THE MOST IMPORTANT AMERICAN DISCOVERIES AND INVENTIONS.

No. 3.

THE OXY-HYDROGEN BLOW-PIPE AND CALCIUM LIGHT.

Hare—1801.

Robert Hare was born in Philadelphia in 1781. His father was the proprietor of a brewery, and for a time the son, Robert, assisted in the conduct of the business. He early showed a fondness for scientific studies, and before he was 20 years of age he joined the Chemical Society of Philadelphia. Soon after he joined, before he had reached his majority, he announced the discovery which has immortalized his name.

From the little that was then known in relation to heat and combustion, he conceived the idea that the most intense heat ought to be produced by burning pure hydrogen in pure oxygen. Having a remarkable faculty for mechanical invention, he devised an apparatus by which oxygen gas was held in one vessel and hydrogen gas in another, and the two gases were brought together in one jet where they could be kindled. He forced the gases out at the tops of the vessels by introducing water under pressure at the bottoms. From this arrangement he called the apparatus the "Hydrostatic Blow-pipe." It was afterwards named by Professor Silliman the "Compound Blow-pipe," but is now generally designated with more exact precision the "Oxy-hydrogen Blow-pipe."

Hare's anticipations in regard to the heat produced by this remarkable instrument were fully realized. Barytes, alumina, and silex were completely fused. About two penny-weights of the native grains of platina, when subjected to the gaseous flame on carbon, became completely fused into an oblate spheroid as fluid as mercury.

In 1802 a full description of Hare's apparatus, with an account of his experiments, was published in Tilloch's *Philosophical Magazine*, in England, and in *Annales de Chemie*, in France. The following remarks made at that time by Dr. Hare in relation to anthracite coal are interesting :—

"There is a peculiar species of native coal found on the banks of the Lehigh in this State, which it is extremely difficult to ignite ; but when exposed to a high degree of heat and a copious blast of air, it burns, yielding an intense heat without either smoke or flame, and leaving little residue. By exposure to the gaseous flame on this coal, both magnesia and lime exhibited strong symptoms of fusion. The former assumed a glazed and somewhat globular appearance. The latter became converted into a brownish and semi-vitreous mass."

It was by heating lime in the flame of his blow-pipe that Dr. Hare produced a more intense light than had ever been formed by artificial means. This is the calcium light, which still has no rival except the electric light.

In 1816, 14 years after the publication in London of Hare's account of his experiments, a Professor Clarke, of Cambridge, England, published a book on the blow-pipe, and quietly ignoring Dr. Hare, represented himself as the discoverer of the oxy-hydrogen blow-pipe. And the *Encyclopedia Britannica*, a very voluminous and very pretentious work, recently published, is guilty of the despicable injustice of awarding, in opposition to the plainest and most unquestionable proof, the credit of the discovery to this English pretender. This is an exception, however, to the mass of English authorities—all of the others that we have been able to consult assigning the credit without any question, where it properly belongs, to the American experimenter.

In 1818, Dr. Hare was appointed Professor of Chemistry in the Medical School of the University of Pennsylvania, and he occupied this position till 1847, when he resigned. He died in Philadelphia on the 15th of May, 1858.

His long life was devoted to the study of science and the accounts of his investigations were generally contributed to *Silliman's Journal*. He was especially noted for his ingenuity in devising philosophical and chemical apparatus. In his old age he became a convert to spiritualism—this being the single instance, so far as we are aware, of a man who had been trained to original scientific investigation, becoming the subject of this wonderful delusion.

Dietary of the Working Classes.

A great deal has been written on the subject of the food of the working classes, and a great many suggestions for its improvement have been made, which dietetic experience and progress in science afterward proved to have been injudicious. Nothing is more common at the present time than the recommendation of pseudo-scientific or semi-scientific men to increase the amount of nitrogen in the food of the laborer. Supplement, say these wise-acres, the bread which the workman eats, and which is deficient in nitrogen, with the highly nitrogenous substance—meat. They also recommend the poor man to invest his money in brown bread, because it contains a higher proportion of nitrogen than is found in the white loaves, and to leave the latter to the rich, who prefer quality to quantity. But these recommendations are all based upon fallacious conclusions, deduced from defective information. Fesh, as it comes into the butcher's stalls, is *not* so nitrogenout as wheaten bread, and far less so than oatmeal cake; and when the vegetable-eater is able to purchase a little meat, he prefers, as a general rule, the fattest kind he can get. Of all staple articles of food used in this country the potato is that which is most deficient in nitrogen; yet the potato-eater delights in fat bacon, and would infinitely prefer a little "dripping" to *moisten* his dry tubers with than a stringy piece of very lean beef.

