March 24, 1953 W. L. BUSH ET AL 2,632,832

TERMINAL CONSTRUCTION FOR VARIABLE RESISTORS

Filed March 23, 1951 2 SHEETS—SHEET 1

Fig. 1.

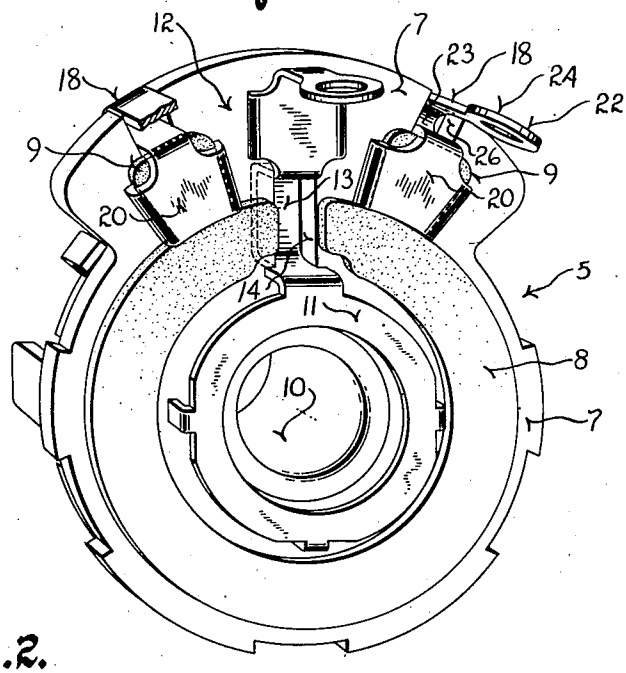

Fig. 2.

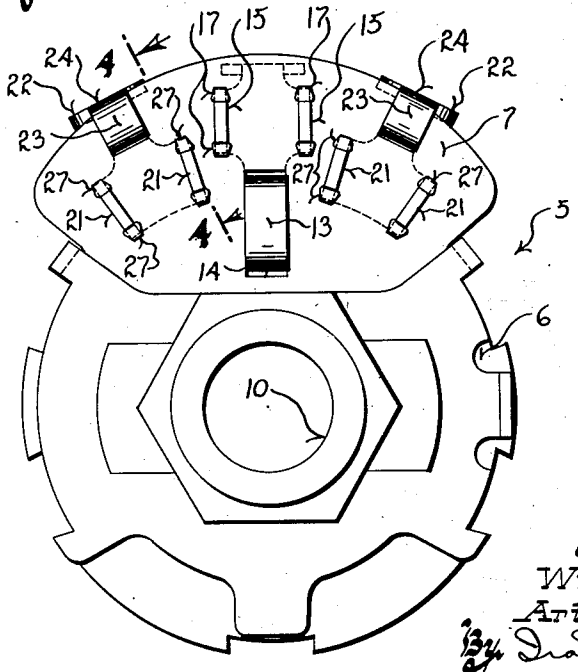

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Fig. 3.

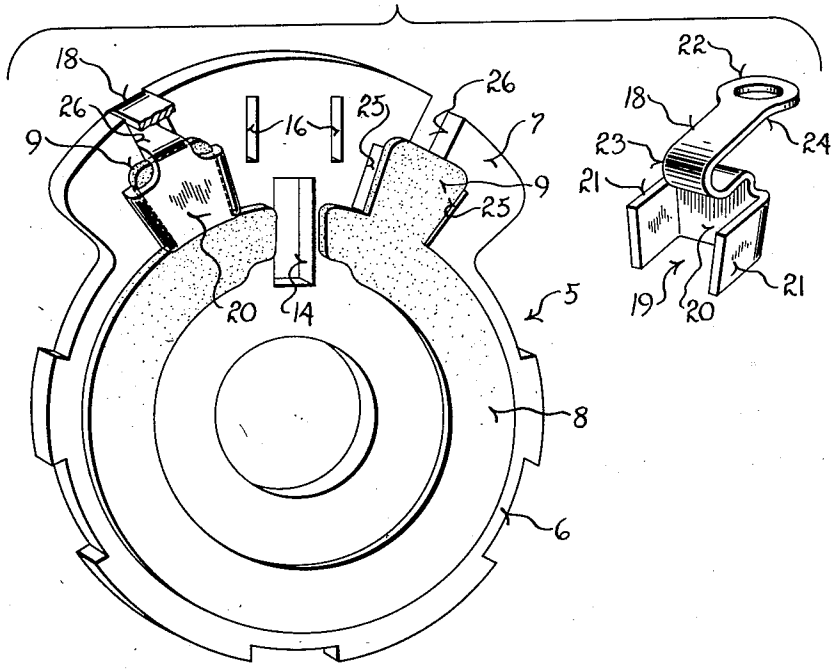


Fig. 4.

