure of the atmosphere is the same as before. 2. A. also claims that the wind lowers the mercury in a thermometer. I say that the wind has nothing to do with it. Which is right? A. You are.

What is a good cement for joining the angles of an aquarium, built of glass and wood? A. Make a mixture of boiled linseed oil, litharge, and white and red lead.

Has a law permitting any person to make and sell any patented article, on payment of 10 per cent to the owner, been passed? A. Such a law was proposed, but has not been passed.

(63) J. A. B. asks: What size of engine would be the most economical for driving a two run flouring mill and attachments? A. The question is rather indefinite, but we imagine that an engine with cylinder 7x9 will answer your purpose very well. If you use shavings for fuel, a plain slide valve engine will give good satisfaction.

Which has the fastest motion, the top of a wagon wheel or the bottom? A. Considering the rate of motion with respect to a fixed point without the wagon, the top of the wheel runs the fastest.

(64) L. A. C. asks: What is the cause of ice forming on the bottom of the bay at Rockaway? It is sometimes from two to three inches in thickness. A. It is doubtless formed at low tide, and afterwards covered with water.

(65) M. asks: What is the philosophy of warm weather driving the frost into the ground still deeper? It seems to be a fact that water pipes laid four feet deep are more apt to freeze when warm days come than during the coldest weather. In other words, when it commences to thaw, the frost in the ground extends to a greater depth than before. A. We never observed that this was a fact, but it is easy to understand that the freezing process may go on underground when it is thawing above, since it takes time, as well as cold, to produce frost and ice.

(66) C. O. H. asks: Is it practicable to use a wire rope (instead of chain or hemp rope) over pulleys 3 inches in diameter, where there would be an unsteady strain of from 100 lbs. to 400 lbs.? A. It would not be easy to use a wire rope with such small pulleys, or, indeed, a hemp rope or chain, unless some special construction were adopted.

(67) H. M. F. asks: Can you give me a method for determining the pitch line of a cog-wheel, having the number of cogs and the pitch? A. We could not do the subject justice in our limited space. You will find it well treated in Rankine's "Machinery and Millwork," or in the "Machinist's Assistant."

Can you give a recipe for making a preparation for sticking drawing paper to a board? A. Good paste answers very well.

(68) F. McG. asks: If equal quantities of salt water and fresh water were put in a vessel, which would come to the top? A. They would mix, but not very readily; and the lighter of the two, the fresh water, would tend to go to the top.

(69) G. V. asks: What is the momentum of a body of a given weight moving at a given velocity? Take for an example the piston, rod, walking beam, and connecting rod of a steamer. How much power is required to arrest the motion of these parts, and to move them in a directly opposite course? A. To change the motion suddenly from one direction to the opposite direction, with the same velocity as before, the energy of the moving mass must be overcome, and an equal amount of energy impressed. The force required to overcome the energy of a moving mass is found by multiplying the weight of the body in pounds by the square of the velocity in feet per second, and dividing by 64.

(70) W. E. H. asks: We have been putting in two new turbine water wheels under 21 feet head, using 52½ cubic feet of water per second. We bring the water to the wheels in a round wooden trunk of 208 feet length and 6 feet inside diameter. The trunk is made of white pine, 3 inches thick and hooped with iron hoops, ½ inch thick by 2 inches wide. The hoops are placed 2 feet apart, from center to center. The lags are 44 in number to the circle of the trunk, each lag being driven 2 feet, there being no more than 7 joints under any hoop. At the upper end of trunk we put an air pipe 8 inches in diameter. When the wheels are running, the volume of water passes through the trunk at a speed of from 2 to 3 feet per second. What is the shortest time in which it will be safe to shut the gates without danger of bursting the trunk? We have a regulator connected with the wheels which will shut the gate in 40 seconds. A. We think it will be perfectly safe to close the gate in the time mentioned. It might be well to connect a pressure gage to the trunk, and see exactly what change of pressure occurs from shutting the gate quickly.

