L. T. ROBINSON.

RESISTANCE BOX.

APPLICATION FILED AUG. 14, 1909.

963,395.

Patented July 5, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

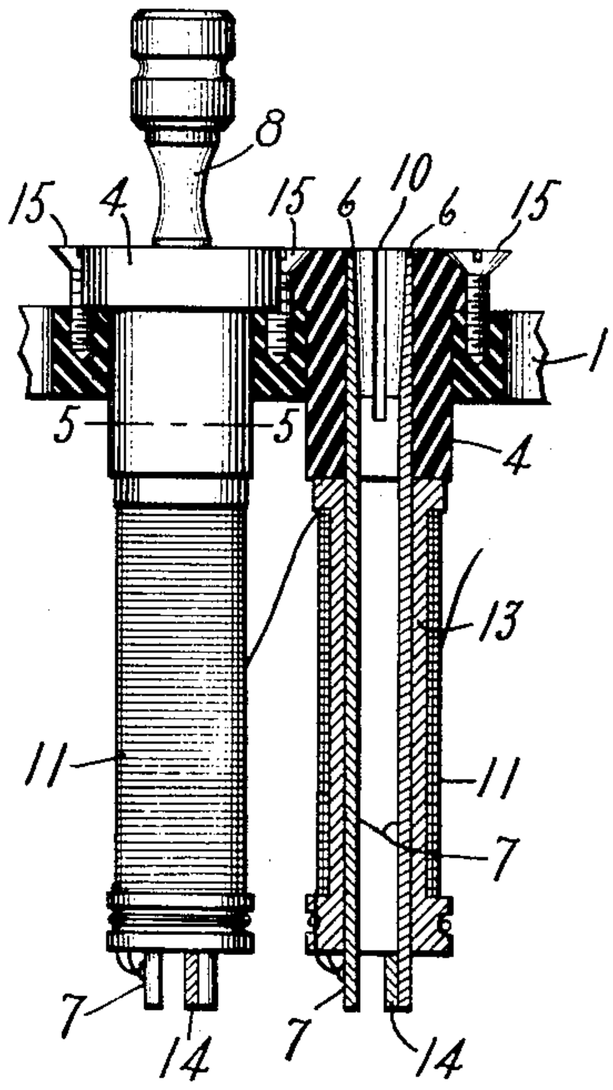


Fig. 2.

