

(24) J. F. asks: If I condense ten volumes of atmospheric air into one volume, and cool it, say, to 40°, then allow it to suddenly expand to the original ten volumes, what will be its temperature? A. The following formulæ are applicable to such cases, provided there is no loss of heat by radiation or conduction: T=absolute temperature of air before compression; t=absolute temperature of air after compression; V=volume of air before compression; v=volume of air after compression; P=pressure of air before compression; p=pressure of air after compression. Then $\frac{t}{T} \left(\frac{v}{V}\right)^{0.408} = \left(\frac{p}{P}\right)^{0.29}$

(25) E. M. F. writes: I wish to have some metallic cylinders cast, about 10 inches long, 2 1/4 inches in diameter, and 1/8 inch thick. Lead is too soft. What cheap metal can be moulded as thin and be moderately strong? A. Soft or yellow brass, or solid drawn brass tubing, might answer.

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

A. T. B.—Principally a ferruginous clay. May be used as a cheap paint if properly calcined.—T. J. H.—It is a bituminous shale or clay slate. It will yield a small quantity of oil illuminating gas by destructive distillation.

COMMUNICATIONS RECEIVED.

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

- Locomotive Strokes. By W. G.
Protection against Torpedoes. By F. P.
The Towne Scientific School. By H. H., Jr.
Is the Nation Safe from Invasion? By C. S.
The Weather and Rheumatism. By J. H.
Treatment of "Rusty" Gold. By J. T.
Claude Bernard. By H. M. D.
Galvanic Action. By C. P.

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending March 19, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Table listing various inventions and their patent numbers, including Alloy, bronze, E. C. Kirk; Amalgamator, L. M. Boardman; Animal trap, J. McMahel; Ashes, separating breeze from, J. Coyne; Axle box, R. E. Bason; Axle box, J. A. P. Vanclain; Bag machine, G. O. Lackey; Bale band tightener, Sevey & Manz; Bale tie, F. M. Logue; Bed, camp, M. A. Stevens; Bedstead fastening, C. H. Goebel; Bedstead, wardrobe, W. Fay; Bevel, square, and level, W. P. Walter; Billiard cushion, H. W. Collender (r); Billiard table cushion, H. W. Collender (r); Bit brace, C. H. Amidon; Blanks, receiving and arranging, H. W. Bassett; Blasting powder, Graham & Ward; Blind, outside window, J. Hester; Blind stile mortising machine, Doane & Bugbee; Boiler, sectional steam, J. W. Hard; Boilers, removing sediment from, T. C. Purves; Book binding, I. Reynolds; Boot and shoe machine, N. J. Simonds; Boot, balmoral or laced, L. R. Stockbridge (r); Boot legs, device for stretching, J. H. Walker; Brake, wagon, Keene & Van Order; Brick machine, J. A. Grawell; Brick machine, P. H. Kells (r); Bridle bit, J. Stanley; Broom brace, C. H. Butler; Bung and bush, J. Blair; Burglar alarm, A. Beck; Button hole cutter, A. J. Lytle; Button, lacing, G. W. Prentice; Cake holder and cooler, S. W. Larrabee; Can, metallic, Green & Wilson, Jr. (r); Can spout, A. L. Fisher; Car, railway, J. C. Paul; Car starter, W. Jasper; Cars, draw bar for railway, G. F. Godley; Carriage, child's, J. A. S. Simonson; Chair, rocking, C. C. Nichols; Chimney cap, J. W. Taylor; Churn, J. Huebenthal; Churn, O. O. Moore; Clamp, E. F. Gordon; Corn sheller, Scharnweber & Barkham; Cornices, mould for running plaster, J. Y. Brickey; Corpse cooler, G. C. Hill; Corset, I. W. Birdseye; Cotton opener and cleaner, R. Kitson; Cultivator sleeve manufacture, C. P. Buckingham; Cut off, self-adjusting, W. Lowe; Cylinder with steam jackets, Leavitt, Jr., & Jones; Depot platform, L. J. Swett; Diagrams, transmitting, J. M. Wolbrecht; Digging machine, J. Coast; Ditching machine, J. F. Watring; Dough mixer, J. M. Stanyan; Dredging tongs, C. A. Scanlan; Drill, grain, J. R. Finch; Drill grinder, A. K. Rider; Drills, making twist, C. F. Jacobson; Drilling, etc., subaqueous, J. H. Striedinger et al; Egg carrier, Laffin & Elliott; Egg carrier, P. Schulz; Egg carrier, J. L. Stevens; Egg cup, W. Starkey; Electrical currents, C. H. Wilson; Elevator feeder, R. Marquis; Engine for cotton presses, C. E. Emery.