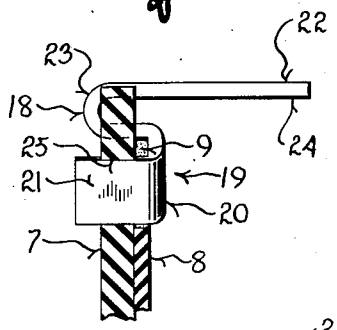


Fig. 5.

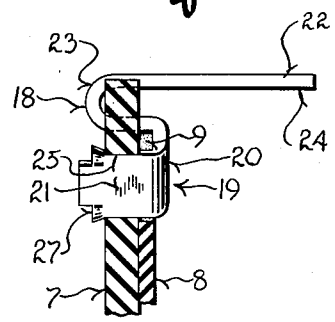
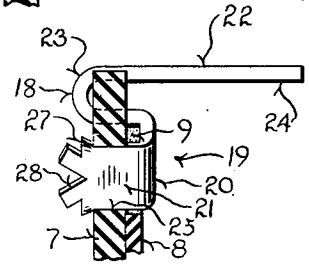


Fig. 6.



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UNITED STATES PATENT OFFICE

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TERMINAL CONSTRUCTION FOR VARIABLE RESISTORS

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6 Claims. (Cl. 201—55)

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This invention relates to variable resistors of the type used in radio and television apparatus and refers more particularly to the manner in which the resistance element per se is secured to the base of the instrument.

As is well known to those skilled in this art variable resistors of the present day generally have a flat circular resistance element flatwise overlying the base and concentrically disposed about the axis of the instrument so as to be swept by the movable contactor which is drivingly connected to the rotatable driving shaft of the instrument.

The customary manner of securing the resistance element in position on the base has generally involved the use of a stamped sheet metal terminal secured in position by a rivet which passed through the base and a terminal tab on the resistance element. The use of such rivets, however, had serious disadvantages. It required a hole through the relatively small terminal tab thus weakening the tab; it concentrated the clamping pressure upon a small area of the tab and it naturally increased assembly time especially since the stamped terminals had to be made right and left handed to provide them with lugs positioned to engage shoulders on the base by which the stamped terminals were constrained against rotation about the rivets.

To overcome these objections, the present invention has as its purpose to provide a novel manner of securing the terminal to the base which obviates the need for rivets and allows staking the terminal in position in a manner which precludes the imposition of localized pressure upon the terminal tab of the resistance element and instead distributes the clamping pressure over the entire area of the tab.

More specifically it is an object of this invention to provide a terminal for securing the resistance element of a variable resistor to its base wherein a U-shaped part on the terminal straddles the tab on the element and has a flat contact portion in surface-to-surface engagement with the tab throughout substantially its entire area and attaching ears extending the length of the tab closely embracing the same and passing through holes in the base so that the opposite outer ends of the attaching ears can be staked over without concentrating pressure upon the tab at localized areas. This arrangement has the advantage of obviating the need for right and left handed terminals, enabling a greater safe compression of the tab to thereby assure good electrical contact, notwithstanding the inevitable expansion and contraction to which a connection such as this is subjected, and of providing a connection of exceptional strength.

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Another object of this invention is to so shape the tab on the element and the stamped terminal that upon assembly of these parts they are held against relative movement edgewise of the tab in all directions, whereby securement of the terminal to the base not only clamps the tab to the base but also secures it against shifting thereon.

With the above and other objects in view, which will appear as the description proceeds, this 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.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view showing the inside aspect of the stationary element or assembly of a variable resistor embodying this invention;

Figure 2 is a plan view of the front or outer face thereof;

Figure 3 is a perspective view similar to Figure 1 but minus the center terminal and its collector ring and one of the end terminals which is shown alongside the assembly;

Figure 4 is a detail sectional view through Figure 2 substantially on the plane of the line 4—4 showing the attaching ears before being staked over;

Figure 5 is a view similar to Figure 4 but showing the ears staked; and

Figure 6 is a view similar to Figure 5 but showing a slightly modified construction.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts the numeral 5 designates the base of a variable resistor which, as is customary, is die cut from suitable insulating material to provide a generally circular body portion 6 and a radially extended terminal supporting segment 7.

