Oct. 9, 1934. J. J. MUCHER 1,976,624

RESISTANCE DEVICE

Filed April 18, 1933

Fig. 1.

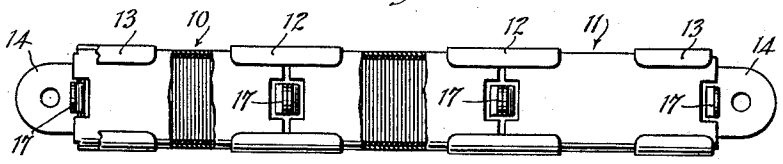


Fig. 2.

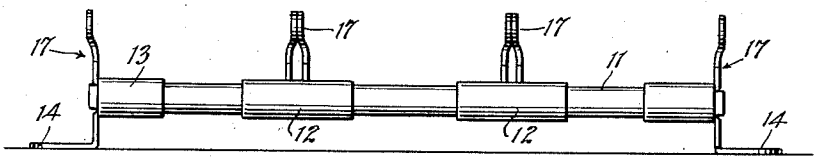


Fig. 3.

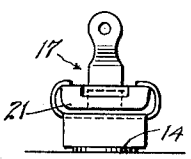


Fig. 4.

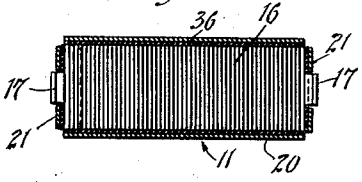


Fig. 5.

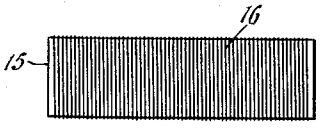


Fig. 6.

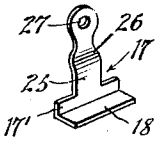


Fig. 7.

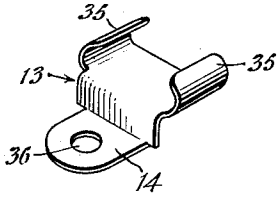


Fig. 8.

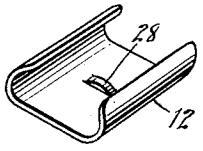


Fig. 9.

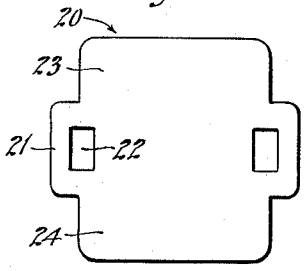


Fig. 11.

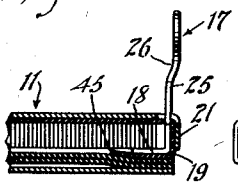


Fig. 12.

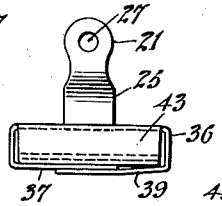


Fig. 10.

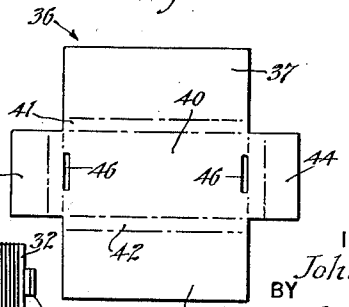


Fig. 13.

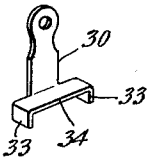
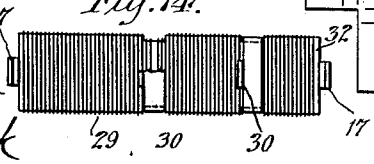


Fig. 14.



WITNESSES

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UNITED STATES PATENT OFFICE

1,976,624

RESISTANCE DEVICE

John J. Mucher, Brooklyn, N. Y.

Application April 18, 1933, Serial No. 666,765

8 Claims. (Cl. 201—63)

This invention relates to electrical resistance devices, and more particularly to an electrical resistance device made up of a number of fixed resistance sections or units, which is especially adapted for use in radio receiving and transmitting apparatus and in other electrical apparatus and circuits requiring one or more fixed resistances.

The invention also has in mind the provision of means for coupling a number of independent resistance sections or units together into a rigid assemby, forming a multiple resistance device, each unit being in direct electrical contact with its adjacent unit or units and the assembly providing a convenient means for centrally locating or mounting a number of resistance sections or units.

