March 4, 1941. D. F. HASTINGS 2,233,450

RESISTANCE UNIT

Filed Dec. 20, 1939

Fig. 1

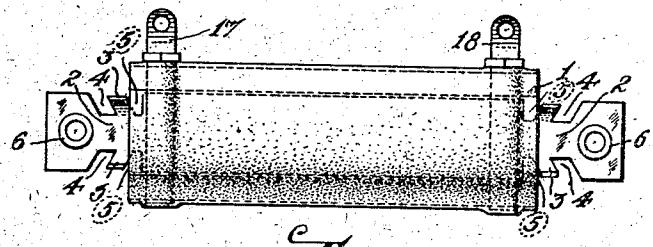


Fig. 2

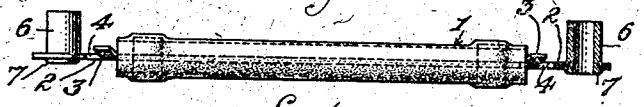


Fig. 3

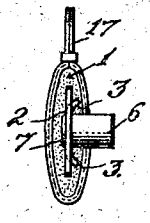


Fig. 4

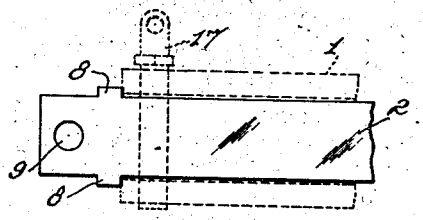


Fig. 5

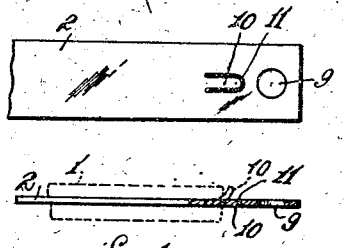


Fig. 6

Fig. 8

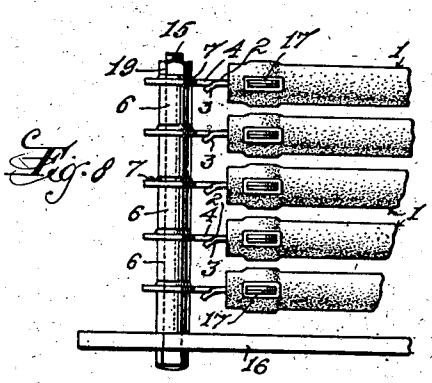
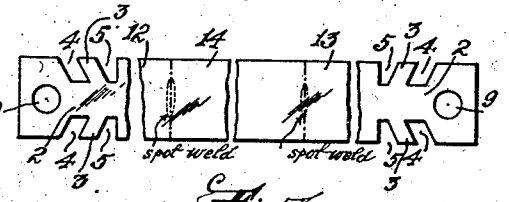


Fig. 7



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Patented Mar. 4, 1941 2,233,450

UNITED STATES PATENT OFFICE

2,233,450

RESISTANCE UNIT

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Application December 20, 1939, Serial No. 310,155

8 Claims. (Cl. 201—63)

This invention relates to a resistance unit and especially one of the wound ceramic type; that is, one having a core or form of ceramic material on which the resistance winding is arranged, and after the winding is applied, the same is covered with a coating of vitreous material and baked, the winding being provided with suitable terminals by which electrical connection may be made to the resistance unit.

The present invention has for its principal object the provision of an improved means for mounting the resistance unit whereby the mounting is of such a type that the strains on the unit are reduced to a minimum and at the same time are distributed along the length of the unit instead of being concentrated at the ends as is customary in most resistance devices of this kind with which I am familiar.

Another object of my invention is to provide a unit assembly which lends itself to stacking the unit in an efficient and compact manner.

Another object of my invention is to provide an assembly unit which is rugged in construction and cheap to manufacture.

Other objects will be discerned by one familiar with these devices, from a study of the annexed drawing, wherein:

Figure 1 is a plan view of my improved type of resistance unit.

Figure 2 is a side view of the device looking at the side opposite the terminals.

Figure 3 is an end view of the device shown in Figure 1.

Figure 4 is a fragmentary view of a modified form of mounting strip.

Figure 5 is a fragmentary view of a further modified form of mounting strip.

Figure 6 is a side view of Figure 5.

Figure 7 is a plan view of a modification of the mounting strip shown in Figure 1.

Figure 8 shows the method of assembling the resistance unit in a stack.

