Tomato Flour.

The Italians dry and pulverize the pulp of the tomato. Large districts are devoted to the culture of the fruit for this purpose, the plant being usually raised between rows of vines in vineyards for the sake of economy of land. The ripe fruit is macerated in water, and when reduced to a thin pulp is strained to take out the seeds, cores, etc., and then spread in the sun to dry. It is afterward ground and put up for market. There seems to be no reason why evaporating ovens, so much in use for drying less succulent fruit, as apples, might not be utilized in this country for preparing tomatoes by drying.

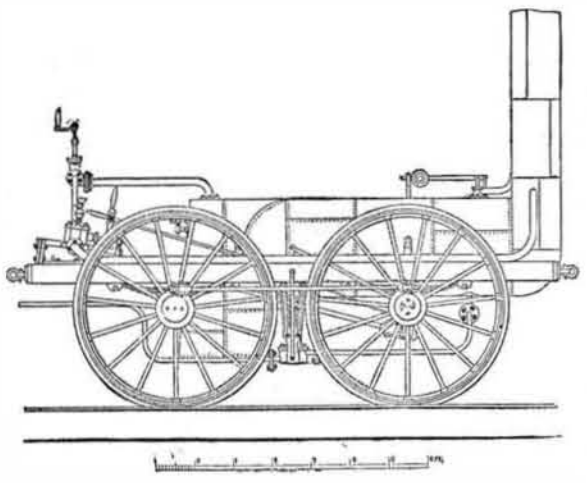
Of course powdered tomato might not supersede the canned fresh fruit. Its chief use would be for soups, sauces, and other auxiliary uses in cooking. But there are many consumers of the fresh tomato who refuse the tinned canned tomato from fear of the action of the acid of the fruit on the leaded tin of the can, the resultant being in their estimation a virulent lead poison. Tomatoes put up in glass—quite high priced—have therefore been welcomed by lovers of the fruit—or vegetable. Possibly there is room here for an addition to our list of dried or evaporated food articles.

A Lack of System.

It is the general impression that system and uniformity were becoming the rule in practical mechanics, the reduplication of parts and machine-produced articles not being confined to a few departments, but being gradually extended so as to promise eventually to embrace most of our industries. In railroading, especially, it has been the common belief that uniformity was gradually taking the place of independent diversity, an indication being the growing adoption of the ordinary gauge for width between rails.

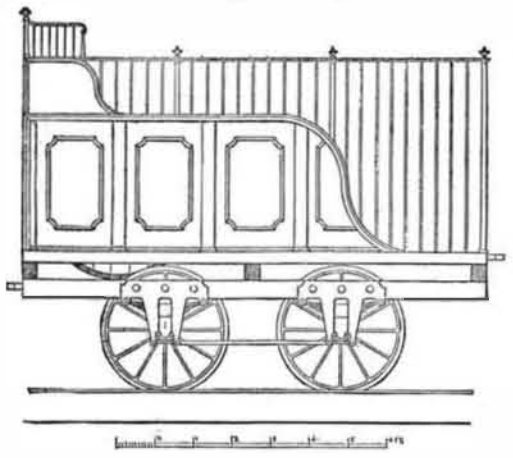
But from a circular issued by the secretary of the Master Car Builders' Association it appears that the very opposite of uniformity is the rule among car builders for railroad companies. The master car builder of the Boston and Albany Railroad says he has forty different kinds of brake heads and shoes, eleven of journal boxes, thirty-seven journal bearings, ten cast iron and five or six wrought iron draw bars, eight or ten different draw bar side castings, and a multitude of various other different parts of a car. The master car builder of the Baltimore and Ohio road reports sixty-five different kinds of journal bearings, and in eleven other articles in common use varieties numbering from twenty-five to six. And similar reports have been sent from other railroad authorities.

