J. A. MISLAND.

RESISTANCE ELEMENT.

APPLICATION FILED SEPT. 9, 1916.

1,232,450.

Patented July 3, 1917.

Fig. 1,

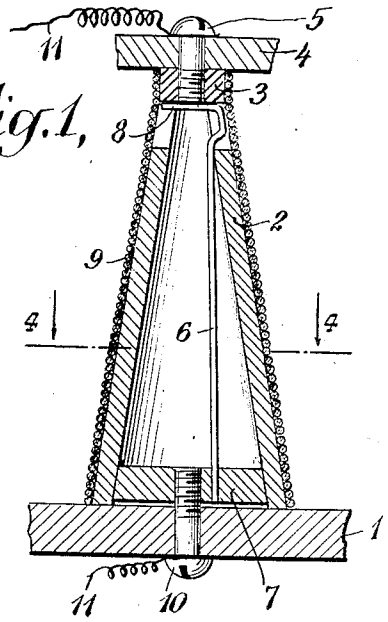


Fig. 2,

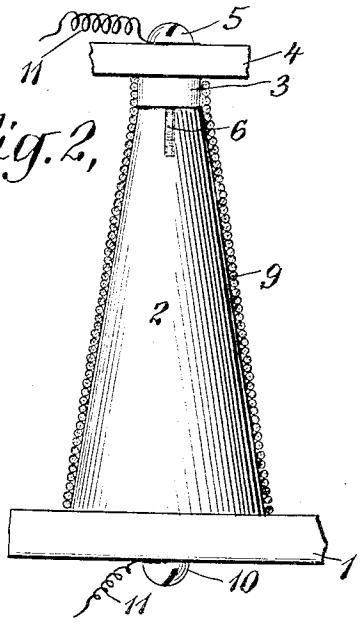


Fig. 3,

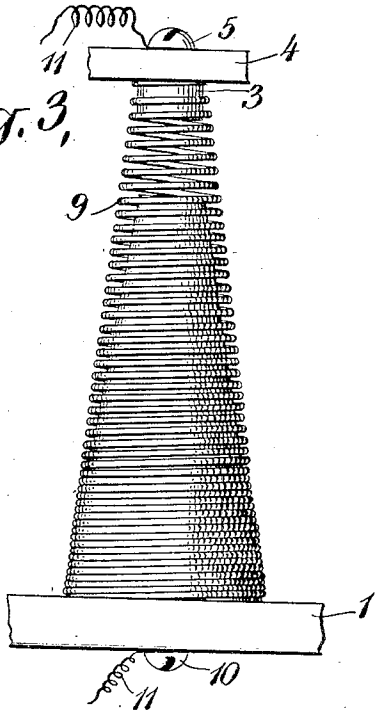
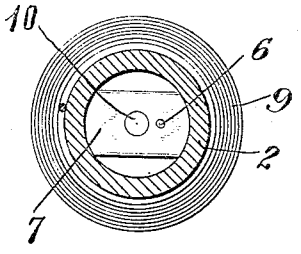


Fig. 4,



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RESISTANCE ELEMENT.

1,232,450. Specification of Letters Patent. Patented July 3, 1917.

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To all whom it may concern:

Be it known that I, JOSEPH A. MISLAND, a citizen of the United States, and residing in Bayonne, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Resistance Elements; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to electrical resistances or resistance elements, and more particularly to one having the character that the amount of resistance may be varied gradually throughout a wide range without interrupting any electrical circuit and without employing a sliding or other moving contact, thereby providing a simple and durable resistance suitable for use under severe operating conditions in a great variety of places.

In former devices, having extensible coils, the resistance wire was improperly supported or entirely unsupported so that the adjacent extended convolutions often came into contact, while adjacent contracted convolutions shifted their points of contact or became entirely separated due to vibration, shock or magnetic effects. Furthermore, the pressure at the points of contact continually varied so that the electrical resistance thereof also varied. Due to this mechanical instability, the resistance offered to the electric current was materially altered when such alteration was not intended and the regulation was unsatisfactory in any of the applications of the device.

In accordance with my invention, the resistance wire is preferably in the form of a spiral coil suitably supported by an inner insulating support throughout its entire length when contracted and throughout most of its length when extended.

In the accompanying drawings showing the preferred embodiment of my invention, Figure 1 is a sectional elevation of the resistance element; Fig. 2 is an elevation with the resistance winding in section; Fig. 3 is an elevation of the resistance element with coil extended; and Fig. 4 is a horizontal section on the line 4—4 of Fig. 1.