(71) W. F. S. asks: 1. Do you think it a good plan to force hot water through the tubes of a horizontal boiler 15 feet long, 3 feet in diameter, with 24 three inch tubes? The boiler is new, made of ¾ inch iron doubly riveted. A. We understand you to refer to cleaning the tubes by forcing hot water through them. We do not recommend this. It is better to use a brush or scraper. In special cases, steam can be employed with advantage. 2. My engine is a horizontal; cylinder is of 9 inches diameter and 18 inches stroke. It drives about 8 horse power. I carry steam at 60 lbs. and exhaust into about 1,000 feet of three inch heating pipes, the lever to back pressure valve having considerable weight on it. I burn between 5 and 6 cwt. of Pittston nut coal per day, and very little smoke comes from the chimney. I would like to put an indicator on my engine, but I cannot get one here. Am I using too much coal? We cannot tell certainly whether you are running economically, but it seems to us that you are managing very well.

(72) J. N. T. says: I grouted the floor of my cellar some two years ago with a mixture of sand, gravel, lime, and cement. Since it became dry, it has continually ground off from the top into a fine lime dust, making it impossible to sweep without raising a great dust, besides wearing down into the larger gravel in some places where it is used most. Can you suggest through your columns a cheap wash or paint that will harden the surface and obviate the dust? A. Wet the surface and float it over with a thin, pasty coat of Portland cement of best quality. This may give you the surface you want.

(73) S. says: I have an icehouse whose dimensions are 80 feet 6 inches long, 22 feet 6 inches wide, and 14 feet 9 inches high. How many tons of ice will it contain? A. Multiply the length by the breadth, and this product by the height, all in feet, and the result will give you the number of cubic feet of contents in your icehouse. Then, as there are about 40 cubic feet in a ton of ice, divide the said number of cubic feet by 40, and the quotient will indicate the number of tons of ice the house will contain if filled full in all parts solid (about 742 tons in this case). But allowance must be made for vacant spaces in every case. Weight of a cubic foot of ice, 57½ lbs.

(74) D. W. S. asks: 1. Is a single Bunsen quart cell sufficient to magnetize a horseshoe bar within a helix? A. Yes. 2. Must a helix be made of copper wire, or will soft iron wire answer the same purpose? A. Copper is better.

(75) H. L. C. says: I have a battery of four Hill cells, and a key and sounder. I used No. 32 cotton insulated wire for my sounder. When I arrange my battery for quantity (all zincs on one wire and all coppers on the other), the sounder is so faint that it cannot be heard. What is the difficulty? A. The wire is too fine in your sounder.

(76) G. B. says, in reply to J. C. W., who asks how to tin small lead castings: Clean your castings well, rub them with powdered rosin, and dip them in a tin bath. Be sure to use plenty of rosin.

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

J. M. H.—It is iron pyrites.—R. L.—It is tin.—W. S. N.—It would be difficult to form an estimate from the pieces of ore sent, which are of ferruginous quartz rock. If you desire to have an assay, it would be necessary to send sufficient of what you regard as average rock, to yield about an ounce of the ore. The expense of the assay for silver would be \$10, for silver and gold \$20. If the surface indications are as you state, it would be well to locate the vein.—W. H. G.—It is tin.—R. L.—No. 1 is sulphide and carbonate of copper. No. 2 is the same as No. 1, with quartz. No. 3 is carbonate of copper with oxide of iron. No. 4 is oxide of manganese with quartz. No. 5 is yellow oxide

of iron. No. 8 is oxide of manganese, containing carbonate of lime.—J. E. G.—It is actinolite, a silicate of magnesia and lime with a small percentage of the oxides of iron and manganese. It is not valuable as an ore.—J. C. B.—It is a compact slate, containing a considerable amount of iron pyrites; this has been converted by exposure to the weather to a white incrustation of sulphate of iron, which is soluble and gives the disagreeable taste. No. 2 is a fine sand rock containing some alumina.—B. S.—The specimen of granite sent has a fine color, is tough, and would come into use for the purposes to which red granite are applied.—H. L. A. C.—The red mineral is red ochre, or sesquioxide of iron; the crystals in the cavities are quartz, which have occupied the place of crystals of another species; the other mineral, glassy but softer than quartz, is sulphate of barytes or heavy spar.—J. C. B. T.—It is sulphide of lead, or galena.