A further object is to provide flexibility in combining different resistance ranges to constitute the individual resistance requirements of one or more circuits.

The invention is also particularly useful in repairing burned out or broken resistances in established circuits where a resistance is to be replaced and a duplicate of the original cannot be obtained because the manufacturer of the original apparatus has discontinued the manufacture thereof.

The present invention, therefore, provides means for building up independent fixed resistances from units of standard resistances to produce a resistance device of the same ohmage as the original unit which is to be replaced with comparatively little expense. It has also been customary to build resistance devices by winding independent resistance sections on an insulated support and to tap off each section with end terminals. Such resistance devices are objectionable in view of the fact that should one section burn out it necessitates the replacing of the entire resistance device. In the present construction each independent unit while being electrically connected to its adjacent unit or units can be readily replaced with comparatively little expense.

With these objects in view, the invention comprehends a multiple resistance device made up of a number of fixed resistance units, each of which is in electrical contact with its adjacent unit or units, and which units are coupled together in end-to-end relation and may thus be arranged or located at a central place in the apparatus.

With these and other objects in view, the invention also resides in certain novel features of construction and arrangement of parts as will be more fully described and claimed hereinafter.

The invention is shown in the accompanying drawing in which—

Figure 1 is a plan view of the multiple resistance device embodying the said invention;

Figure 2 is a view in elevation of the resistance device shown in Figure 1;

Figure 3 is an end view of the said device;

Figure 4 is a plan view of one of the fixed resistance units with the metal container and insulating covering removed to show the resistance winding and the terminal connection therewith;

Figure 5 is a plan view of the non-conductor core with the resistance winding thereon;

Figure 6 is a perspective view of one of the end terminals;

Figure 7 is a perspective view of an end member by which the device is mounted to a support;

Figure 8 is a perspective view of the coupling member for coupling adjacent sections together;

Figure 9 is a plan view of the metal blank which forms the metal sheath or container of a resistance unit;

Figure 10 is a plan view of the insulating member adapted to be wrapped around the core shown in Figure 5;

Figure 11 is a detailed fragmentary sectional view through Figure 1 approximately on the line 11—11;

Figure 12 is an end view of the structure shown in Figure 11;

Figure 13 is a perspective view of one of the intermediate terminals;

Figure 14 is a modified form of resistance unit having two intermediate terminals.

The resistance device 10 illustrated in the accompanying drawing comprises a plurality of fixed resistance units 11, each of which is in direct electrical contact with its adjacent unit or units, adjacent units being coupled together by a sleeve 12 and the end units being provided with an end member 13 having a foot 14 by which the device may be secured to a base. As shown in Figure 1, the resistance device 10 comprises three fixed resistance units 11, which are coupled together by two sleeve members 12, but it is to be understood that the said devices may be made up of two or more of such resistance units to provide the ohmage desired, and thus constitute a multiple resistance device which may be used in any desired circuit.

Each of the fixed resistance units 11 comprises a non-conductor core 15 upon which is wound any desired length and any desired cross-sec-

tional area of a resistance wire 16, adjacent convolutions or turns thereof being spaced a predetermined distance so that the said unit will have a fixed resistance in proportion to its length. The units 11 are also provided with end terminal members 17 having a base 18, which are superimposed upon one or more of the turns or convolutions of the resistance wire 16 in predetermined spaced relation for each particular length of unit, by which each unit of a given length will have the same resistance. The core 15, together with the resistance wire 16 and the base 18 of the terminals 17, are covered with a strip of insulation, such as an asbestos sheet which is rolled around the same to completely enclose the resistance wire 16 and the base 18, and is folded at the ends, as at 19, to cover the ends of the core 15. A metal container or sheath 20 forms a jacket or covering for the unit, this jacket being formed from a blank as shown in Figure 9, which is cut to form an extension presenting a clamping bar 21, the body of the blank being apertured at 22. When the said jacket is disposed upon the unit 11, the opposite edges 23 and 24 thereof are arranged in close confronting relation with the clamping bar 21 bent to tightly compress or enclose each of the end portions 19 of the insulating covering, thus securely enclosing the parts within said jacket, with the upstanding portions of the terminal members 17 disposed in the recesses 22.

