Feb. 28, 1961 J. S. WILKERSON 2,973,497

CIRCUIT COMPONENTS

Filed July 1, 1959

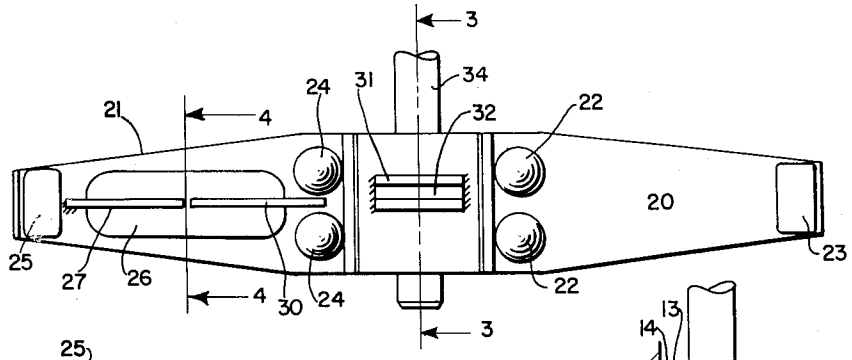


FIG. 2

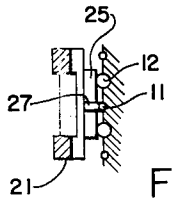


FIG. 4

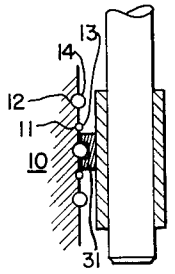


FIG. 3

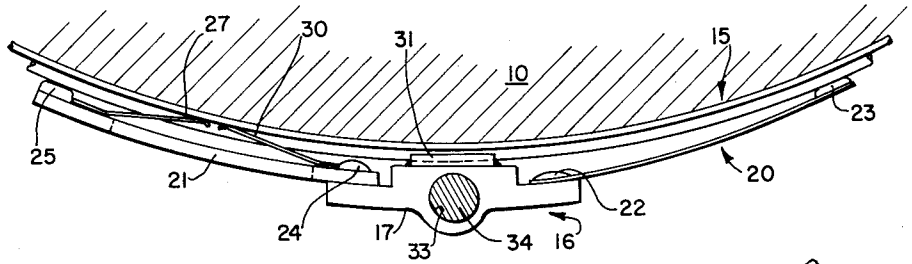


FIG. 1

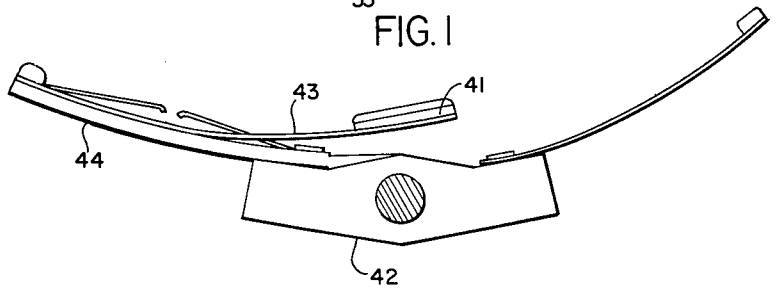


FIG. 5

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CIRCUIT COMPONENTS

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4 Claims. (Cl. 338—143)

This invention relates to the field of electrical circuit components and more especially to variable resistors of high precision. It is the object of the invention to provide an improved variable resistor in which tracking of the movable contact with the resistance element is smooth and free from binding or chatter, and in which wear with its attendant electrical "noise" is reduced.

Various other objects, advantages and features of novelty not particularly enumerated above which characterize my invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and objects attained by its use, reference should be had to the subjoined drawing, which forms a further part hereof, and to the accompanying descriptive matter, in which I have illustrated and described a preferred embodiment of my invention.

In the drawing

Figure 1 is a fragmentary showing of a variable resistor constructed according to the invention, partly in section;

Figure 2 is a showing of the slider assembly of Figure 1 looking outward from the center of the winding;

Figures 3 and 4 are sections taken along the lines 3—3 and 4—4 of Figure 2; and

Figure 5 shows a modification of the invention.

In the drawing element **10** is a form of suitable insulating material preferably grooved at **11** and **12** to receive a pair of helices **13** and **14** comprising respectively the resistance element and a collector element of the variable resistor. Resistance wire **13** is preferably made of an alloy known as Sigmund Cohn L.T.C. wire, and is of relatively small diameter, high resistivity, and excellent uniformity of resistance. Collector wire **14** is preferably made of a gold alloy known commercially as "Ney-Oro G" and is of relatively large diameter and of low resistivity. The wires are fastened to the form in any conventional fashion and are brought out from there to the terminals of the device.

Cooperating with the resistance assembly **15** just described is a slider assembly **16** including a central drive portion **17**, a spring **20**, and a relatively stiff wiper arm **21**. Spring **20** is fastened to portion **17** as by rivets **22**, and bears a contact pad **23** at its outer end. Wiper arm **21** is fastened to drive portion **17** as by rivets **24** and also bears a contact pad **25** at its end. Arm **21** is cut away at **26**, and carries a pair of wipers **27** and **30**. The assembly is generally arcuate to conform to the shape of form **10**. and wipers **27** and **30** extend inwardly from the concave surface, as do pads **23** and **25**. Each of the latter is large enough to engage two adjacent turns of collector wire **14**.

