

water. Let the solution cool. When the sulphuric acid is added, the solution will become hot, and redissolve most of the crystals formed on cooling.

(47) W. K. R. writes: Supposing that a man had the power to fly through space at the rate of 104655 statute miles per hour, in same direction that the world revolves, starting from New York city at 12 M., and having flown one hour, would stop and ask what time it was, would he not get the reply that it was 12 o'clock? He flew another hour, and asked the time; he was told it was still 12 o'clock, and so on until he came to his starting point, New York. He has traveled all through day time, but when he gets to New York he is told a night has passed. How do you account for the day gone by and the difference in time? A. As you have put the proposition, why not place the man on top of some high steeple? In this case he will be passing through space at a rate of 104655 miles an hour in same direction as revolution of earth. His relation to objects below him will remain unchanged, but his relation to time will be ever changing. It will be midday when he is on the nearest approximate side to sun, and midnight when he is in exactly the opposite face of earth. If, however, he flies at rate stated in opposite direction of rotation of earth, which is probably what you wish, he will remain on midday line, while the earth will be rotating constantly below him. During the mean time it is New York or any point from which he may have started which has found the midnight line, and which therefore counts one day as having elapsed.

(48) S. A. R. asks: 1. What is the power and probable cost of a dynamo capable of running a dozen incandescent lamps? A. Probably \$200. 2. What power of motor would be necessary for running such dynamo? A. 1 1/2 to 2 horse power. 3. What size lamp is most suitable for an ordinary sized dwelling, more than one lamp per room being preferred? A. 15 candle power.

(49) G. W. L. asks (1) how to change the surface of iron and steel to a black color. A. See answer to query 48 in SCIENTIFIC AMERICAN for March 29, 1883. 2. Is there anything that will protect finished iron from rusting? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 226, for recipes of Varnishes for Protecting Iron.

(50) G. P. W. asks how to treat fence posts to make them last longer in the ground. Some boil in coal tar, others char the ends with fire, others say put the top end down. A. We would recommend the coal tar treatment, and why not at same time put top end downward? You would then have a very good combination. 2. I want a recipe for an embalming fluid, to use as an undertaker upon human bodies. A. See A New Method of Embalming Bodies and Preserving Tissues, page 69, SCIENTIFIC AMERICAN, for February 4, 1882. Also, Brunelli's Process of Embalming, page 169, SCIENTIFIC AMERICAN, March 13, 1882, and Embalming in Italy, page 52, SCIENTIFIC AMERICAN, July 22, 1882.

(51) W. H. writes: 1. When celluloid collars have been worn a short time, they turn yellow. Can they be restored to their original color? A. If the coloring does not disappear when the affected portions are rubbed with a woolen cloth and a little turpentine, and then polished with a clean woolen rag, the injury is a permanent one. 2. How are the sticky fly papers made that are sold by drugstores? A. Boil 1/4 ounce small chips of quassia in 1 pint of water, and add 4 ounces glycerine. 3. What metal is it that mixed with tin prevents it turning lead color, but makes it look whiter and more like silver when the article has been used some time? A. An imitation of silver is made by combining 3 ounces tin with 4 pounds copper. So that it is possible that by adding copper in suitable quantities the desired result will be obtained.

(52) R. S. B. writes: 1. I want to make caustic soda liquor for boiling goods. I know that carbonate of soda boiled in lime and allowed to settle will produce the liquor. What is the best way to do this? A. The most convenient way for you will be the best way. It is immaterial in what kind of vessel the operation be performed. 2. Will the liquor be as strong this way as by putting in 70 per cent soda? A. We believe it will be. 3. Will it be free of lime, as the lime will spoil the goods I want to cook? A. Unless exactly the right amount of lime is used to satisfy the sodium carbonate, there will be danger of an excess of lime. To obviate any difficulty of this sort, the utmost care must be used to employ the proper proportions of each.

(53) R. B. R. writes: In my letter to you suggesting what seemed to me to be the natural arrangement of the colors of the spectrum as applied to the musical scale, the order of colors should have been reversed in the list given, so as to read:

Table with 4 columns: Notes, Colors, Sound vibrations, Light vibrations. Rows include A (Red, 106 2/3, 458 trillions), B (Orange, 120, 506), C (Semitone, Semitone, Semitone, 128, 535), D (Green, 144, 577), E (Blue, 160, 632), F (Indigo, 170 2/3, 658), G (Violet, 192, 737).

