

### A PORTABLE OXYGEN-INHALING APPARATUS.

BY EMILE GUARINI.

The apparatus illustrated herewith is the invention of Dr. Guilleminetti, and seems to us to be destined to render very great services. In 1891 Dr. Guilleminetti, in the capacity of physician, accompanied the expedition of the astronomer Janssen for the construction of an observatory at the summit of Mont Blanc. He purposed to study the influence of atmospheric depression upon himself and a score of guides and carriers, during a stay of two weeks at an altitude of 14,430 feet. During the first few days, all the members of the expedition were seriously attacked with mountain sickness, and Dr. Jacottet, of Chamounix, died in a hut among the glaciers, a victim of the altitude. Later on, Dr. Guilleminetti observed the same symptoms in a free balloon on the occasion of half a score of physiological ascensions made in November, 1901. In the train of these observations, he undertook some researches upon the efficacy of the inhalation of oxygen in balloon and mountain sickness. Such researches contributed toward the invention of the oxygen inhaler, the construction of which he intrusted to the Draegerwerk establishment of Lübeck.

This apparatus permits of inhaling oxygen directly from a compression tube by means of a manometric expander. This latter is so regulated as to allow of the passage of 180 cubic inches of oxygen per minute—a quantity that the inventor deems fully sufficient in all cases in which recourse is had to inhalations of this gas. Formerly, when a physician prescribed inhalations of oxygen, the pharmacist transferred the compressed gas from the cylinder to rubber bags of 1,800 cubic inches capacity and costing from 40 to 60 cents each. The use of oxygen in therapeutics was for that reason too expensive, although a 35-cubic-foot cylinder of the gas stood the manufacturer in but a dollar and a half. On the other hand, rubber gives oxygen a disagreeable odor, and, through the friction of the internal walls of the bag, there forms a dust that may be inhaled by the patient and pass into the respiratory tracts. In order to obviate such inconveniences, the experiment was tried of placing an expander directly upon the oxygen cylinder, but this did not permit of ascertaining the quantity of gas that escaped per minute, that is to say, how long a cylinder of oxygen would last—a very important matter in practice, particularly to the aeronaut, to whom it is of importance to know during his ascensions how many hours the supply of oxygen taken along will hold out. Dr. Guilleminetti's apparatus presents another advantage. Formerly the current of oxygen was always continuous, either when the gas was inhaled from rubber bags or by means of an expander fixed to the cylinder. Hence it necessarily followed that the oxygen that flowed during the exhalation escapes as a pure loss. In order to remedy such an inconvenience, Dr. Guilleminetti has interposed in his apparatus a Draeger reservoir consisting of a bag of thin gold-beater's skin, into which the gas flows during the patient's expiration.

The mask of the apparatus is of metal, and is consequently easily sterilized. Its proper operation is assured by an expiration valve of very light glass. It is, in addition, provided with an air inlet consisting of a small free aperture, in order that the oxygen shall not be inhaled in a perfectly pure state.

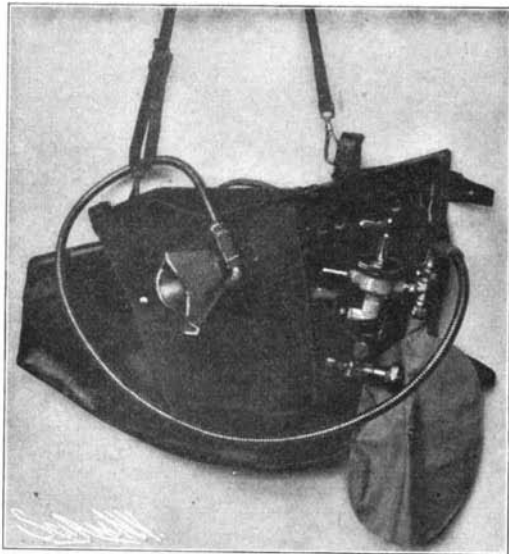
In order to make use of the apparatus, it is necessary, as soon as the expander is secured to the oxygen cylinder, to open the cock that controls the latter. There is then nothing more to be done, as long as the gage shows that gas remains in the cylinder, but to move the lever that controls the flow of oxygen.

As for the masks, there is one for the mouth and nose simultaneously, and one for the nose alone and one for the mouth alone. They have the form of a small pipette, very simple and very practical. The mask for the face may be easily put on by means of an elastic band passing around the patient's head in such a way as to leave the hands entirely free.

