

also a definite amount in weight of that substance; thus, O stands not only for oxygen, which is the most common substance in nature, but it also stands for 8 parts of oxygen; H stands not only for hydrogen (water generator), but also for 1 part of hydrogen; and the formula H O, therefore, means 1 part of hydrogen combined with 8 parts of oxygen, the most common compound existing, and known as ice, water, and steam, according to the amount of heat it contains.

When two or more substances have the same initials, another letter of the name is added to the less frequent one; in the same way as we indicate the different States of our American Union, Mo. for Missouri, and Miss. for Mississippi. Osmium, one of the rare noble metals, is indicated by Os, and Mercury, after the Latin name Hydrargyrum, by Hg. Both symbols standing respectively for 100 parts of the substance.

Table listing chemical elements and their atomic weights: Ag. stands for Argentum (silver), 108 parts. Al. " Aluminum (metal of alum), 14 parts. As. " Arsenium (metal of arsenic), 75 parts. Au. " Aurum (gold), 200 parts. B. " Boron (similar to coal), 11 parts. Ba. " Barium (similar to calcium), 68 parts. Bi. " Bismuth (similar to tin), 208 parts. Br. " Bromine (similar to chlorine), 80 parts. C. " Carbon (coal), 6 parts. Ca. " Calcium (metal of lime), 20 parts. Cd. " Cadmium (similar to zinc), 56 parts. Cl. " Chlorine (found in salt), 36 parts. Co. " Cobalt (a hard, rare metal), 30 parts. Cr. " Chromium (analogous to iron), 26 parts. F. " Fluorine (analogous to oxygen), 19 parts. Fe. " Ferrum (iron), 28 parts. I. " Iodine (analogous to chlorine), 127 parts. Ir. " Iridium (similar to platinum), 90 parts. K. " Kalium (potassium), 39 parts. Li. " Lithium (analogous to potassium), 7 parts. Mg. " Magnesium (metal of magnesia), 13 parts. Mn. " Manganese (very similar to iron), 27 parts. Mo. " Molybdenum (similar to lead), 18 parts. N. " Nitrogen (part of our atmosphere), 14 parts. Ni. " Nickel (metal), 29 parts. Na. " Natrium (sodium, found in salt), 23 parts. P. " Phosphorus (found in bones), 31 parts. Pb. " Plumbum (lead), 104 parts. Pd. " Palladium (similar to platinum), 53 parts. Pt. " Platinum, 90 parts. S. " Sulphur (brimstone), 16 parts. Sb. " Stibium (antimony), 119 parts. Se. " Selenium (similar to sulphur), 40 parts. Si. " Silicon (found in silex, flint, etc.), 22 parts. Sn. " Stannum (tin), 59 parts. Sr. " Strontium (similar to calcium), 44 parts.

The above numbers represent the quantities in weight by which the different substances will mutually combine. As, for instance, 27 parts of iron will combine with exactly 16 parts of sulphur, and the symbol Fe. S., expresses not only the compound of iron with sulphur, but also the above proportion of quantities. These numbers are called atomic weights or chemical equivalents.

Besides these forty elementary substances, there exist some thirty others, which, being very rare, are omitted here. The whole crust of our globe is made up of different combinations of these seventy elementary substances, of which, however, only fourteen or fifteen constitute the chief mass of the mineral and of the organic world. In regard to the last, the different products of the earth's crust, vegetable and animal, they are chiefly made up of only three or four of these substances, with the incidental combination of the remaining ten.

THE WEST SIDE ELEVATED RAILWAY.

On Friday last the members of the city press were invited to inspect the working of the new elevated railway on Greenwich street. As has been before noted in our columns, the section now completed, running between the Battery and Greenwich street, was built as an experiment, to test the practicability of the plan. On Thursday, the Legislative Commissioners and Governor Fenton examined the railway, and expressed their entire approval of its mode of working.

