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J. T. BEECHLYN

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VARIABLE COMPOUND RESISTOR

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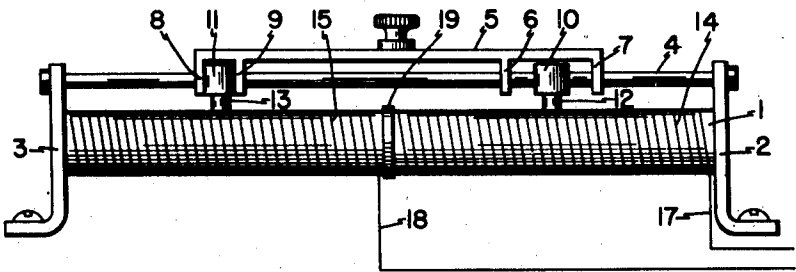


FIG. 1

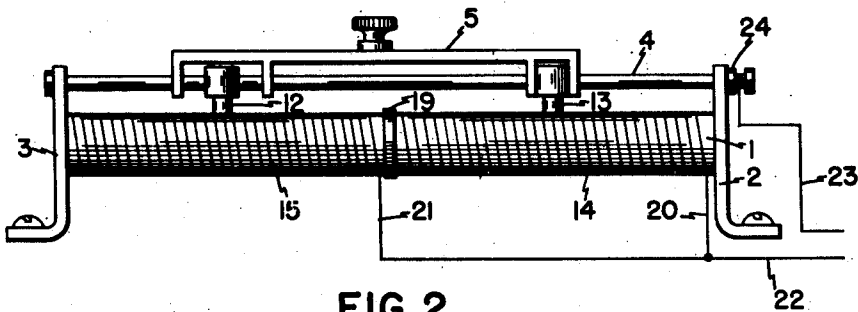


FIG. 2

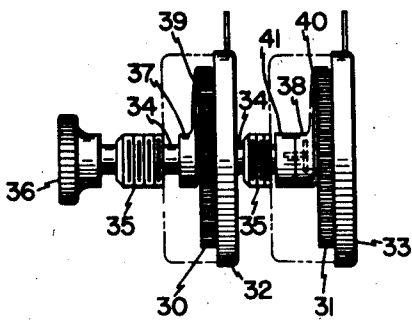


FIG. 3

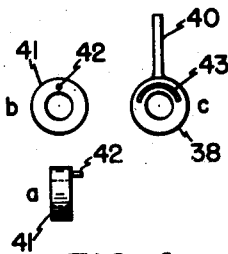


FIG. 4

INVENTOR.

JOHN T. BEECHLYN

BY

Egbert H. H. H.
HIS ATTORNEY

UNITED STATES PATENT OFFICE

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VARIABLE COMPOUND RESISTOR

John T. Beechlyn, Worcester, Mass., assignor, by
mesne assignments, to Submarine Signal Com-
pany, Boston, Mass., a corporation of Delaware

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1 Claim. (Cl. 201—56)

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The present invention relates to a variable adjustable electrical element providing adjustable resistance, capacity, inductance, or such other electrical element. In the present invention the unit is so designed that both a coarse and a fine adjustment are obtainable with the same operating element.

In the present invention a single operating shaft or a single slide bar is employed for all of the adjustments, both fine and coarse, which need be made to the electrical element eliminating the necessity of having separate dials or operating buttons and the making of independent settings with such units. The invention may be applied to various types of adjustable units but is particularly applicable to potentiometer units arranged in a circular fashion or on a slide bar.

The invention will be more readily understood in connection with the drawings illustrating embodiments of the same in which

Fig. 1 shows the invention as applied to a slide wire resistor in which the two parts are in series with each other;

Fig. 2 shows a view substantially corresponding to that of Fig. 1 in which the resistance elements are in parallel.

Fig. 3 shows a view of the invention applied to a circular resistance element; and

Fig. 4, A, B, and C illustrates details of elements used in Fig. 3.

The arrangement in Figs. 1 and 2 takes the general form of a slide wire resistor in which there is provided an insulating cylinder 1 supported by side brackets 2 and 3 and carrying a slide rod 4 supported in the brackets 2 and 3 and spaced parallel to the axis of the cylinder 1. Slide bar 4 carries an arm 5 with downwardly extending supporting arms 6 and 7 terminating in eyelets fitting about the slide bar or rod 4 in such a manner that the bar 5 may be freely slid over the rod 4. Similar downwardly projecting arms 8 and 9 are at the other end of the bar 5 and provide also a sliding fit on the bar 4.