The vibrations per second in this list increase in the same direction; and you will observe that the difference in both series of vibrations between B and C shows the semitones. This is evidently no accident on the part of nature, but clearly an indication that she intended we should study sound music and color music in connection, and not as separate arts. Will you kindly inform me how I can obtain seven distinct transparent shades of each color? I cannot get the information from the painters. Would gelatine paper enable me to do it? A. Your investigation, if novel, is an extremely interesting one. We would suggest that excellent effects may be obtained by coating glass with ordinary shellac varnish (made with bleached shellac) tinted with aniline dyes. The dyes you can easily select of the shade that seems to you most desirable. The glass must be slightly warmed before applying the varnish. The strongest alcohol should be used or dissolving the shellac and the powdered (not liquid)

aniline colors. One part of shellac to eight of alcohol is a good proportion. The varnish should be poured on and placed evenly over the glass, and the superfluous quantity returned to the bottle. It must not be painted on.

(54) L. V. T. writes: 1. I send a piece of wall paper, and would like to know if there is any arsenic contained in the green color, and what are the symptoms of arsenic poisoning? A. The green spots on the paper are so small and so few that we think there is very little danger of poisoning from this source. To determine the quantity of arsenic in the wall paper sent, a chemical examination would be necessary. The symptoms of arsenical poisoning, according to Taylor, are first faintness, depression, nausea, and sickness, with an intense burning pain in the region of the stomach, increased by pressure. The pain in the abdomen becomes more and more severe, and there is a violent vomiting. In chronic cases there will be inflammation of the conjunctiva, with suffusion of the eyes and intolerance of light; also with more or less irritation of the skin. 2. Can you tell us of a substance to mix with Portland cement that will set middling quick and stand weather, and become hard and durable? Sharp sand and Portland cement with plaster of Paris, we have tried, but the plaster freezes and swells in winter and bursts the socket. Is there anything we could mix with the sand and cement to improve it? A. The following cement will probably suit your wants: 63 parts well burned brick and 7 parts litharge pulverized and moistened with linseed oil. Moistened the surfaces to which it is to be applied. Also see article on Cements, page 2110 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 133.

(55) W. R. S. asks whether or not any one has succeeded in photographing in natural colors. If it has been done, what was the modus operandi? A. Not very successfully. See back Nos. of the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT for information. We send you catalogue. 2. In SUPPLEMENT No. 149, under the heading Simple Electric Light, four or six bichromate cells of the size given are said to be necessary. Would a single cell, four or six times as large as the one recommended, answer the purpose just as well? A. No. 3. Where, and by whom, is the Chemical News published? A. Editor, William Crookes, Boy Court, Ludgate Hill, London, Eng.

(56) W. L. T. asks: What is crocus? A. The term, as employed in the mechanic arts, usually refers to a preparation of the oxide of iron used for polishing metals and gems. But the term is generic and not specific, and means, from the Greek, "saffron," a color. It is applied also to an oxide of copper and an oxide of antimony.

(57) D. S. asks: 1. Are all kinds of small castings made to any extent direct from the Bessemer converter into the ordinary sand moulds? If not, why not? A. Bessemer steel demands so high a heat for fluidity sufficient to pour small castings that ordinary sand moulds will not contain the metal in shape. Ground silica is used for Bessemer steel moulds. 2. As I understand, malleable castings are simply ordinary castings put through a process to extract a part of the carbon. If this is so, and the Bessemer converter decarbonizes the fluid metal to begin with, why should not all kinds of castings be made direct into sand moulds from the converter? A. The material of Bessemer steel and that of malleable cast iron is radically different, fully as much so as brass and bronze, or lead and Britannia metal. Not only is the resultant material different, but the materials of the compositions are different. Treatment appropriate to the one is entirely unfit for the other.