Extending inwardly from the central drive portion **17** is a shoe **31** having a groove **32** proportioned to engage collector wire **14** without engaging resistance wire **13**. It has been found that if pads **23** and **25**, shoe **31**, and wipers **27** and **30** are made of the alloy commercially known as "Paliney #7" the wear resulting from rubbing

between the movable and stationary components is reduced to a minimum.

Drive portion **17** is cross bored at **33** to give a smooth sliding fit with a rod **34** aligned with form **10** and spaced therefrom slightly. Provision is made for causing relative movement between form **10** and rod **33**, either by holding the rod stationary and rotating the form about its axis, or by holding the form stationary and mounting rod **33** on an arm for rotation about the axis of the form. Both methods are satisfactory and choice is dictated by convenience in packaging and other considerations.

The elements of slider assembly **16** are so positioned that when groove **32** engages a turn of the collector wire, wipers **27** and **30** engage an adjacent turn of the resistance wire at closely spaced intervals therealong, and each of the pads **23** and **25** rides on a pair of adjacent turns of the collector wire. The resilience of spring **20**, wiper arm **21**, and wipers **27**, **30** is such that the latter engage the resistance winding very lightly, and since they are of very light construction the assembly is essentially immune to vibration difficulties.

A modification of the invention is shown in Figure 5, which differs from the previously disclosed arrangement in that shoe **41** is not rigidly attached to drive portion **42**, but is carried in a resilient member **43** connected to wiper arm **44**: the other elements are the same as in the previously described embodiment.

Numerous objects and advantages of my invention have been set forth in the foregoing description together with details of the structure and function of the invention, and the novel features thereof are pointed out in the appended claims. The disclosure, however, is illustrative only, and I may make changes in detail, especially in matters of shape, size, and arrangement of parts, within the principle of the invention, to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

I claim as my invention:

1. In combination: a cylindrical form; first and second mutually spaced helices on said form, the first helix comprising a plurality of turns of relatively large diameter wire having relatively low resistivity and the second helix comprising a plurality of turns of relatively small diameter wire having relatively high resistivity, said helices having the same helix angle so that the turns of one helix lie between the turns of the other helix; means making electrical connection to said helices; a resilient, electrically conductive slider assembly comprising a central drive portion, a pair of end bearing portions, and intermediate wiper means, said slider assembly being generally arcuate to conform to the shape of said cylinder; and means mounting said assembly for movement parallel to the axis of said form and spaced therefrom, said drive portion comprising a shoe engaging a turn of said first helix without engaging either of the adjacent turns of said second helix so that said assembly is moved axially of said form upon relative rotation between said form and the mounting means, said bearing portions each comprising a pad proportioned to contact a pair of adjacent turns of said first helix, and said wiper means comprising a pair of resilient contacts engaging a turn of said second helix at closely spaced points therealong, so that regardless of the sense of said relative rotation one of said contacts can remove unwanted material from said second helix to insure good electric contact thereof with the other contact.

2. In combination: a plurality of spaced, aligned wires, comprising a pair of electrically connected wires of relatively large diameter and relatively low resistivity and a further wire therebetween of relatively small diameter and relatively high resistivity; a slider assembly comprising a central drive portion including a shoe engaging at

least one of the wires of said pair, a pair of resilient end bearing portions each including a conductive pad contacting said pair of wires, and wiper means comprising a pair of contacts electrically connected to at least one of said pads and engaging said second wire at closely spaced points therealong; mounting means slidably engaging said drive portion to prevent motion of said slider assembly with respect to said wires except in the direction of said wires, and means causing relative motion, between said wires and said mounting means, having a component aligned with the direction of said wires.

3. In combination: a plurality of spaced, aligned wires comprising a pair of electrically connected wires of relatively large diameter and relatively low resistivity and a further wire therebetween of relatively small diameter and relatively high resistivity; an arcuate slider assembly comprising a central drive portion including a shoe engaging at least one of the wires of said pair, a pair of resilient end bearing portions each including a conductive pad contacting said pair of wires, and wiper means comprising a pair of contacts electrically connected to at least

one of said pads and engaging said second wire at closely spaced points therealong; mounting means slidably engaging said drive portion to prevent motion of said slider assembly, with respect to said wires, except in the direction of said wires; and means causing relative motion, between said wires and said mounting means having a component aligned with the direction of said wires.

4. In combination: a collector wire; a resistance wire aligned with said collector wire, and a movable slider assembly bridging between said wires; said slider assembly comprising a pair of wipers making electrical contact with said resistance wire at closely spaced points therealong, a pad connected to said wipers and making electrical contact with said collector wire, and a shoe mechanically engaging said collector wire so as to guide the movement of said slider assembly in alignment with said wires.

References Cited in the file of this patent

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