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Chemical Philosophy.

To all matter we ascribe certain properties: water possesses properties of chemical action, and what are known as *physical laws.* It presents the three great conditions of matter on earth, viz., the solid, liquid and gaseous conditions. The first attribute we ascribe to matter is gravity; by this law all bodies have a tendency to approach their common centres of attraction. This force belongs to the laws of Mechanics,—but the force which changes the condition of matter, such as water into steam, or by pouring sulphuric acid on marble and disengaging carbonic gas, is termed "a chemical force." When we look into the constitution of certain bodies, we find them to be made up of particles, some of these being all of one kind, others made up of different kinds. By the voltaic battery, water can be separated into a gas, and that gas again separated into two different gases, one very light and highly combustible, and the other heavier, which will not burn of itself but will assist other bodies to burn, and is called oxygen. The elements of water are oxygen and hydrogen—both gases and both have a gravitating power. Oxygen is the most abundant of all elements: it has neither color, taste nor smell. It has the property of combining with all the other elements in many proportions. By mixing the chlorate of potash with one fifth of its weight of the peroxide of manganese, and applying a gentle heat, the oxygen will be set free, as by the voltaic trough. One hundred cubic inches of this gas weighs 34·6094 grains.

Hydrogen may be separated from water in many ways: if a piece of zinc is placed in a vessel containing water and sulphuric acid, hydrogen gas will be evolved. Hydrogen, unlike oxygen, will burn; 100 cubic inches of it weighs 2·1318 grains. Since there is in water only the molecules which compose the two gases, they are certainly curiously modified to be so heavy under one condition and so light in another. A drop of pearly dew that might gently hang upon a lady's needle, when it becomes gaseous, will fill a large bottle. The power by which the molecules of hydrogen and oxygen combine, to produce water, is termed chemical affinity. This power is totally unlike gravity, yet it cannot exist apart from it. When two bodies having chemical affinity for one another come in contact, each parts with some of its properties, producing a new mass with different properties from those which each possessed separately. Soap is made of oil and potash, each separately possessing different, properties. Common salt is made of soda and chlorine—an acid and an alkali, each possessing quite different properties. If a leaf of silver is placed in a bottle of chlorine gas, for about two weeks, a distinct body will be formed. Chemical affinity is characterized by *waiting* and *instant* attraction.

Oxygen and hydrogen have a great affinity for one another, yet these two elements of water may remain in contact for months and never join to produce water. Affinity in this case waits as a sentinel to receive its orders for operation from some third substance,—such a substance is platinum. When this metal is brought into contact with these two gases, the whole are thrown into action, and water is the result. The two gases, nitrogen and oxygen, which compose our atmosphere, remain in a state of mechanical, not chemical, mixture. On the other hand, when a thin slip of copper is mixed with chlorine gas, the former is at once burned and the chlorine disappears—the action, like the law of gravity, is instant.

Gravity, having commenced action, continues it until its completion, but it is different with chemical affinity, for after it has begun it often becomes suspended after a certain effect is produced. When a piece of bright copper is exposed to the atmosphere for some time it becomes tarnished by an oxide forming on its surface, and there it remains unchanged, waiting for a third substance, such as sulphuric acid to complete the operation. Such are some of the principles of chemical philosophy as it relates to chemical affinity; in other words, that power which enables different elements of matter to combine together—the one forming a mixture, the other a chemical compound, and to produce a chemical compound in all cases, the particles of the two bodies must be different.

Light and Heat from Water.

The following is a specification published in our excellent exchange, the London Patent Journal (8th June), the best periodical of the kind in England, and for which we are agents for the United States. We publish this specification owing to the present excitement respecting Mr. Paine's alledged discovery. As it is of considerable length, we reserve some comments we intended to make upon it, until next week.

Joseph Pierre Gillard, a gentleman, in the Republic of France, for certain improvements in the production of heat and light in general. Patent dated November 22, 1849—enrolled May 22, 1850.

The patentee's invention consists in certain apparatus and processes for producing hydrogen gas, by the decomposition of water, and its application to heat and light. The means and processes by which he obtains this gas are: I. By the incandescency of iron. II. By carbon. III. By magnets.

First—The means and purposes for obtaining hydrogen in decomposing water by incalescent ore. In retorts purposely constructed, and fitted up with iron tubes (enclosed in iron plates) or with iron chains, iron wire, or spirals of the same metal rendered incalescent, the patentee introduces steam from any generator whatever,—or he even produces steam by means of water injected into the retort. The oxygen of the water combines with the iron, and the hydrogen is conducted first into a refrigerant, and thence into a gasometer, from which it is supplied for use.

