

THE FOUR ORGANIC ELEMENTS.

OXYGEN, HYDROGEN, NITROGEN AND CARBON.

I.—OXYGEN.

Nine pounds of water consist of eight pounds of oxygen and one pound of hydrogen; 342 pounds of red-lead consist of 310 lbs. of lead and 32 pounds of oxygen; 100 lbs. of atmospheric air consist of 77 lbs. of hydrogen and 23 lbs. of oxygen. One of the most curious facts in nature is the change in the properties of substances which results from their chemical combination. Oxygen and hydrogen combined together assume the liquid form; but oxygen on being combined with lead becomes solid, and the lead is no longer malleable, but may be pounded into powder. Oxygen, when separate or uncombined, has yet been obtained only in the gaseous state; but it is found in by far the largest quantities, in combination with other substances, forming either solids or liquids. It has strong affinity for more substances than any other of the elements. There is a great difference among them in this respect; gold and platinum are not disposed to combine with other things, they are old bachelors, but oxygen is a perfect Brigham Young—it wants to marry everything that it meets. It surrounds us on every side, but generally wedded to some other substance. It forms a portion of almost all the rocks which we see, and which make up the crust of our globe. Of 50 lbs. of marble, 24 lbs. are oxygen. In the three constituents of granite it forms 40 per cent of the feld-spar, just half of the mica, and more than half of the quartz.

All changes in chemical combination are accompanied by alterations of temperature. When oxygen especially combines with any other substance there is always a great exhibition of heat, and generally of light. Almost all fire is produced in this way. Burning a body is generally simply oxidizing it. This was the great discovery of Lavoisier. He found that when a body is burned in oxygen the body is increased in weight precisely as much as the oxygen is diminished. If we take a tight jar full of oxygen gas and drop a piece of sulphur into it, the sulphur burns with intense brilliancy and disappears. But if we weigh the jar we find its weight exactly the same as the sulphur and the jar of oxygen added together weighed before. The sulphur was not destroyed by being burned, but combined with the oxygen to form sulphurous acid, which is a transparent and invisible gas. If we heat the end of a piece of iron wire red-hot and introduce it into a jar of oxygen gas, the wire burns with the most brilliant scintillations, throwing down black scales. If we collect these scales and weigh them, we find that for every 117½ ounces of iron that were burned, we have 141 ounces of iron scales; and if we weigh the jar of oxygen, we find that that has lost 24 ounces of its weight.

When Lavoisier announced his discovery, all the chemists in Europe immediately supplied themselves with delicate scales; and the weight of various substances, as compared with each other, has now been ascertained by different observers thousands of times. A young chemist would ask no better passport to universal fame than the detection of a material error in one of these weights.

The combustion of a gas or of a volatile substance, like sulphur or phosphorus, produces flame; while, if the substance is solid and not volatile, it burns without flame.

The heat of our bodies is kept up by slow combustion or oxydation. The air, on entering the lungs, is spread through thousands of cells where it is separated from the blood by exceedingly thin membranes, through which the oxygen of the air is absorbed by the blood. Here it enters into combination with the carbon which has before been brought to the blood from the food taken into the stomach, burning the carbon as literally and truly as the coal is burned in the grate, and producing the same substance as the burning of the coal produces, that is, carbonic acid gas. Our lungs are perfect furnaces, which warm the body by a constant though slow combustion.

EUROPEAN PATENTS.—In connection with their American Patent Agency, Messrs. MUNN & Co. attend to procuring patents in England, France, Belgium, Russia, Prussia, Austria, Spain, and in all other countries where laws for the protection of inventors exist. Persons desiring to consult with MUNN & Co. can do so freely, and be supplied with a circular of instruction on the subject. A pamphlet of advice how to procure American patents will also be furnished on application.

A SOUTH-EAST RAIN.

There is one property of the atmosphere which is the cause of many of the phenomena of the weather; that is the increase of its capacity for moisture, with the increase in the temperature. Warm air will hold more water than cold air. As the wind moves along from the south-east across the warm water of the Gulf Stream, its temperature is raised, and it absorbs the vapor which is constantly rising from this tepid current. Continuing on its course across the cooler tract which intervenes between the Gulf Stream and the land, the temperature of the wind is reduced so that it cannot hold all the water that it has absorbed, and it deposits it in the form of rain. Our fishermen have a maxim that a south-east wind never blows 12 hours without bringing rain. We have known exceptions to this rule, but we believe it is more generally true than any other among all the signs of the weather.

The same property of the atmosphere, in connection with the trade winds, explains the dry climate of Peru. As the wind, coming across the ocean from the east, strikes the land of South America, it is cooled and deposits its moisture, giving to the north-east portion of South America the most rainy climate on the face of the earth. As the wind continues on its course up the side of the Andes, it grows cooler and colder till, as it rolls over the frozen summit, almost the last drop of moisture is squeezed out of it, clothing the peaks in everlasting snow; and when it tumbles down the western slope of the mountains, and experiences the warmth of the lower elevation, its capacity for water is increased and it becomes greedy for every drop of moisture it can find; in other words is a very drying wind. The consequence is, the inhabitants of Lima sometimes do not see a drop of rain for a whole year.