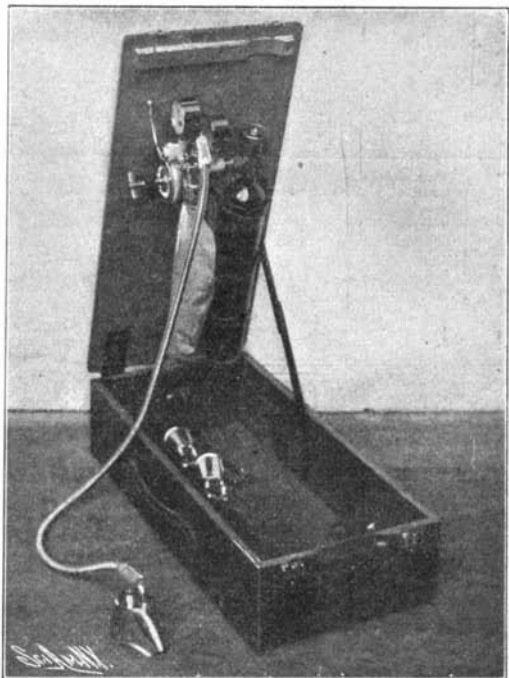
Dr. Guilleminetti has also devised a life-saving apparatus, which is merely the oxygen-inhaling one practically fixed in a small portable box or in a bag that may be attached to a bicycle. This is especially designed to be used in cases of asphyxia, in which it is of importance to administer oxygen at once, and in which a few minutes may decide the life or death of the patient. On the other hand, everything must be immediately ready to operate. The oxygen cylinder contains but 4.25 cubic feet, which suffices for an inhalation of 40 minutes at the rate of 180 cubic inches per minute. The mask is fastened on the face as has already been described, and this permits of proceeding at once to artificial respiratory motions.

### A Wonderful Clipper.

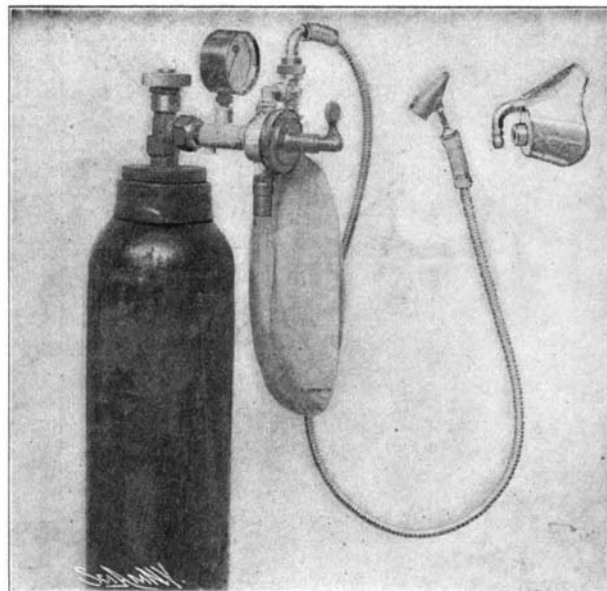
The achievements of the five-masted steel bark



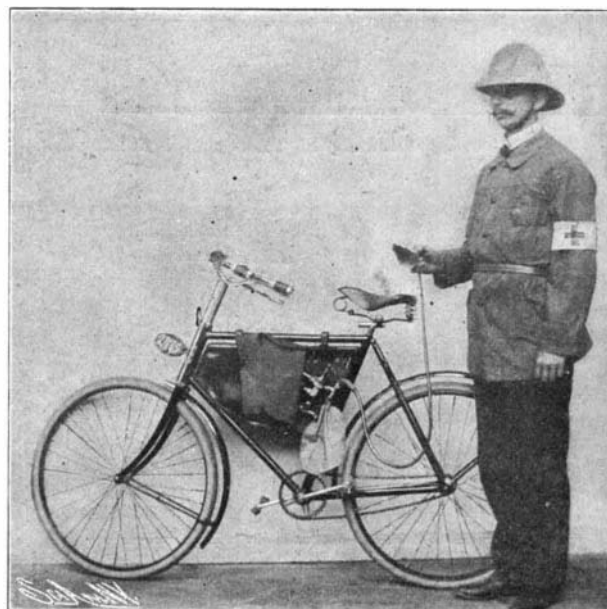
Portable Apparatus Carried in a Bag.