It is a singular exhibit. It would seem almost that human perversity and not mere chance, or individual convenience, had produced this wide diversity. It was generally known that human lives—brakemen's lives—were sacrificed to the lack of uniformity in the height of couplings, but it is appalling to learn that "the most careful estimates show that from 1,200 to 1,500 railroad employes are killed in this country annually, and from 5,000 to 10,000 more or less seriously injured; and a very considerable proportion of this sacrifice of life and limb is preventable by improved and uniform methods of constructing cars."



"DE WITT CLINTON."

Copy of original drawing of the "De Witt Clinton," the third locomotive engine built for actual service on a railroad in the United States. Made for John B. Jervis for railroad between Albany and Schenectady, A. D. 1831, by the West Point Foundry Association.

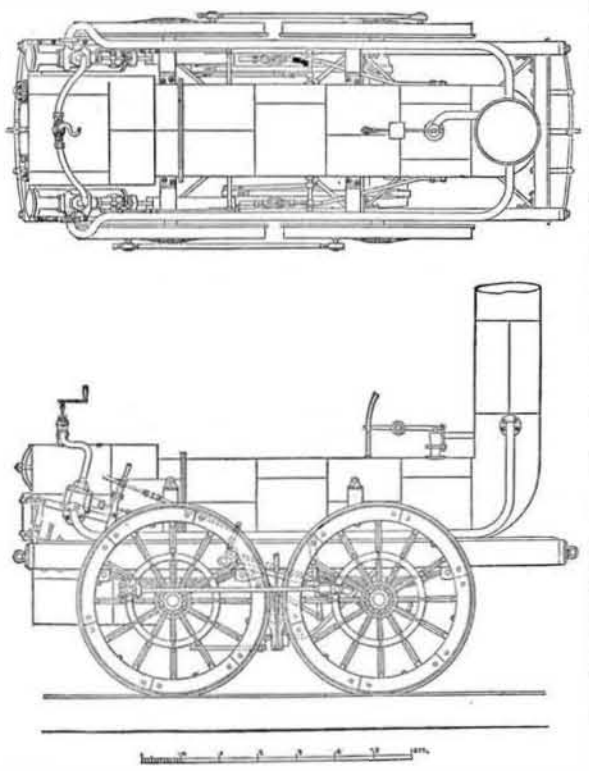


LOCOMOTIVE TENDER.

Built by the West Point Foundry Association.

THE CHICAGO RAILWAY EXPOSITION.

Among the interesting things to be seen at the Chicago Exposition of Railway Appliances, lately opened, are the original drawings of several early locomotives, diagrams of which we give herewith. The drawings were presented by the West Point Foundry Association to the American Society of Civil Engineers. Our diagrams are from larger cuts given in the *Railroad Gazette*.



"THE WEST POINT."

Copy of original drawing of "The West Point," the second locomotive engine built for actual service on a railroad in the United States. Made for the South Carolina Railroad, A. D. 1830, by the West Point Foundry Association.

The inscription in each of the engravings is copied from the original drawings, and gives the date when the engines were built.

The "Best Friend" was shipped to Charleston, and arrived there in October, 1830, and, according to Brown's "History of the Locomotive," "continued to do the necessary work of the road, hauling materials, workmen, ballast, lumber, etc., used in the construction." On June 7, 1831, its boiler exploded, being, it is said, the first locomotive boiler explosion on record.

The "West Point" was the second locomotive built for actual service. It was ordered from the West Point Foundry, and constructed from plans sent by Horatio Allen, Esq., then Chief Engineer of the South Carolina Railroad. It arrived in Charleston in February, 1831.

The locomotive "De Witt Clinton" was ordered by John B. Jervis, Chief Engineer of the Mohawk and Hudson Railroad, and was the third locomotive built in America for actual service upon a railroad. It was built at the West Point Foundry, and taken to Albany in the latter part of June, 1831, and was put upon the road and run by David Matthew. The first experimental trip was made on July 5, 1831.

A variety of illustrations of these engines have been published, which differ materially from each other. The engravings herewith have the merit of being authentic, as they have been made direct from tracings of the original drawings.

