Dec. 31, 1929. L. E. POWER 1,741,582

RESISTOR UNIT AND METHOD OF FORMING THE SAME

Filed Oct. 28, 1927 2 Sheets-Sheet 1

Fig. 1.

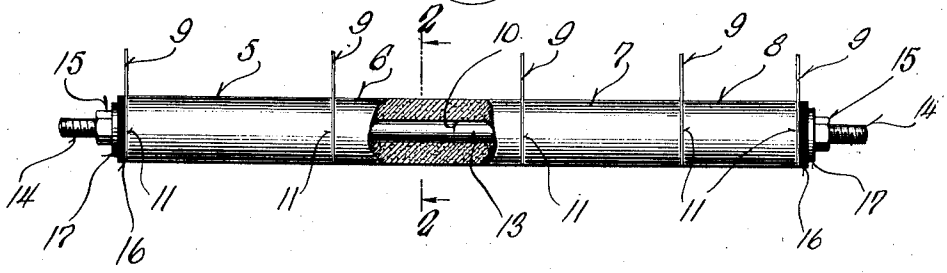


Fig. 2.

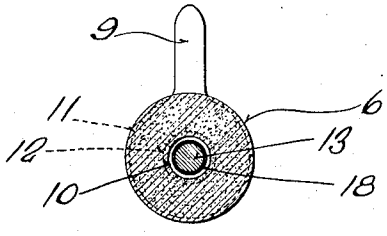
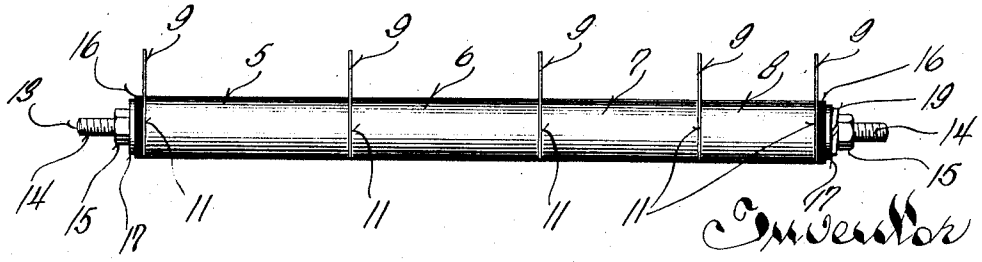


Fig. 3.



Inventor

Laurence E. Power

By Ira Milton Jones.

Attorney

Dec. 31, 1929. L. E. POWER 1,741,582

RESISTOR UNIT AND METHOD OF FORMING THE SAME

Filed Oct. 28, 1927 2 Sheets-Sheet 2

Fig. 4.

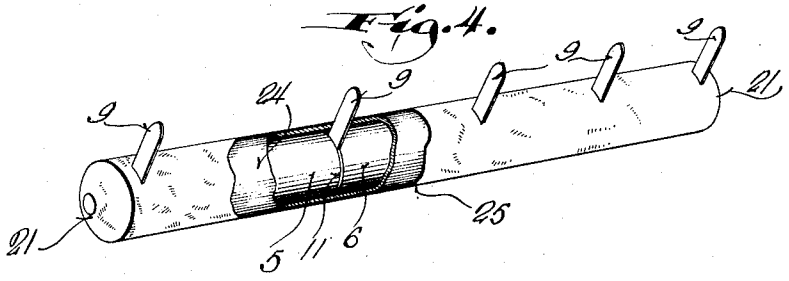


Fig. 5.

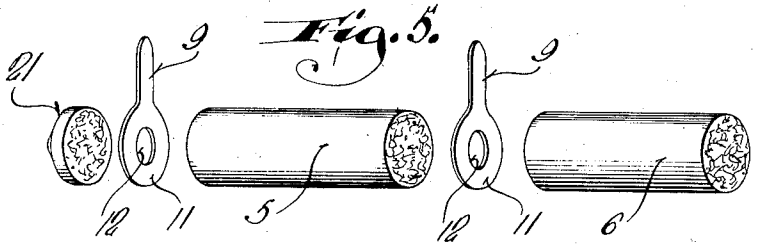


Fig. 7.