E. J. B. asks: What will cure blindness in chickens? The disease, which is contagious, consists in a sort of yellow scum growing over the sight of the eye, and comes, I have been told, from overfeeding with corn.—D. G. asks: How can I prepare small blocks of wood so that they will not expand when exposed to the action of steam, nor contract when exposed to the atmosphere of 100° Fah.?—H. B. asks: Does the hair grow after death? If so, why?—W. says: A cast iron ball 18 inches outside diameter, cored out to 12 inches, leaving a shell 3 inches thick, with one hole 1 1/4 inches in diameter through the shell, lay in such a position that it filled with water. The water froze, and with a loud report the ball was torn in three pieces. How many tuns pressure did it take to tear asunder the ball, and why did it give a report in bursting?—W. J. B. asks: What is the best method of grinding leger blades for shearing woolen cloth?

COMMUNICATIONS RECEIVED.

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

- On Propelling Yachts. By H. W. H.
On the Birth Rate. By F. Y. A.
On the Fish Jointed Rail. By F. A. B.
On an Ore-Roasting Furnace. By E. H.
On Talking Ants. By J. S.
On Rifle Projectiles. By J. M.
On Spiritualism. By F. H. R.
On an Invisible Gas Lighter. By E.
On Telegraph Alphabets. By J. W. C.
On the Sagacity of the Partridge. By J. K.
On Mathematical Problems. By A. E. O.
On Perpetual Motion. By J. W.
On Small Steam Engines. By E. W.
On Engine Valves. By L. F.
On Pneumatic Transmission. By S. P. D.
On Balloons. By W. A. W.
On the Drive Wheel of a Locomotive. By J. A. K.
Also enquiries and answers from the following:
F. A. R.—H. G. C.—J. W. C.—J. N. N.—A. M. C.—J. C.—J. E. B.—W. J. D.—G. A. B.—J. V. M.—R. D. C.—M. F. R.—P. P. J.—T. F. & Co.—F. A. G.—R. W. G.—C. T. E.

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.

Enquiries 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 enquiries analogous to the following are sent: "Who sells dollar steam engines? Who makes pens for ruling machines? Who sells sextants and quadrants? Who makes endless chain? Who makes a machine for cutting dough into pieces of similar weight? Who sells hemispherical anemometers? Who makes blowers suitable for furnaces for melting iron? Who sells nitroglycerin? Who sells stereotyping appliances? Who sells materials for decalcomanie, vitrimanie, and diaphanie?" 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

February 23, 1875,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions with names and dates, including Animal hopple, Battery, earth, J. C. Bryan, Bed bottom, H. S. Hale, Belts to shafts, attaching, A. A. Bevin, Blanket and pantaloons, horse, C. Franke, Blind stop, W. A. Clark, Boiler, wash, J. B. Camyre, Boiler scale compound, J. H. Pitts, Book holder, A. L. Wilson, Boom, sheer, M. Anderson, Boot, etc., sole, H. E. Van Benhuten, Box machine and box, J. W. & C. M. Hyatt, Box, spice, J. E. Camp, Braiding machine, F. W. Huppelsberg, Brake machinery, C. Kahler.