The Bower-Barff Process for Preserving Iron and Steel Surfaces.

At a recent meeting of the Society of Engineers, London, a paper was read by Mr. George Bower, on "The Bower-Barff Process of Preserving and Ornamenting Iron and Steel Surfaces."

The subject of the paper was of necessity interesting to all those who had to use iron and steel for constructive purposes, but although the author's and the Barff process of coating these metals with magnetic oxide had been before the world for several years, yet it was astonishing how few there were who really understood what these processes were.

There were two methods of producing the film of magnetic oxide, one of them, the Barff, by means of subjecting the articles at a red heat, inside an iron muffle, to the action of a superheated steam; the other, the Bower, by subjecting articles, at a similar heat, inside a brick chamber, to the action of products of combustion and of superheated air.

The Bower-Barff Company having acquired both patents, a furnace had now been devised which embraced the good points of both systems.

Iron at a sufficiently elevated temperature decomposes water; the oxygen entering into combination with the iron, in certain definite proportions, forms magnetic oxide, which is impervious to rust. This is especially applicable for wrought iron.

The Bower process was more especially adapted for cast iron, and it proceeds on the principle of first forming sesquioxide and then reducing it to magnetic by hydrocarbon gases or carbonic oxide. The Barff process produces magnetic oxide at one operation, but it is costly and takes a long time, while the Bower is obtained in two operations, and a very cheap and effective coating is produced in less than half the time of the other.

A model of a Bower-Barff furnace and drawings were exhibited as well as specimens of various articles which had been treated, consisting of stoves, ornamental castings, kitchen utensils, etc., which were most interesting.

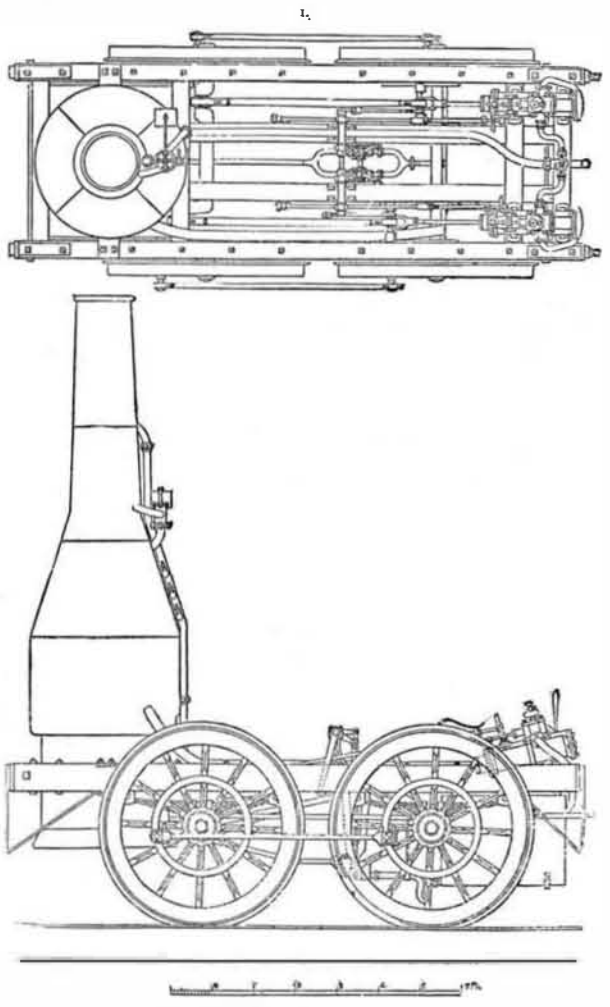
NOVEL MODE OF DEPOSITING METALS ON IRON.

