THE INHALATORIUM, A NEW MEDICAL INSTITUTION.

The beneficial results obtained in the treatment of the respiratory organs, nose, pharynx, larynx, and lungs, by the inhalation of certain medicinal substances in vapor form has long been recognized. Until recently there was no apparatus devised that would dissipate the vapors fine enough to permit of their complete permeation into the remote lung air cells. It was not only impossible to penetrate the minute ramifications of the bronchi, but frequently the hot vapors irritated the sensitive mucous membrane, causing more harm than good.

Within a recent period, the well-known German specialist Dr. A. Bulling, of Munich, invented and perfected two forms of apparatus termed the "Guttafer" and "Thermo-Variator," which have been installed in a new medical institute in this city, named "The Inhalatorium," at No. 137 West 122d Street, equipped primarily for the utilization of this improved system of treatment.

Institutions of this character have been successfully established in various prominent cities and localities in Germany, also in London, and are patronized by visiting Americans and others with most satisfactory results.

The accompanying illustrations show the two forms of apparatus; the larger view represents the interior of one of four rooms on an upper floor, each about six or eight feet square, with a slatted wood floor, and located in the center is a large porcelain bowl called the "Guttafer," in which the medicinal preparation to be vaporized is placed. At the base of the bowl are compressed-air supply pipes, which convey the air to the vaporizing pipe and other eight air pipes around it, all projecting upward within the bowl. Through the center tube the air forces upward the liquid in the bowl in a fine vapor, and other jets of air are projected upward through minute orifices in the ends of surrounding tubes. Thus the several upward air jets immediately subdivide the primary jet of vaporized air into innumerable infinitesimal particles of such extreme fineness that they become part of the air, and are readily carried by the natural act of breathing to the most minute ramifications of the bronchi and alveoli of the lungs, reaching the diseased portions at a point heretofore unattainable. The effect of the treatment is to dissolve the mucus collected in the bronchi, and enable the patient to easily expel it in the act of coughing. The patient (protected by a light gossamer cloak to prevent the vaporized air from coming in contact with clothes) usually sits in the chamber half an hour at a time, twice a day, for a period of a few weeks, according to the nature of the disease.

In another sectional illustration, it will be observed that the air compressor, operated by a motor in the cellar, takes in fresh air from the outside through a filter, that it is forced through a heater, adjoining a range in the kitchen, into metallic reservoirs or tanks at a pressure of four atmospheres. From the tanks it is piped upward to four individual chambers on an upper floor.

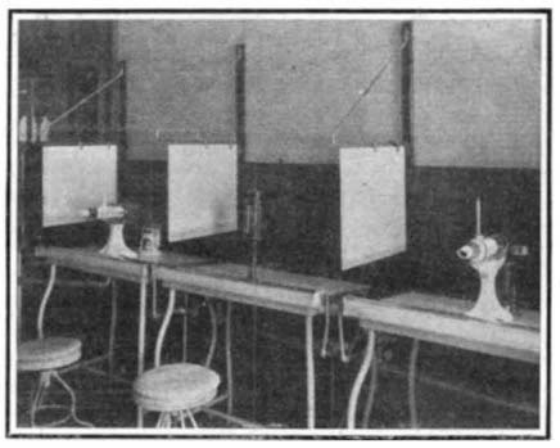
In the front basement are the smaller portable "Thermo-Variator" inhalers upon tables divided by hanging partitions. The instruments operate without compressed air. The peculiarity of their construction is an adjustable tube on the outside at the back, which will allow more or less air to mix with the vaporized air and vary the temperature to suit different cases. A thermometer located near the mouth-piece registers the temperature of the vaporized air, prior to inhalation. A corner of the room with three of these instruments is shown in another view; the further one is fitted with a nasal piece, held by a rubber tube. The second one, in an upright position, is operated by compressed air, with a special swinging tube for insertion in the nostrils. The nearest one is fitted with a porcelain mouth-piece; this is removable and interchangeable with other instruments, for the purpose of being easily cleaned. The fluid preparation is placed in a metal cup at the rear, and is brought to the vaporizing chamber by capillary attraction.

On the first floor are arranged the reception and consultation rooms, equipped with sterilizers and other instruments. All of the floors are carpeted with smooth-rubber sectional carpeting, so that the entire interior is an example of scrupulous cleanliness.

