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DEVICE FOR THE COMPARISON OF CURRENT, TENSION, AND POWER BY SELF ACTING RESISTANCES.

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1,136,810. Patented Apr. 20, 1915.

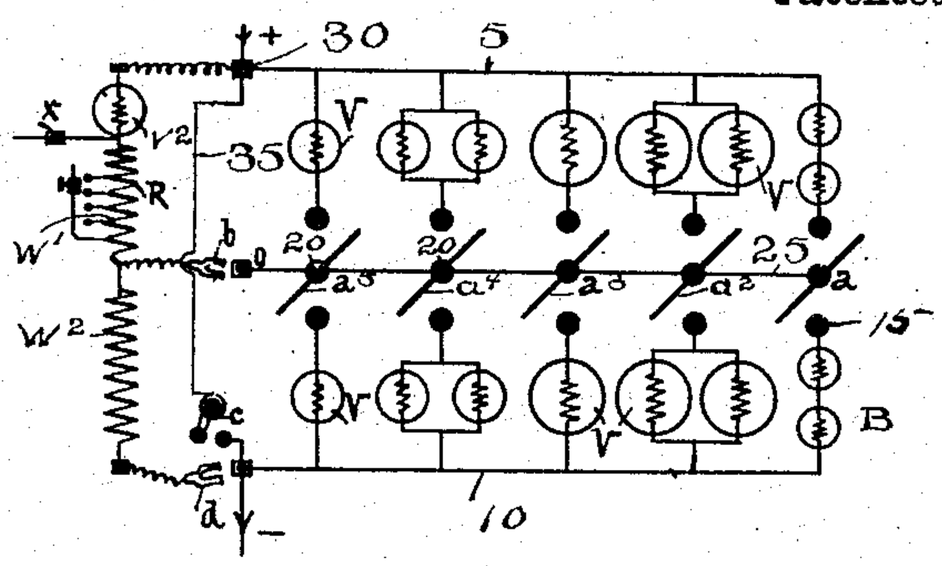


Fig. 1.

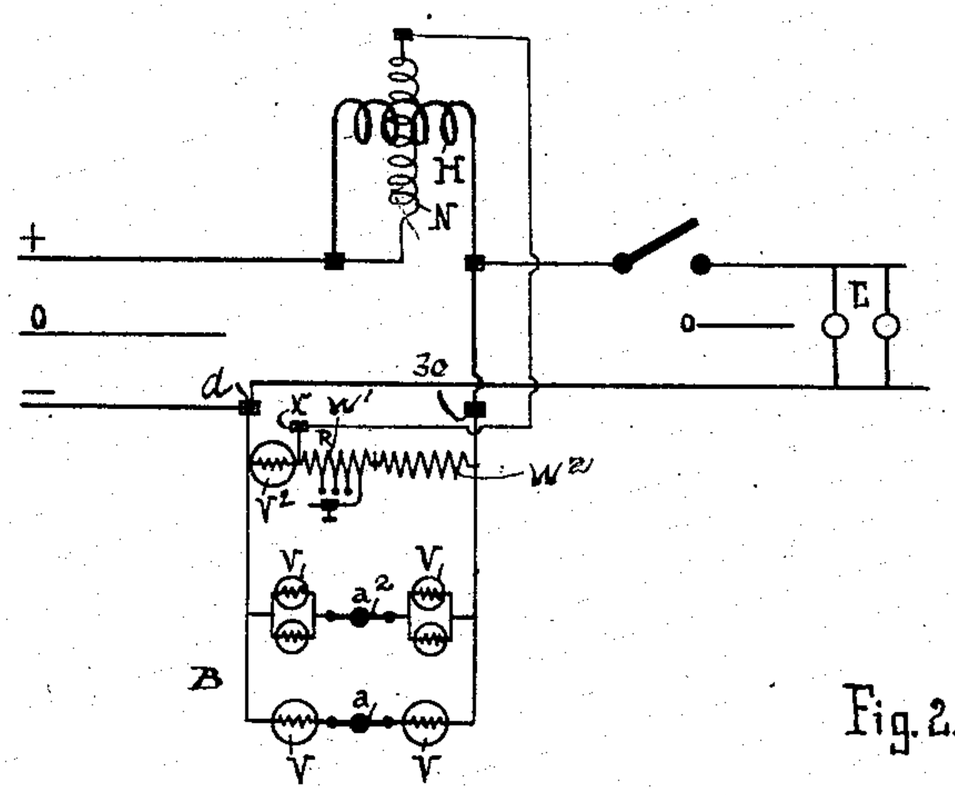
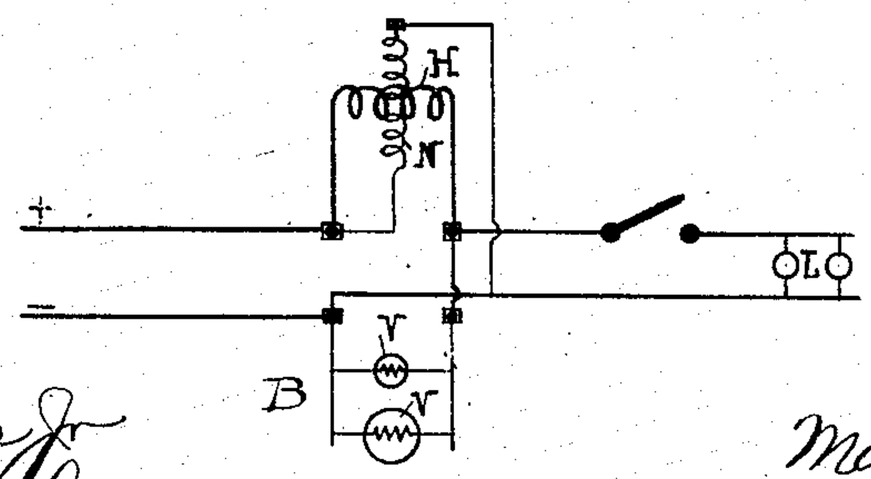