When the iron is oxidized, the pantentee dis-oxidizes it first by means of the waste gas of furnaces; the carbonic acid of them is at first changed into oxide of carbon within the furnace in which the hydrogen, as well as the oxide of carbon is produced; the last gas is obtained by the passage of steam into the oxide furnace (a kind of kiln); the oxide of carbon and hydrogen are afterwards injected into the retorts containing the oxidized iron; this latter transmits the oxygen to the oxide of carbon, and to the hydrogen which has been generated in the furnace for oxide of carbon.

Secondly—The patentee dis-oxidzes iron by causing to fall on incalescent iron, some pulverized coal, coke, charcoal, pit-coal, ligneous substances, &c.; also by igniting with oxide of iron some hydrogen, oxide of carbon, or by throwing on the incalescent iron some oil or of any the hydrocarburets,—eventar or ammoniacal waters.

Thirdly—The patentee dis-oxidizes iron by submitting it to a white heat, when this metal loses its oxygen like peroxide of manganese, and returns to the state of protoxide of iron, by which means the water is decomposed.

Process for producing hydrogen gas by the decomposition of water with incalescent coal, coke, pit-coal, ligneous substances, or carbonized pit (peat,) or by means of oxide of carbon. —The patentee causes steam to pass into horizontal retorts similar to those employed in gas works, filled up more or less with deep layers of coal; the steam is distributed to the whole of the retorts, and over the surface of the coals, by means of one or more pipes in connection with a boiler, pierced with holes of a small diameter, like the spout of a water-pot; the contact of the steam produces hydrogen, carbonic acid, and a small quantity of oxide of carbon and other gases; these mixed gases pass off through the educt pipe into an epurator, when the carbonic acid is taken up, and the hydrogen passes off into the gasometer. The patentee observes that this apparatus for decomposing water is similar to that in which coal is distilled, differing, however, from it, as regards the steam tubes, the boiler, and the system of depositing the steam on the surface of the coals, instead of passing it through them; these points the patentee states to be new. The patentee also decomposes water by means of magnets, working with induct bobbins; the movements of each magnet on an axis, sets in motion all the bobbins, and as there is only one resistance of attractive action which is resisted by that of the opposite pole, it follows (states the patentee) that in communicating such force, I put in action a considerable number of magnets, by means of cogs, and transmission of mechanical movements, the magnets decompose the water;—pure hydrogen may be collected at one pole, and pure oxygen at the other, and stored in separate gasometers for use.

The patentee's improved process for rendering hydrogen gas illuminating, is by causing a small jet of lighted hydrogen to pass through a burner (the holes very small) on a thin strip of plantinum wire, the threads being excessively fine, and of graduated section, proportioned to intensity of the pressure of the flame and the burning hydrogen,—a very powerful light is thus produced. The platinum threads are immediately heated to such whiteness that the luminous refulgence is extraordinarily brilliant. Besides platinum, other unalterable and unoxidizible metals may be employed.—The wick must be of the shape necessary to agree with that of the jet of hydrogen,—it may be that of a cone, or any other figure, according to the size which the gas takes when it is allowed egress from the burner; the wick must be made more or less strong, according to the greater or less intensity of the heat to which it is exposed. The burner and wick may be modified in their shape,—the patentee does not limit himself as regards the strength, the length, or the height of the wick, provided the principle of his invention be retained.

Process for heating melting furnaces for ores, locomotive boilers, and dis-oxidizing iron and other metals:—In melting furnaces already constructed, the patentee utlizes the gas which is lost through the mouths (of the furnaces,) and he accelerates the melting of the ore by the combustion of hydrogen, oxide of carbon, and air combined together; the hydrogen is produced either in the retorts, as before stated, or in a furnace, from twelve to fifteen feet high, constructed like a kiln, and filled up with coke, charcoal, pit-coal, or other ligneous substances; the patentee causes a powerful draft to be maintained, at the same time that he injects steam; the hydrogen and oxide of carbon which are produced together, are drawn out by means of a strong mechanical draft.—The melted ore in the furnace is more or less carburetted by the powdered coal thrown upon it, and this process is employed in puddling furnaces, in which carburation is easily effected by cementation, as well for pig iron as for steel. The same hereinbefore described process is equally applicable to reverberatory furnaces, for heating boilers and locomotives. The patentee heats boilers and locomotives by hydrogen and oxide of carbon injected under the boilers in the locomotives with hot or cold air, by means of many small holes or divided and concentric tubes set under the boilers, and he also injects hydrogen and oxide of carbon into the tubes of tubular boilers, by employing concentric tubes, in which the air and gases of the tenders, which are purposely constructed as reservoirs,—are made to enter. The patentee constructs gas burners with double currents of air, that is to say, the air acting internally and externally on the flame; these burners have the advantage of presenting a large quantity of air or of oxygen to the combustion of the gas. The patentee does not confine himself to the precise details in the construction of the apparatus or the precise mode of carrying out the processes described, provided the general features of the mechanical arrangements and processes for carrying out his invention be preserved; but what he claims as his invention is—

