

THE INDUCTION TUBE OF W. SIEMENS

A TRANSLATION from a French periodical, *La Nature*, of an article on "Tubes for silent electrical discharges," appears in NATURE of Jan. 29 (vol. ix. p. 244). After referring to the action of the electric spark upon oxygen gas, the author of the article continues: "For the purpose of more easily obtaining ozone, M. Houzeau has recently constructed an apparatus worked by a Ruhmkorff coil, in which there are no longer sparks, but only dark discharges—*effluvia*—far more efficacious in the production of modified oxygen." Again, it is said, that M. Houzeau "has recently devised an apparatus for the preparation of ozone, which is spreading rapidly among the laboratories, and which has already yielded very remarkable results." A description of the apparatus is then given; further on, it is said, that "M. Houzeau is not the only one who has made use of the tubes whose structure he has made known, but that M. Boillot, a writer, it appears," well known to the readers of the *Moniteur*, "has made some further propositions about them; and lastly, that M. A. Thénard" (whose investigations constitute the main subject of the article) "has brought to bear on the construction of the tubes a further modification which makes them still more efficacious." A description and drawing of the apparatus of M. A. Thénard is given. Those who are unacquainted with the facts of the case will be surprised to learn that the invention thus publicly announced, although, doubtless, in principle deserving of the highest praise, was not made either by M. Houzeau, M. Boillot, or M. A. Thénard, but is simply a somewhat clumsy form of the Induction-tube devised by W. Siemens, which is described in his "Memoir on Electrostatic Induction," contained in *Poggendorff's Annalen*, for 1857 (vol. cii. p. 120).

This Induction-tube is one of the most remarkable, as well as simple instruments, of chemical research which has ever been devised; enabling us, by the action of electricity, to effect changes in the composition of gases which may be compared with the chemical changes effected in liquids by the agency of the voltaic battery. A few words in explanation of the instrument may interest the readers of NATURE.

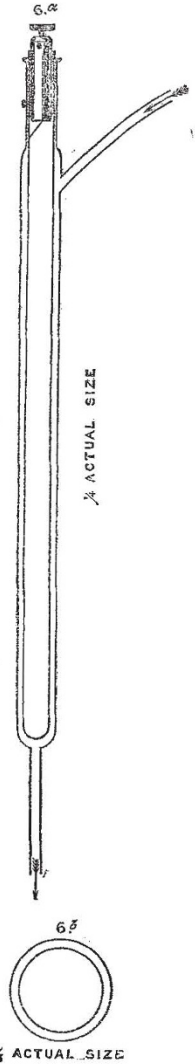
The simplest form of induction-apparatus consists in two thin glass plates, of which one side is coated with tin-foil, and which are so arranged that the uncovered surfaces are parallel to one another, and separated by a uniform, narrow interval of about one or two millimetres filled, say, with air. If this apparatus be charged with electricity by a sufficiently charged Leyden jar, at the moment of the charge the air between the plates becomes luminous, and the same appearance is presented when the apparatus is discharged. To produce this effect, however, the apparatus must be charged beyond a certain limit, determined, in each case, by the special arrangement of the apparatus and the materials employed in its construction. Now, if the two plates of tin-foil be respectively connected with the terminals of a powerful Ruhmkorff's coil, the apparatus is successively charged with electricity and discharged; these operations being alternately repeated in such rapid succession that the air, in the interval between the plates, appears permanently luminous. We have, moreover, evidence of the occurrence in this interval of chemical changes determined by the electric action, in the odour and characteristic properties of ozone which may be recognised in a current of air or oxygen compelled to pass between the plates. The conclusion drawn by Siemens from this experiment is, that the electric polarisation of the particles of a dielectric cannot be carried beyond a certain point; and that if it be attempted to accumulate electricity in the apparatus beyond this point, the excess of this tension or polarisation appears in the form of the

dynamical phenomena occurring between the plates, namely, light, heat, and chemical change. (*Poggendorff's Annalen*, loc. cit., p. 119).

Now it is evident that in this arrangement the two sheets of glass may be replaced by two concentric cylinders of glass, the interior of the inner cylinder and the exterior of the outer cylinder being coated with tin-foil, as in the case of the plates. It is precisely this change which is effected in the induction-tube of Siemens, but with the additional advantage that in the induction-tube a regular flow of the gas to be operated upon may be maintained, that the experiment may be made at any required temperature, and the gaseous products of the experiment collected for examination. The construction of this induction-tube will be readily understood from the annexed drawing (taken from *Pogg. Ann.* loc. cit.), where the ring shows the horizontal section of the tube.

If the reader will be at the trouble of comparing the description of the tube of M. Houzeau and the drawing of the tube of M. A. Thénard, with the description and drawing of the induction-tube of Siemens he will be satisfied of the substantial identity, both in principle and construction, of these pretended novelties with that invention. At the same time if the statement of these ridiculous pretensions were limited to those made in the article translated in NATURE, vol. ix. p. 244, they would hardly be worthy of notice, but this is not quite the case. The induction-tube of Siemens under the title of "the tube of M. Houzeau," is being rapidly acclimatised as a French discovery. In the article on ozone contained in a recent number of the "Dictionnaire de Chimie," which bears evidence of being the work of a highly competent writer, where we might expect to find a comprehensive treatment of the subject, a similar lapse occurs. We have there, too, a drawing of the tube of M. Houzeau, which is described as "a happy modification of the tube of M. Babo," but not a word is said about Siemens, the inventor of the tube, whose name is simply dropped. Other similar instances might be brought forward which have afforded an opportunity of rectifying these mistakes, but of which no advantage has been taken. I have therefore ventured to make these remarks, not only I may say in the interest of justice, but also, having myself made many experiments with the induction-tube of Siemens, I have learned, perhaps, more than others to appreciate its value and feel myself under a special debt of gratitude to the inventor.

B. C. BRODIE



RECENT RESEARCHES ON TERMITES AND HONEY-BEES

THE accompanying letter, just received from Fritz Müller, in Southern Brazil, is so interesting that it appears to me well worth publishing in NATURE. His discovery of the two sexually mature forms of Termites,