In the various views, wherein like numbers refer to corresponding parts, 1 is a hollow core of ceramic material which is relatively wide and thin as compared with its thickness. The hollow part of the core is also relatively wide and narrow to receive a relatively thin, flat, metallic strip 2. As shown in Figures 1 and 2, the strip 2 has abutment means located at opposite ends of the core 1. The abutment means shown in Figure 1 comprises a plurality of lugs 3 which are formed by cutting away the material at 4 and 5 so as to leave the lugs 3 extending at an angle to the axis of the strip 2 and the core 1, and away from the end of the core in opposite directions with respect to the opposite ends of the core. The reason for this angularly positioned lug is to take care of the variations in the length of the core 1, as in the manufacture of the core this length may vary as much as $\frac{1}{32}$" or more.

The lugs 3 are preferably located so that the bases of the lugs 3 at the notch 5 will come a short distance inside the plane of the ends of the core 1 as shown at the left-hand end of Figure 1, calculated on a theoretically correct length of the core. Should the length of the core 1 vary, for example, over its calculated length, it will overlap a certain portion of the lugs 3. However, there will be some part of the lugs which is not covered by the core, and this extending end or ends are, after the strip 2 has been slipped into the hollow core, bent or displaced out of the plane of the strip as indicated in Figures 1 and 2, thereby locking the core 1 securely in position in the strip 2, after which the hollow mounting studs 6 are fastened to the extremities of the strip 2 in any satisfactory manner as by spinning over, at 7, their properly formed ends.

As shown in Figure 4, the metallic strip 2 may have formed at one end, abutments 8 which overlap the end of the core 1 while the opposite end is formed with the displaceable lugs 3. The strip 2 is provided with a hole 9 to receive a mounting stud 6.

In Figure 5 a lug or finger 10 is formed in the strip 2 by cutting out a U-shaped formation 11, leaving the finger 10 in the plane of the strip 2, which finger or lug may be bent upwardly across the face of the core 1 after the metallic strip has been inserted in place within the hollow core. Both ends of the metallic strip 2 may be constructed with fingers 10, or this construction may be used with the construction shown in Figure 4. However, I prefer the construction of Figure 1, for the reason that the lugs 3 are positioned toward the stronger portion of the ceramic core and the bending of the lugs is not so apt to crack or injure the ends of the insulator as the centrally located lug 10 shown in Figure 5, which is bent in a direction at right angles to the bend of the lugs 3. Of course, the lug 10 may be positioned to one side of the axial center of the strip 2 which will partly overcome this objection.

For different resistances the length of the core 1 and its winding, where the same size wire is used, is longer, and to cover the range different lengths of metallic strips 2 will be required. Instead of making different punches and dies for these various lengths of mounting strips, I may

use a construction such as shown in Figure 7, wherein the end sections 12 and 13 of the strip 1 are identical, requiring only one punch and die. An intermediate or built-up extension section 14 may be cut off from a standard strip stock without any special tools, and this strip then spot-welded at the points indicated to the end sections 12 and 13. Thus, one punch and die will form all the end sections for different size units. The section 14 may be sheared to any desired length to suit the requirements of the resistance unit desired to be mounted.

The resistance units may be mounted individually or they may be mounted on a bolt or stud 15 fastened to a support member 16 by passing the hollow studs 6 over the bolt 15. Since the winding carried by the core 1 is provided with terminals 17 and 18, it is very easy to connect the resistance units in series or multiple, or any arrangement desired, by properly connecting the terminals 17 and 18 after the units have been stacked in a manner similar to that shown in Figure 8.

From the foregoing, it will be seen that I have provided a resistance unit in which the mounting centers between the mounting studs 6 may be accurately fixed without any direct relation to the location of the terminals 17 and 18.

The metallic strip 2 may be made of any satisfactory material, either magnetic or non-magnetic, depending on the requirements, and since metal is a good conductor of heat, the heat is conveyed away from the interior of the core 1 better with this metallic support than if air alone were used as the conducting means. It will also be observed that all the mounting strains, such as tightening up on the nut 19 where the units are stacked, or equivalent arrangement if the units are mounted individually, are applied to the metallic strip 2 and none, whatever, to the core 1 and its winding which is applied after the core has been made and the terminals fixed to the winding, and then a vitreous enamel coating applied and the whole baked, thus forming the resistance unit per se. The strains, if any, due to expansion and contraction under heating and cooling, are distributed along the length of the core which has a small amount of looseness in its mounting on the strip 2 to take care of this expansion and contraction of the parts, and also for ease of assembly.