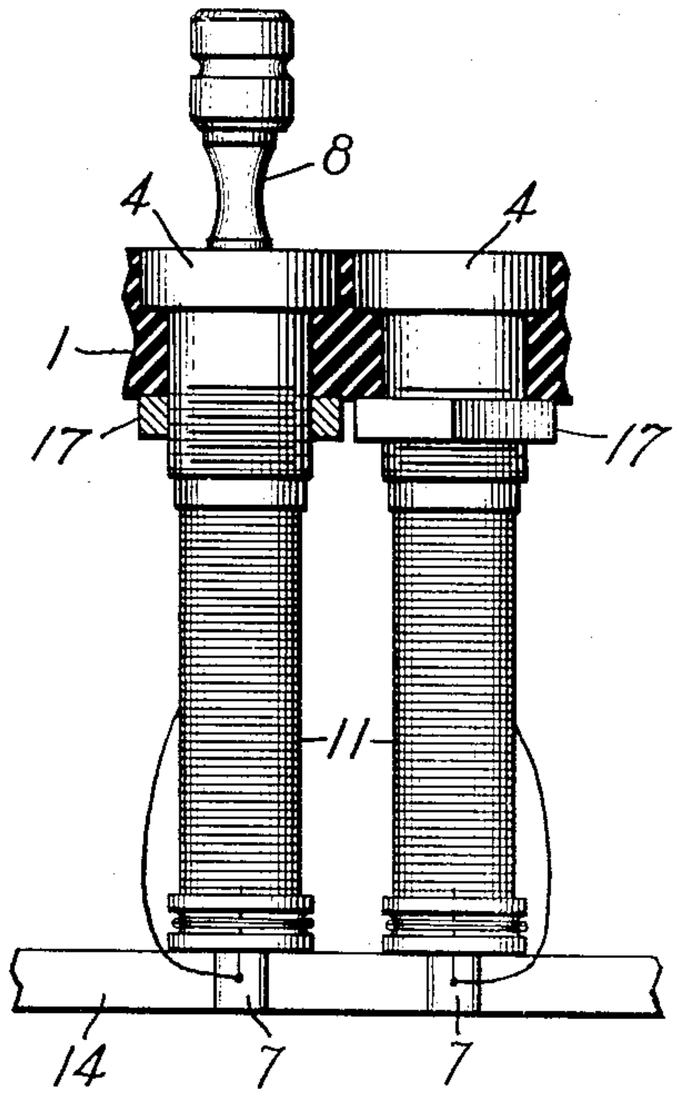


Fig. 3.

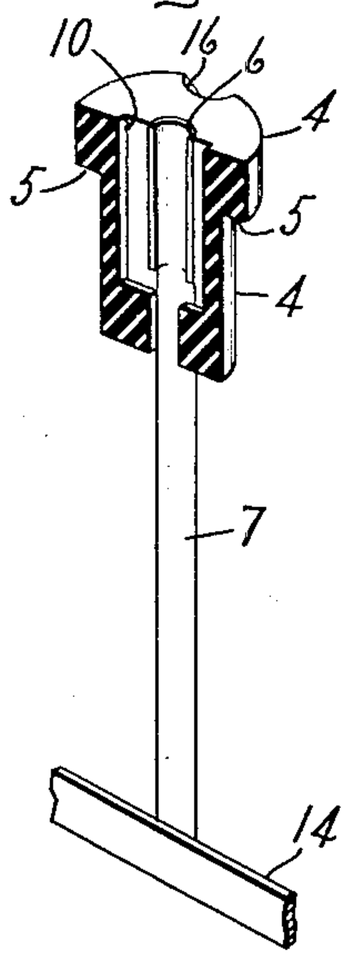


Fig. 5.

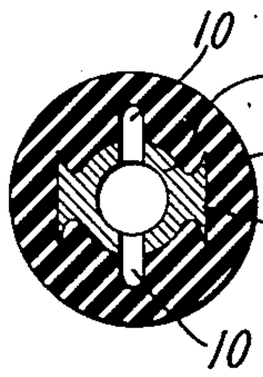
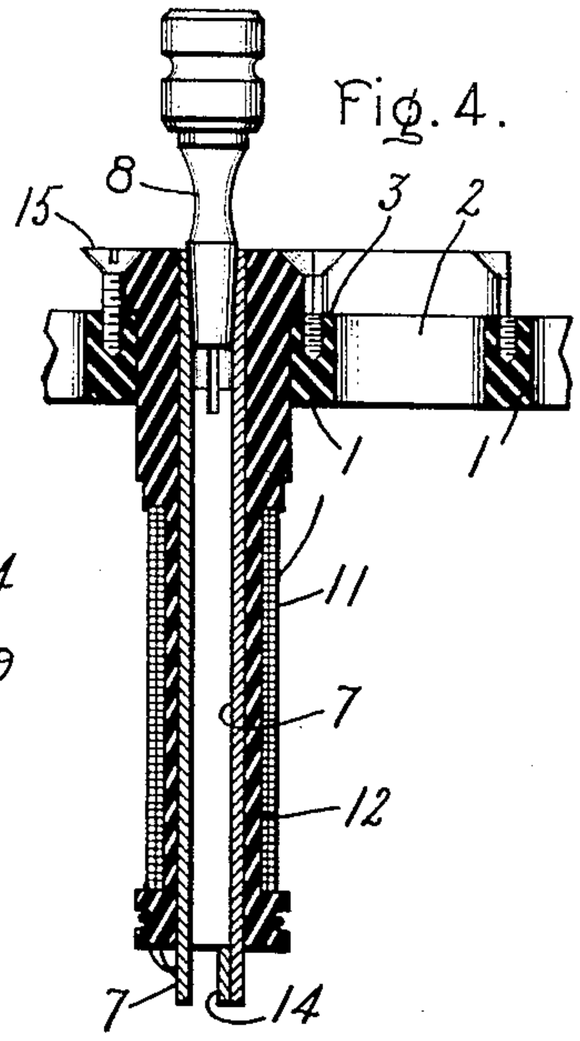