Main table listing inventions with names and dates, including Breweries, cooling floor for, A. Brandt, Brush attachment, fly, G. S. Beekman, Brush for grain cleaners, G. E. Throop, Brush, shoe, I. & J. A. Joseph, Bustle, R. Bierling, Butter worker, J. L. Englehart, Buttons, etc., attaching, D. Heaton, Caoutchouc screw mold, G. H. Roberts, Car axle, railway, S. L. Harrison, Car brake, C. C. Clark, Car brake, Hiner & Feasler, Car coupling, A. H. Clark, Car coupling, J. M. Clem, Car coupling, W. Cline, Jr., Car coupling, H. T. Lovell, Car coupling, H. Merlam, Car coupling, J. West, Car, dumping, R. Roberts, Car lamp, Hicks & Smith, Car, passenger, I. Bridgman, Carriages, jump seat for, N. Starkey, Carriage loading implement, B. Burton, Casting bobbins, machine for, M. Dimock, Chain link and chain, S. D. Locke, Chair, tilting, D. E. Teal, Chimney top, H. Becker, Churn, D. C. Bailey, Clock-operated horse crib, Gribbin & McMillan, Clothes frame, P. Cameron, Clothes frame, J. H. Chadwick, Clothes frame, A. Wright, Coal hod, G. Seyfang, Coat shaper, E. B. Viets, Cooking stirrer, J. M. Roush, Corcs, clamp for anchoring, L. E. Roberts, Corn cutter, green, W. J. Potter, Corn sheller, T. J. Hoover, Corpse-preserving casket, B. Hartwell, Cotton scraper, etc., W. H. McLaugherty, Cultivator, J. Behel, Cultivator, Lawrence & Thomas, Cutlery die, W. H. Miller, Dasher flap fastener, J. A. Kincald, Dish drainer, J. A. Fox, Elevator, C. H. Gules, Elevator, ice, X. Wittmer, Elevators, dumping gage for, J. McCulloch, Embroidery stamping, J. McGavin, Engine, steam, J. W. Middleton, Engine frame, portable, J. W. Hill, Faucet, beer, M. J. Sullivan, Faucet, measuring, L. L. Dennick, Fertilizing compound, C. H. Hoffmann, Fire arm, revolving, F. W. Hood, Fire escape for safes, Hackett & Crouse, Fire extinguisher, G. E. Barker, Fire kindler, B. S. Harrington, Flat iron heater, E. D. Dudley, Floors for passage of pipes, W. H. Gedney, Floral decorations, body for, C. A. Warren, Flue cleaner, Kea & Schmid, Fuel, compound for gas, C. Jenty, Funnel, measuring, I. W. Hoagland, Furnace, hydrocarbon, H. Napier, Furnace, metallurgic, B. Bayles, Furnace fire chamber, H. H. Gilmore, Game board, M. Riedinger, Garden sprinkler, P. Muller, Gas engine, P. Vera, Gas from hydrocarbon, H. S. Maxim, Gas fuel, compound for, C. Jenty, Gas in water, absorbing ammonia, J. M. Beath, Gas lighting apparatus, Potter & Thomas, Gas meter, J. Radston, Gearing, H. L. Gordon, Generator for cooking, etc., steam, W. Cooper, Grain cleaners, brush for, G. E. Throop, Grain dryer, J. B. Wheeler, Gun carriage, N. E. Johnsen, Gunpowder, manufacture of, E. Greene, Harvester reel, G. G. Read, Hat brim, curling, A. Freshfield, Hay loader, F. Marlon, Heater, feed water, H. S. Maxim, Hoist, hydraulic, H. Richmann, Hoisting machine, H. Richmann, Horse blanket and pantaloons, C. Franke, Horse power, E. J. & J. W. Hoyle, Horses, hitching, E. Ohm, Horses, interfering boot for, A. D. Westbrook, Horseshoe, S. B. Henry, Horseshoe magnets, bending, J. C. Bryan, Horseshoes, making, W. Horsfall, Hose, engine, T. L. Pierce, Hubs to