The road is about one half mile in length, is fourteen feet in the clear above street level, and is supported by cast-iron pillars placed from twenty to forty feet apart. An endless wire cable of three quarters inch diameter, carrying with it a series of small trucks every fifty yards, is put in motion by steam power below ground, midway between the extreme stations. Motion is imparted to the car on bringing a projecting lip below the car floor in contact with the swiftly moving trucks, but by means of a series of leafed elliptic springs, having india-rubber buffers between each, there is far less shock at starting than is experienced in ordinary horse-cars, being hardly perceptible. The car can be stopped at any time by releasing the truck and applying the brake. The rails are of the ordinary pattern used on steam roads, and their wheels flanged so that no apprehension need be felt of the cars leaving the track. To make assurance doubly sure, each end of the car is provided with an extra axle and guide wheels with safety flanges. The speed attained on Friday was from ten to fifteen miles per hour. The projectors propose making the wire-cable larger, so that the rate can be considerably increased; other minor alterations and improvements, which the trials have suggested, will also be introduced.

Our city sadly needs increased traveling facilities within its limits. No more surface roads can be accommodated in our streets, and such as now exist are open to serious objections from which both the elevated and underground railways are free. Steam power can be safely applied on these, and increased speed be attained, a great consideration for those journeying morning and night from one end of the island to the other; besides, there is little liability on either road of travel being incommoded or stopped by track obstructions. The friends of the underground road are organized, and tunneling operations will soon begin, and with this section of elevated road actually in successful operation, the

prospect surely brightens for a speedy improvement in city traveling accommodations.

Experiments with Dynamite.

Dynamite, the new explosive agent, manufactured by Mr. Alfred Nobel, of Hamburg, consists of porous silica, saturated with nitro glycerin to the extent of about 76 per cent, the compound forming a powder of reddish yellow color. It is, in fact, nitro glycerin, rendered safe to handle, without any diminution of its prodigious explosive force. As shown in the course of recent experiments, it is as safe as gunpowder against explosion by concussion. Nor does it, under ordinary circumstances, explode on the application of fire, but burns away quite quietly, leaving behind a whitish ash. To produce explosion by fire, the powder must be enclosed in a bore or vessel, perfectly air-tight. The portion brought in contact with the flame will simply burn, but when the gases produced by such combustion have accumulated to a certain pressure the remainder will explode. In actual practice the explosive pressure is supplied by a sort of percussion cap placed in contact with the powder, and connected with an ordinary gunpowder fuze. The force exerted by exploding dynamite is said to be about three times greater than that of gun cotton, or some twelve times greater than that of gunpowder. Whatever the exact proportion may be, the power of the new agent is unquestionably tremendous. A couple of table-spoonfuls laid quite loose on a thick beam proved sufficient, when fired, to break the timber right across, and project one of the fragments to a considerable distance. A charge of six pounds, exploded in a horizontal bore, brought down about 4000 cubic feet of whinstone rock. Four pounds, fired in a tough rock, produced results which, it is averred, could not have been obtained by any possible charge of gunpowder. In another experiment four tenths of a pound of dynamite were placed in a small bore in the center of a mass of malleable iron, measuring twelve inches by ten. The charge was not plugged in; but even without that advantage, the explosion sufficed to shiver the iron into half a dozen pieces. Still more remarkable was the force exerted in a subsequent trial. A block of wrought iron, measuring nine inches by eight, was placed vertically in the ground, and a quantity of dynamite, covered only with loose rubbish, exploded on its upper surface. The result was to convert what had been a convex surface into a concave one, the mass of iron being at the same time split in several places. A five-ounce cartridge laid on the top of a huge block of whinstone, and covered with a little clay, served, by its explosion, to shiver the block into workable pieces. In addition to the blasting experiments, trial was made of the powder as a means of signaling at sea. For this purpose it seemed highly recommendable—a one-lb. cartridge, suspended by a cord, producing a report like that of a 32-pounder cannon.

OFFICIAL REPORT OF PATENTS AND CLAIMS Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 30, 1868.

Reported Officially for the Scientific American.