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 6.

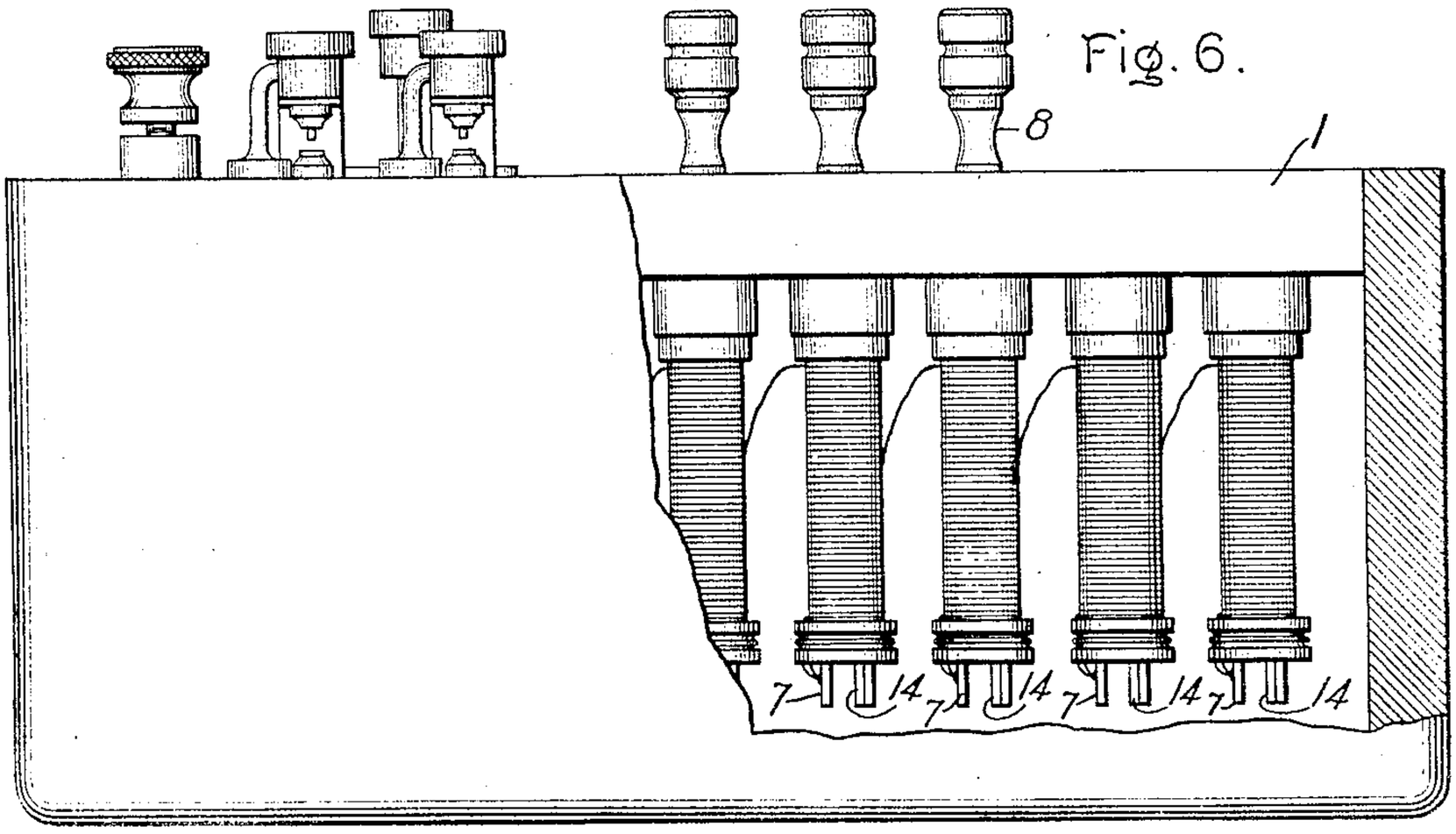