axles, attaching, D. Dalzell, Indexing hooks, F. R. Alderman, Inkstand, S. Darling, Kiln and furnace, drying, Cawthon & Conner, Ladder, firemen's, P. P. Carnes, Lamp, A. Albertson, Lamp, car, Hicks & Smith, Lamp extinguisher, J. W. Waterman, Land pulverizer, A. Underwood, Landau, C. Thomas, Leather straps, etc., finishing, S. B. Randall, Lightning rods, J. C. Bryan, Loom, Davis & Stone, Loom, W. V. Gee, Loom shuttle, F. Blanding, Lounge, adjustable reclining, E. Bartels, Lumber carrier, Pinney & Hasty, Magnet, electro, M. A. Rice, Main springs to arbors, attaching, W. C. Maynard, Meat and vegetable slicer, J. W. Murkland, Meat chopper, J. Perkins, Metal plates, pickling, Gething et al., Metal, turning tool for, W. Clay, Milk safe, J. F. Pool, Miter machine, D. A. Fisher, Molding machine, A. Miller, Mower lawn, E. E. Passmore, Musical mouthpiece, C. G. Conn, Musical strings, Farmer & Ballie, Neck tie shield, R. R. Parker, Needle blanks, turning, E. Sauter, Nut lock, B. B. Snyder, Jr., Nut machine, W. Horsfall, Ordnance, breech-loading, N. E. Johnsen, Ordnance, projectile for, C. Arrick, Ore separator, B. Tyson, Organ case, J. R. Lomas, Organ, reed, L. K. Fuller, Paints, gloss compound for, J. B. Tascott, Paper box, E. D. F. Shelton, Paper, etc., protecting rolls of, J. L. Firm, Paper perforating machine, R. Hemingray, Pavement, Filbert and Hoffman, Peg float, D. Lynahan, Pin, safety, Furness and Wales, Pisciculture, apparatus for, A. Bond, Plane, G. L. Weaver, Planter row check, G. D. Haworth, Plow, Dugdale and Breed, Plow, A. Hampe, Plow carriage, D. W. Ralston, Plow, gang, J. B. Hunter, Pocket book, C. Strauss, Poker and tongs, combined, I. J. Conklin, Pot lid, A. E. Colgrove, Press, T. J. Jenne, Press, horizontal hay and cotton, Bennett et al., Press, lever, W. O. Watson, Printing surface, Friedlaender and Moeller, Propellers, blade for screw, J. H. Loftus, Pruning implement, W. H. Johnson, Pruning shears, W. H. Johnson, Pump, double, submerged, Hartwick and Marx, Pump, force, L. J. Knowles, Pump sucker, J. M. Springer, Pump air chamber, etc., L. J. Knowles, Pumps, bucket for chain, D. F. Stow, Purifier, flour and middlings, G. W. Brown, Railway crossing, gate for, S. Cox, Railway, elevated, F. A. Williams, Railway rail joint, R. Pickel, Railway rail joint, D. K. Reeder, Railway switch, P. C. Bragg, Railway switch, C. D. Tisdale, Railway switch, G. J. Woodruff, Railway tracks, repairing, J. Houston, Rake, horse hay, B. Owen, Refrigerator, J. C. Clark, Reinholder, C. Osgood, Relishing machine, W. G. Caldwell, Roll for finishing tubes, G. Matheson, Roller, land, P. Blyen, Roof, slate, L. Brandt, Roving frame, T. Mayor, Ruffles, making, T. Robjohn, Saddle iron, J. M. Whiting, Saddle tree, P. B. Horton, Safes, fire escape for, Hackett and Crouse, Sash balance, J. Berndt, Sash holder, F. A. Battey, Saw grinding machine, D. M. Mefford, Saw, jig, E. J. Wescott, Sawmill, G. P. Bellows, Saw mill head block, J. Osgood, Saw, scroll, J. M. Bengler, Sawing machine, scroll, R. McConnell, Screw blank mechanism, Bidwell and Jaquith, Screws, cap for