Fig. 2.

Fig. 3.



Witnesses:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MARTIN KALLMANN, OF BERLIN, GERMANY; PAULA KALLMANN, OF BERLIN, GERMANY, ADMINISTRATRIX OF SAID MARTIN KALLMANN, DECEASED.

DEVICE FOR THE COMPARISON OF CURRENT, TENSION, AND POWER BY SELF-ACTING RESISTANCES.

1,136,810. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed July 12, 1909. Serial No. 507,271.

To all whom it may concern:

Be it known that I, MARTIN KALLMANN, electrical engineer, citizen of Germany, residing at Kurfuerstendamm 40/41, Berlin, W., Germany, have invented new and useful Improvements in Devices for the Comparison of Current, Tension, and Power by Self-Acting Resistances, of which the following is a specification.

This invention relates to means for testing electric meters, and it consists in the use of resistances of known value having a high positive temperature coefficient, connected with one or both of the coils of the meter and constituting an automatically regulated load resistance designed to maintain a substantially constant current, for use in testing without a standard meter.

In the accompanying drawings forming part of this application, Figure 1 is a diagrammatic view of the device, showing the manner of connecting the various resistances. Figs. 2 and 3 are similar views showing the connections with the main and shunt coils of the meter, under the conditions described below.

Referring to the drawings in detail, and especially to Fig. 1, B indicates the entire group of load resistances, such group being composed of a number of individual elements consisting of iron conductors in receptacles filled with hydrogen. The resistance elements V are connected in the manner shown in Fig. 1, in which two conductors 5 and 10 have connection with a number of resistances which are also connected with contact members 15, arranged in pairs, so that the members of any two pairs (or all of them), may be connected by switches pivoted at the points 20. These switches are connected by a wire 25. The first group of resistances at the right comprises two variable resistances connected in series with wire 5, and two connected in series with wire 10, all four being arranged for connection in series with each other by means of switch a. The switch a^2 is arranged to connect two variable resistances which are in parallel with each other and have connection with wire 5, in such manner that they will be in series with two resistances (also in parallel with each other) which have connection with wire 10. Switch a^3 connects in series two variable resistances connected respectively with wires 5 and 10, and switch a^4 controls resistances connected like those controlled by switch a^2, while switch a^5 controls resistances arranged similarly to those connected by switch a^3. A variable resistance V^2 is connected with a resistance R of substantially constant resistance material, such resistance R comprising two sections W' and W^2, the first of which is adjustable. Resistance V^2 is connected with terminal 30, with which wire 5 is also connected, and resistance R may be connected with terminal d.