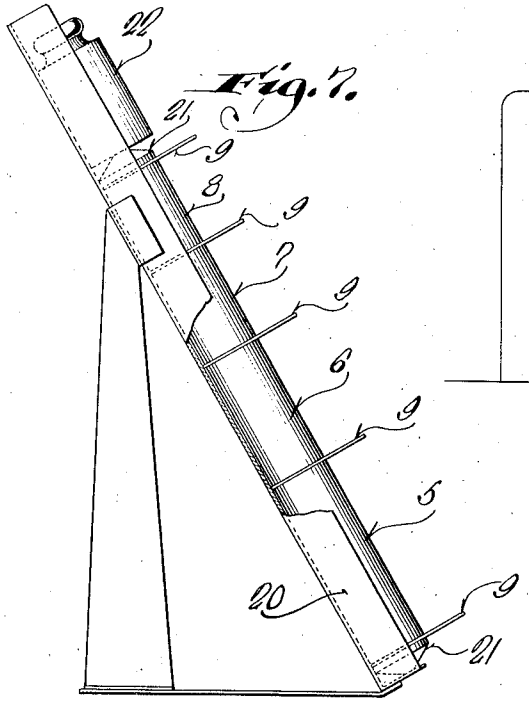
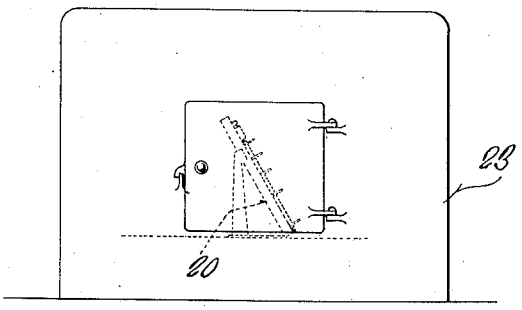


Fig. 6.



Inventor

Laurence E. Power

By Ira Milton Jones

Attorney

Patented Dec. 31, 1929 1,741,582

UNITED STATES PATENT OFFICE

LAURENCE E. POWER, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE RELIANCE COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN

RESISTOR UNIT AND METHOD OF FORMING THE SAME

Application filed October 28, 1927. Serial No. 229,409.

This invention relates to certain new and useful improvements in resistor units of the type especially designed for use in radio broad-casting and receiving sets, telephones and other apparatus and the method of forming the same, and has as an object the provision of an improved resistor unit which provides different resistances in a single unit.

Another object of this invention resides in the provision of an improved unit of the character described having a plurality of resistor elements of predetermined values and secured end to end with terminals between the adjacent elements whereby all or any one or more of the elements may be included in a circuit according to the resistance it is desired to impose in the circuit.

It is a further object of this invention to provide an improved resistor unit having a plurality of centrally bored resistor units adapted to be arranged end to end with terminal members therebetween and means passing through the bores of the units to connect them.

And a still further object of this invention resides in the provision of an improved method of forming resistor units by placing elements of predetermined values end to end with tap offs therebetween, in impregnating the entire unit with a stiffening agent, such as a phenol condensation varnish and baking the same, and in further impregnating the unit with paraffin should it be desired.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated several complete examples of the physical embodiment of my invention constructed according to the best modes I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view, partly in elevation and partly in section, of a resistance unit embodying my invention;

Figure 2 is a transverse sectional view taken through Figure 1 on the plane of the line 2—2;

Figure 3 is a side elevational view of a slighty modified resistor unit;

Figure 4 is a perspective view, with parts broken away and in section, of another modified form of resistor unit embodying this invention;

Figure 5 is an enlarged, fragmentary perspective view of one end portion of the unit illustrated in Figure 4 with the resistor elements, end caps and terminal members in spaced relation;

Figure 6 is a diagrammatic view illustrating the manner of cementing the elements and terminal members under pressure in the presence of heat; and

Figure 7 is an enlarged view illustrating one manner of obtaining pressure on a unit after it has been assembled.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, 5, 6, 7 and 8 represent independent resistance elements of predetermined values obtained in a suitable manner and arranged end to end with terminal members 9 therebetween to facilitate the inclusion of the elements in suitable circuits, not shown.