Table listing various inventions and their patent numbers, including Engine, rotary, L. Van Doren; Engine, rotary steam, A. Stegrist; Engine, wind, Croft, Sr., & Croft, Jr.; Fare box, M. M. Moore; Faucet, lock, F. C. Lillis; Faucet, measuring, Johnson & Everts; Fence post, B. C. Johnson; Fence post, D. K. Mabie; Fence post, metallic, E. C. McVitty; Fence wire, barbed, T. H. Dodge; Filter, G. H. Moore; Filtration, C. Gerson; Fire arm, Henry & Fraser; Fire escape, C. A. Sheldon; Fire escape, J. Stengel; Fish and animal trap, G. Davis; Flaming machine, Campbell & Richards; Flour and meal chest, sifting, C. Romine; Flue, H. R. Bash; Flue cleaner, boiler, F. I. Pearce; Flume, R. H. Campbell; Funnel, D. Williams; Furnace, gas, N. Will; Game apparatus, C. Eusten; Garment supporter, T. J. Carroll; Gas apparatus, C. Holland; Grain binder, A. S. Hoyt; Grapple, A. L. Larwill; Grate for fire places, J. Moore, Jr.; Gymnastic apparatus, J. S. Chamberlin; Harrow, J. K. Miller; Harrow, J. W. Pearson; Harrow, Smith & McCulley; Harvester, G. H. Spaulding; Harvester, C. Wheeler, Jr.; Harvester, cotton, I. Boone; Hat brims, machine for curling, T. Lees; Hat and cap, sweat leather, W. J. Van Horne; Hatchway, L. Pare; Haversack, J. H. Lambert; Heaters, register box for, J. Moore, Jr.; Hinge, lock, P. Adams, Jr.; Hoe, W. H. Eggleston; Hog dressing machine, I. Boone; Horses, toe weight for, C. Ferrier; Horseshoes, W. Dickinson; Hose carriage, C. Castle; Hot air apparatus, E. Moreau; Hub boring machine, J. Kritch; Hub, W. H. Wright; Irrigating apparatus, C. D. Page; Ivory imitation, J. W. & C. M. Hyatt; Jeweler's soldering tweezers, C. F. George; Key fastener, J. T. White; Knitting machine, A. Reichenbach; Lamp, F. B. Squire; Lamp chimney, E. S. Drake; Lamp extinguisher, A. Hall; Lamp extinguisher, L. W. Swem; Lamp, shoemaker's, A. Rosenstjerna; Land roller, A. H. Uford; Latch, gate, W. F. Golden; Latch, reversible, I. E. Van Benthuyzen; Leather stuffing machine, J. W. Hildreth; Lewises, Graham & Dennison; Lifting jack, Tichenor & Dexter; Lifting jack, etc., A. W. Comstock; Lighting device, W. W. Batchelder; Lock, bag, A. Oberndorfer; Lock, permutation, G. W. Youmans; Lock, time, P. F. King; Lock, trunk, J. Arnold; Locks, striker for spring, W. H. Taylor; Lubricator, W. A. Clark; Lubricator, loose pulley, W. G. Beach; Lubricator, G. W. Farnham; Lumber, drying, G. Woods (r); Lumber, running through flumes, N. P. Chipman; Machinery, driving light, M. Everhart; Manhole and cover, T. Kerr; Marble, artificial, J. J. Williams; Meats, powder for curing, E. Gorges; Metals, expanding and contracting, G. W. Ford; Mill for pulverizing, J. W. Hyatt; Mirror and other frames, G. Eastman; Mirrors, T. Carney; Moulding in sand, Aiken & Drummond; Motor, water, W. F. Eyster; Motor, water, G. W. Stith; Motor, weight, A. Barker; Mower, R. Eickemeyer; Mud pipe cleaner, H. Green; Musical instrument, valve action, T. Artaud; Musical top, T. W. Harrison; Nails, picture, W. E. Jones; Neck tie retainer, O. P. Hurd; Numbering machine, C. Ewing; Oil cup, A. S. Smith; Oiling wheel axles, H. D. Goodrich; Padlock, W. D. Spencer; Painting machine, C. T. Brandon; Paper pulp machine, Baxendale & Barry; Paper pulp machine, J. G. Moore; Pianoforte action, F. St. Amant; Pin, dowel, B. F. Allen; Planing machine, J. B. Stockham; Plant duster, J. O'Brien; Planter attachment, Armsworth & Brown; Planter, C. Berryman; Planter, O. C. Green; Planter, O. B. Seamans et al.; Planter, P. B. Doty; Plow, J. C. Carpenter; Plow, L. Eberle, Sr., et al.; Plow, J. Pollock; Plow, T. I. Wade; Plow, C. A. Weed; Plow cutter, Wansbrough & Spear; Press, cotton and hay, G. W. Soule; Press, hay and cotton, P. K. Dederick (r); Printing machine, G. Rosquist; Printing, transfer sheets for, C. T. Moore; Pulp machine, F. A. Cushman; Pump and condenser, R. M. Marchant; Pump, ship's, J. Edson; Pump valve, Tregoning & Hastings; Railway, street, J. R. Beckett (r); Rake, hand, J. 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