

Sept. 16, 1930.

G. J. MUCHER

1,776,191

RESISTANCE UNIT

Filed Sept. 9, 1926

Fig. 1,

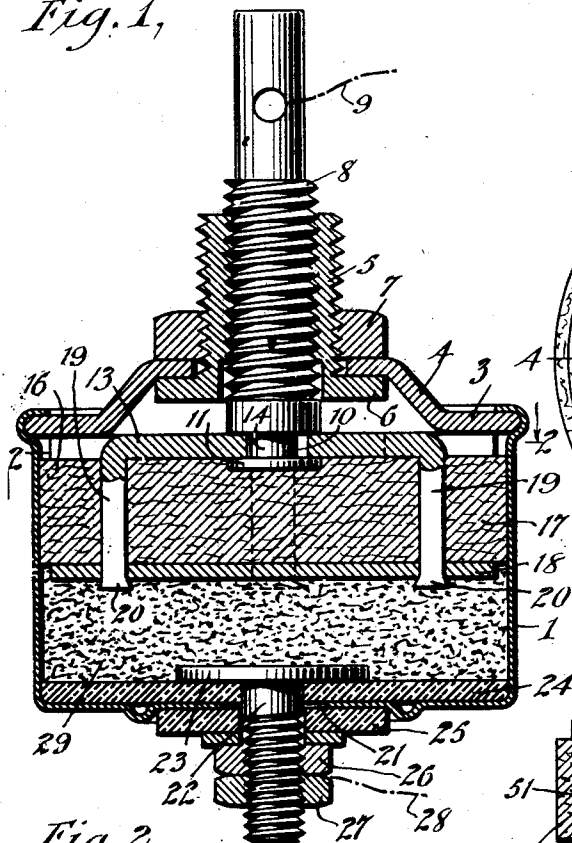


Fig. 3,

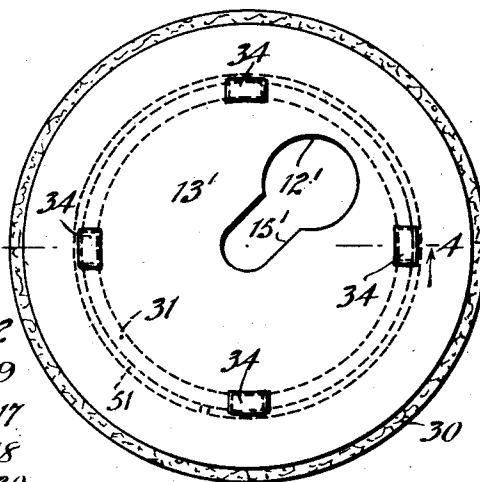
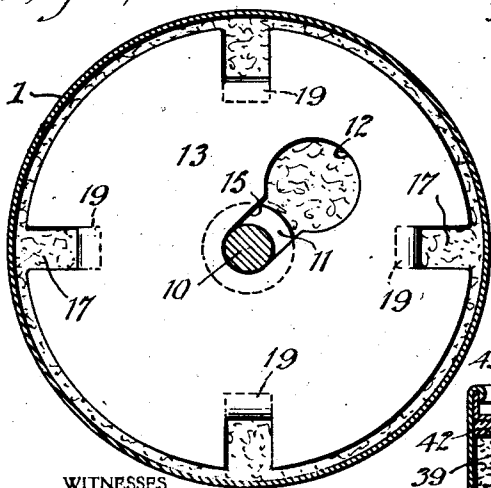


Fig. 2,



WITNESSES

Edw. Thorpe
A. L. Kitchin.

Fig. 4,

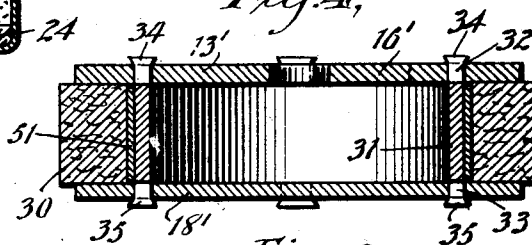


Fig. 5,

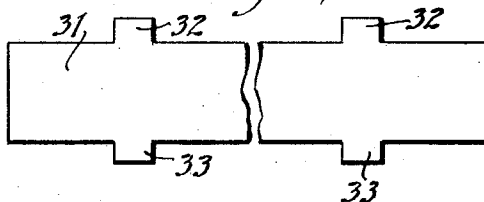
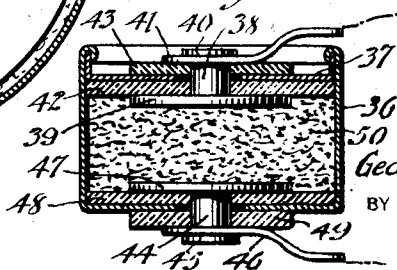


Fig. 6.



INVENTOR

George J. Mucher

BY

Mum & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE

GEORGE J. MUCHER, OF BROOKLYN, NEW YORK

RESISTANCE UNIT

Application filed September 9, 1926. Serial No. 134,442.