From the neighborhood of Behring's Straits, a cold ocean current rolls in a south-eastern direction along the western coast of North America. Opposite San Francisco this current, when once observed, was found to have a temperature of 54° Fahrenheit. In the summer, the intense heat of California makes the land warmer than this cold water, and when the breeze comes in from the ocean, instead of depositing its water in rain, it becomes very drying, drinking up every drop of moisture it can find. In the interior of California, the sun rolls daily over the blazing sky unobscured by a speck of cloud, from early in May till the first of October. In the winter the land becomes cooler than the water, and then rain is formed.

The same property of the atmosphere, in connection with the wind currents, also explains the dryness of the climate of Egypt, in which country rain is never known.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page.

GRAIN SEPARATOR.

The object of this invention is to separate oats and other foreign substances from small wheat, after the latter has been separated from sound heavy wheat by any of the known implements in use. This invention, although capable of general application, is more especially designed to be used with improved grain-separating devices which were patented by J. L. Booth, March 8th, 1859, and July 12th, 1859. The invention consists in the employment or use of a series inclined of zig-zag screens and boxes having a proper shake-motion communicated to them, and used in connection with a fan and blast spout, whereby the desired end is attained. The inventor resides at Cuyahoga Falls, Ohio.

REEFING SAILS FROM THE DECK.

Capt. G. B. Cornish, of the New York and Liverpool packet-ship *Emerald Isle*, has patented an improvement in the Cunningham rig, consisting principally in the employment for the purpose of reefing square sails, by rolling them upon their yards, of a single reef pennant applied in the form of a parbuckle, around the middle of a yard, in combination with an improved method of suspending the yard and providing for its rolling, by which means he obtains a method of reefing from the deck of a vessel which possesses several advantages over the method heretofore used. The invention further consists in a certain method of fitting an apron

to the central opening in the sail which is rendered necessary by rolling the sail on the yard.

IMPROVED LAMP.

The object of this invention is to economize in the construction of lamps, render them more durable than usual, and make suitable provision whereby the flame may be supplied with a requisite amount of warm oxygen to feed the flame and at the same time the top or cap be kept in a sufficiently cool state to permit the same to be detached by the fingers for the purpose of trimming the wick, or supplying the fount with oil. The inventor of this device is John L. Drake, of Cincinnati, Ohio.

BOOK-BACKING MACHINE.

This invention consists, firstly, in the employment, for shaping the backs of books, of a longitudinally divided roll or pair of segments operating across the back from the center towards both sides. It consists, secondly, in certain mechanism for operating the book-holder, to make it present the book to repeated operations of the divided roll, and gripe it tighter before every repetition of the operation; and it consists, thirdly, in certain mechanism for moving the divided roll out of the way to permit the insertion of the book in and its withdrawal from the holder. The credit of this invention is due to G. H. Sanborn, of Boston, Mass., and John E. Coffin, of Portland, Maine. The former is the assignee of the patent.

HYDRO-CARBON LAMP.

The object of this invention is to obtain a lamp that will burn, for illuminating purposes, hydro-carbon fluids varying in density, and which require different supplies of oxygen to support proper combustion. The invention, although it may be used for burning all hydro-carbon fluids, is more especially designed for burning coal oils and by a certain mechanism intended to be rendered capable of such adjustment as to burn both the light and heavy oils with a white and brilliant flame. The inventor of this device is Halvor Halvorson, of Cambridge, Mass.

THERMOMETRIC REGULATOR FOR HEATING APPARATUS.

In the various kinds of apparatus for heating air for warming buildings, many kinds of regulators have been used, but mostly of two classes; one class being controlled by the temperature of the apartment, or one of many apartments, that is warmed, and the other by the temperature of the heater itself. The first class may serve the purpose very well when the building contains but one apartment, but in a dwelling-house or building containing many apartments to be warmed by the same apparatus, it is obviously almost impossible to regulate the temperature of all the apartments by that of any one of them; and the second class can never operate successfully in a climate of very variable temperature, as they tend to preserve a uniform temperature of the heater, without regard to the temperature of the incoming cool air. L. W. Leeds, and C. Vaux, of New York City, have patented a regulator which is said to be more perfect than any operating upon either of the above mentioned systems; it consists of a vessel which they term a secondary heater, having no communication with the prime heater by which the air for warming the building is heated, but exposed at the same time to the heating influence of the primary heater, and to the cooling influence of the current or currents of incoming cold air, and containing water or other fluid, which, by the expansion and contraction due to variations in its temperature, is caused to operate upon a piston or into equivalent connected or geared with a regulating-cock or valve in the pipe which supplies steam or other heating agent to the primary heater, in such a manner as to cause the supply of such agent to the heater to vary in vessels with the temperature of the incoming cold air.

EXTENSION CASES.

CORN-SHELLER.—Thomas D. Burrall, of Geneva, N. Y., has applied for an extension of the patent granted to him, Dec. 6, 1845, for an improved Corn-Shell. The petition is to be heard at the Patent Office on the 21st of November next.

STEAM BOILERS.—James Montgomery, of New York City, has applied for an extension of his patent for improved Tubular Boiler, issued Dec. 26, 1845. The day of hearing is set down for Dec. 5th at the Patent Office.

COOKING-STOVES.—Samuel Pierce, of Troy, N. Y., has applied for an extension of his cooking-stove patent which was granted Dec. 6, 1846. The case will be heard at the Patent Office on the 14th of November.