In the average of flesh used as human food, the proportion of fat-forming to muscle-forming principles is as four to one, in bread as five to two, in potatoes as four to one. Milk is an excellent and proper addition to potatoes, because it supplies both fatty and nitrogenous matters, and it is the cheapest source of fat in country districts. From skimmed milk or buttermilk the workman may derive his nitrogen at a cheaper rate than from any other source. Eggs are cheaper in proportion to the amount of nutriment than beef or mutton, and they form an excellent adjunct to potatoes or bread. Kitchen garden vegetables, such as cabbages, are not desirable additions to the workingman's food. They contain a high proportion of semi-elaborated products, which are likely to exercise a laxative effect upon the bowels. They are only suitable in the case of a mixed animal and vegetable diet.

Brown bread is richer in nitrogen than white bread; hence our semi-enlightened lecturers and writers recommend the poor man to purchase the former in preference to the latter. But the poor man knows better than his self-constituted teachers what is the more nutritious for him, and accordingly prefers the white to the brown article. We have great faith in the popular instincts. Whatever practice is founded on instinct is generally correct. Workingmen instinctively find that there is more work in a pound of white bread than a pound of brown bread, though science tells that the latter is richer in nitrogenous or muscle-forming materials. The reason of the inferiority of brown bread in nutritive power is easily explicable; its nitrogen is partly in the husk of the grain, which confers the brown hue on the bread, and the husk is almost indigestible. Brown bread is also a luative food, so that a portion of it is sure to pass unchanged through the body. The fact is that the rich prefer the brown bread to the white because of this very laxative property; but the poor, who rarely suffer from indigestion or constipation, select the food which furnishes the largest amount of available nutriment at the smallest cost. Oatmeal is slightly but only slightly superior to wheaten flour. Peas and beans are an excellent addition to potatoes. Indian meal is inferior to both wheaten flour and oatmeal On the whole the diet of the agricultural laborer and small farmer is more nutritious and more wholesome than the sloppy food upon which the lowest classes of the city population subsist. Potatoes and milk, with a little butter and meal occasionally, is in every respect more substantial and healthful nutriment than the bad-bread and hog-wash tea, occasionally varied by a salt herring or dish of bacon and cabbage, which form the pabulum of the thousands of tailors, shoemakers, and such like craftsmen, who swarm in the bye-streets, lanes, alleys, closes and purlieus of the cities. *Irish Agricultural Gazette.*

Each charge of the 20-inch gun recently cast at Pittsburgh, will cost $75. The cost of the gun will be about $30,000.

Curiosities of the Ocean Bottom.

Mr. Green, the famous diver, tells singular stories of his adventures, when making search in the deep waters of the ocean. He gives some new sketches of what he saw at the "Silver Banks" near Hayti :—