Table listing patent fees: PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:— On filing each caveat.....\$10 On filing each application for a Patent, except for a design.....\$15 On issuing each original Patent.....\$20 On appeal to Commissioner of Patents.....\$20 On application for Reissue.....\$30 On application for Extension of Patent.....\$50 On granting the Extension.....\$50 On filing a Disclaimer.....\$10 On filing application for Design (three and a half years).....\$10 On filing application for Design (seven years).....\$15 On filing application for Design (fourteen years).....\$30 In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

- 79,293.—MACHINE FOR CLIPPING HORSES' HAIR.—Patrick A. de, of the Strand, England. I claim the combination of the toothed plate, A and B, screws, I and J, handle, A H, with handle or lever, L K D H, the whole constructed and operated in the manner and for the purpose above set forth and described.
79,294.—HOT AIR FURNACE.—James Albee (assignor to Moses Pond and Company), Boston, Mass. I claim the arrangement and combination of the flue, N, with either or both the pipes, M, the fire pot, A, the drum, F, the cond. ut, T, the escape pipe, O, or its branch pipe, H, provided with a damper as described, the case, I, being furnished with a door or opening for the passage of the evaporating pan, P, to and from the top of the flue, N, as set forth.
79,295.—KEYBOARD FOR PIANOS, ETC.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis. We claim a keyboard to a pianoforte or other musical instrument, to which additional keys, whether one or more series, are employed or arranged for operation upon the ordinary keys of the keyboard, substantially as and for the purpose described.
79,296.—TREADLE FOR SEWING MACHINES.—A. Q. Allis, Dayton, Ohio. I claim the arrangement upon the frame, A, of the spring, F, on shaft B, pulley, E, fly wheel, D, friction pulley, H, brake, b, rod, k, spring, m, treadle, n, and rack, p, as herein described, for the purpose specified.
79,297.—SPINNING MACHINERY.—Robert Atherton and Geo. Singleton, Paterson, N. J. Antedated June 19, 1868. We claim in silk spinning machinery the combination of the stationary pin B, stationary table cap, K, and thread guide traveler, W, with the movable tube, E, and bobbin, H, constructed and arranged substantially in the manner described and for the purpose set forth.
79,298.—MANUFACTURING GLASS WARE WITH HANDLES.—J. S. Aterbury and T. B. Aterbury, Pittsburgh, Pa. We claim a glass lamp, or other article in glass, having a molded or cast handle and a blown body, produced substantially as described.
79,299.—WHIP.—Dexter Avery, Westfield, Mass. I claim as a new article of manufacture, a whip having its covering woven with a welt and warp, as herein described, for the purpose specified.
79,300.—HARVESTING.—Darius Babcock, Warsaw, Ill. I claim 1st, The dome-shaped frame, A; in combination with the dome, A, and in combination with any mowing or reaping machinery, substantially as shown and described and for the purposes set forth. 2d, The annular frame, P, in combination with the frame, A, and the axle, M, substantially as shown and described, and for the purposes set forth. 3d, The combination of the axle, M, gear wheel D, pinion, C, shaft, B,

