

(31) B. L. D. asks: Can you give me a recipe for making paste for sharpening razors, knives, etc.? A. Mix the finest emery obtainable with a little suet.

(32) C. B. McM. says: I hear that four gallon measures of different capacities are in use, and that the United States standard gallon contains 230 cubic inches. In the confusion of text-book statements such as—"wine gallon=231 cubic inches," "beer gallon=282 cubic inches," "American standard gallon=58973 grains (Youmans' Chemistry)=nearly 234 cubic inches," and the very extensive ignorance of what is really correct, please repeat the information in a way that may be quoted as authority for the capacity of a United States gallon in cubic inches, and the weight in grains. A. "The gallon of the United States is the standard or Winchester wine gallon of 231 cubic inches, and contains 8.338882 lbs. avoirdupois, or 58372.1754 troy grains of distilled water at 39° 83'° Fahr., the barometer being at 30 inches. It is equal to 3.785207 liters. The gallon of the State of New York is of the capacity of 8 lbs. pure water at its maximum density, or 221.184 cubic inches. It is equal to 3.62346 liters."—*Appleton's Cyclopaedia*.

(33) S. C. D. says: Please give directions for electrotyping cylindrical rollers for impressing upon sheets of wax, accurately, of the proper figure for honeycomb foundations. The figure for the surface of the cylinders to be derived from sheets of wax foundation, having the figure correctly impressed upon them. A. This can be done by coating with plumbago, and then electrotyping with copper, in a way familiar to most printers and to all electrotyping establishments. The plates can afterwards be bent round a roller, and used to impress the sheets of wax.

(34) J. H. T. asks: There is a piece of ground, 100 rods long and 10 rods wide at one end, running to a point at the other, which we wish to divide into 4 equal lots. Please give a rule. A. Let the 100 rods be the base of a triangle, divide it into 4 parts of 25 rods each, and join the apex with each of the three dividing points. You will then have 4 triangles on equal bases and between the same parallels, which, according to Euclid, are equal to each other.

(35) R. S. asks: What are the chemical qualities of bisulphide of lime, and how can I prepare it? A. The bisulphide of calcium (CaS_2) is produced by boiling milk of lime with sulphur and water, but not long enough to allow the lime to become completely saturated. The filtered liquid, on cooling, deposits crystals whose composition agrees with the formula $\text{CaS}_2 + 3\text{H}_2\text{O}$. Exposed to the air, it soon absorbs oxygen, becoming converted into insoluble sulphate of calcium. Its aqueous solutions are likewise decomposed. Its reactions with the metallic salts are similar to those of the alkaline sulphides.

(36) H. M. S. asks: 1. Of what is the bronze preparation made and how is it applied to clock fronts? A. Bronze powders are made of various metallic alloys. The gold bronze is usually made of Dutch gold (an alloy of copper and zinc) and of the bisulphide of tin (*aurum musivum*). They are usually applied to metal work by means of an oil size or japan varnish. 2. In what way can I remove the old bronze? A. Wash first with a solution of washing soda (hot), clean and dry, and then rub with a little benzole, alcohol, or ether.

(37) W. E. W. asks: 1. Of what mixture is the bright red paint usually put upon axes made? A. It consists of fine vermilion ground with 1 part boiled oil and 2 parts turpentine. 2. Is more than one coat applied? A. One coat will suffice. It is best applied with a fine brush, when the metal is warm.

(38) C. M. B. asks: Is the odor emitted by the allanthus tree unwholesome? A. It is considered so by many, but we have no proof as to the facts.

(39) L. S. & Co. ask: Is there anything known which would clean the hands from paints and lacquers without the use of turpentine? A. A little ammonia and benzine or naphtha, aided by a little sand, is often used in stubborn cases; but plenty of good soap and warm water, with a stiff brush or a small piece of pumicestone, will ordinarily suffice.

(40) W. P. S., Jr., says: Can you give me a recipe for making *papier maché*? A. *Papier maché* is obtained from old paper and the like made into a pulp by grinding with milk of lime or lime water, and a little gum dextrin or starch. This pulp is then pressed into form, coated with linseed oil, baked at a high temperature, and finally varnished. The pulp is sometimes mixed with clay (kaolin), chalk, etc.; and other kinds are made of a paste of pulp and recently slaked lime. This is used for ornamenting wood, etc.