"The banks of the coral on which my divings were made, are about forty miles in length, and from ten to twenty in breadth. On this bank of coral is presented to the diver one of the most beautiful and sublime scenes the eye ever beheld. The water varies from ten to one hundred feet in depth, and is so clear that the diver can see from two to three hundred feet when he is submerged, with but little obstruction to the sight. The bottom of the ocean, in many places, is as smooth as a marble floor ; in others it is studded with coral columns, from ten to one hundred feet in height, and from one to eighty feet in diameter. The tops of those more lofty support a myriad of pyramidal pendants, each forming a myriad more ; giving the reality to the imaginary abode of some water nymph. In other places the pendants form arch after arch ; and as the diver stands on the bottom of the ocean, and gazes through these in the deep winding avenue, he finds that they fill him with as sacred an awe, as if he were in some old cathedral, which had long been buried beneath 'old ocean's wave.' Here and there, the coral extends even to the surface of the water, as if those loftier columns were towers belonging to those stately temples that are now in ruins. There were countless varieties of diminutive trees, shrubs, and plants, in every crevice of the corals, where the water had deposited the least earth. They were all of a faint hue, owing to the pale light they received, although of every shade, and entirely different from plants I am familiar with, that vegetate upon dry land. One in particular attracted my attention ; it resembled a sea fan of immense size, of variegated colors, and the most brilliant hue. The fish which inhabited those 'Silver Banks,' I found as different in kind as the scenery was varied. They were of all forms, colors, and sizes—from the symmetrical goby, to the globelike sun-fish ; from those of the dullest hue to the changeable dolphin ; from the spots of the leopard to the hues of the sunbeam ; from the harmless minnow to the voracious shark. Some had heads like squirrels, others like cats and dogs ; one of small size resembled the bull terrier. Some darted through the water like meteors, while others could scarcely be seen to move. To enumerate and explain all the various kind of fish I beheld, while diving on these banks would, were I enough of a naturalist so to do, require more than my limits will allow, for I am convinced that most of the kinds of fish which inhabit the tropical seas, can be found there. The sunfish, sawfish, starfish, white shark, blue or shovel-nose shark, were often seen. There were also fish which resembled plants, and remained as fixed in their position as a shrub ; the only powers they possessed was to open and shut when in danger. Some of them resembled the rose in full bloom, and were of all hues. There were the ribbon fish, from four to five inches to three feet in length ; their eyes are very large, and protrude like those of the frog. Another fish was spotted like the leopard, from three to ten feet in length. They build their houses like beavers, in which they spawn, and the male or female watches the egg until it hatches. I saw many specimens of the green turtle, some five feet long, which I should think would weigh from 400 to 500 pounds."

Vial's Process of Engraving.

On page 176 of the current volume we published an account of Mr. Vial's new process of etching steel plates, by which a plate of any size is completely engraved in five minutes by a single immersion in a bath of sulphate of copper and nitric acid. The London *Art Journal* speaks as follows of the artistic effects produced by this process :—

"To begin with a fine line engraving. There is a small plate, of which the subject is a sportsman shooting a hare, in every respect like a proof from a plate engraved by a masterly hand ; every blade of grass, every weedy tuft, is there, with the same precision that distinguishes the print taken from the plate in the usual way. Perhaps even clearer than this, is a print of a fawn in a thicket, which it is impossible to fancy other than a finished proof from a

highly-wrought copper-plate. To artists, the most interesting capability of the invention is its power of transferring, in a few minutes, impressions of a drawing or sketch to a steel plate, line for line, touch for touch. M. Gerome, the celebrated French artist, made, in the presence of the French Commissioners of Fine Arts, a sketch of the head of a dromedary, which was prepared and printed from in a few minutes The sketch was drawn with lithographic chalk. There is by Jules David a sketch—something between an etching and a wood-cut: the subject, a French cottage girl hearing a child read; also a dog by another artist, drawn with chalk and touched with India ink, wherein the spirit and manner of the drawing are so perfectly maintained that it is difficult at first to determine it other than the drawing itself."

Patent Extensions before Congress.

We notice that applications are now pending before Congress for the further extension of certain well known patents, of which the prominent ones are the famous india-rubber patents of Charles Goodyear, deceased—the Woodworth planing machine—Sherwood's Janus-faced lock—and Fitzgerald's fire-proof safe. The three last-named patents have each been extended, the patents have since expired, and are now, if we mistake not, the property of the public. Goodyear's rubber patents were extended by Commissioner Holt, under provisions of the general law of patents, made and provided, and will expire in June, 1865, unless Congress can be induced to prolong the term for another seven years.

It strikes us that, after an invention has received all the protection the laws afford, and has become the property of the public, Congress is not justified by any equitable principles in depriving the public of the indisputable right to continue such use; and it is a questionable proceeding, to say the least, on the part of Congress to interfere to extend patents by special act. The india-rubber patents of the late Mr. Goodyear are acknowledged to be the most valuable in existence.