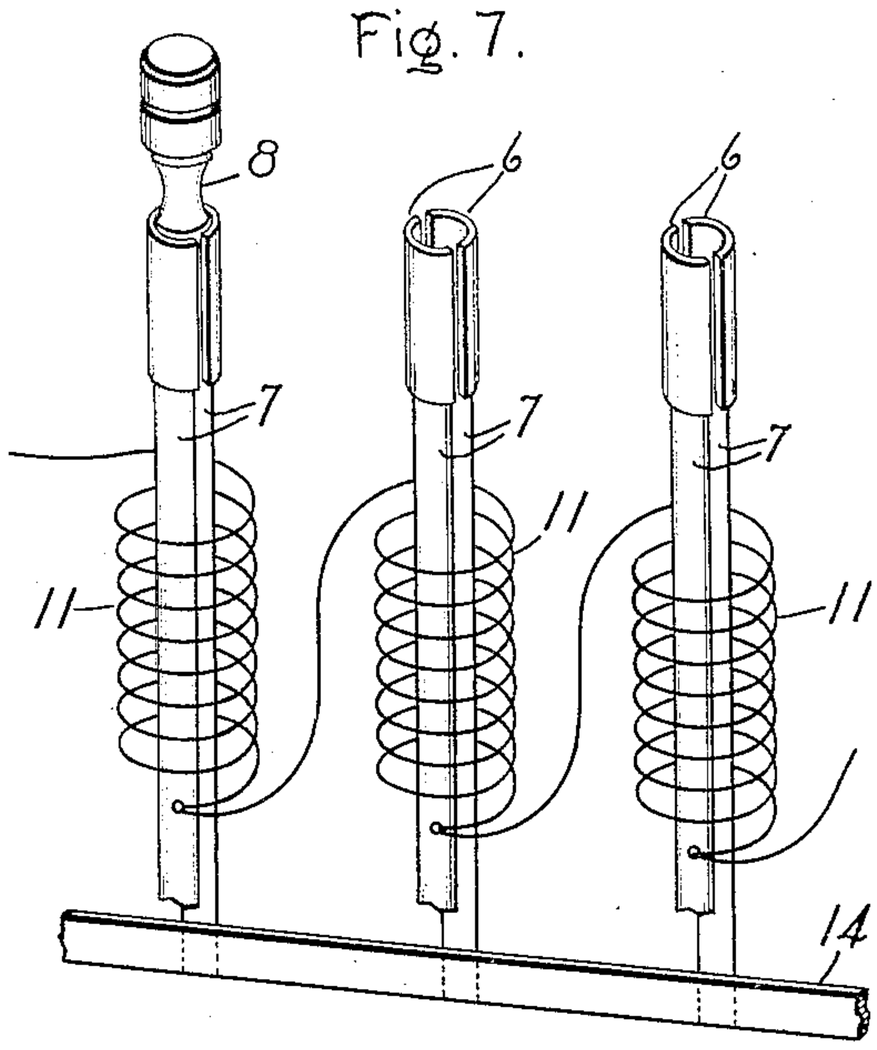


Fig. 7.



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UNITED STATES PATENT OFFICE.