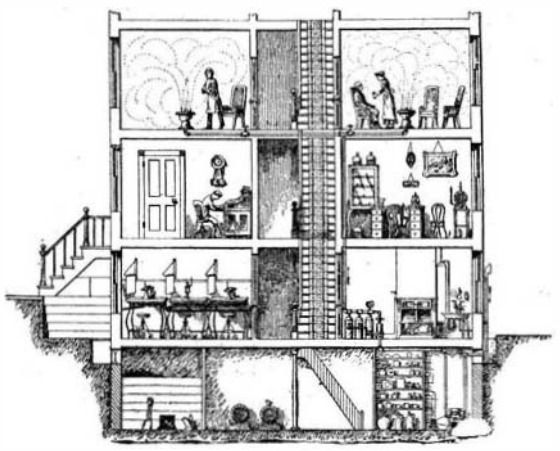
The thoroughness with which the treated air in the rooms enters the remote portions of the lungs was scientifically demonstrated by mixing a dye with the solution to be vaporized; the air was then inhaled by a dog for a brief period; he was next suddenly killed, the lungs removed, and when examined, the color of the dye was found in the extreme portions, showing the circulation of the vapor air here was complete. It is stated that rooms equipped as above are very useful when installed in large factories, theaters, or stock exchanges, for those troubled with hoarseness or throat and chest difficulties, and is particularly valuable in checking the early stages of consumption.

There are also, we are told, in the institution ingenious apparatus for the treatment and possible cure of asthma and apparatus for light therapeutic treatment.

Dr. Johannes Hoving, a specialist who has had much experience with the system abroad, is in charge of the institution.



THERMO INHALING APPARATUS.



INTERIOR ARRANGEMENT OF THE INHALATORIUM.

INHALING CHAMBER IN THE INHALATORIUM.

The Mechanical Equivalent of Combustion.

In a lecture delivered at the recent meeting of the Association of German Naturalists and Physicians Prof. M. Cantor discussed the problem of the mechanical equivalent of combustion and the construction of a rational combustion motor. Combustion processes are known to constitute one of the most important sources of mechanical work. After theoretically defining the mechanical work which can be generated by a given combustion, the author suggests an essentially new process of combustion, by means of which the theoretical limit may be approximated more closely than heretofore. The great practical importance of this discussion need not be emphasized; it is obviously the aim of technical thermo-dynamics to indicate methods whereby a maximum amount of energy can be derived from a given amount of fuel. The theoretical definition of the possible limit is likewise important for the industries, allowing as it does the comparative gaging of results both attained and attainable.

The question of the maximum amount of energy that may be derived from a given combustion process had up to the present been discussed in the following form: What portion of the heat of combustion may be converted into work? Now this implies the idea of a quantity of heat to be converted into work, and this question, as is known, has been answered by Carnot. The qualitative heat values presumed by Carnot, however, are not achieved in reality. What is given is *determined chemical systems by whose conversion work may be produced.* The general problem of technical thermo-dynamics would thus be not a thermo-mechanical, but a chemico-mechanical conversion, and the problem would have to be given the following shape: What amount of work can we derive from a given chemical conversion? In order to solve this problem generally it should be considered that chemical conversions are usually attended by an expenditure of work and the evolution of heat, the latter possessing a working power determined by the Carnot theorem. Only the sum total of the work immediately yielded and possible of derivation from the transformation of this heat will give the total amount of work that can be derived from the chemical change. For this amount may be given a general expression depending only on the initial and terminal conditions of the system that is converted, i. e., being independent of the manner of conversion. This will give the upper limit of the greatest possible amount of work that can be obtained and this is what the author defines *mechanical equivalent of chemical conversion.* The ratio of the work yielded by a motor to the mechanical equivalent of the chemical process occurring in the motor is the *rational efficiency* of the motor. Applying the theoretical results to the usual types of engine where mechanical work is expended by the alteration in the volumes of given amounts of gases or vapors, the amount of work which can be obtained from a combustion will be found to be determined mainly by the ratio of the terminal to the initial volume of the gaseous masses. The smaller that the latter, particularly, can be made, the higher will be the efficiency. Drawing the necessary consequences from the result, it is imperative that the combination of the reacting substances, viz., oxygen on one hand and fuel on the other, be confined to a volume as small as possible.

This postulate now leads to a novel working process where the oxygen is used not in the *gaseous condition,* but in physical or chemical combinations, i. e., in the shape of oxides. The author suggests a practical design where liquid fuels, as petroleum, are forced into incandescent copper oxide in such a way that the gases of combustion produced by burning of the oxide with the oxygen assume the smallest possible initial volume. The reduced metallic copper is then reconverted into the oxide by the oxygen of an air current blown through it, and thus the oxygen is reduced to a volume about 7,000 times smaller than that which it had in the air, while the oxidation may be utilized for a further production of work. A diagram exhibited by Prof. Cantor strikingly shows the superiority of this novel working process, and it is believed that when properly developed by engineers, it may lead to important practical results.

Watering the Streets with Sea Water.—There are now a large number of cities on the seacoast which have recourse to salt water for watering the public thoroughfares, esteeming it a veritable waste to make use of fresh water for this purpose. They are the more satisfied because the hydroscopic properties of sea water avoid the necessity of frequent applications. On the other hand, salt water exerts a very destructive influence on the paint and varnish of vehicles, and merchants affirm that the salt is found everywhere, and that its deliquescence is attended with harmful results. And again, salt water is destructive to the pipes and metallic fittings, and the leakage of the pipes will kill vegetation in streets, parks, and gardens.—La Nature.