This invention relates to an improved resistance unit and has for an object to provide an improved construction wherein a maximum contact surface is provided for the resistance material.

Another object of the invention is to provide a resistance unit wherein the resistance is formed of powdered or granular matter and entirely enclosed, the enclosing casing acting as a contact or connector.

A further object of the invention is to provide a resistance unit using a resilient powdered or granular resistance body, the structure being such that the parts may be adjusted for compressing the resistance material or reducing the pressure thereof for varying the action of the unit.

A still further object is to provide a resistance unit in which a compressible resistance body is provided and a substantially fire-proof compression member used so as to cause the unit to properly function even when hot.

In the accompanying drawings—

Figure 1 is a longitudinal vertical sectional view through a resistance unit disclosing an embodiment of the invention.

Figure 2 is a sectional view through Figure 1 on line 2—2.

Figure 3 is a top plan view of a modified form of compressor to that shown in Figure 1.

Figure 4 is a sectional view through Figure 3 on line 4—4, the same showing a packing ring and an annular spring for expanding said ring.

Figure 5 is an enlarged elevation of the clamping ring shown in Figure 4, certain parts being broken away.

Figure 6 is a view similar to Figure 1 except that it is on a reduced scale and shows a modified form of resistance unit wherein the parts are not adjustable.

Referring to the accompanying drawing by numerals, 1 indicates a casing or shell which is preferably of thin metal. The upper edge of the casing 1 is turned over at 2 so as to pinch the top plate 3, which top plate has an apertured offset portion 4 accommodating the internally and externally threaded sleeve 5. The sleeve 5 is provided

with a base or shoulder 6 engaging the offset 4 on one side while a nut 7 engages the opposite side and thereby locks the sleeve 5 in position. This sleeve accommodates a threaded shaft 8 to which a conductor 9 is adapted to be secured when the device is in use. It will be understood that shaft 8, sleeve 5 and plate 3 are of metal whereby a good connection is made with the casing 1. The lower or inner end of the shaft 8 is provided with an annular groove 10 whereby an annular flange 11 is produced adapted to be passed through the aperture 12 in plate 13 and then moved laterally so that the reduced neck 14 will snugly fit in the end of the slot 15. This permits a quick and easy assemblage of the shaft 8 and the compressing member or piston 16. The compressing member 16 is formed by the plate 13, a packing member 17 and a plate 18. The packing member 17 may be any fibrous material, as for instance, ordinary felt. This is clamped properly in position by the posts or spurs 19 which are preferably integral with plate 13, said posts extending through the packing 17 and through plate 18 whereby when they are upset for forming enlarged ends 20 the parts are firmly clamped together. Plate 18 is preferably a disk and falls short of the casing 1. The bottom of casing 1 is provided with an aperture 21 through which the metallic screw 22 extends, said screw having a comparatively large head 23 fitting against the bottom plate 24, said bottom plate being of insulating material. An insulating washer 25 is arranged exteriorly of the casing 1 and is clamped in position by a suitable nut 26 whereby the screw 22 is firmly clamped in place but is held out of contact with the casing 1. A nut 27 acts to lock nut 26 in place and also to clamp conductor 28 whereby current may be allowed to pass through the device. Arranged between the plate 18 and the enlarged head 23 and also between plate 18 and plate 24, is a resistance filling 29 which may be of any desired material which will be granular or powdered form and which will be more or less resilient so as to present a proper resistance at all times and variable

resistance according to the density of the material.

The material 29 may be for instance, flaked or powdered graphite and finely divided mica or even asbestos. The graphite acts as a conductor while the mica acts as a resistance and also as resilient means for expanding or spreading the mass whenever permitted to do so. When the parts are in the position shown in Figure 1, the device presents a certain resistance. If the shaft or threaded rod 8 is rotated for moving the compressor 16 toward plate 24, the resistance material 29 would be compressed somewhat and the resistance of the apparatus will be changed. If shaft 8 is rotated in the opposite direction so as to relieve the pressure on the resistance material 29, said material will expand by reason of the resilient action of the mica and being more expanded and open the resistance of the device will be changed again and will be greater than when the material 29 is compressed. It will be noted that the material 29 is in contact with casing 1 and, consequently, all electrical current must pass from the enlarged head 23 to the resistance material and from thence to the casing as well as to plate 18. In this way a uniform action and a highly efficient device is presented.

Under some circumstances it is desired to operate the unit with an appreciable current and under some considerable heat. When this is desired, the compressor 16 is removed and a modified form of compressor 16' is provided. The compressor 16' is provided with a plate 13' similar to plate 13 and with openings similar to openings 12 and 15. However, instead of having a solid body of felt, a ring 30 of asbestos or other fire resisting fiber is provided and clamped in position by the plate 18', which plate is held in place by the solid ring 31, said ring having projecting portions 32 and 33 which are upset at the ends so as to form enlargements 34 and 35 whereby plates 13' and 18' are properly connected together and properly grip the ring 30. Whenever desired, a flat spring 51 is used. This spring is especially desired where the packing 30 is non-resilient or substantially non-resilient. The spring continually acts to spread or force out radially the packing 30 and thereby maintain a good contact at all times with the walls of the casing 1 so that none of the resistance material can escape past the compressor. When this compressor is substituted for that shown in Figure 1, the device may be operated even though it becomes hot as an appreciable amount of heat will not injure any of the parts.