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RESISTANCE-BOX.

963,395. Specification of Letters Patent. Patented July 5, 1910.

Application filed August 14, 1909. Serial No. 512,803.

To all whom it may concern:

Be it known that I, LEWIS T. ROBINSON, a citizen of the United States, residing in the city of Schenectady, county of Schenectady, and State of New York, have invented certain new and useful Improvements in Resistance-Boxes, of which the following is a specification.

My invention relates to resistance boxes and similar devices in which it is necessary to close electric circuits by switches or controlling devices which offer practically no resistance to the flow of current when closed and the object of the invention is to provide a unitary structure which is mechanically and electrically strong; which may be cheaply and rapidly manufactured; from which a resistance box or similar device may easily be built up; in which contacts for receiving a plug are rigidly and immovably mounted in proper relation to each other; and which may be connected to a resistance strip or coil to form a unit easily removed and replaced and quickly and easily assembled in its place in the resistance box.

In carrying out my invention, stationary contacts are mounted in proper relation to each other to form a tapered socket for receiving a plug of the form generally used in connection with resistance boxes, the contacts being rigidly fastened to the walls of a tubular member or sleeve of insulation which is mechanically strong enough to hold the contacts in proper relation to each other when the plug is inserted. The contacts are preferably embedded in the walls of the sleeve or member of insulation by means of projections which are buried in the insulation. In the preferred construction the insulation is molded around the contacts so that the contacts and sleeve of insulation form a rigid unitary structure which is both mechanically and electrically strong. The contacts are flush with one end of the sleeve and have projections which extend beyond the other end for making connection with the resistance strip or similar device. In the preferred construction, when my invention is embodied in a resistance box, a resistance strip or coil is mounted upon the tubular sleeve or member in such a way that the sleeve containing the contacts and the resistance coil form a unitary structure which may be easily removed from or attached to the resistance box.

My invention will best be understood in connection with the accompanying drawings, which show, merely for purposes of illustration, one of the various forms in which the invention may be embodied and in which—

Figure 1 is a view showing two units embodying my invention in place in a resistance box, one of the units being shown in section; Fig. 2 a view of similar units in elevation with modified means for holding them in position; Fig. 3 a section through one of the units shown in Fig. 1; Fig. 4 a view of a portion of the supporting plate of the resistance box in section with a modified form of unit in place and also shown in section; Fig. 5 a cross section showing the projections on the contacts for interlocking with the insulating sleeve, the section being taken on the line 5—5 of Fig. 1; Fig. 6 is a side view of a resistance box with part of the side broken away to show the resistance units mounted on the top of the box; and Fig. 7 is a perspective view with the insulating spools omitted and the resistance coils represented diagrammatically to show the connections of the coils to the bus-bars and to the contacts.

The specific form of embodiment shown in the drawings is a resistance box having a base or supporting plate 1 of insulation which is provided with openings 2, each provided with a shoulder 3 as shown in Fig. 4. The resistance unit comprises a tubular member or insulating portion 4 which fits into the opening 2 and is provided with a flange 5 which rests on the shoulder 3. As clearly shown in Figs. 1 and 3, the tubular portion or member 4 has stationary confronting contacts 6 rigidly mounted on the inner wall, one end of each contact being flush with the upper surface of the tubular member 4, while the other end of the contact is in the form of a projection or extension 7 which extends outside of the tubular member 4, preferably by extending beyond the other end of it, as shown in Figs. 1 and 3. The tubular member 4 is of sufficient size and thickness to hold the contacts 6 immovable and in unyielding relation to each other, so that a tapered plug 8 of the usual form may be forced into the socket formed by the contacts 6 with sufficient pressure to make a good electrical contact while the member 4 resists the wedging action of the plug 8 to

