

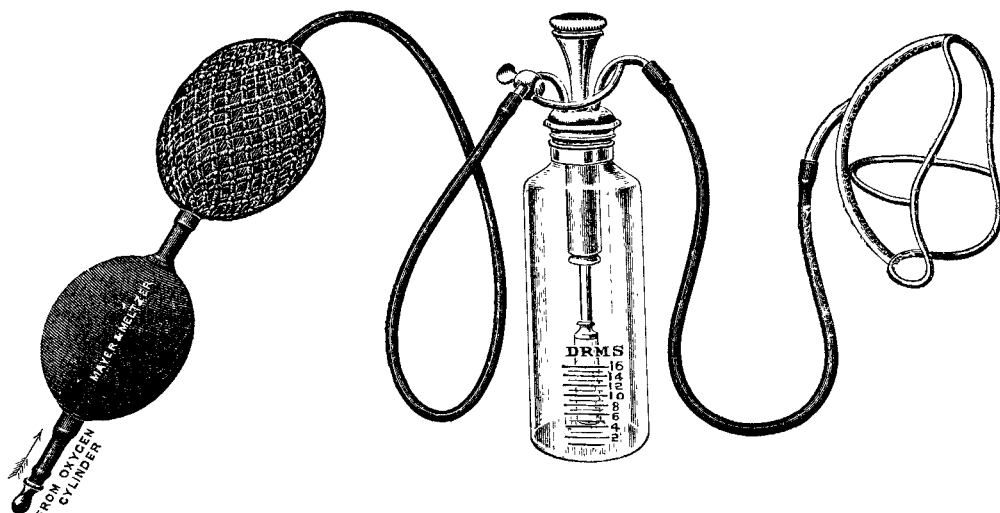
New Inventions.

AN OXYGEN-DRIVEN CHLOROFORM INHALER.

THIS apparatus (Fig. 1), on the principle of the Junker chloroform inhaler, is designed to simplify the simultaneous administration of oxygen and chloroform. A short cannula (Fig. 2) at the extremity of the bellows system plugs into the tube leading from the oxygen cylinder. The bellows consists of two bulbs, each of the capacity of 100 c.c.; the first bulb is provided with an inlet valve. The chloroform chamber is fitted with oxygen inlet and chloroform vapour outlet tubes (Figs. 3 and 4). These tubes are connected outside the chamber by a short-circuit tube controlled by a simple tap. By closing this tap the current of oxygen no longer passes through the chloroform in the chamber, but is delivered through the short circuit directly to the face-piece free from chloroform vapour.

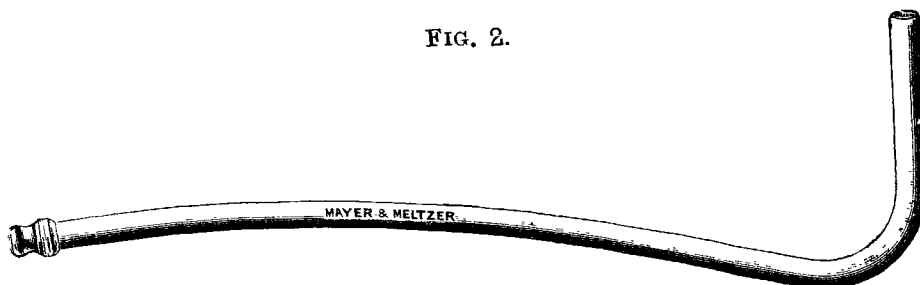
To use the inhaler the cannula is plugged into the oxygen cylinder

FIG. 1.



Oxygen-chloroform inhaler, consisting of a bellows system free at one end for attachment to the oxygen cylinder, and attached to the chloroform bottle, from which an outlet tube leads to the face mask. The inlet and outlet tubes can be short-circuited by a curved connecting tube, which is opened and closed by a stopcock.

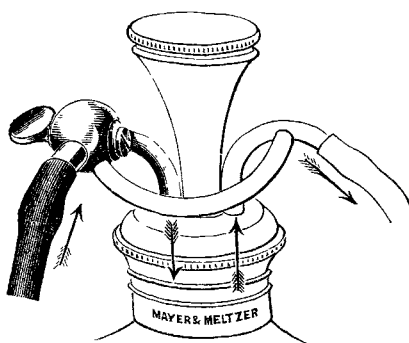
FIG. 2.