Certain changes may be made in the details without departing from the spirit of my invention; for example, the construction shown in Figure 7 may be varied by having a tool to receive one end of the strip to make the lugs 3 and mounting holes 9. The strip may then be sheared to the right length to suit the requirements and this sheared-off portion reversed and inserted in the tool for forming the opposite end.

While I have shown one type of terminal for the winding, this may be varied over a wide range.

What I claim is:

1. A resistance unit comprising a single-piece hollow core of ceramic material having a winding thereon with terminals leading therefrom, a metallic member passing through the ceramic core and having integral abutment means at opposite ends of the said core, the abutment means at one end at least being formed at an angle to the axis of the metallic member and displaced, after assembly of the metallic member and core, in a manner to engage the end of the core and lock the core with its winding securely on the metal member, and means at the extremities of the metal member for mounting the unit on a support.

2. A resistance unit comprising a single-piece hollow core of ceramic material having a winding thereon with terminals leading therefrom, means for mounting the core and winding on predetermined centers even though the length of the core may vary considerably for a given resistance unit, said means including a metallic member passing through the core and having integral abutments at opposite ends of the core formed at an angle to the axis of the metallic member and displaced, after assembly of the metallic member and core, in a manner to engage the ends of the core of varying length for a given unit, and means at the extremities of the metal member for mounting the unit on a support.

3. A resistance unit comprising a hollow core of ceramic material with a winding thereon having extending terminals, the core being relatively wide and thin and the hollow part being wide and narrow, a relatively thin, flat, metallic strip located rather loosely in the hollow core to allow for expansion and contraction of the parts, the strip having integral abutment means at opposite ends of the core, the abutment means at one end at least being formed at an angle to the axis of the metallic strip and displaced after assembly of the core and strip in a manner to lock the core securely on the metallic strip, and means at the extremities of the strip for mounting the unit on a support.

4. A resistance unit comprising a hollow core of ceramic material with a winding thereon having extended terminals, the core being relatively wide and thin and the hollow part being wide and narrow, a relatively thin, flat, metallic strip located in the hollow core, the strip having integral lugs located adjacent the ends of the core and formed at an acute angle to the axis of the strip and core, the lugs at one end extending in a direction away from the core end and opposite to those at the other end of the core, said lugs being bendable along their length so at least some portion thereof extends beyond the end of the core and over a portion of the end surface of the core and in contact therewith, and means at the ends of the strips for mounting the unit.

5. A resistance unit comprising a hollow core of ceramic material having a winding thereon with terminals leading therefrom, the hollow part of the core being relatively wide and narrow, a thin, metallic strip positioned in the hollow part of the core, the strip having integral abutment lugs located adjacent the ends of the core, those at one end at least being bendable across the end surface of the core and in contact therewith to lock it in place on the strip, and studs attached to the extremities of the strip for mounting the unit individually as well as in a stack.

6. In a resistance unit of the wound ceramic type having a hollow core, means for mounting the unit comprising a metallic strip passing through the core, the strip having integral lugs formed at an acute angle on the sides of the strip adjacent the ends of the core and extending away from the core ends, the lugs being of a length and positioned so some portion of them is overlapped by the core while the unlapped portion is bent across a portion of the end of the core.

7. Means for mounting individual resistance

units of different lengths and resistance values wherein each unit has a single-piece hollow core of ceramic material with a winding directly fixed thereon; said means comprising a relatively thin, flat metallic strip passing through the core, the strip having two similar end sections used for all units and interconnected by a single plain section having an initially separate length to suit the resistance unit required to be mounted, each end section having means to engage the ends of the core, the means at one end at least being bendable into engaging position with the core after the said strip has been inserted through the core, and further means for mounting the core and strip assembly.

8. In a resistance unit of the wound ceramic type having an integral hollow core, means for supporting the unit along its whole length, said means being a metallic strip fitting within the core so as to allow for expansion of the parts, yet close enough to pick up heat from the center of the core and conduct it outwardly to the ends of the metal strip and having integral means at its opposite ends for engaging the ends of the core said means, at least at one end, being angularly positioned and bent across the end face of the core and in contact therewith after the core is assembled on said strip, and further means for mounting the units singly and in a stack.

DONALD F. HASTINGS.

CERTIFICATE OF CORRECTION.

Patent No. 2,233,450. March 4, 1941.

DONALD F. HASTINGS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 57, claim 4, for the word "extended" read --extending--; line 74, claim 6, after "core" and before the period insert --and in contact therewith--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of April, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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