such an extent that insertion of the plug 8 does not cause the contacts 6 to spring away from each other or to yield. The contacts 6 may be immovably secured to the tubular member 4 in any desired way, preferably by being embedded in and interlocked with the walls of the tubular member. One method of securing the contacts in place is shown in Fig. 5, in which each contact is provided with a projection 9 of such a shape that when the insulating material of the tubular member 4 is molded around the contacts the projections interlock with the material of the tubular member 4 and the contacts are rigidly held in proper relation to each other. The confronting surfaces of the contacts 6 are preferably semicircular to make a conical socket for receiving the plug 8 and their confronting edges are separated by a radial slot 10 extending longitudinally of the tubular member 4 and below the lower edge of the contacts, as shown in Figs. 3 and 5. The slot 10 is wide enough to permit some suitable instrument to be inserted in the slot to remove any foreign substance which may be lodged between the contacts and tend to establish electrical connection between them.

The construction so far described is a unitary structure which is very strong both mechanically and electrically, and is useful in any place where a plug switch of the type used in resistance boxes is required, but where my invention is embodied in a removable unit for resistance boxes it is usually desirable to mount the resistance strip or coil on the tubular portion 4 in such a manner that the tubular portion with the contacts 6 embedded therein forms with the resistance coil a unitary structure which can be easily attached to and removed from the supporting base 1 and which is preferably so proportioned that it will pass through the opening 2. In order to accomplish this result, the resistance strip is wound to form a resistance coil 11 of less diameter than the tubular portion or member 4 and mounted on the tubular portion or member concentric therewith. In the specific arrangement shown in Fig. 4, the tubular portion 4 is provided with an integral extension or spool 12 through which the extensions 7 of the contacts 6 extend and on which the resistance strip or coil 11 is wound. In this form of device the contacts 6 and the resistance coil 11 are mounted in fixed and definite relation upon an integral supporting member of insulation, the resistance coil being of such a size that it will easily pass through the opening 2 in which the tubular portion 4 fits. The resistance strip or coil 11 may also be wound upon a separate spool 13 having an opening large enough to permit the spool to be slipped over the extensions 7 of the contact 6 so that the spool and resistance coil are mounted on the extensions 7 and are concentric with the tubular member 4. Both the spool and the resistance coil are preferably of less diameter than the tubular portion 4, and the entire unit may, if desired, be removed through the opening 2 in the base 1.

The resistance strips or coils 11 of the various units are connected together to enable the operator to secure the usual combinations and preferably have one end connected to one of the contacts 6, while the connections between the contacts of the adjacent units are made by means of suitable bus-bars 14, which extend transversely of the spools on which the resistance coil is wound and which are soldered to one of the contacts 6 of each unit. The bus-bars are mounted parallel to one another, as shown in Fig. 6, and along each bus-bar is arranged a number of resistance units, each having one contact 6 connected to the bus-bar, and the other contact 6 connected through the resistance coil to the adjacent bus-bar. As a result of this construction any bus-bar can be connected to any other bus-bar through the resistance units, which can be connected in various ways by means of the bridging plugs 8. If it is desired to remove one of the resistance units constructed in accordance with my invention, the bus-bar 14 is unsoldered from the contact and then the tubular member 4 with the resistance coil 11 mounted thereon may be easily and quickly removed from the base 1.

The individual resistance units may be secured to the base 1 of the resistance box in various ways and where it is desired to space the units as closely as possible the units may be held in place by the construction shown in Figs. 1, 3 and 4, in which holding screws 15 are threaded into the base 1 with their heads fitted into countersunk recesses 16 in the edge of the flange on the tubular member 4. By this construction, as shown in Fig. 4, it is possible to space the units so that the flanges on adjacent units will be practically in engagement with each other.

Where it is possible to space the units farther apart the mode of attachment shown in Fig. 2 is preferred, in which each tubular member 4 is threaded and provided with a nut 17 for holding the tubular member 4 in position in the opening 2 with the flange 4 in firm engagement with the shoulder 3 on the base 1. Any suitable construction may be used for holding the units in place on the base 1 and the arrangements above described are shown merely for purposes of illustration.