Immense manufacturing establishments have grown up under the protection afforded by law to these patents, and the public have been compelled to pay enormous profits to those concerns without the right to participate in the manufacture of the goods. This is a monopoly of which (so long as the principles of the patent laws have been carried out) we do not complain, but it seems to us now that, after a monopoly of twenty-one years, the people should be allowed to avail themselves freely of the right to use these inven tions without let or hindrance. We have not the statistics before us of the receipts and expenditures under these Goodyear patents, but observation satisfies us that they are among the most valuable franchises now existing; and, so long as they exist, the people must be taxed to support the wealthy monopolists who control them, and have no power to check their rapacity; not only this, but protected by extended patents, they can not only exact their own tariff of prices, but can effectually crush out all attempts on the part of other inventors to make improvements in this branch of the art.

This point is one which we urge as a very strong reason why Congress should decline to listen favorably to the prayer of the petitioner.

We all recognize the utility and value of patents; the prosperity of the whole country is due in a great measure to the influence of invention in all the industrial arts. We all recognize also the justice of affording protection to all good improvements, and our patent system is acknowledged to be in this respect a model of excellence, but it is not designed to hedge up the field of discovery by perpetuating patents beyond a reasonable limit; and the people consented, under the act of 1836, to allow protection to inventors for a period of fourteen years, with the right of extension for a further term of seven years, under certain conditions, after which the right to use the invention belongs to the public.

Now unless Congress respects the laws of its own making, and regards with care the interests of the people in such matters, there is no telling what abuses may arise. If the Goodyear patent is extended by Congress, the heirs are to have five per cent of the net sales of goods, to which must be added the enormous manufacturing profits. We submit that this system of taxation is one against which the people have a just right to complain and we trust that Congress will set its seal of disapprobation upon the whole scheme by refusing the application.—*Bridgeport (Conn.) Standard.*

MISCELLANEOUS SUMMARY.

Deaths from Chloroform.—"Out of fifty-one cases of death from chloroform, thirty-eight declared their danger by sudden stoppage of the pulse; twenty-five of these showed in addition, as a chief sign, pallor of the countenance. In two deaths the symptoms have occurred thus:—sudden vomiting, instant cessation of the pulse (food had been taken just before). In six cases congestion of the face was the most marked symptom. In eight cases cessation of the breathing was the most noticable symptom. What is to be done in cases of threatened death? There is only one perfect stimulus to the failing heart—the stimulus of aerated blood; and the only means of producing this is by the excitation of respiration. Artificial respiration may be practiced by one or two postural methods—that of Dr. Silvester, or that of Marshall Hall; or by mouth to mouth insufflation, or by galvanism of the phrenic nerve. Before any means for artificial respiration are adopted, the tongue should be well drawn forward. A great error would be committed if a patient *in extremis* were wheeled round to an open window. Dr. Richardson has well established the value of warmth as an adjunct to the respiratory efforts."—*Dr. Sansom in Medical Times and Gazette.*

Dr. Ziegler, one of the editors of the *Dental Cosmos*, adds:—"Arterialization and respiration can be most readily induced in asphyxia, by nitrous oxide, either in its gaseous form through the lungs, or condensed in water and introduced into the alimentary canal by the mouth or bowels."

The Maple Sugar Crop of 1864.—From present indications there is little doubt that the maple sugar crop of 1864 will vastly exceed that made in any previous year. The season thus far has been a good one, and favorable for the early commencement of operations. We have had for the past two weeks a succession of sunshiny days and freezing nights. In all probability the crop of maple sugar at the north for the present year will reach 25,000,000 pounds, worth, at the low estimate of 15 cents per pound, $3,750,000, an important item in the sugar product of the country. This will be but a small amount of the sugar consumed in the whole country, yet it will go far toward supplying the deficiency caused by non production at the South. Few people comprenend the great amount of sugar annually used in the United States. In 1862 it is estimated that the total consumption of sugar, both of the North and South, was 482,411 tuns, or nearly 29 pounds to every man, woman, and child. This consumption was largely decreased in 1863, and will be still more so during the present year. By the manufacture of sugar from the maple and from sorghum, the North will soon be independent of all foreign sugar-producing countries. —*Detroit Tribune.*

White Beeswax.—Have a hard-wood board made in the shape of a shingle, then put the wax in a pot of hot water over the stove. While the wax is melting soak the board in warm water to prevent the wax sticking to it, then dip the board into the pot of water and wax as you would to dip candles, and you will have a thin sheet of wax on the board. This you can loosen with a knife so it will slide off. Then dip as before, and so on until you have dipped all the wax off. Take these thin sheets of wax and spread them on a white cloth in the hot sun until they are white, afterwards melt and cake.

