resembles them in its character. The following analytical results show that the compound had not been obtained pure.

	n/10 alkali required to combine with the SO_3H group in 1 gram of substance. Methyl orange as indicator.	Additional *n*/10 alkali required to combine with the fatty group in 1 gram of substance. Phenolphthalein as indicator.
	cc.	cc.
Calculated for $C_6H_3OH.SO_3H.C_{18}H_{35}O_2$.	21.929	21.929
Found 1	24.47	20.39
" 2	29.75	20.77

These results clearly indicate the presence of a disulphonic acid. This I have not yet attempted to separate, but its quantity can be calculated and allowed for, and if this is done it will be seen that the figures will agree closely with those required by the formula.

In much of the analytical work described in this paper and also in the preparation of some of the compounds, I was kindly assisted by Mr. Wm. Simonson.

[CONTRIBUTIONS FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY, NO. 12.]

A NEW INTERRUPTER FOR THE KOHLRAUSCH-OSTWALD CONDUCTIVITY METHOD.

BY J. LIVINGSTON R. MORGAN.

Received December 7, 1899.

IN a recent paper[1] I described three useful additions to the Kohlrausch-Ostwald conductivity method. Since then an improvement has been made in the interrupter, the first of the three described, which simplifies it to such an extent that a description of it is deemed advisable. In the apparatus as first proposed, the primary current (2–5 volts from the electric light circuit or from storage cells) was used to charge the vibrating wire as well as to excite the electromagnet. The current from the cell used in the conductivity apparatus was then connected, through the vibrating wire and an extra mercury cup, to a small induction coil (without the breaker), the secondary of the coil being connected to the bridge arrangement in the usual way. The intermittent current produced by the vibrating wire and the mercury cup becomes a rapidly alternating one, such as is desired, in passing through the induction coil.

[1] This Journal, **22**, 1 (1900).

In the new form, one of the mercury cups is dispensed with entirely, and the current from the cell of the conductivity apparatus alone goes through the wire causing it to vibrate, and thus with the mercury cup to make and break the circuit. In the Pupin arrangement[1] using the permanent magnet, one cell is

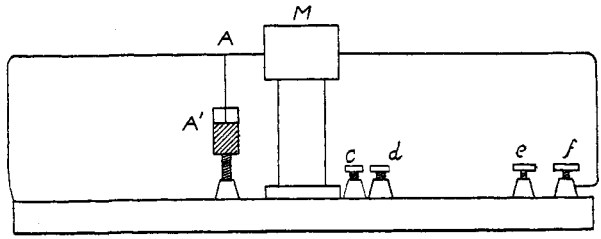

Fig. 1.—*c* and *d*, the binding posts of the electromagnet, are connected to the electric light circuit (3 to 5 volts). *c* is connected under the base to the mercury cup *A'*.

insufficient to cause a vibration but by the use of an electromagnet the strength of the magnetic field can be so intensified that the wire is repelled even when carrying a very small current. Fig. 1 shows the arrangement of the new form of

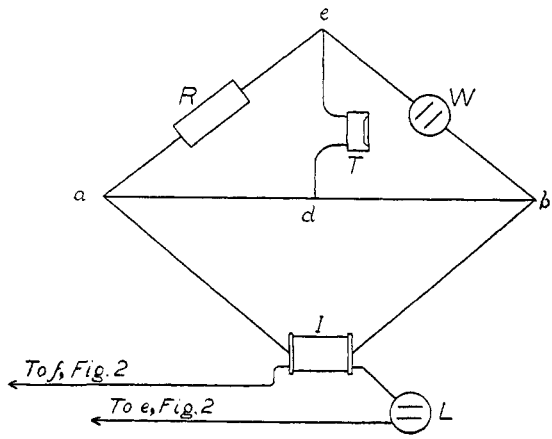

Fig. 2.—R is the known resistance, W the electrolytic cell, I the coil, L the Lelanché cell and T the telephone. The current breaker of the coil I is removed.

apparatus. The electromagnet is excited by a current of from 2 to 5 volts entering at the posts *c* and *d*. The current from the battery *L* (Fig. 2) is connected to the primary of the induction coil *I* through the posts *e* and *f* (Fig. 1). The dipper of the

[1] *Am. J. Sci.* [3]. 45, 325 (1893).

wire A is in contact with mercury A' in the adjustable cup, which is connected by a wire under the base to the post e. The current then goes from one pole of the battery L to f, A, A', e and then through the primary of the induction coil back to the other pole. When the current is passing through the wire the magnet will repel the wire, and if the cup A' is at the proper height the contact with the mercury will be broken and since the wire when uncharged is not affected by the magnet its tension will make the contact once again and the same process will be repeated. The tension of the wire and consequently the rapidity of vibration, may be altered by the screw devices at each end.

This new form of apparatus is not only simpler in construction than the original, but is also much more readily adjusted and kept in adjustment. In the earlier form with two mercury cups it is necessary that the wire vibrate in such a way that loops are formed at the two cups, so that the original adjustment is more difficult to make and a variation in the number of vibrations per second is less easy to arrange. If three or more pieces of conductivity apparatus, each with its cell, are connected to the same vibrator, a smaller voltage may be used for the electromagnet, for the voltage in the wire is much greater and consequently the strength of the magnetic field may be much reduced and still give the same result.

[CONTRIBUTIONS FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY, NO. 13.]

THE SPECIFIC GRAVITY AND ELECTRICAL RESISTANCE OF METALLIC TELLURIUM.

BY VICTOR LENHER AND J. LIVINGSTON R. MORGAN.

Received January 2, 1902.

IN this Journal[1] one of us described the preparation of metallic tellurium by means of the reduction of an alkaline solution of the oxide of tellurium with sugar. A description was given in that paper of the means used to test the tellurium for impurities. The tellurium obtained by reducing with sugar was found to be volatile in hydrogen gas leaving no residue. Its oxide was found to be completely volatile in hydrochloric acid gas.

[1] Lenher: This Journal, 21, 348.