(41) M. P. B. says, in reply to a correspondent who asked how to prevent his water filter from getting choked up: Fit in the filter, on the top of the charcoal, a piece of board having in the center a circular hole from two to four inches in diameter, according to the size of the filter; force in this a sponge so tightly that all the water has to pass through it first, but not so as to prevent its free passage. This sponge will absorb readily the gross impurities of the water, and can easily be taken out and cleaned once or twice a week.

(42) A. C. S. asks: 1. Is there any reason why lightning rods should always be bright, if the points are kept sufficiently sharp? A. It makes no difference if the points are not bright. 2. If lightning rods put up in the ordinary way above the roof terminate in the eaves' spouting of the house, and said spouting had good ground connections, would this not be equal to the best lightning rod, and thereby save many feet of rod and many dollars of expense? A. The arrangement you suggest would be good. Make a thoroughly good ground connection with leaders, have all joints well soldered, and you may dispense with the rod as you propose.

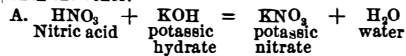
(43) J. A. W. says: Having occasion to do some copper plating some time ago, I dissolved sulphate of copper in water in a glass jar. I then poured it off into my battery, and there was some left in the jar. I threw a small piece of iron into it and left it for

some days. I then took it out; and to my surprise, I found that it had been perfectly plated with copper. Please let me know the cause? A. The reaction you note is taken advantage of to cheaply copper plate small articles of cast iron. See answer to J. O. M., p. 347, vol. 36. In the presence of water, the reaction is as follows:

$\text{CuSO}_4 + \text{Fe} = \text{FeSO}_4 + \text{Cu}$
Sulphate of copper. Iron. Sulphate of iron. Copper.
As the iron is a more positive metal than copper, it displaced the latter in combination with acids, the remaining portions of the iron becoming coated with the precipitated copper.

(44) A. G. asks: Is the silver, for a reflecting telescope, put on the back of the glass the same as on looking glasses? A. No. Only one side of the glass is ground and polished to the shape required. The silvering is done on this side; and then, with the softest buckskin and the finest rouge, the surface of the silver is polished for the reflecting surface. In cities where gas is used, it will not retain its brilliancy very long; then it requires to be cleaned with nitric acid and resilvered, which is only the work of a few hours when a person has become accustomed to it.

(45) A. L. B. says: 1. I understand that, in modern chemistry, the acids and alkalis are the two extremes of a class of substances called hydrates, the only difference being the radical. In the reaction of nitric acid, HNO_3 , or HNO_2 , on potassic hydrate, KOH is KNO_3 , or KNO_2 , and H_2O . Which molecule loses the oxygen atom, and why should one part with it more than the other?



In this reaction the potassium is considered, by virtue of its greater affinity, as replacing the hydrogen atom in the hydric nitrate; the hydrogen in turn satisfying the OH group to form water. These hydrates are similar only in point of constitution. Their chemical deportments are widely different. 2. What are oxides in modern chemistry? A. The bodies formed by the direct combination of oxygen with the elementary bodies are called oxides. With water some of these oxides form hydrates, as $\text{K}_2\text{O} + \text{H}_2\text{O} = 2(\text{KHO})$
potassium oxide water potassic hydrate

(46) J. R. M. asks: To have a circular saw run well, should the mandrel have a little end play if it is desired to relieve the saw and guides of strain? A. If the saw is not true or the carriage runs crooked, end play of the mandrel to the extent of the deviations will relieve the strain upon the saw. But if the carriage runs true and the saw true, the mandrel should have no end play.

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

M. S. M.—It is a quartz crystal, the opposite sides of which have been ground flat, probably by artificial means.—F. B.—It is graphite.

COMMUNICATIONS RECEIVED.

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

On a Battery and Electric Clock. By J. E. W.
On Anti-Water Drinking. By C. P. W.
On Snakes Catching Fish. By C. R. G.
On Utilization of Sewage. By Dr. H. D. T.
On Aerial Navigation. By C. W.
On the Ash-Colored Salamander. By C. F. S.

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.

Inquiries 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 inquiries analogous to the following are sent: "Who makes machinery suitable for making flour barrels? Whose is the best treadle? Who sells steam whistles? Whose is the cheapest silk, suitable for balloons? Who makes the best engraving machine for transferring designs to copper?" 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
June 5, 1877,
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.