In the embodiment illustrated in Figures 1, 2 and 3, the resistor elements have central bores 10 extending throughout their lengths and likewise the inner enlarged portions 11 of the terminals are centrally bored, as at 12, to accommodate a clamping rod 13 which passes therethrough and is threaded at its ends 14 to receive nuts 15. The ends of the rod are insulated from the endmost terminals and elements by discs or washers 16 of insulating material disposed between the metal washers or discs 17 against which the nuts bind. The bores of the resistor elements and the terminal member are of a diameter to provide an air space surrounding rod 13 so that the various units are insulated therefrom and, if desired, the rod 13 may be covered with a

suitable insulation 18, such as vitreous enamel or any other material.

The threaded ends of the rod preferably extend beyond the nuts 15 a distance sufficient to facilitate mounting the unit in a suitable manner and in that form of my invention illustrated in Figure 3, a split or spring washer 17 is provided to supply any "give" that may be necessary in the contraction and expansion of the unit.

In that form of my invention illustrated in Figures 4 to 7, inclusive, the rod 13 is eliminated and the various elements are secured in end to end relation with the terminals therebetween by a suitable cement having the desired tenacity and conductive qualities and preferably consisting of a mixture of varnish and a powdered conductor, such as graphite, gas black, or copper powder mixed in the desired proportions. The resistor elements are solid and the cement is applied to the ends thereof and the assembly is disposed in a chute or trough 20 with caps or end members 21 covering the outermost terminals and pressure is applied in a suitable manner and as by a weight or other means 22, shown diagrammatically in Figures 6 and 7. The unit with the pressure applied thereto is then preferably placed in an oven 23 or otherwise subjected to heat until the cement sets. The end members 21 may be formed of composition having the desired conductive characteristics or of metal and provide means for mounting the unit.

If desired, the unit may then be wrapped with a suitable covering 24, impregnated with a stiffening agent, such as a phenol condensation varnish and then baked. The unit may also be impregnated with paraffin or other substance to exclude moisture.

The respective resistor elements are molded and their resistance values determined in any desired manner.

It will thus be readily apparent that with a unit of the character described, it is possible to obtain within a circuit a resistance equal to the combined values of all the elements or a resistance equal to any one or more of the elements and the respective elements may be of the same resistance values or of different values depending upon the specific needs for which the units are manufactured.

What I claim as my invention is:

1. A resistor unit consisting of end to end arranged sections molded from a common composition of materials and of varied lengths to provide a difference in resistance values, terminal tap offs disposed between the sections, and means cementing the sections to opposite sides of the terminal tap offs and to each other through apertures in the terminal tap offs.

2. The method of forming a resistor unit which consists in forming independent resistor elements of predetermined resistance values, in securing the elements in end to end relation with tap offs therebetween, and in covering the unit and impregnating the covering with a stiffening agent.

3. The method of forming a resistor unit which consists in forming independent resistor elements of predetermined resistance values, in securing the elements in end to end relation with tap offs therebetween, in covering the unit, and in impregnating the covering with a phenol condensation product.

4. The method of forming a resistor unit which consists in forming independent resistor elements of predetermined resistance values, in securing the elements in end to end relation with tap offs therebetween, in covering the unit, in impregnating the covering with a phenol condensation product, and in baking the unit.

5. A resistor unit consisting of end to end arranged elements, terminal tap-offs having apertured portions disposed between the elements, means cementing the elements and tap-offs into a single unit, the cement entering the apertures in the terminal tap-offs to form a bond directly between adjacent elements through the tap-offs, and a protective covering for the unit providing added rigidity therefor.

6. A resistor unit consisting of end to end arranged elements, terminal tap-offs, each having an apertured portion corresponding substantially to the cross-section of the elements, means cementing the elements and tap-offs into a single unit with the apertured portions of the terminal tap-offs disposed between the elements, the cement having conductive characteristics and entering the apertures in the terminal tap-offs to form a bond therethrough directly between adjacent elements, and a protective covering for the unit providing added rigidity therefor.

In testimony whereof I have hereunto affixed my signature.

LAURENCE E. POWER.