My invention may be embodied in many other forms than that shown and described and I do not wish to be restricted to the precise arrangement disclosed, but intend to cover by the appended claims all changes

and modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A resistance box comprising a base, a rigid tubular member of insulation secured to said base, contacts rigidly secured to the inner walls of said member to form an unyielding socket for a conducting plug, and a resistance strip connected to one of said contacts.

2. A resistance box comprising a base, an integral tubular sleeve of insulation provided with a flange, contacts rigidly embedded in and interlocked with the inner walls of said member to form an unyielding socket for a conducting plug, and means for holding said sleeve with the flange in engagement with the base.

3. A resistance box comprising a base, an integral tubular member of insulation mounted on said base, contacts interlocked with said member and unyieldingly embedded in the inner walls of said member to form a socket for receiving a conducting bridging plug, and a resistance coil connected to one of said contacts.

4. A resistance box comprising a base, an integral tubular member of insulation having a flange at one end and a spool near the other end, contacts mounted in the inner walls of said member at the flanged end to form a socket for a conducting bridging plug, a resistance coil wound in said spool and connected to one of said contacts, and means coöperating with the flange of said member to hold said member in position on said base.

5. A resistance box comprising a base having openings therein and a plurality of resistance units fitted into said openings, each of said units comprising an integral tubular insulating member, contacts mounted on the inner walls of said member to form a socket for a conducting plug and a resistance coil smaller than said member connected to one of said contacts and mounted on said member concentric therewith.

6. A resistance box comprising a base having an opening therein, a flanged tubular member of insulation having a body portion which fits into said opening, contacts unyieldingly mounted in said tubular member to form a socket for receiving a conducting plug, a resistance coil connected to one of said contacts and means for holding said member in the opening in said base with its flange in engagement with the base.

7. A resistance box comprising a base having a plurality of circular holes therein, and a plurality of resistance units carried by said base, each unit comprising a cylindrical tubular member of insulation having at one end a body portion which fits into said holes and a flange which engages said base edge, contacts embedded in the inner walls of said tubular member to form a socket for a conducting plug, said contacts having extensions which project beyond the end of said tubular member, means for holding each unit with its body portion in one of said holes and its flange in engagement with said base, and a resistance coil mounted on each of said tubular members near the other end thereof and connected to one of said contacts.

8. A resistance unit comprising an integral cylindrical member of insulation provided at one end with a recess, contacts embedded in the inner walls of said recess to form a socket for a conducting bridging plug, and a resistance strip connected to one of said contacts and wound on said member to form a resistance coil.

9. A resistance unit comprising a tubular insulating member, confronting contacts embedded in said member in position to be bridged by a conducting plug, said contacts having portions which extend outside the walls of said member, and a resistance coil mounted on said member and connected to one of said contacts.

10. A resistance unit comprising a tubular insulating member, contacts mounted in said member with semi-circular confronting walls which form a socket for a conducting bridging plug, said contacts having longitudinal extensions which project beyond one end of said member, and a resistance coil mounted on said member to surround said extensions and electrically connected to one of said extensions.

11. A resistance unit comprising an insulating member having a tubular body portion near one end and reduced in size between said body portion and the other end to form a spool, contacts embedded in the inner walls of said body portion to form a socket for a conducting bridging plug, and a resistance strip connected to said contacts and wound on said spool to form a resistance coil smaller than said body portion.

12. A receptacle for resistance boxes comprising an integral tubular member of insulation having a radial slot extending longitudinally thereof and contacts embedded in the inner walls of said member on opposite sides of said slots in a position to be bridged by a conductor plug.

In witness whereof, I have hereunto set my hand this 12th day of August, 1909.

LEWIS T. ROBINSON.

Witnesses:

MAY WHITTAKER,

MARGARET E. WOOLLEY.