The cannula for mouth administration.

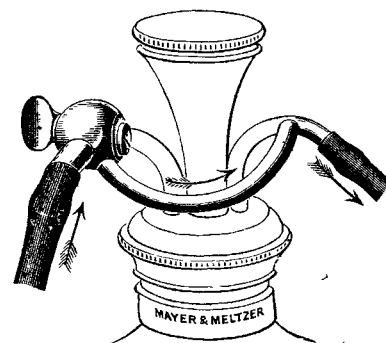
tubing and a feeble current is allowed to enter the chloroform chamber. The current required to maintain anaesthesia corresponds to between 0.5-1.0 litre per minute. The current passing is measured by compressing the bulb, allowing it to fill, compressing again, and noting how often per minute the bulb is filled. As the capacity of the bulb is 100 c.c. five fillings per minute correspond to a current of 0.5 litre, ten fillings to a current of 1.0 litre, and so on. The average patient requires a current of 0.75 litre per minute (7-8 fillings). At any moment the chloroform vapour may be instantaneously cut off and pure oxygen supplied to the patient by turning the short-circuit tap. The percentage of chloroform in the mixture delivered is very low; about 3.5 c.c. (1 drachm) of chloroform is volatilised every quarter of an hour with the average 0.75 litre oxygen current. It has not been found necessary to interpose

FIG. 3.



The attachment to the chloroform bottle, showing the stopcock open, so that the stream of oxygen passes down the tube into the chloroform bottle, whence the emerging stream to the face-mask consists of oxygen plus chloroform.

FIG. 4.



The same as Fig. 3, but with the stopcock closed, showing how the oxygen stream, instead of passing through the chloroform bottle, goes directly through the short-circuit tube to the face-mask, thus delivering pure oxygen without the admixture of chloroform.

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UNIVERSITY OF ST. ANDREWS.—We learn that the Senatus Academicus of the University of St. Andrews has resolved to confer the honorary degree of LL.D. upon the following members of the medical profession, in this country and abroad, at the celebration in September of the 500th anniversary of the foundation of the University:—Professor Sir T. Clifford Allbutt, Cambridge University; Sir Thomas Barlow, President of the Royal College of Physicians of London; Mr. G. A. Berry, honorary surgeon oculist to the King in Scotland; Dr. Byrom Bramwell, President of the Royal College of Physicians of Edinburgh; Dr. Robert Bridges; Dr. Alexander Crum Brown; Professor Sir Hector Cameron,

University of Glasgow; Professor Francis Gotch, University of Oxford; Professor Peter Fredrik Holst, Royal Frederick University of Christiania; Professor Hector Leboucq, University of Ghent; Professor C. S. Minot, of Harvard; Professor R. A. Reddingius, University of Groningen; Professor Robert Saundby, President of the British Medical Association; Professor E. A. Schäfer, University of Edinburgh; Professor W. W. Keen of Philadelphia; Lieutenant-Colonel David Prain, Director of the Royal Botanic Gardens, Kew; Dr. Anthony Traill, Provost of Trinity College, Dublin; and Professor Johann Veit, University of Halle.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 2, 1911.

Energy and Elemental Instability.