The manner of using this arrangement when testing a watt-hour meter is shown diagrammatically in Fig. 2. The shunt coil N of the meter is connected with terminal X, and the main coil is connected with terminal 30, the outer conductors of a three wire system being connected, respectively, with the main coil and with terminal d.

L indicates the installation to which current is being supplied by the leads.

The switches a, a^2, a^3, a^4 and a^5 permit the resistance elements with which they are connected to be cut out in steps.

For the purpose of maintaining constant a potential of 220 volts affecting the outer conductors, d is connected to the negative terminal and b is disconnected. Switch c is open. The resistances V^2, W' and W^2 are then placed in series between the outer conductors. The strength of the current is generally one-half an ampere, there being 20 volts at V^2 and 200 volts at the constant resistance. Across the latter (V^2 and R), and between the terminal X and the negative connection d, the shunt coil N of the watt hour meter is connected, and is at a constant voltage of 200. The variators at a potential of 210 only require 10 volts. On a 110 volt circuit the switch c is closed, connecting the outer conductors 5 and 10. The negative main is disconnected from the outer conductor 10 at d and is connected with the middle conductor 25 at b. The shunt coil N of the meter is influenced by the constant potential between X and b. In Fig. 3, the connections are substantially the same, the constant resistances being omitted when not required. Attention is again directed to the connections in Fig. 1.

As many of the groups of variable resistances V are connected up by switches a, a^2,

etc., as may be necessary, the current passing through the main coil of the meter, through wire 5, the switches just mentioned, wire 10, to the other lead, and the shunt circuit being completed through resistances W′, W², as in Fig. 1, or through resistance V², as in Fig. 2. The current will be maintained constant within limits by the iron resistances, since their ohmic value increases with the increase of voltage. The value of the resistances being known, the meter may be tested without a standard meter. The degree of incandescense of an iron resistance shows when it is performing its normal function.

The advantage of the above described arrangement over previous constructions, is that it is not only possible to test amper-hour meters and watt-hour meters without lowering the voltage of the shunt circuit in the first case, but the regulating control of the large variable resistances V is greater and the current is constant within wider limits. Moreover, the construction is greatly simplified and no adjustment is required, the same load resistance being used for voltages between 210 and 230.

The more delicate the construction of the iron resistances, that is, the thinner the wires used, the more sensitive do they become, as they immediately respond to the variations of potential, becoming heated to a high degree, and checking the initial rush of current. The efficiency of the test is increased in proportion to the sensitiveness of the resistances controlling the current.

What I claim is:

1. In a device of the character described, a plurality of outer conductors having terminal connections; a third and normally neutral conductor between the conductors first mentioned; a meter having its main coil connected with one of the outer conductors; a plurality of load resistances of high temperature coefficient arranged to be connected across the outer conductors and with the main coil, said resistances also being arranged for connection with said third conductor; a supplementary resistance of high temperature coefficient connected with one of the outer conductors and with the shunt coil of the meter, the latter coil having connection with the other of said outer conductors; independent means arranged to connect the outer conductors; means for connecting the third and normally neutral conductor with the supplementary resistance and the negative terminal; and means for disconnecting one of the outer conductors from said negative terminal.

2. In a device of the character described, a plurality of outer conductors having terminal connections; a third and normally neutral conductor between the conductors first mentioned; a meter having its main coil connected with one of the outer conductors; a plurality of load resistances of high temperature coefficient arranged to be connected across the outer conductors and with the main coil, said resistances also being arranged for connection with said third conductor; a supplementary resistance of high temperature coefficient connected with one of the outer conductors and with the shunt coil of the meter, the latter coil having connection with the other of said outer conductors; an adjustable resistance of constant resistance material in series with the supplementary resistance of high temperature coefficient; independent means arranged to connect the outer conductors; means for connecting the third and normally neutral conductor with the supplementary resistance and the negative terminal; and means for disconnecting one of the outer conductors from said negative terminal.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN KALLMANN.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."