The author showed a very curious property of magnetic oxide. He applied a brush formed of wires of different metals, first of all, to a casting which was not coated, and on which no effect was produced; then to a similar one which had been coated, when it was immediately covered at all parts touched by the brush with a beautiful shining coat of the metal of which the brush was formed. The author attributes this to the fact that magnetic oxide not being metallic, and to some extent gritty and porous, it had rubbed off by attrition some of the metal from the wires; and he expected that this would supersede the existing methods of bronzing and of depositing metals for the commoner kinds of Birmingham goods.

The author concluded a very interesting paper by saying that iron and steel were the kings of British industry, and he trusted it would be acknowledged at some time or other that the Bower-Barff process had contributed in some degree to maintain them in their supremacy.

Carbonic Acid and Bisulphide of Carbon.

At a recent meeting of the Royal Society, a paper was read "On a Hitherto Unobserved Resemblance between Carbonic Acid and Bisulphide of Carbon," by Dr. John Tyndall, F.R.S. He said: "When, by means of an electric current, a metal is volatilized and subjected to spectrum analysis, the 'reversal' of the bright band of the incandescent vapor is commonly observed. This is known to be due to the absorption of the rays emitted by the hot vapor in the partially cooled envelope of its own substance which surrounds it. The effect is the same in kind as the absorption by cold carbonic acid of the heat emitted by a carbonic oxide flame. For most sources of radiation carbonic acid is one of the most transparent of gases; for the radiation from the hot carbonic acid produced in the carbonic oxide flame, it is the most opaque of all. Again, for all ordinary sources of radiant heat, bisulphide of carbon, both in the liquid and vaporous form, is one of the most diathermanous bodies known. The analogy between the two substances extends to the vibrating periods of their



"THE BEST FRIEND."

Copy of original drawing of "The Best Friend," the first locomotive engine built for actual service on a railroad in the United States. Made for the South Carolina Railroad, A. D. 1830, by the West Point Foundry Association.

atoms, and the bisulphide, like the carbonic acid, abandons its usually transparent character, and plays the part of an opaque body, when presented to the radiation from the carbonic oxide flame. Of the radiation from hydrogen, a thin layer of bisulphide transmits 90 per cent, absorbing only 10. For the radiation from carbonic acid, the same layer of bisulphide transmits only 25 per cent, 75 per cent being absorbed. For this source of rays, indeed, the bisulphide transcends, as an absorbent, many substances which, for all other sources, far transcend it."

Why there are no Water-rats in Ireland.

In an interesting article on the vole or water-rat, by Mr. Grant Allen, in the English *Country Gentleman*, the writer discusses the question why certain animals, such as snakes, vipers, water-rats, etc., are not found in Ireland. For the real solution of the problem, he says, we must go back to the time when England, Ireland, and the Continent were united by a broad belt of land across the beds of the English Channel, St. George's Channel, and the North Sea. It is now an ascertained fact that in the very latest geological period, known as the glacial epoch, the whole surface of the British Islands (except an insignificant strip of the south coast) was covered from end to end with a deep coating of glaciers, like that which now envelops all polar lands, and while this condition of things prevailed there were, of course, no animals of any sort in all Britain, or, at any rate, none but a few Arctic types. After the ice melted, however, the existing British fauna, such as it is, began to occupy the land, and the fact that it did so is one proof, though by no means the only proof, that a communication with the Continent then existed across the bed of the North Sea. Now, the animals only pushed their way very slowly into the newly cleared region as the ice melted away, and the consequence is that only some forty kinds of mammals out of the whole European fauna had penetrated as far as England before the gradual submergence of the lowland belt separated it from the Continent by forming the inclosing arms of the sea.

But Ireland lies even further west than England, and there is reason to believe that St. George's Channel had all been flooded some time before the waves of the Atlantic broke down the last link between Dover and Calais. Accordingly, Ireland never got her fair share of land animals at all, for though the wolf and fox and the Irish hare and many other quickly migrating creatures had time to cross the intervening belt before the submergence, several smaller or slower creatures, including the vipers, did not get over the ground fast enough, and were thus shut out forever from the Isle of Saints. Among them were the whole race of voles, and that is the reason why Ireland to this day has no water-rats.