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Baking pan, J. H. Pitts 191,548
Barrel cover, McClellan & McBride 191,699
Barrel head, G. M. Breinig 191,644
Bedstead, wardrobe, S. S. Burr 191,651
Bee hive, T. A. Atkinson 191,685
Bee hive, H. F. Poggenpohl 191,612
Bee hive, Sperry & Chandler 191,620

Bench dog, W. Lyle 191,698
Bit stock, J. T. Matthews 191,540
Blacksmith's tongs, J. Van Matre 191,734
Boiler furnace, etc., J. E. Crowell 191,518
Bottle stopper, C. De Quilfeldt (r) 7,722
Bottles, etc., sealing, C. L. Darby 191,519
Bottling machine, W. H. Kelly 191,596
Bracket, J. B. Sargent 191,718
Breech loading fire arm, V. Bovy 191,563
Bridge, E. S. Sherman 191,721
Bung cutter, R. & G. N. Crichton 191,658
Button clasp, L. B. Collin 191,657
Button fastening, A. Brookmann 191,649
Calendar and washing list, J. C. Coombs 191,517
Car brake, E. S. Jones 191,594
Car coupling, W. Duesler 191,522
Car lavatory, C. E. Lucas 191,691
Carriage perch stay, J. R. McGuire 191,700
Chair convertible, J. P. True 191,733
Chair, folding, B. F. Little 191,689
Chicken coop, Sullivan & Retallic 191,621
Chicken coop, R. L. & N. J. Todd 191,556
Chimney draft regulator, W. H. Sears 191,722
Chisel, mortising, J. T. Bowen 191,643
Churn, T. J. Parrish 191,708
Churn, reciprocating, H. C. Sperry 191,726
Churn, rotary, A. J. Borland 191,562
Churn, rotary, Hatton & Record 191,676
Churn, rotary, J. G. Wallace 191,736
Clasp hook, spring, J. W. Knause 191,686
Clocks, adjusting position of, W. F. Wuterlich 191,630
Coal and ore washer, J. M. Bailey 191,511
Corn dropper, J. P. Simmons 191,723
Corset skirts supporter, T. F. Hamilton 191,672
Cotton scraper, etc., M. Roby 191,613
Cultivator, W. E. Dewey 191,690
Cultivator, A. S. McDermott 191,606
Cupb ard, W. H. Salada 191,549
Curry comb, Bennett & Moody 191,559
Curry comb, P. Miller 191,608
Desk, school, C. H. Presbrey 191,713
Drawing instrument, J. R. Peel 191,611
Drill hoe, E. F. Pryor 191,714
Easel, T. L. Fisher 191,577
Easel, F. S. Frost 191,579
Eccentric, reversible, Lafayette & Strong 191,602
Elevator, etc., telescopic, W. R. Comings 191,516
Elliptic spring, N. J. Tighman 191,731
Engine frame, S. W. Putnam 191,716
Engine exhaust, C. T. Parry 191,545
Engine valve motion, H. Haering 191,588
Feed rack, W. H. Howard 191,590
Feed water heater, N. W. Kirby 191,597
Fence, E. H. Perry 191,547
Fences, R. F. Ward 191,626
Fence cap, metallic, J. D. W. Lauckhardt 191,603
Finger guard, K. A. Wynne 191,742
Fire escape, L. Henkle 191,677
Fire front, G. W. Purcell 191,715
Fire kindler, J. G. Distler 191,572
Fireproof column, Drake & Wight 191,662
Flourbin and sifter, F. M. Mahan 191,694
Fluting and polishing, C. Johnson 191,684
Fluting machine, Keller & Olmesdahl 191,595
Fly trap, Carroll & Lamb 191,652
Fountain, portable, W. H. Zinn 191,557
Fruit crate, G. Willard 191,739
Fuel, pressing, stalks, etc., for, Davis & Fisk 191,571
Fulling mill, J. Hunter 191,592
Furnace bottom construction, P. D. Nicols 191,543
Furnaces, oxygen, blast, C. Hornbostel 191,530
Gage cock, boiler, D. T. Ellis 191,668
Gas apparatus, portable, D. H. Irland 191,531
Gate, B. R. Baker 191,637
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Gearing, oscillating, N. P. Otis 191,705
Glassware, making, C. L. Knecht 191,534
Grate, J. H. Mearns 191,702
Griddle, H. C. Milligan 191,703
Gutter holder, M. Schmitt 191,616
Hame attachment, J. Hudson 191,591
Harness saddle tree, W. L. Frizzell 191,525
Harrow, H. I. Lund 191,604
Harvester, Philoe & Cox 191,711
Harvester corn, B. Osgood 191,610
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Harvesterrake, R. D. Warner 191,743
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Harvester cutter, Haskin & Relgart 191,675
Hats, pressing, R. Kent 191,538
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Hay derrick, etc., R. N. B. Kirkham 191,598
Hay elevator, E. L. Church 191,568
Hinge and door, safe, P. F. King 191,680
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Hoisting machine, G. H. Reynolds (r) 7,727
Hoisting machine, F. G. Hesse 191,529
Holdback, J. W. Hight 191,589
Honey box, Johnson & Keeley 191,593
Hoopskirt spring, etc., A. Benjamin 191,641
Hydrocarbon injector, H. E. Parson 191,546
Hydrocarbons, extracting, W. Adamson 191,623
Ice cream freezer, J. Solter 191,725
Ice cutting machine, C. Chadwick 191,515
Ice house, E. Schandeln 191,719
Ice machine, A. T. Ballantine 191,638
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Iron and steel cementation, J. W. Hoxie 191,681
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Ore, reducing nickel, W. B. Tatrow 191,728
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Paper box, P. B. Pickens 191,712
Pianoforte bridge, J. Herald 191,597