THE presidential address delivered by Sir WILLIAM RAMSAY before the meeting of the British Association for the Advancement of Science at Portsmouth was a novelty in its distinguished position, for it was discursive. It was not confined to presenting a summary of the progress of science within the past year, nor was it devoted entirely to a given aspect of science in which the President himself had been engaged. Sir WILLIAM RAMSAY delivered an address which was generally retrospective, seeking to picture the present position of civilised nations politically, scientifically, socially, educationally, industrially, imperially, in contrast with periods of the past. In an audience necessarily cosmopolitan in its scientific tastes the address presented something of interest to everybody; while he kept his discussion of the various subjects well within the capacity of his listeners, bearing in mind that the British Association of Science opens its ranks not merely to those following different branches of science, but also to many who, though interested in the problems of science, are not engaged in actual scientific pursuits. His address, in fact, carried out his view that the greatest benefit accruing from meetings of the kind is the opportunity for intercourse. The object of the association was declared 80 years ago at its first meeting in York to be: "To give a stronger impulse and a more systematic direction to scientific inquiry, to promote the intercourse of those who cultivate science in different parts of the British Empire with one another and with foreign philosophers, to obtain a more general attention to the objects of science and a removal of any disadvantages of a public kind which impede its progress." As a mighty contributor to this progress, whose arduous researches have thrown strong light upon the constitution of matter, Sir WILLIAM RAMSAY was well qualified for the presidential post of the association.

Whilst we perceive the value of the suggestive incursions which Sir WILLIAM RAMSAY made into regions not practically explored by himself, we regard as the most remarkable passages in his address those in which he referred to the position of the elements of radium and the wonderful manifestations of its energy. He gave only a few minutes to the consideration of ancient and modern views regarding the chemical elements, and yet in those minutes he was able to announce that for the first time we have accurate knowledge as to the descent of some of the elements. This was a recognition that our ideas as to the definition of an element have been seriously disturbed. From its physical and chemical properties radium is an undoubted element, but, as Sir WILLIAM RAMSAY observed, it is a very curious

one, for it is unstable, and hitherto stability has been believed to be the essential characteristic of an element. Radium, however, disintegrates—changes, that is to say, into other bodies, and at a constant rate. If one gramme is kept for 1760 years only half a gramme will be left at the end of that time; half of it will have given off other products. It yields a condensable gas—radium emanation—and besides evolves helium. Helium seems to be a veritable element, and radium emanation has been shown to be incapable of chemical union, but it has been liquefied and solidified in the laboratory of University College, London, and its spectrum has been measured and its density determined. The emanation has been called niton to recall its connexion with its congeners, argon, neon, krypton, xenon, helium, and its phosphorescent properties. The atomic weight of niton is 222.4 and that of helium 4. The sum 226.4 is the atomic weight of the parent radium. But the descent does not stop there. Niton in its turn gives radium A and helium, radium A rapidly gives another solid substance radium B, helium again accompanying the change. Soon a half of B gives place to radium C, but in this case no helium is evolved, only atoms of electricity to which the name "electrons" has been given by Dr. JOHNSTONE STONEY. Radium C has a short life, for it changes into radium C², parting with helium atoms. In two and a half minutes, however, radium C² is half gone, parting once again with electrons and forming radium D, which is longer lived, its disappearance eventuating in radium E with apparently no discharge of electrons or helium. Radium E changes spontaneously into radium F, which is the substance to which Madame CURIE gave the name "polonium." In 140 days, however, polonium in its turn is half changed into an unknown metal, supposed to be possibly lead. Then apparently a check to the rapid descent takes place, for lead within present human limitations, at any rate, is stable. But there is no reason why even the stable elements should not decompose when subjected to enormous strains. The virtue of the energy of radium consists, as Sir WILLIAM RAMSAY pointed out, in the small weight in which it is contained; energy here is in an enormously concentrated form. It is disappointing to be told, therefore, that the supply is a very limited one, and that it can safely be affirmed that the production will never surpass half an ounce in any year. The small quantities, however, which have been so far produced have afforded sufficient energy to induce the degradation of elements hitherto regarded as stable. The action of niton or radium emanation on salts of copper appears to show that the metal copper can be converted partially into lithium; and similar experiments indicate that thorium, zirconium, titanium, and silicon are degraded into carbon, for solutions of compounds of these, mixed with niton, invariably generate carbon dioxide, while cerium, silver, mercury, and some other metals give none. This is all a very wonderful story, and we may well ponder over the possibilities for the human race to which these discoveries are leading. Sir WILLIAM RAMSAY suggests that if elements are capable of disintegration the world will have at its disposal a hitherto unsuspected source of energy. If radium were to evolve its stored-up energy at the same rate that gun-cotton does we should have an undreamt-of explosive; could we control the rate, we should have a useful and