Catching Float Gold in Streams.

We often hear mining men tell of the large quantities of float gold which pass down the streams of this State where mining is carried on, or which receive the waters of other streams where men are mining. No one seems to have thought it possible to catch any of this float gold after it passed out of the sluices into the streams themselves. Yet in other countries the people avail themselves of the opportunity afforded on streams where mining is done to catch the float gold—for it really does exist. It has been found, for instance, at Charleston, New Zealand, that the gold does not all settle in the tail races, but that, in the union of the water of several tail races, a small percentage, well worth saving, floats away.

The gold is arrested by a method termed "fly-catching," which consists of a series of blanket-tables placed across stream, like wiers, so that the waters shall flow over each table in succession. The tables are washed in turn, and the gold is streamed from the sand and caught up by quicksilver. Many of these "claims" yield from $20 to $45 per week, with little labor. In the Charleston district referred to, fly catching has become quite an industry in itself, and no doubt there are quite a number of places in this State where similar stations could be maintained with profit.

The tables are constructed entirely of timber. Piles two or three feet in length are driven firmly into the bed of the creek, and on these are nailed lengths of stout quartering, covered over with one-inch boards laid close together, so as to form a smooth table. Pieces of lighter quartering are then placed over the boards from top to bottom, forming divisions about four feet in width. Blanketing or cloth—ordinary grain sacks opened out are frequently used—is next spread smoothly along these divisions and securely fastened down by small strips of wood. The tables vary in length from seven to twelve feet, and are placed in the creek at intervals of from sixty to a hundred feet, extending quite across the stream. The proprietors of these rights are said to realize during rainy weather very good returns, ranging from $10 to $30 a week, according to the nature of the workings on the banks above and the number of tables set in the creek. The tables are liable to damage by flood. The tables are made in compartments, and when the blankets are lifted out of one compartment, spare cloths are kept to replace those lifted. The men wash out the cloths once or twice a day, in a box by the side of the creek. The fine tailings pass over several sets of tables in their course down the creek.—*Mining and Scientific Press.*

AN $800 silver brick from the Pioneer Reduction Works was exhibited at Nevada City last week.

NEW FUEL ECONOMIZER.

It is a matter well understood among steam users and engineers that from 50 per cent to 75 per cent of the steam generating powers of coal are lost by the passing off of the gases and smoke in an unburnt condition, caused by lack of oxygen sufficient to produce combustion. By the use of one part steam to fifteen of hot air commingled and injected rapidly into the furnace by vacuum, the otherwise waste gases are ignited and economy effected.

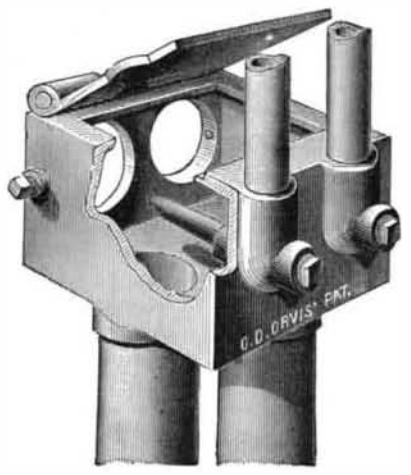


Fig. 2.—VACUUM CHAMBER WITH TWO STEAM JETS FOR INJECTING HEATED AIR AND STEAM INTO THE FURNACE.

When anthracite coal is burned, this attachment will, by the injection of hot air over the surface of the firebed, ignite the gases, utilize more completely the fuel employed, and, it is stated, show an actual saving of from 15 to 35 per cent. If bituminous coal is used, the economy will average about the same, with the additional advantage of burning all the smoke. The air is drawn through a heater in the asbpit, and projected into the combustion chamber by small jets of steam, as shown in Fig. 2.

