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LVI. *Intelligence and Miscellaneous Articles.*

ON THE DISENGAGEMENT OF HEAT OCCURRING WHEN ELECTRICAL VIBRATIONS ARE TRANSMITTED THROUGH WIRES. BY DR. I. KLEMENČIČ.

THE present research is concerned in the first place with the disengagement of heat which occurs when electrical vibrations are transmitted through wires. For the experimental investigation a method was used which consisted in placing close to the wire to be heated the junction of a thermo-element constructed of fine wires, and measuring the heating of the wire due to the radiation against the junction by the thermo-current produced. The primary circuit furnished waves 3.3 m. in length, and consisted of two brass disks 30 cm. in diameter, which were connected by a linear conductor with a spark-gap in the middle. An exactly similar body constituted the secondary inductor, except that it had no spark-gap, but the middle part of the linear conductor was formed of the wires to be investigated. Two experimental wires were interposed; the length of both together was at most 12 cm., while the whole linear part of the secondary inductors had a length of 89 cm. Experiments on the development of heat in wires led thus to the question of the division of the electrical current in vibrations. With regard to the circumstance that the disengagement of heat in very rapid electrical oscillations takes place almost exclusively in the surface-layer, it seemed to the author not unimportant to observe how in this case the intensity of the radiation is related to the change of resistance of the heated wire, and then further to investigate what is the value of this ratio with constant current. Measurements have shown that with wires of the thickness here examined (0.037 cm.) there is no appreciable difference in this respect. The heat disengaged on the surface is rapidly conducted to the interior of the wire. It follows from the experiments on the disengagement of heat that the resistance to the passage of very rapid electrical vibrations depends on the magnetizability of the wire in question, and on the kind of wire; yet as regards the latter in a way differing from the constant current. For several wires of different material 6 cm. in length and 0.037 cm. in thickness, a heat is found in vibrations which is approximately expressed by the following ratio:—

Iron : german silver : brass : copper = 10.5 : 1.75 : 1 : 1.

The number for copper is probably too large, as it was inserted in the series after a correction which was only approximately correct.

If the formulæ of Stefan are applied to these observations, theory and experiment agree well in the combination german silver-brass. The combination german silver-copper did not give concordant values, which is partially due to the fact that in these experiments all the conditions were not fulfilled which theory requires.

Taking Stefan's formula the number 111 was obtained for the magnetic permeability of iron, and in another 73. The observations

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showed further that in the branching of electrical vibrations the coefficient of self-induction is almost entirely of dominant influence and not the resistance.—*Wiener Berichte*, March 16, 1893.

ON THE POTENTIAL OF ELECTRICAL DISCHARGE.

BY PROF. HEYDWEILLER.

The author, at the conclusion of a paper on this subject, gives the following table for the values of the potential of discharge, v , between equal spherical electrodes of radius r , for sparking-distances d cm.; the experiments were made by means of a spark-micro-meter of suitable construction, so that no appreciable inductive actions were to be feared. The experiments were made at a pressure of 745 mm. and at a temperature of 18° C.; for an increase of pressure of 8 mm. or for a diminution of temperature of 3°, these values are to be raised 1 per cent. in either case.

$r = 2.5$ cm.		$r = 1.0$ cm.	
d cm.	v	d cm.	v
0.5	61.2	0.1	15.7
0.6	72.0	0.2	27.0
0.7	81.8	0.3	37.9
0.8	91.1	0.4	48.3
0.9	100.3	0.5	58.3
1.0	109.5	0.6	67.9
1.1	118.6	0.7	77.5
1.2	127.7	0.8	86.8
1.3	136.7	1.0	104.3
1.4	145.6	1.2	118.3
1.5	154.1	1.4	128.8
1.6	162.2	1.6	137.6
$r = 0.5$ cm.		$r = 0.25$ cm.	
d cm.	v	d cm.	v
0.1	16.0	0.1	16.1
0.2	27.9	0.2	27.9
0.3	37.9	0.3	37.8
0.4	48.5	0.4	45.9
0.5	57.7	0.5	52.4
0.6	66.4	0.6	57.3
0.7	73.5	0.7	61.0
0.8	80.3	0.8	63.4
0.9	85.3	1.0	67.3
1.0	90.0	1.5	74.4

With the accuracy of 1 per cent. which these values possess as derived both from Paschen's observations and my own, they will be sufficient in most cases for practical purposes, and will probably have attained the limit of accuracy possible in such cases.—Wiedemann's *Annalen*, xlviii. p. 213, 1893.

ON A PROPERTY OF THE ANODES OF GEISSLER'S TUBES.

BY E. GOLDSTEIN.

While a great number of properties of the kathode of induced discharges in rarefied spaces have been made out, only a few properties of anodes are known. The following communication describes a new property of the anode. If a vessel in which the discharge takes place, one for instance with electrodes at the ends