(58) N. D. T. asks for a recipe for making soap bubbles, such as are used for chemical experiments. A. One gramme dry Marseilles soap is dissolved in 100 grammes warm water; this is filtered, and to every 100 cubic centimeters of this solution 40 grammes white sugar is added. Bubbles made with this liquid will last several hours.

(59) E. S. A. asks how the cement is manufactured, or where I can obtain it, which is used to paper iron pulleys to prevent the belts from slipping? Also the kind of paper used for the same. A. Use hard wrapping paper and glue. Roughen the surface of the pulley with a coarse file. Then draw the paper tightly around the pulley, brushing the glue quickly upon the pulley and upon the paper, so that every layer will be perfectly glued together; put on eight or ten thicknesses.

(60) E. D. L. asks if there is any preparation that you can put on a wall that has been whitewashed, to make paper adhere to it, and thus avoid the trouble of scraping the walls. A. The whitewash must be scratched with a stiff brush, to remove every particle of loose lime from the surface, after which it should be thoroughly swept down with a broom and then coated with glue size prepared by breaking up glue into small pieces, putting them in a vessel with sufficient cold water to just cover them, and in the morning the glue will be soft enough to melt readily with a moderate heat; then reduce to desired consistency by adding suitable amount of water.

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

Mrs. J. A. H.—The mineral is simply a very pretty piece of crystallized quartz, and is of no value except as a curiosity.—E. A. B.—Realgar is found principally in Europe, in Austria and in Saxony. It is valuable as a mineral, being worth 25 cents to \$2.00 per specimen. The ease with which it could be produced artificially would prevent it from ever becoming commercially valuable.—A. O.—The specimen appears to be clay colored with oxide of iron or decomposed iron ore. Its nature cannot be positively determined unless it be chemically examined.—L. F. K.—The brown specimen is a close grained siliceous material colored by iron, and is of no value as an ore. The other specimen is hornblende and mica.—G. A. S.—The specimen is simply clay (aluminum silicate) colored with a little iron oxide,

INDEX OF INVENTIONS For which Letters Patent of the United States were Granted April 22, 1884, AND EACH BEARING THAT DATE.