Picture exhibitor, J. Hannerty 191,673
Plow, E. Halman (r) 7,724
Plow, L. F. W. Liles 191,683
Plow clevis, C. O. Wilder 191,629
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Plow, sulky, W. Henry 191,588
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Spoils, preventing unrolling tape, etc., A. C. Gould 191,581
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Steamboat smoke stack, Rouze *et al* 191,614
Stop motion fork slide, J. McCaffrey, Jr. 191,697
Stove, J. Gladding, 3d 191,580
Stove, coal oil, M. H. Barnes 191,557
Stove, cooking, D. E. Paris 191,706
Stovepipe damper, A. Brightman 191,646
Stovepipe thimble, J. Carhartt 191,567
Stove, oil, cooking, Sherburne *et al* 191,623
Straw cutter, A. Vahldick 191,585
Sugar, liquefying hard, O. H. Krause 191,535
Sugar liquor, collecting, A. A. Goubert 191,527
Sugar liquor, collecting, Matthiessen *et al* 191,537
Sugar, washing raw, F. O. Matthiessen 191,589
Swing, J. J. Janzecek 191,633
Thillcoupling, J. Kitzmiller 191,599
Tobacco, holting, C. H. Slaton 191,619
Tobacco pipe, N. T. Oberg 191,544
Tobacco plant planter, R. A. Knox 191,601
Top, spinning, T. McLaughlin 191,701
Tortoise-shell handle, C. W. Schaeffer 191,615
Towel rack, C. A. Brickley 191,564
Trap for balls, T. Wilkie 191,628
Tubewell, T. J. Dean (r) 7,721
Type writer, D. H. Sherman 191,617
Upholstering tuft, R. H. Bryant 191,630
Valve tank, J. P. Duncan 191,523
Vegetable cutter, W. Chapin 191,658
Vehicle spring and axle, S. W. Ludlow 191,536
Ventilation, etc., W. H. Bennett 191,512
Wagon axle skein, H. L. Hinds 191,679
Wagon gearing, W. P. Brown 191,648
Wagons, skid attachment for, C. Crandall 191,570
Wardrobe hook, labeled, T. F. Stearns, Boston, Mass. 191,645
Wash boiler, T. Gunsalus 191,582
Water gauge, C. D. Smith 191,724
Waterwheel, L. Good 191,668
Water wheel, I. Mallory 191,605
Weaving shuttle, duck, W. L. Gilbert 191,526
Wheelbarrow, E. W. Walker 191,735
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DESIGNS PATENTED.

10,030 to 10,032.—EMBROIDERY.—E. Crisand, New Haven, Conn.
10,033.—LOCK-CASE.—R. Flocke, Newark, N. J.
10,034.—BOTTLES.—J. H. Harrison, Davenport, Iowa.
10,035 to 10,037.—CARPET.—H. S. Kerr, Philadelphia, Pa.
10,038, 10,039.—CARPETS.—T. F. Stearns, Boston, Mass.
10,040.—MOULDING.—R. M. Merrill *et al*, Laconia, N. H.
10,041 to 10,044.—OIL CLOTH.—C. T. Meyer *et al*, Bergen, N. J.
10,045.—STUDS, ETC.—J. W. Miller *et al*, Newark, N. J.
10,046.—BOOK CASES.—J. W. Schuckers, New York city.

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