- crown wheel, a, pinion, E, and shaft, H, with the frame, P, all constructed arranged, and operating substantially as and for the purposes set forth. 4th, The frame, f, in combination with the lever, L, and chain, and arm, i, substantially as shown and described and for the purposes set forth. 5th, The book, g, in combination with the arm, i, and any flexible bar, B, substantially as shown and described, and for the purposes set forth. 79,301.—BROADCAST BOWER.—Alfred B. Beaumont, Grand Rapids, Mich. I claim, 1st, The adjustable disks, k' k'' for regulating the discharge of the grain, substantially as and for the purpose shown and described. 2d, The stop, s', in combination with the disk, k'', substantially as and for the purpose shown and described. 3d, Arm, m'', substantially as and for the purposes shown and described. 4th, Arm, m'', substantially as and for the purposes shown and described. 5th, The stop, v, on the arm, m'', substantially as and for the purposes shown and described. 6th, The spring, v', on the arm, m'', substantially as and for the purposes shown and described. 7th, Operating the disk, k'', by means of a rod, M, spring, S', lever, P, and hook, r, or other equivalent devices, substantially as and for the purposes shown and described. 8th, The guiding cone, K, substantially as and for the purposes hereinbefore shown and described. 9th, The arms, m and n, of the cone and hopper, substantially as and for the purposes shown and described. 10th, Constructing a scattering wheel, i, with a central opening, k, and channels, o, whereby the grain can pass into a portion of its said channels, substantially as and for the purposes specified and shown. 11th, The cylindrical shell, p, of the disk, k'', for the purpose of retaining the latter in the throat of the hopper, whereby the said disks permitted to partially rotate, substantially as and for the purposes hereinbefore described. 12th, The bevel wheel, F, on the axle, x, and connected with an independent ratchet disk, f, substantially as and for the purposes hereinbefore shown and described. 13th, The hollow pulley, H, with its bevel wheel, G, within it, in combination with a grain sowing machine, substantially as and for the purpose shown and described. 14th, The coupling devices, f'' b', in combination with a grain-sowing machine, substantially as and for the objects shown and described. 15th, The disk, k', attached to the cone, K, and provided with openings for dropping the grain or plaster, substantially as and for the purpose shown and described. 79,302.—BED SPRING.—Henry Beyrodt, Louisville, Ky. I claim the combination and arrangement of the outer cylinder, No. 3, the spiral spring and its covering, No. 4, and the presser, No. 6, constructed and operated in the manner as shown and described and for the purposes set forth. 79,303.—GILDING AND ORNAMENTING GLASS SIGNS.—J. B. Blair, Philadelphia, Pa. I claim the production of duplicates in plain or ornamental gilding or painting, substantially as and for the purposes set forth. 79,304.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Beach, Independence, Iowa. We claim, 1st, The levers, J J, strips, a, a bar, L, and pivoted frame, I, when all are arranged and operating substantially in the manner and for the purpose set forth. 2d, The set screw, H, seed slide, b', levers, J J, strips, a, a bar, L H, pivoted frame, I, all combined and arranged as and for the purpose described. 79,305.—CRUTCH.—A. E. Bowen, Baltimore, Md. I claim, 1st, An adjustable crutch, constructed in the manner and for the purpose herein set forth. 2d, The combination of the legs, A A and B B, the thumb-screws, i, the elastic top, w, the arm, c, and the elastic bottom, of the crutch, substantially as described. 79,306.—WRENCH.—Wm. Bradshaw and Charles Lyon, Delphi, Ind. I claim the open-backed jaw, E, in combination with the links, b, and shanks, C, substantially as described for the purpose specified. 79,307.—NAIL EXTRACTOR.—J. D. Breathitt, Cooper county, Mo. I claim the fulcrum, B, of the nail extractor, A, when pointed at its lower end, and adapted to be adjusted longitudinally of the extractor, A, to increase or decrease the leverage of the latter, as herein described for the purpose specified. 79,308.—DOOR BELL.—Asa T. Brooks, New Britain, Conn. I claim, 1st, An oscillating arm, k, and vibratory cam, u, secured and oscillating both upon the same stud pin, n, in combination with the arms, d, k, substantially as described. 2d, In combination with the above, the angle lever, v, oscillating upon the pin, v', all arranged and operating substantially as and for the purpose described. 79,309.—RAILROAD RAIL.—R. M. Brooks, Griffin, Ga. I claim the combination of the railroad rails, A and B, provided with corrugated flanges, a and b, and fitting together, substantially as and for the purpose set forth. 79,310.—WASH BOILER.—Stephen Buynitzky, St. Petersburg, Russia. I claim a loose plate, C, provided with the guides, E, or their equivalents, substantially as described, to be placed on the top of the clothes in the wash boiler, for the purposes set forth. 79,311.—WAGON BODY.—Matthew M. Carr (assignor to himself and Thomas S. Carr), Ringwood, Ill. I claim the combination of the hinged sections of the bottom, C D E, the bars, F, pivoted as described at H, the springs, J, latches, I, lever, K, cord or chains, G and N, and levers, L and M, all arranged and operating in the manner set forth. 79,312.—STOVE GRATE.—Gardner Chilson, Boston, Mass. I claim the square or rectangular grate, as arch or curb' both longitudinally and laterally, and having its side bars trussed or made keeper at their ends, and at their ends, as represented, their ends, substantially as described. Also, the combination and arrangement of the elbow of the grate arm, with such arm and the grate, constructed and disposed relatively to each other, substantially as specified. 