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

Table listing inventions with names and patent numbers. Includes: Adding machine, W. H. Beatley; Air cooling device, W. V. Wallace; Air medicator and injector, B. McGregor; Alarm, See Burglar alarm; Animal shears, W. F. Winckenden; Ash pan, steam emptying, J. Desmond; Axle lubricator, car, W. G. Mitchell; Axle yoke, H. K. Porter; Bag, See Mail bag; Bag turning machine, S. T. Lockwood; Baletie, J. White; Baling press, H. V. & C. F. Scattergood; Barrels, apparatus for plugging and tapping, N. W. Payne; Bed pan, J. E. Drakeley; Belt fastener, E. Maynz; Belt, traveler's, A. H. Kepley; Berth, folding, H. S. Hale; Billiard cue tip, D. Dessauer; Bleaching raw cotton, J. C. Vanlohe; Blind slot lock and operator, I. Van Kersen; Blind stop, T. Massey; Block, See Building block; Blower, fan, J. E. Studley; Blower, rotary, R. E. Harris; Board, See Cutting board. Game board. Lap board; Boat, See Canal boat; Book clasp, extensible, J. Munch; Boot cleaner, Kupferle & Dowler; Boot or shoe, F. Packard; Boot or shoe, W. H. Wetmore; Boot or shoe coasting guard, W. Lawrence; Boot or shoe heel plate, S. D. Mehew; Boots or shoes, machine for cleaning and blacking, J. Hargrave; Boots, shoes, etc., forming felt, D. F. Messer; Bottle, T. L. Seymour; Bottle opener, W. H. Hannan; Bottles for aerated or gaseous liquids, stoppering, R. J. Sankey; Box fastener, T. Humphreys; Bracket, See Lamp bracket; Brake, See Car brake. Vehicle brake; Brick kiln, J. S. Lester; Brick machine, W. Andrus; Bridge, suspension, G. Wegner; Building block, W. Stranders; Building, fireproof, G. W. Rader; Burglar alarm, H. E. Taber; Button, J. Bird; Button fastener, J. F. Thayer; Button machine, D. H. Campbell; Button setting implement, J. F. Thayer; Buttons, machine for making, D. H. Campbell; Cable grippers, pawl for, Root & Tucker; Cables, laying subterranean, S. F. Shelbourne; Calipers, C. Bovensiepe; Canal boat, A. McDonald; Capsule machine, J. H. Glover; Capsules, machine for moulding gelatine, W. A. Tucker; Car brake, J. Stroecker, Jr.; Car brake attachment, Holcomb & Miller; Car coupling, Brower & Dunlap; Car coupling, G. Forbes; Car coupling, T. L. McKeen; Car coupling, R. T. Morrison, Jr.; Car coupling, E. L. Raynsford; Car coupling, G. W. Smillie; Car coupling, S. L. Wiegand; Car starter and brake, J. W. & G. R. Strickland; Carpet fastener, H. A. Schwes; Carriage top, H. McCurry; Carriages, material for covering, E. W. Harral; Cart, dumping coal, W. S. Shoemaker; Cartridge shell, P. Boca; Case, See Organ case. Show case. Ticket case. Watch case; Cash system, T. M. Kenney; Catamenial sack, C. H. Levy; Chain, drive, W. D. Ewart; Chain, drive, D. McKernan; Chain hook, watch, C. B. Carpenter; Chair, N. Jacobson; Check holder and bag fastener, C. Leavitt; Check row wire, W. F. Johnson; Check rower, J. J. Tuttle; Chuck for rock drills, H. C. Sergeant; Churn, J. H. Burck; Churn, D. W. Curtis; Churn, A. M. Otis; Churn, Steed & Nixon; Churn, J. B. Wilson; Chute, coal, J. E. Clifton; Cigar bundling machine, H. F. Behnsen; Cigar cutter, G. E. Siebler; Cigarette, B. A. Kaufmann; Clamp, See Cord clamp. Rope, cord, etc., clamp. Clasp. See Book clasp; Cleaner, See Boot cleaner; Cleat for end gates, J. H. Warren; Clocks, automatic winding signal for spring, E. Jungerman; Cloth cutting machine, D. H. Campbell; Clothes hanger, L. Barkany; Clutch mechanism, Bell & Gay; Coffee pot, B. F. Staggs; Coffin lid or cover and making the same, B. Morris; Coin, counter for facilitating the transfer of, Lego & Dupau; Collar, horse, G. W. Pool; Coloring matter, ethyl blue, A. Kern; Coloring matter, manufacture of ethyl blue, A. Kern; Coloring matter, methyl blue, A. Kern; Compasses, device for ascertaining the variation of, C. E. Kirtland; Cop building mechanism, Bond & Smethurst; Cord clamp, C. J. A. Sjoberg; Cores, machine for making green sand, J. Scull; Corkscrew, T. Curley; Corn sheller, H. Packer; Coupling, See Car coupling. Pipe coupling. Lighting rod coupling. Thill coupling; Crane, traveling Barnhart & Huber (r);