The resistance device has a base 1 of wood or other suitable material and has fastened to it the hollow conical support 2 of insulating material such as fiber, vulcanite or the like. The carrier consists of the conducting piece 3 fastened to the top piece 4 of suitable material by means of the terminal screw 5 which extends entirely through the carrier.

A short-circuiting wire or rod 6 of copper or other conducting material is electrically connected to the plate 7 and terminal screw 10. The wire 6 is bent over at 8 on the top of the cone, so that the screw 5 makes good contact with it when the resistance winding is in its fully contracted position. In any extended position of the carrier, the path through the short circuiting wire is interrupted at 8.

The resistance consists of coiled uninsulated wire 9, preferably made of some alloy having a high specific resistance, such as German silver or some one of the high resistance alloys which have more recently come into use. In some cases I prefer to use a resistance wire having a cross section in the form of a parallelogram, either rectangular or oblique, whereby the surfaces of contact between adjacent contracted coils are considerably increased. The resistance wire is soldered or otherwise attached at its lower end to the metal plate 7 and at the other end to the carrier 3. The support and carrier are relatively movable so that they may draw apart the adjacent convolutions of the resistance wire and thereby gradually establish the main electrical path around the convolutions of wire instead of across them. The wires 11 connect the resistance winding to the electrical circuit to be regulated.

In the preferred embodiment of my invention, the insulating support is a frustrum of a cone and the resistance wire is coiled around it into a conical spiral which, at its closed position, as shown in Fig. 1, conforms to the surface of the conical support and lies in contact with it. In this position the adjacent convolutions are in contact so that the main part of the current flows across them while a current flows around the convolutions, thus reducing the resistance to a minimum. Upon separating the support and carrier, the coils of the resistance wires are successively drawn away from each other so that the path across the convolutions is gradually reduced in extent and the resistance gradually increased.

I find that the rate of increase of the resistance, as the carrier and support are

drawn apart, may be varied by changing the contractile force of the convolutions. If the convolutions are tight, so that the adjacent coils tend to remain in contact with each other, the separation of the convolutions will be comparatively rapid and the consequent increase of resistance will be correspondingly rapid; whereas if the convolutions lie loosely together, the increase of resistance will be more gradual. Furthermore, the contractile force of the individual convolutions may be made different by employing wire of differing cross section or differing hardness so that the pull required varies at different positions of the carrier.

With resistance-elements constructed in accordance with my invention, as above described, it is only necessary, in order to automatically vary the resistance, to provide suitable mechanism such as a solenoid for gradually drawing away the carrier from the support, or the support from the carrier. As will be understood by those skilled in the art, the resistance elements may be used alone or in any number, and they may be connected either in series or parallel, or any combination of the two, as the demands of the particular service required of them may suggest.

Having thus described my invention, what I claim is:

1. An electrical resistance device comprising a coil of uninsulated wire, an inner insulating support therefor, a conducting member associated with said support, a relatively movable carrier, the ends of said coil being respectively attached to said member and said carrier, and means for automatically short circuiting said coil when the coil reaches its fully contracted position.

2. An electrical resistance device comprising a conical coil of uninsulated wire, an inner conical insulating support therefor, a conducting member associated with said support, a relatively movable carrier, the ends of said coil being relatively attached to said member and said carrier, and means for automatically short circuiting said coil when the coil reaches its fully contracted position.

3. An electrical resistance device comprising an insulating support, a conducting member associated with said support, an uninsulated conducting wire having one end attached to said member and coiled around said support in such manner that the individual convolutions may be brought into and out of contact with each other by a relatively movable carrier to which the other end of said coil is attached, and means for automatically short circuiting said coil when the coil reaches its fully contracted position.

4. An electrical resistance device comprising a coil of uninsulated wire, an inner hollow insulating support therefor, a conducting member within said support, a relatively movable carrier, the ends of said coil being respectively attached to said member and said carrier, and means within said support and attached to said member adapted to be engaged by said carrier when said coil reaches its fully contracted position to short circuit said coil.

5. An electrical resistance device comprising a coil of uninsulated wire, an inner hollow insulating support therefor, a conducting plate within said support to which one end of the coil is attached, a binding post attached to said plate, a relatively movable carrier to which the other end of the coil is attached, a binding post attached to said carrier, a conducting member attached to said plate and extending through said support and formed at its upper end to be engaged by said carrier when said coil reaches its fully contracted position to short circuit said coil.

In testimony whereof I affix my signature.

JOSEPH A. MISLAND.