Constructed in this manner the unit 11 constitutes a fixed and independent section, two or more of which may be built up to form a multiple resistance device of the desired ohmage resistance to suit the requirements of any particular circuit, it being understood that the units are arranged in end-to-end relation with adjacent terminals 17 in direct contact by which the several resistance units may be coupled in series. For this purpose the terminals 17 have their upwardly extending portions 25 offset as at 26 in order that the upper ends of adjacent terminals will be in direct contact, the said ends being provided with openings 27 for connecting the device in an electrical circuit or circuits.

The sleeves 12 are constructed, as shown in Figure 8, to slidably receive two adjacent units 11 for holding the same in fixed assembled relation, the coupling snugly engaging the metal container or jacket 20 and being provided with a stop 28 punched inwardly from the body thereof to limit the distance the units may be slid into the coupling.

Instead of the multiple resistance device 10 being made up entirely of units 11, the same may consist of one or more units 11 and one or more resistance units 29 having one or more intermediate terminals 30 spaced as desired between the end terminals 17, as shown in Figure 14. The unit 29 is constructed in a manner similar to the unit 11, the resistance wire 31 being of any desired cross-sectional area and being wound upon a non-conductor core 32, adjacent turns or convolutions being spaced apart at predetermined distances to give the desired resistance between adjacent terminals. The core 32 is notched at its side edges, in which notches are arranged the legs 33 of the intermediate terminals 30, it being understood that the ends of the resistance wire 31 are also wound about the core 32 beneath the base 34 of the terminals 30. An insulating covering of asbestos or other material is also wound upon the resistance wire 31, covering the base 34 and the ends of the core 32. A metal jacket or container is applied to this form of unit substantially similar to the construction of the jacket 20 for the unit 11, the unit 29 being of a size to be snugly engaged by sleeve members 12 for coupling the same to an adjacent unit similar to the manner of coupling the units 11.

For the purpose of mounting the multiple resistance device 10 upon a support, the end members 13 are provided with a sleeve portion 35 adapted to slidably engage the end portion of either unit 11 or the unit 29, the body of the sleeve 35 being provided with a foot 14 in offset or stepped relation by which the same may be secured to the base by means of a screw or other securing means engaging an opening in the said foot. This construction not only properly supports the various units but spaces the units above the support on which they are mounted, whereby a good cooling action is secured as air may freely circulate completely around the device.

As shown particularly in Figures 10 to 12, inclusive, there is provided a suitable insulation for the core 15 with means for clamping the insulation in place. As illustrated particularly in Figure 10, the insulation 36 is provided which is adapted to be wrapped around the core 15 so as to protect the same on top and bottom, both sides and both ends. As shown in this Figure, the sections 37 and 39 are adapted to be folded over the top of the core 15, while the section 40 is at the bottom of the small sections 41 and 42 to cover the sides. If desired, sections 39 and 37 could be wide enough to overlap, but ordinarily they are made to abut while the end sections 43 and 44 are made sufficiently long to extend across the ends of the core 15 and be folded therebeneath as indicated at 45 in Figure 11. From this figure it will be seen that the terminals 17 have their bottom plates 18 arranged beneath the core but in electrical engagement with the wires 16 thereof. The end flange 17', as shown in Figure 6, extends across the ends of the core 15 so that the remaining part may extend thereabove and through the respective apertures 46 in the insulation 36.

By this arrangement the terminals may be easily and quickly mounted and held firmly in contact with the resistance 16 while being insulated from all other parts. The metal container or jacket 20 is folded around on top of the insulation 36 and the ends 21 are bent over as shown in Figure 11, but are spaced from the upstanding portion 25. The positioning of the jacket 20 in place and the bending of the parts thereof until they present a finished structure as shown in Figures 1 to 3 results in the terminals being firmly clamped in place so as to provide not only a good mechanical structure but a good electrical connection. The complete structure shown in Figure 1, for instance, is known as a voltage divider, because at each of the terminals current of different voltage may be taken off. By providing a flexible construction whereby any desired number of units may be used, the voltage may be divided with ease as may be desired.