wood, H. T. Blake, Separator, grain, W. M. Koppes, Separator, grain, J. H. Locke, Sewing machine clamp, J. G. Powell, Shirt, J. Twainley, Shoe brush, I. and J. A. Joseph, Shovel, P. B. Cunningham, Skate, R. H. Earle, Spindle bearing and lubrication, J. M. Stone, Spirits, flavoring, M. Grube, Spool holder, F. J. Taylor, Spooling machine, T. A. Mathewson, Spring for seats, etc., J. A. Stevenson, Square and bevel, try, Larrison and Leigh, Steel reworking, J. N. Lauth, Stove, heating, C. Noble, Sugar cane cutting machine, J. Robert, Sulky, P. Soule, Surgical instrument, H. L. Stillman, Table, extension, A. S. Bowen, Table, folding, P. Cameron, Table, ironing, E. B. Lake, Table, ironing, T. R. Roland, Table slide, extension, D. C. Sivey, Teeth, securing pins to artificial, O. S. Bixby, Threshing machine stacker, Kittinger & Kurtz, Tin from tin scrap, removing, Holliday & Baker, Tobacco, packing, H. Winterwerber, Tobacco, treating chewing, S. V. Appleby, Tool, fitting, T. S. Carroll, Toy, automaton, D. K. Hatfield, Toy trundle, W. E. Leonard, Toy wind wheel, J. Jamouneau, Transfer sheet, ornamental, O. J. E. Palm, Transplanting box, P. Eby, Trap, animal, I. V. Newson, Trap, fly, J. C. Sellers, Umbrella, H. Martin, Umbrella ribs, softening, J. McAuliffe, Valves, etc., corner cap for, G. Crouch, Valve, safety, M. H. Crosby, Valve, steam, J. J. Grant, Vane and pointer, weather, J. C. Bryan, Vehicle spring, J. M. Pressey, Vehicle spring side bar, J. Tilton, Vehicle wheel, J. A. Smith, Ventilator for windows, G. Wagner, Violins, chin rest for, C. F. Albert, Wagon brake, R. J. Knapp, Washers, cutting out metal, D. Goodnow, Jr., Washing machine, W. D. and D. M. Croy, Washing machine, F. M. Lechner, Washing machine, Minderle and Maschmeyer, Water wheel, W. J. Thompson, Weather vane and pointer, J. C. Bryan, Windmill, A. and G. Raymond, Windmill, G. F. Rounds, Wind wheel, Mix and Jacobs, Wood filling compound, Dorr and Seyfert, Wooden pins, making, S. S. Eskey, Wrench pipe, D. Gilbert, Extensions granted, 31,252.—IRON BALE TIE.—J. J. McComb, 31,315.—GRINDING CARD TEETH.—C. Hardy, 31,324.—LOOM.—Jno. Davis, 31,330.—CARRIAGE WORK COLLAR.—M. Seward, Designs patented, 8,070, 8,071.—PAPER.—H. D. Cone, Stockbridge, Mass., 8,072.—CARPET.—J. H. Smith, Enfield, Conn., 8,073 to 8,106.—CARPETS.—O. Heingke, New Utrecht, N. Y., 8,107 to 8,125.—CARPETS.—H. Horan, East Orange, N. J., 8,126 to 8,131.—CARPETS.—L. G. Malkin, New York city, 8,132 to 8,151.—CARPETS.—E. J. Ney, Dracut, Mass., 8,152 to 8,159.—CARPETS.—H. Nordmann, New York city, 8,160.—CARPETS.—G. W. Piggott, New York city, 8,161.—WORK STAND.—M. S. Dunn, Rochester, N. Y., 8,162.—CARPET.—H. F. Goetz, Boston, Mass., 8,163.—ROCKING CHAIR.—G. M. Harwood, Troy, N. Y., et al., 8,164, 8,165.—GLASS DISHES.—G. W. Lowry, East Cambridge, Mass., 8,166.—SPOON HANDLE.—C. Osborne, N. Attleboro', Mass., 8,167 to 8,171.—CARPET.—J. H. Smith, Enfield, Conn., 8,172.—CARPET.—F. W. Green, Orange, N. J., 8,173 to 8,176.—CARPET.—J. H. Smith, Enfield, Conn., 8,177 to 8,179.—CARPET.—W. H. Smith, Enfield, Conn., Trade marks registered, 2,247.—SILVER POLISH.