Mounted upon the inner face of the base is a resistance element 8 which is generally circular but more particularly is in the form of a split ring with terminal tabs 9 on the ends thereof. The movable contactor (not shown)

of the resistor sweeps across the face of the element 8 during adjustment of the instrument which adjustment is brought about by rotation of a shaft (also not shown) rotatably received in a hole 10 in the center of the base.

The movable contactor or arm of the instrument has resilient collecting brushes thereon which ride upon a collector ring 11 overlying the inner face of the base within the resistance element 8. This collector ring has a terminal portion indicated generally by the numeral 12 projecting radially therefrom and overlying the segment 7, where it is held by an intermediate positioning portion 13 bent out of the plane of the collector ring and received in a hole 14 in the base and by attaching ears 15 which pass through holes 16 in the segment 7 and are staked over as at 17.

The resistance element 8 is secured to the base 5 by a stamped sheet metal terminal 18 embracing each terminal tab 9. Like the center terminal, the terminals 18 are secured in position by staking, but they are of novel construction and coact with the terminal tabs in a novel manner to firmly anchor the tabs and hence the resistance element to the base upon being staked in place. The terminals 18 are identical which is an advantage over past constructions in which, as pointed out hereinbefore, it was necessary to provide right and left handed terminals.

As shown, each terminal 18 is a sheet metal stamping having a U-shaped attaching end 19 providing a flat contact portion 20 flanked by two attaching ears 21 which are perpendicular to the flat contact portion and extend the full length of its side edges; and a terminal end 22 extending from the flat contact portion and having its medial portion doubled back upon itself to provide a loop 23 of uniform width which projects from the plane of the flat contact portion in the same direction as the ears 21 and a soldering lug 24 projecting in the opposite direction.

It is to be noted that the bight of the loop 23 is spaced from the flat contact portion 20 substantially the same distance as the ears 21 so that the loop as well as the ears will extend all the way through the base.

The terminal tabs 9 are generally trapeziform and widest at their outer ends and the flat contact portion of the terminal is substantially of the same shape and size with the ears 21 lying in converging planes and the wall of the loop 23 which joins the contact portion extending across the wide side of the trapezium. Hence, upon assembly of the terminal with a tab the terminal and tab are firmly held against relative edgewise displacement so that securement of the terminal to the base not only clamps the tab to the base but also holds the resistance element against shifting thereon.

The securement of the terminal to the base is effected by passing the attaching ears 21 through holes 25 in the terminal supporting segment of the base and at the same time engaging the loop 23 in a recess or notch 26 which opens to the outer edge of the segment, and then staking over the attaching ears as at 27. The holes 25 are of a size to snugly receive the attaching ears and, of course, lie in converging planes disposed at the same angle as the ears, and since the flat contact portion 20 is substantially the same size and shape as the terminal tab, it overlies substantially the entire area thereof and the attaching ears extend for substantially the full length of the diverging side edges of the tab.

With this arrangement pressure applied upon the tab during the staking over of the attaching ears is distributed uniformly over the entire area of the tab. In other words the staking can be effected without imposing concentrated pressure upon localized areas of the tab. This increases the compressive force that can be safely applied upon the tab and thus assures continued good electrical contact notwithstanding the inevitable expansion and contraction to which the connection is subjected in use. Also, by virtue of the novel shape of the tab and the U-shaped attaching end of the terminal which embraces the tab, the securement of the terminal not only clamps the tab to the base but also holds the tab and the resistance element against shifting on the base.

While the holes 25 are of a size to snugly receive the attaching ears and the staking 27 generally can be relied upon to take up any clearance between the ears and the holes, at least edgewise with respect to the ears, added assurance therefor is obtained with the slightly modified construction shown in Figure 6. In this case the shank of the attaching ears is medially split as at 28 and spread apart as shown to fully and completely take up any such edgewise clearance. The splitting may be done concomitantly with the swedging or in a separate operation following the swedging; also if desired a slit may be formed in the blank to facilitate the splitting and spreading of the shank. In any event this construction permanently and tightly locks the terminals in position.

It will, therefore, be readily apparent to those skilled in the art that this invention provides a greatly improved manner of attaching the resistance element of a variable resistor to its base.