In addition, in case any one unit should become worn out or injured for any reason, it may be quickly removed and another one substituted. When the structure shown in Figure 14 is used the various resistances are fixed, but under some circumstances they are very desirable. In this form of the invention the end terminals are as shown in Figure 11, but the intermediate terminals are as shown in Figure 13 and are clamped

in place by the insulation 36 and by a metal cover similar to cover 20 but having suitable provisions for accommodating the intermediate terminals 30.

I claim:—

1. A device of the character described comprising a plurality of resistance units arranged in tandem having terminals at their respective ends, each of said units having a metal casing and a metal sleeve slidably fitted over the ends of adjacent units for connecting the respective units together so that the terminals thereof will be in engagement, said sleeve being resilient and acting not only to keep the adjacent units in alignment but to clamp the ends of adjacent units to prevent accidental disengagement of the respective units.

2. A voltage divider comprising a plurality of independent resistance units, each unit having a terminal at each end, each of the terminals being bent at the upper part so as to extend outwardly, and a coupling connecting the respective units, each of the couplings consisting of a metal sleeve open longitudinally at the top and provided with a central pressed-up portion for limiting the movement of the unit within the coupling so that it will be centered as the terminals of the units extending into the coupling contact.

3. A resistance unit formed with a core, a winding of resistance wire arranged thereon, a terminal at each end, each of said terminals having an L-shaped portion fitting against the end and a lower surface near the end of the core member and overlapping and contacting with a plurality of turns of said winding, a covering of insulation for the core, said covering having apertures through which said terminals extend, said insulation covering the bottom, ends and one side of the terminals except the part that projects through the insulation, a metal covering for holding the insulation in place and at the same time clamping the terminal against said windings, said metal covering being bent around the core member and its winding, said covering being formed with a bent over extension at each end forming bars for holding the insulation at the ends in place and at the same time clamping the terminals in position and against movement longitudinally of said core.

4. In a resistance of the character described, a resistance unit having a core and a winding thereon, a terminal at the end thereof, said terminal having an upstanding contact portion, a flange fitting against the end of said core and a base overlapping said winding, and means for clamping the terminal in position so that said base will press against certain turns of said winding, said means including a covering insulation member covering all of the terminals except the upstanding portion and a metal member for clamping the insulation and terminal in position, said metal member having a portion which straddles the terminal and acts thereon to clamp the terminal against shifting longitudinally of said core.

5. A resistance device adapted to combine a plurality of fixed resistances, comprising a length of non-conducting material adapted to be used as a core, a length of resistance wire wound over said core, terminal clips positioned in engagement with the ends of said wire, each of said terminal clips having an upstanding portion, a base fitting flatwise against part of said wire, an insulating covering for said wire and part of said clip, a metal sheathing positioned on top of said insulating covering, said metal sheathing acting to clamp the insulating material in position as well as the terminals, said sheathing being formed with a plurality of extending members straddling the terminals and pressing the same against the ends of said core.

6. A resistance unit comprising a core of insulating material, a length of resistance wire wound over the length of said core, a terminal at each end of said core, each of said terminals having an upstanding portion and a base, said base extending under the core and into engagement with the end of said winding, the upstanding portion being bent in a direction away from the center of the core longitudinally thereof, a covering of insulating material adapted to cover the resistance wire and overlap the ends of the core including the lower part of the respective terminals, and a metal sheathing for clamping the insulating material in position and said base tightly against said wire, said sheathing having means at each end extending over the insulation at the ends straddling the terminals for holding the terminals against moving longitudinally of said core.

7. A voltage divider comprising a plurality of independent resistance units, each unit having a terminal at each end, and a metallic coupling slidingly and frictionally connecting the respective units, each of said couplings consisting of a metal member open at the top sufficiently to accommodate the terminals of adjacent resistance units, each coupling being provided with a pressed up portion for limiting the movement of the respective units within the coupling so that the coupling will be centered as the terminals of the units move into contact.

8. A voltage divider comprising a plurality of independent resistance units, each unit being provided with a metal casing having a notch at each end, a terminal arranged at each end of each unit, said terminals extending through said notches but out of contact with the metal casing, and a resilient sliding coupling for connecting said units together end to end, said coupling presenting a sleeve structure extending across the bottom of the adjacent ends of the respective units, across their respective edges and partly over the top thereof to frictionally hold the respective units in alignment and adjacent terminals in engagement.

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