To Restore Faded Photographs.—The prints should be unmounted by soaking in water for a time, and then immersed in a saturated solution of bichloride of mercury, in which they may be left for two or three minutes, and afterwards thoroughly washed. The change takes place directly they are in the bichloride solution.—*Br. Jour. Phot. Almanac for 1864.*

The new planet (No. 70), discovered by the American astronomer, Mr. Watson, on Sept. 19, 1863, has received the name of Eurynome, a daughter of Oceanus and Thetis, and according to Hesiod, the mother of the Graces, by Zeus.

Bees and Honey of Greece.—The honeys of Hybla and Hymettus are at this day almost as celebrated as they were in the time of the classical Greek poets; the honeys of Cerigo, of Zante, and many other places, continental and insular, are all fine, and each has its admirers. The honey of Leucadia is, perhaps, almost as good as any, and the descendants of the bees that fed Ulysses deserve some consideration. I was interested, then, in the little bee-garden on the site of the city of Leucas. It was a rocky, barren-looking spot, and did not at first sight seem promising, for the whole ground for a great distance around looks naked and without vegetation; but it is not really so. Every little crevice or interval between two stones, whether large or small, and not a few holes made by vegetation in the solid rock itself, contain some little flowering plant especially patronized by the honey bee. Rosemary and sages abound. I was not much surprised, therefore, to see the bees, but the hives rather puzzled me at first. They consist of small oblong boxes placed on end on a low stone, each box being covered by two or three tiles, evidently to keep off the heat of the sun in the summer. Two round holes, each about half an inch in diameter, sufficed for the bees, to enter and emerge, and it did not seem to matter much where the holes were pierced. The boxes were constructed in the roughest manner, and seemed to be not two feet apart, and each box was about twenty inches high, and nine inches square. The bees were exceedingly busy and perfectly good-tempered.—*Austed's Ionian Islands in* 1863.

At the last sitting of the French Academy of Sciences, M. Coombes described a new system of locomotives now in use on the Northern railway so constructed as to surmount considerable declivities and to describe curves of a small radius. These engines have four cylinders and six axle-trees divided into two groups of three each, moved by the pistons of one pair of cylinders. The wheels are so small that the fire-place of the boiler extends beyond them, whereby the fire requires the unusually large surface of 3·33 square metres. [A metre is about 39 inches ⅜ths.] The engines are provided on starting with 8,000 kils. [a kilogramme is 2½ pounds] of water and 2,200 kils. of combustibles; their total weight is then 60,000 kils. equally divided on the six axle-trees. In order to facilitate the describing of small curves, a little play is left between the flanges of the wheels which keep the train within the rails and the rails themselves; moreover, the axes have some play in their sockets. By these various contrivances combined, the new engines have mounted gradients of 25 millimetres, (a millimetre is ·03937 of an inch) and described curves of 80 metres' radius.

The "Berkshire Sand Company," of Massachusetts, which for many years has been doing a very large and prosperous business, has recently purchased a most valuable property in Bennington county, Vt., in and about Dorset, and lying on the Western Vermont railroad, containing a series of sand beds said to surpass any in New England, the sand being of the softest and finest quality for glass purposes. These beds formerly belonged to and were worked by the "Brooklyn Flint Glass Company," and from which the company obtained its supply.

The Danish engineers have discovered an ingenious and simple (?) contrivance for keeping their opponents exposed to a heavy fire, by a sort of invisible fence made of strong wire, supported at stated distances by timber posts inserted in the ground. It must take, at all events, some precious minutes to overcome this obstacle, during which the attacking troops would be open to a destructive fire without any shelter. The entrenchments at Duppel are surrounded by these formidable barriers.

The Goodyear Patent.—Before the House Committee on Patents on the 25th of March, Messrs. Clarence A. Seward and James T. Brady appeared for the extension of the Goodyear Patent, and Messrs. Fuller and Horace Day of New York, E. S. Day of Connecticut, Parsons of Providence, and Spofford of Boston, appeared against it. The petition and remonstrance were filed, and the hearing then adjourned to April 7th.

Eight thousand school-houses have been erected in Russia since the emancipation of the serfs took place.