79,313.—APPARATUS AND PROCESS FOR MAKING STEEL.—T. J. Chubb, Williamsburg, N. Y. Antedated Dec. 30, 1867. I claim, 1st, The construction of a series of oxidizing and carbonizing retorts or chambers, A A, arranged so as to prevent the gases from the heat-producing fuel from coming in contact with the ore or the materials in the retort, in combination with a melting chamber for the purposes set forth. 2d, The arrangement of the melting chamber, B B', with openings and doors at both ends, in such a manner as to facilitate the manipulation of the ore or metal, and its treatment from both ends, substantially as described. 3d, Making provision for feeding loose ore and metallic and other substances in at one end of the melting chamber or furnace, B', and tapping the molten metal at the other end, substantially as described. 4th, Making provision for conducting heated air and gases over the ore or molten metal, said air and gases entering at one side or end of the said melting chamber or furnace, and passing out at the sides or other end thereof, for the purpose of reducing said ore, metal, or metallic substances therein into a liquid or molten mass, substantially as described. 5th, Making provision for shielding the ore, metal, and other substances from the direct action of the gases of the fuel, or arcates T. 6th, Making provision for shielding and protecting the molten metal in a melting chamber from the direct action of the air, flame, and gases of the fuel, by floating shields, or an equivalent refractory substance or substances floating on the top of the metal, as described. 7th, Making provision for skimming off the surface of molten metal by floating scrapers, or their equivalents, substantially as described. 8th, Effecting a separation of the cinder or upper layer of substances floating on molten metal by the means herein specified and described. 9th, The construction of a vessel or melting chamber of a furnace, so arranged that it may be heated solely from above, by which means the metal therein becomes fully melted into a liquid state previous to skimming, tapping, and drawing off the same, substantially as herein described. 10th, Making provisions for and effecting the mixture of metals by heat applied solely from above the metal, when said heat is derived from a gas regenerative apparatus or furnace. 11th, The arrangement of a furnace or of a vessel or vessels in a furnace for melting metals therein, in combination with and heated by the flame produced by the mingling together of the air and gas rising from and having passed through an air heating and gas heating or reheating furnace, chamber, or apparatus, in separate currents. 12th, Providing for keeping the under side of the melting chamber, or chambers in which the melting chamber or vessel is placed, cool, or from heating or leaking, by the arrangement of a cold air chamber or space below the same, C. 13th, The employment of slats or arch pieces, T T, for the purposes set forth. 14th, The employment of scrapers or skimmers, S S, or their equivalent, for the purpose set forth. 15th, The employment of floating fire shields and heat conductors, S S, or their equivalents, for the purpose set forth. 16th, Constructing slabs, arches, and shields with an uneven or irregular surface on one or both sides thereof, for the purpose set forth. 17th, The method or process of refining metals, and separating the gross and other extraneous matter from the surface of melted metal by mechanical power and appliances, or of inserting of refractory or fusible colder substances than the gross and scum, cooling and congealing them, and then being skimmed or removed from off the surface of the molten metal, substantially as set forth. 18th, Making provisions in the construction of a melting chamber of a furnace for reducing iron into such a liquid state by igneous fusion that highly carbonized iron ore, or pig iron, castor steel, and nature iron ore, or wrought iron, may fuse and mix with each other, and the impurities and surplus carbon, silicon, and other matter that is not essential to the production of good cast steel, may be flooded and removed from the surface of the melted steel, rearing and running the same into vessels or molds, substantially as described. 19th, Obtaining cast steel, or products of any degree of malleability or ductility, by melting together in a vessel or chamber in a furnace, combinations of pig iron and wrought iron, or of natured or partly natured iron and cast iron, and fusing, mixing, refining, and running the same into molds, substantially as described. 20th, The production of cast steel by mixing together, in a fixed or stationary melting vessel, chamber, or furnace, cast iron and iron ore, when such iron has been previously reduced, or natured, or partly natured, or carbonized in a separate vessel, retort, or furnace, and when mixed with manganese or titanium, or the ores or compounds thereof, and fused, mixed, and running the same into molds. 21st, The production of cast steel by first melting the iron or metal containing the most carbon in a stationary vessel, and adding the metal or ore containing the least carbon to the molten metal, and when the whole is reduced to the proper consistency of cast steel, running the same into molds. 22d, Effecting a continuous process of reducing or refining and refining ores and metals by mechanical appliances, and at one heating, and in one furnace chamber, substantially as described. 23d, Effecting a continuous process of making cast steel from iron ore by submerging it into a bath of molten cast iron or highly carbonized iron, whereby the whole will be liquified and brought to the consistency of cast steel and refined and run into molds.