What we claim as our invention is:

1. In a variable resistor having a base and a flat split ring-shaped resistance element with a flat terminal tab projecting from each end thereof flatwise overlying the base, a terminal for each end of the element, comprising: a sheet metal stamping having a U-shaped attaching end providing a flat contact portion flanked by two attaching ears, said attaching end straddling the tab with its flat contact portion in surface-to-surface engagement with substantially the entire area of the flat tab and with the attaching ears passing through and fitting snugly in holes in the base; and said ears having portions staked over the adjacent edges of the holes to secure the terminal to the base with the tab of the resistance element clamped between its flat contact portion and the base.

2. In a variable resistor of the type having a base and a split ring-shaped resistance element overlying the inner face of the base, common means for securing the element to the base and providing electrical terminals for the ends of the element, comprising: a terminal tab projecting radially outwardly from each end of the element and overlying the base, said tabs being of substantially trapeziform and being wider at their outer ends than at their inner ends where they join the element; and a combination terminal and anchor device for each tab and by which each tab is clamped tightly against the base, said device having a U-shaped attaching end providing a flat contact portion flanked by two

attaching ears, the contact portion being of a shape and size to overlie substantially the entire area of the tab and the attaching ears being perpendicular to the contact portion and projecting in the same direction therefrom but lying in converging planes corresponding in spacing and relative angularity to the side edges of the tabs; and a terminal portion integral with the flat contact portion and projecting from the wide end thereof, said terminal portion being doubled back upon itself to provide a loop projecting substantially perpendicularly from the plane of the flat contact portion in the same direction as the attaching ears and so positioned with respect to the ears that upon engagement of said loop with the outer end of the tab the ears tightly grip the tab therebetween; the base having holes in which the ears and the loop of the terminal portion are snugly received with the ears straddling the tab and projecting entirely through the base; and portions on the ears staked over the adjacent edges of the holes and drawing the flat contact portion toward the base with the tab clamped therebetween.

3. A terminal for simultaneously anchoring the resistance element of a variable resistor to its base and providing an electrical terminal for the element, comprising: a sheet metal stamping having a U-shaped attaching end providing a flat contact portion flanked by two attaching ears projecting in the same direction from the flat contact portion, and a terminal portion integral with and extended from one end of said flat contact portion but bent up from the plane thereof in the same direction the attaching ears project to be crosswise of the space between the ears, and then doubled back upon itself with its outer end projecting beyond the opposite side of the flat contact portion, the doubled back part of the terminal portion being of substantially uniform width and having its bight spaced from the plane of the flat contact portion substantially the same distance as the attaching ears, said terminal portion and the spaced attaching ears being so positioned with respect to each other as to embrace a terminal tab on the resistance element with the ears gripping the side edges of the tab and the adjacent part of the terminal portion engaging the outer end of the tab, and the ears being long enough to pass entirely through the base so as to enable staking portions thereof over the opposite side of the base.

4. The terminal tab of claim 3 further characterized by the fact that the attaching ears are flat, perpendicular to the flat attaching portion, and lie in converging planes with their greatest spacing at the end of the flat attaching portion from which the terminal portion extends.

5. In a variable resistor, the structure set forth in claim 1 further characterized by the fact that the ends of the attaching ears are split and spread apart to thus firmly lock the same in the holes in the base through which they pass.

6. In a variable resistor of the type having a base and a flat split ring-shaped resistance element flatwise overlying the inner face of the base, common means for securing the element to the base and providing electrical terminals for the ends of the element, comprising: a flat terminal tab projecting radially outwardly from each end of the element and flatwise overlying the base; and a combination terminal and anchor device for each tab and by which each tab is clamped tightly against the base, said device being a sheet metal stamping and having a U-shaped attaching end providing a flat contact portion flanked by two attaching ears, the contact portion being of a shape and size to overlie substantially the entire area of the tab and the attaching ears being perpendicular to the contact portion and projecting in the same direction therefrom, and a terminal portion integral with the flat contact portion and projecting from one end thereof, said terminal portion being bent up from the contact portion in the same direction as the ears and lying transversely across one end of the space between the ears and being doubled back upon itself to provide a loop which projects substantially perpendicularly from the plane of the flat contact portion in the same direction as the attaching ears so that when the combination terminal and anchor device is in position on the tab the inner leg of the loop engages the end of the tab while the attaching ears engage the side edges thereof; the base having holes in which the attaching ears and the loop of the terminal portion are snugly received with the ears straddling the tab and projecting entirely through the base and the loop of the terminal portion engaging the end of the tab; and portions on the attaching ears staked over the adjacent edges of the holes and drawing the flat contact portion toward the base with the tab clamped therebetween.

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ARTHUR M. DAILY.

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