Portable Apparatus Carried in a Box.



Guilleminetti's Oxygen-Inhaling Apparatus.



Portable Apparatus Carried by a Bicycle.

### A PORTABLE OXYGEN-INHALING APPARATUS.

"Preussen," 5,081 tons, built in 1902 for the Laeisz shipping agency of Hamburg, the largest square-rigged bark in the world, have excited much interest of late. The most remarkable performance of the "Preussen" thus far has been the completion of the voyage from the Channel to Iquique, Chile, a distance of 12,000 miles, in 57 days—about the time made by the steam freighters engaged in the South American trade. On this voyage the vessel took her departure from Ouesant March 5, 1903, and crossed the line March 18, thirteen days out, establishing a record never before equaled by a sailing ship. The parallel of 50 deg. S. in the Atlantic was attained April 10, and in the Pacific April 21, eleven days being thus spent in weathering that most tempestuous of regions, Cape Horn. From noon of April 23 to noon of April 24 the vessel laid down 368 miles to her credit, this being the best day's run throughout the voyage. The anchor was dropped in the harbor of Iquique May 1, which made fifty-seven days from point of departure to destination.

It is expected that the Agra-Delhi chord line of the Indian Midland Railway will be opened toward the end of 1904.

### The Uses of Natural Gas.

The most profitable customers that the natural gas companies have are the householders. Natural gas is eminently fitted for domestic uses, as every woman who has cooked by its convenient flame has realized, if she has ever had occasion to abandon it for a wood or coal range. She does not wonder that the gods were jealous of the hero who brought fire down from heaven in a hollow reed and showed men how to warm and light their homes and how to cook their food. His was a god-like gift and meant to mankind the beginning of civilization. It is from such primitive uses of fire as Prometheus taught that the natural gas companies of to-day derive nearly all their revenue. They supplied natural gas to 509,695 domestic consumers in 1902, and blessed not less than 4,500,000 people with it as an illuminant.

So says Mr. F. H. Oliphant in his report on the Production of Natural Gas in 1902, which has just been published by the United States Geological Survey as part of its annual volume on Mineral Resources. He says many other pertinent things in this report. Natural gas, he states, is used on many other hearths than the purely domestic. Iron mills, steel works, glass works, and various other establishments to the total number of 8,103 made use of its energies in 1902. The number of natural gas companies that supplied the 509,695 home-consumers and the 8,103 establishments in 1902 was 2,147, which represented a gain of 602 companies over the enrollment of 1901.

One of the most effective uses to which natural gas has been put is as motive power for engines. The natural-gas engine came into favor about ten years ago, when its use was first employed in pumping wells. Afterward, in forms of magnitude ranging from 5 to 500 horse-power, it was extensively introduced into manufacturing plants, where it has successfully demonstrated its economy and reliability. It has in many cases replaced the steam engine and boiler. Owing to the large number of points that are often widely separated and are difficult to supply with other fuel, it is particularly applicable to the pumping of oil wells and to driving pipe-line pumps.

In connection with a mantle of alkaline earth, natural gas has produced the cheapest and best illuminant known. All natural gas has not, however, the same illuminating value. In some districts it carries a small percentage of the heavier hydrocarbons, which add much to its illuminating properties.

Only one article is manufactured from natural gas. That is lampblack, for which a considerable quantity of the annual production of natural gas is employed.

M. U. Schoop, in a recent number of the *Elektrotechnische Zeitschrift*, records the results of a comparative study of the familiar lead accumulator and Edison's alkali accumulator. The parallel between the lead and alkali accumulators, though not complete, goes to show that nickel sheets or steel sheets plated with nickel in alkali solution, when exposed to the effect of currents, will not be altered in the least, even after weeks, corrosive effects being, as is not the case with the lead peroxide plate, never observed. The author, however, thinks it possible that the active masses present in perforated pockets in the form of compressed powders devoid, it appears, of the adhesive properties of lead salts, would drop from their supports in course of time. As regards the life of lead accumulators, even in the best of accumulators the positive lead support is gradually destroyed by oxidation, the negative mass diminishing progressively in capacity; the need of durability is, therefore, absolutely in disaccord with the demand for a small weight.