The apparatus can be attached to any furnace in a few hours, without structural changes. It requires no fitting to or alteration of the boiler. It will invariably effect an economy in any grade or price fuel, varying according to condition of boiler, furnace, smoke stack, and fuel used. It will improve the draught and save the expense of high chimney stacks.

Practical experiments and exhaustive tests during a period of over two years both in this country and Europe, on various kinds of furnaces and fuels, have shown gratifying results in every instance.

This invention supplies the furnace by means of two vacuum boxes and four pipes opening into the fire chamber above the burning fuel. Through these pipes are introduced steam and heated air, that mingle with the heated gases arising from the firebed, and supply the requisite oxygen and hydrogen for consuming the gases and promoting perfect combustion.

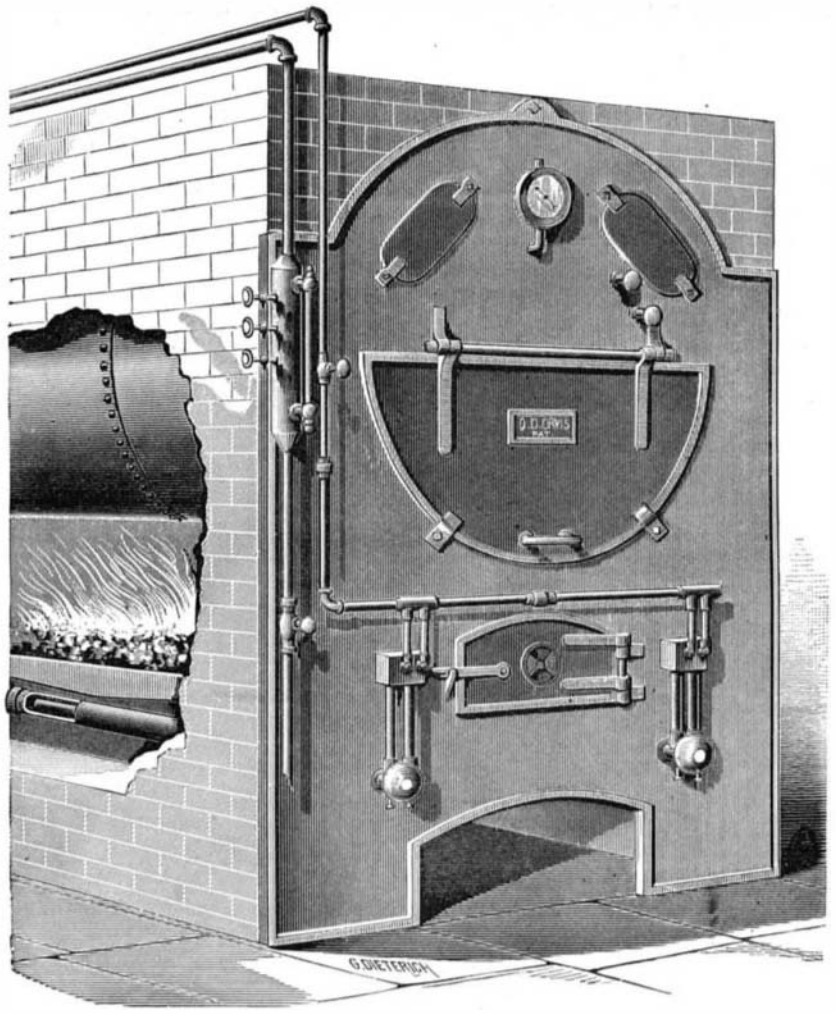


Fig. 1.—ORVIS COMBUSTION ATTACHMENT.

This invention is the result of protracted study on the part of the inventor, Mr. Orel D. Orvis, who is also a capitalist, and the president of the company. Six companies have been organized to work the patent in different parts of this country. The New Jersey company has already declared a dividend of five per cent. Further particulars may be obtained by addressing Orel D. Orvis, President of the New York Combustion Attachment Company, 261 Broadway, New York city.