In many cases a permanent and nonadjustable resistance is desired. When this is the case, the structure shown in Figure 6 is used, said structure being similar to Figure 1 but not provided with the adjustable compressor. In this form of the invention, the casing 36

is turned over on top plate 37 through which the contact rivet 38 extends, said rivet having an enlarged head 39 and a small head 40, said small head clamping a connector 41 in place. An insulating plate 42 is arranged between head 39 and plate 37 and also an insulating washer 43 is arranged between connector 41 and plate 37. This insulates the head 39 from plate 37 and from casing 36. A similar structure is arranged at the opposite end of casing 36, namely, a contact rivet 44 is provided having a small head 45 for clamping the conductor 46 in place. The contact rivet 44 is also provided with an enlarged head 47 resting on the insulating plate 48. An insulating washer 49 is provided for insulating a conductor 46 from casing 36. A resistance filling 50 of the same kind as filling 29 is provided and is placed under the desired pressure when the device is manufactured so that the compactness of the material 50 will always remain the same and, consequently, the resisting action will always remain the same.

It will be noted from Figures 1 and 6 that the resistance material is always in contact with the metal body or container 1 and, therefore, permits the heat generated to more rapidly become dissipated as the parts are metal and rapidly conduct heat. This rapid dissipation of heat permits a more efficient action of the unit and particularly permits heavier currents to be handled with smaller units than would be the case if this dissipation of heat was not provided for. It will also be noted that in case of a heavy overload, the metal casing provides an instant path for taking care of this overload so that the flow of current will not be stopped and the device will not be appreciably injured. By reason of the substantially air-tight structure provided, the resistance material is sealed against the action of the air and, consequently, is practically humidity proof so that the action of the unit will be constant under varying climatic conditions.

What I claim is:

1. A resistance unit comprising a metal casing, a resistance body arranged in the casing, said resistance body contacting directly with the sidewalls of the casing, means presenting a contact structure in engagement with the resistance body and out of engagement with said casing whereby current passing through said contact must pass through the resistance body before it can enter said casing, a compressor for varying the density of said resistance body, and manually actuated screw means rotatably connected with said compressor without rotating the same.

2. A resistance unit comprising a pair of contacts, one contact being formed as an enclosing metal casing substantially air-tight and the other contact as a rod provided with an enlarged head, said head being positioned within the casing but out of contact there-

- with, a resistance body connecting directly the side walls of said casing and said enlarged head, said body being made of material which will vary its resistance according to its compression, a compressor for varying the density of said resistance material, and manually actuated screw means rotatably connected with said compressor for shifting the position of the compressor without rotating the same.
3. A resistance unit comprising a pair of contacts, one of said contacts being formed as part of an enclosing casing, a granular resistance body arranged in the casing and connecting the side walls of the casing directly with the other contact, a compressor arranged in the casing, and a threaded member for moving said compressor in either of two directions for varying the density of the resistance material whereby the resistance action will be varied, said threaded member being rotatably connected with said compressor for moving the compressor without rotating the same.
4. A resistance unit comprising a pair of contacts, one of said contacts being formed as an enclosing casing, said casing having an opening at both ends, a second contact extending through one of said openings, means for insulating said second contact from said casing, a screw member extending through the other of said openings, a substantially granular resistance body connecting directly the side walls of the casing with said second contact, a compressor arranged in the casing and operatively connected with the screw member whereby when the screw member is caused to function the compressor will be moved toward or from the second contact for varying the density of said resistance body.
5. A resistance unit comprising a pair of contacts, one presenting a metallic casing and the other extending into said casing but insulated therefrom, a resistance body of compressible material arranged in said casing and in direct contact with the side walls of said casing and with said other contact, a compressor arranged in said casing with the periphery thereof continually in engagement with the casing, said compressor acting to compress and force the resistance body toward the insulated contact, and screw means carried by the casing for shifting said compressor, said screw means having a head rotatably connected with said compressor whereby the screw means may be rotated for shifting the position of said compressor without rotating the compressor.
6. A resistance unit comprising a pair of contacts, one contact presenting a casing and the other contact extending into the casing but insulated therefrom, a compressible resistance body arranged in the casing and in continuous contact with the walls of the casing and with the insulated contact, a compressor arranged in the casing for varying the density of said compressible resistance body, an end plate arranged at the end of the casing opposite the insulated contact, said casing having a turned over edge gripping and holding said end plate, a threaded member carried by said end plate and a threaded member carried by said compressor and engaging the threaded member carried by the end plate whereby as the threaded member carried by the compressor is rotated the compressor will be moved toward or from the insulated contact for varying the density of said resistance body.
- GEORGE J. MUCHER.

80

85

90

95

100

105

110

115

120

125

130