First—The production of hydrogen gas by the decomposition of water in furnaces and retorts, serving to distil coal, as hereinbefore described.

Secondly—The process for producing hydrogen and a small quantity of oxide of carbon (carbonic oxide,) hereinbefore described.

Thirdly—The illuminating by means of the electricity of magnets put in motion by any mechanical processes, as hereinbefore described.

Fourthly—The process for producing hydrogen and oxygen, by means of magnets, put in motion simultaneously, by any force whatever, the two gases being separately collected, as hereinbefore described.

Fifthly—The means of rendering platinum and other unalterable and inoxidizible metals illuminating, by the combustion of hydrogen, or even of oxygen, as hereinbefore described.

Sixthly—The means of rendering platinum and other unalterable and inoxidizible metals more or less illuminating by means of hydrogen, or of hydrogen and oxygen, or also of hydrogen and air united before, or at the place of combustion, as before described.

Seventhly—The process of illuminating, by heating platinum and other more oxidizible metals to luminous white heat, by means of hydrogen, burnt either alone, or combined with oxygen, as before described.

[This specification contains descriptions of processes which are not claimed, and claims of processes which are not described.

Meanness Carried to Extremes.

The "Farmer and Mechanic," a celebrated journal of "masterly" stupidity, not satisfied with copying the official report of the Patent Claims from our columns, week after week, under the grave and *honest* announcement of its being a "feature not to be found in any other publication in this country,"—has got into the habit of copying original articles which have appeared in our columns, and crediting them to other journals. In proof of which we call attention to the "Novel and Ingenious Clock" of John Geldard, on the second page of the last number of that paper, the "humorous description," it seems, the editors found in the "American Cabinet,"—a journal probably of the same stamp, and through whose kindness they were furnished with the description of Chas. S. Snead's Grain Dryer, taken from No. 33, Vol. 5, "Sci. Am." The "Farmer" could have had the description of Mr. Geldard's clock—without credit, two weeks earlier, by reference to the "Sci. Am." of June 8th. We would add that the description was furnished for this paper, and was modified in some points by us. It would seem singular that the "Cabinet" should have hit upon our modification, word for word, as the "Farmer" does in copying our Patent Claims the week after they have appeared in our columns.

If this had been the only instance of their *unbounded generosity*, we should have paid no attention to it. We now call attention to another misappropriation of our labors, in order, if possible, to open the eyes of the editors to the fact, that like "Sol Gills," the old chronometer maker, they "are a long way behind the time." In their paper of April 25th, an article "To Prevent Dampness in Walls," is credited to a southern journal, which was original with us, and appeared in the "Sci. Am.," April 6th. We sincerely hope that the editors of the "Farmer" will, for the future, abandon a business so small as this. If they are short of brains to fill up the paper, we will not say one word against their extracting largely from our columns, "without giving proper credit for the same," by so doing they will be nearer the age, a benefit not only to themselves, but a corresponding one to some of their readers, who no doubt have full belief that they are first and foremost in the receipt of all that relates to the progressive age.

Great Building.—Exhibition of the Industry of all Nations.

A monster building is now being erected for this exhibition; it will be about 2,300 feet long and 400 feet across. The dome of it is to be 200 feet in diameter, made of light sheet iron. This will be an immense project. The whole building is to encircle an area of twenty acres.

Glasgow.

We are indebted to the News Agent of the City of Glasgow Steam Propeller for the prompt delivery of our files of the "Glasgow Daily Mail." The City of Glasgow made a fine run of about 14 days, which is equal to 13 from Liverpool. For a propeller this is a remarkable passage. Capt. Matthews had a splendid piece of plate presented to him by the passengers.