—W. E. Dunham, Fall River, Mass., 2,248.—SHAFTS, ETC.—J. A. Leippe, Lancaster, Pa., 2,249.—CIGARS.—S. Lowenthal & Co., Cincinnati, Ohio, 2,250.—WASHING BLUE.—S. S. Myers, Philadelphia, Pa., 2,251.—BAKE POWDER.—Plumb & Co., Grand Rapids, Mich., 2,252.—HOSIERY.—W. F. Salmon, Lowell, Mass., 2,253.—TEAS.—Williams & Co., San Francisco, Cal., 2,254.—COSMETIC.—A. Deland, New York city, 2,255.—CIGARS.—A. W. Foote, Brooklyn, N. Y., 2,256.—TOOTH PASTE.—Forster et al., Philadelphia, Pa., 2,257.—CIGARS.—Goldsmith et al., Cincinnati, Ohio, 2,258.—POCKET STOVE.—G. P. Houston, Washington, D. C., 2,259.—STEAM ENGINE ETC.—V. Mauger, New York city, 2,260.—COTTON PRESS.—Mrs T. C. Nisbet, Macon, Ga., 2,261.—PAINT OR CEMENT.—E. W. Tibbels, Chester, Pa., Schedule of Patent Fees, On each caveat, \$10, On each Trade mark, \$25, On filing each application for a Patent (17 years), \$15, On issuing each original Patent, \$20, On appeal to Examiners-in-Chief, \$10, On appeal to Commissioner of Patents, \$20, On application for Reissue, \$30, On filing a Disclaimer, \$10, On an application for Design (3 1/2 years), \$10, On application for Design (7 years), \$15, On application for Design (14 years), \$30, Canadian Patents, List of Patents Granted in Canada, February 26 to 27, 1875, 4,430.—E. H. Aydon, Wandswoth, England, et al. Improvements in smelting, etc. Feb. 26, 1875, 4,431.—Wm. Johnson et al., Montreal, P. Q. Plane iron adjustments. Feb. 26, 1875, 4,432.—H. M. Converse et al., Waterloo, P. Q. Blind and scene apparatus. Feb. 26, 1875, 4,433.—J. B. Tison, Montreal, P. Q. Window fastener. Feb. 26, 1875, 4,434.—P. Beaudry et al., Ottawa, Ont. Motor. Feb. 27, 1875, 4,435.—J. Dewe, Ottawa, Ont. Mail or despatch bag. Feb. 27, 1875, 4,436.—H. J. Young, Lansdowne, Ont. Hay loader. Feb. 27, 1875, 4,437.—J. B. Brown, Stanstead, P. Q. Milk cooling apparatus. Feb. 27, 1875, 4,438.—S. T. Lamb, New Albany, Ind., U. S. Nut lock and washer. Feb. 27, 1875, 4,439.—S. L. Crocker, Taunton, Mass., U. S. Smelting and refining copper ores, etc. Feb. 27, 1875, 4,440.—L. Miers et al., Lynden, Ont. Horseshoe machine. Feb. 27, 1875, 4,441.—R. Eaton, Montreal, P. Q. Freight car. Feb. 27, 1875, 4,442.—L. A. Frigon, Montreal, P. Q. Spring bed. Feb. 27, 1875, 4,443.—D. R. Winnett, London, Ont. Oil still. Feb. 27, 1875, Advertisements, Back Page, \$1.00 a line, Inside Page, 75 cents a line, Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Friday morning to appear in next issue, Local Agents Wanted, To canvass for the MANUFACTURER and BUILDER, the largest, best, and cheapest mechanical, building, and scientific journal published. We want active, responsible, permanent local agents in every intelligent community in the United States and Canada. To persons who will properly and faithfully serve our interests we offer a pleasant business and remuneration most ample for services rendered. LADY CANVASERS PREFERRED. Live agents can make from \$10 to \$20 per day. Specimen copies and terms will be furnished on application to ACUSTIN BLACK PUBLISHER, P. O. 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