How to Make Printing Plates from Photos.—The Asser Process.

A sheet of unsized paper—white blotting paper, in fact—was laid on a slab of plate glass, and dabbed over with a thin starch paste, a soft sponge being used for the purpose, and care taken to only apply so much starch paste as would fairly sink into the texture of the paper.

The sheet was next dried, after which it was sensitized by being floated (starched side downward) for five minutes on a five per cent solution of potassium bichromate, and it was hung up to dry in a moderately warm room. When dry, it was exposed under an ordinary negative for about two-thirds of the time which would have been required to obtain a silver print, after which the print—now of a light brown color—was soaked in water until all traces of unaltered bichromate were removed. The wet print was now partially dried by means of blotting-paper, and then exposed to the air until dry, after which it was laid between sheets of ordinary white paper, and well ironed with an ordinary flat iron, heated to about 150° Centigrade; the object of this proceeding being to harden the altered starch, and to enable it to hold the fatty ink firmly.

The sheet was next moistened, laid on a sheet of damp blotting-paper, and inked by a velvet roller charged with rather thin lithographic transfer ink. This ink adhered to the exposed portions, which refused to take up water, as a kind of granular deposit, leaving the thorough damp portions of the paper clear and white. The stippled ink picture thus obtained was then laid on a cleaned zinc plate, and etched into relief.—*Photographic News.*

"Compound Oxygen."

Compound oxygen is a trade name given to various compounds of secret composition and of boasted medicinal qualities. Several varieties have been analyzed by Prof. Prescott, of the University of Michigan, and his results are published in the *Physician and Surgeon* of Ann Arbor.

1. COMPOUND OXYGEN. *Keep Dark.*—A colorless aqueous solution of nitrate of ammonium and nitrate of lead, the two salts being in nearly equal proportions, and together forming about three per cent of the solution.

2. OXYGEN AQUÆ. *For Digestion. Keep Cool.*—One of the grades of "compound oxygen." A colorless, odorless, and tasteless liquid—found to be water, of a commendable degree of purity, quite free from sophistications. Probably this is the original compound oxygen.

3. COMPOUND OXYGEN. *Dr. Green's,* 1880.—An aqueous solution of nitrate of ammonium, with a very little nitrate of lead.

4. COMPOUND OXYGEN. *A White Crystalline Solid.*—Obtained for analysis about five years ago, and then found to be nitrate of ammonium alone. "Contains all the vitalizing elements of the atmosphere, but combined in a different way."

5. COMPOUND OXYGEN.—Sent out from Boston. A colored, fragrant liquid, consisting of alcohol, chloroform, and balsam of tolu.

6. COMPOUND OXYGEN. *Dr. O'Leary's.*—Contains alcohol, chloroform, bitter almond oil, balsam of tolu, and red coloring matter.

The first two samples, Compound Oxygen and Oxygen Aquæ, were sent to Prof. Prescott for analysis by the editor of *Good Health,* who remarks as follows:

"It should be recollected that this solution is to be used by inhalation, a teaspoonful being added to a small quantity of warm water, through which air is drawn by means of a glass tube. Neither of the substances contained in the solution are volatile at the temperature at which the solution is used, so that it is impossible for any medicinal property whatever to be imparted by this boasted remedy, except what comes from the warm water, which is itself very healing when used in this way, as we have demonstrated in hundreds of cases. Prof. Prescott also tested the vapor given off from the pure solution when it was boiled, but found nothing more than the vapor of water.

"The Compound Oxygen is usually accompanied by what the manufacturers are pleased to call Oxygen Aquæ, which they recommend their patients to take as an aid to digestion. The analysis of this showed it to contain nothing but water. The most careful tests revealed nothing else."

Specific Heat of Gases.

The author has verified the identity of the specific heats of hydrogen, nitrogen, oxygen and carbon monoxide gases at temperatures up to 2,700°.—*M. Vieille, in Comptes Rendus.*