Table listing inventions with names and patent numbers. Includes: Crank disk, H. Tabor; Cultivator or harrow, wheel, C. La Dow; Cupboard, Dow & Gorgas; Curtain fixture, T. L. Quigley; Cutter, See Oatmeal cutter; Cutter head, M. S. O'Neil; Cutting board, G. W. Cody; Dictionary stand, E. D. Swain; Digger, See Potato digger; Disinfecting sewers, Collings & Pike; Distillation of wood, apparatus for the, R. Hal-dane; Door lock, sliding, J. H. Dougherty; Door securer, W. Starrett; Double headed gauge, G. S. Forrest; Double-tree, S. M. Firey; Dough mixer, F. F. Hussey; Draught equalizer, C. Olson; Drill, See Grain drill. Ratchet drill; Drilling machine, suspended, Gordon & Hobbs; Dust arresting machine, J. S. Brandstaetter; Dust collector, Ortmann & Taylor; Egg and sugar beater, C. Deis; Electric cable, S. F. Shelbourne; Electric circuits, junction box for, A. P. Wright; Electric conductor, anti-induction, S. F. Shelbourne; Electric conductors, conduit and attachment for, S. F. Shelbourne; Electric conductors from induction, protecting, S. F. Shelbourne; Electric light and telegraph post, combined, S. F. Shelbourne; Electric light fixture, P. H. Klein, Jr.; Electric light tower, J. S. Adams; Elevator, See Excavating elevator. Water elevator; Elevator safety clutch, J. W. Simmons; Embroidery, M. H. Pulaski; Engine, See Gas engine. Portable and traction engine. Rose engine. Rotary engine; Engine, I. De Graff; Engine, combined straw and coal or wood burning, M. Rumely; Engraver's tool, W. Wildt; Excavating elevator, G. H. Kamacher; Excavator and dredge, R. R. Osgood; Extension suspensory rod, C. La Dow; Fan, automatic, W. B. Greene; Fanning mill, W. H. Kelly; Faucet, J. McGinley; Feed water heater, R. G. Ewer; Fence, barbed, H. M. Underwood; Fence, flood, J. Snider; Fence, iron, T. Rogers; Fence post, F. S. Smith (r); Fences, machine for making wire, H. Smith; Fences, warning device for barbed, C. H. Bacon; Filtering apparatus, Farquhar & Oldham; Filtering apparatus, liquid, Farquhar & Oldham; Finger ring, C. Prahl; Firearm, magazine, J. M. Marlin; Fire escape, portable, F. I. Freeman; Fire extinguisher, automatic, W. Neracher; Flier for twisting silk, H. Liautier; Forge, portable, T. H. Bullock; Furnace, See Glass furnace; Gauge, See Double-headed gauge. Railway track gauge; Game board, L. P. Valiquet; Gas, apparatus for the manufacture of, H. M. Pierson; Gas engine, S. L. Wiegand; Gas, generating, Pratt & Ryan; Gas governor, J. S. Connelly; Gear, driving, F. Jenkin; Glass furnace, J. Dalzel; Glass lamps and lamp founts, mould for the manufacture of, J. F. Miller; Governor, marine engine, Bell & Fuller; Grain binder cord holder, R. W. Maske; Grain drill, T. Becker; Grain header and harvester, P. E. Drouet; Grain scourer, G. A. Dawson; Grate, L. Bannister; Grate, fire, G. Alexis-Godillot; Grindstones, knockdown frame for, F. M. Stearns; Gun locks by recoil, mechanism for operating, H. S. Maxim; Halter fastener, M. C. Hayes; Hame clip, C. W. Massenheimer; Handle, See Saw handle; Hanger, See Clothes hanger; Harness checking device, Floyd & Barton; Harness pad, H. C. Babcock; Harvester, W. Dingman; Harvester, W. N. Whiteley; Harvester grain wheel, W. N. Whiteley; Hasp lock, D. H. Donaldson; Hat and coat hook, F. Seliger; Hat bodies, method of and machine for scalding and felting, J. S. Taylor; Hay rickling device, R. O. Davis; Header and thrasher, combined, S. L. Gaines; Heater, See Feed water heater; Heating and ventilating apparatus, P. W. Nolan; Heating apparatus, D. M. Graham; Heel machine, E. H. Parks; Hides and leather, machine for wringing raw, A. Heim; Hoisting device for vessels, R. H. Purnell; Holder, Grain binder cord holder. Paper holder. Sash holder; Hook, See Chain hook. Hat and coat hook. Snap hook; Horse attaching and detaching device, C. C. Ferrill; Horse cleaner, E. M. Farr; Horse detacher, I. A. Wesson; Horse power, portable, H. Packer; Hose pipe nozzle, J. E. Prunty; Ice making apparatus, absorber for ammonia, M. S. Conly; Ice plow, H. F. Dernel; Ice tongs, J. S. Dollinger; Ice tongs, M. Hatfield; Indicator, See Station indicator; Induction, controlling and limiting, S. F. Shelbourne; Injector, W. T. Ewing; Ink well, J. H. Gifford; Insulated electric conductor or cable, S. F. Shelbourne; Insulating electric cables, method of and apparatus for, S. F. Shelbourne; Insulator for telegraph wires, Baldwin & Thurston; Jack, See Lifting jack; Kiln, See Brick kiln; Kite, W. C. Wood; Knife, See Pocket knife;

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