The arm 5 may, therefore, be freely moved along the rod 4. Between the positions of the supporting arms 6 and 7 the rod 4 carries a freely adjustable contact-supporting block 10 which has a hole through it of sufficient size to permit its free movement over the rod 4 when either of the arms 6 or 7 comes in contact with it. The distance between the arms 6 and 7 is considerably greater than the width of the block 10 so that the bar 5 may be moved in one or the other direction at times dependent upon its relative position with respect to the block 10 without moving the

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block 10 on the rod 4. A second block 11 similar to the block 10 is also carried by the rod 4. The arms 8 and 9, however, touch the block 11 at either side so that whenever the bar 5 is moved, the contact-supporting block 11 is also moved. Each contact-supporting block 10 and 11 carries electrical contact brushes 12 and 13 which make electrical contacts with the turns of the coils 14 and 15, respectively, wound on the insulating cylinder 1.

As indicated in Fig. 1 two leads 17 and 18 are shown, one connected to each coil 14 and 15, respectively. In this arrangement the contacts 12 and 13 bridge the coils and therefore there is included in the series circuit, between the conductors 17 and 18, that portion of the coil 14 lying between the end 2 and the contact brush 12 and that portion of the coil 15 lying between the contact brush 13 and the separating collar 19. In the position indicated in Fig. 1 if the bar 5 is moved to the left, the contact 13 will be moved first and then when the depending arm 7 comes against the block 10, the brush 12 will also be moved. The brush 12 provides the coarse adjustment on the coil 14 and the brush 13 provides the fine adjustment on the coil 15. When the approximately correct position has been obtained, that is, a value slightly greater than desired, then the bar 5 is moved in the reverse direction at which point the brush contact 12 remains stationary and the brush contact 13 is moved to provide the fine adjustment. The space between the arms 6 and 7 should be sufficient to cover at least a unit adjustment; that is to say, the motion of the bar 5 between extreme end positions of the dependent arms 6 and 7 against the block 10 should be sufficient to permit adjustment of the fine contact brush 13 over a space equivalent to a unit of the motion of the brush 12. For example, if the movement of the brush 12 from one turn of wire to the next would vary the resistance along the coil 14 one ohm, then the motion of the brush 13 a distance equal to the space between the dependent arms 6 and 7 should also be of the order of one ohm adjustment. The movement of the brush 13 may be in tenths of an ohm while the motion of the brush 12 may be in ohms.

In the arrangement indicated in Fig. 2 the same type of mechanism is shown as in Fig. 1 with the exception that both ends of the contacts 20 and 21 are connected together to the same side of the line 22 while the other end of the line is brought in by the conductor 23 which is connected to a terminal post 24 at the end of the conducting bar 4.

The two sections 14 and 15 are therefore connected in parallel across the lines 22 and 23. The same type of adjustment, however, is provided, the brush 13 being the fine adjustment and the brush 12 being the coarse adjustment. These are shown in reversed positions in Fig. 2.

Figs. 3 and 4 show a different arrangement in which substantially the same results are produced. In this arrangement there are provided two cylindrically wound wires 30 and 31 which are mounted on cylindrical forms supported in plates 32 and 33, respectively. A single shaft 34 supported by bearings 35 is journaled perpendicular to the plane of the windings 30 and 31 passing through the first supporting plate 32. A turning knob 36 is fastened at one end of the shaft 34. The shaft itself carries two collars 37 and 38, the collar 37 being pinned to the shaft 34 and being provided with a contact arm 39 which makes contact with the turns of the electrical wire 30. The second collar 38 similarly has a radial contact arm 40. A further collar 41 is provided on the shaft 34 to which it is fixed. This collar is adjacent the collar 38 and is provided with a pin 42 which projects into a slot 43 concentrically arranged in the collar 38. The collar 38 is mounted freely on the shaft 34.

In the operation of this device the wire 30 provides the fine adjustment and the wire 31 the coarse adjustment. The pin 42 engaging in the slot 43 will begin to turn the collar 38 when the pin has reached one end of the slot. The knob 36 is turned until the adjustment desired has been approximately reached and then the knob 36 is turned in the reverse direction to make the fine adjustment of the contact arm 39 on the wire 30.

It will be seen from the above description that the arrangement shown in Figs. 3 and 4 may be used on an instrument board with the knob 36 projecting through the front of the board and the resistor adjustments in the rear. This will save

the necessity of separate shafts for coarse and fine adjustments, and will also insure a more rapid adjustment for the values needed.

While only two elements are shown in Fig. 3 it is quite obvious that more elements could be used simply by extending the shaft and using more resistances, some operated by the collar similar to 37 and others similar to the collar 38.

Having now described my invention, I claim:

A device of the type described comprising a plurality of resistance wires wound on independent cylindrical shells concentrically aligned with one another, an operating shaft adapted to be rotated extending through one of the cylinders at the center, a contact arm for each of said resistance wires mounted to be rotated with said center as the turning point, means coupling one of said arms rigidly to said shaft for rotation thereof, means coupling the other of said arms to said shaft, said coupling comprising a collar attached to said shaft having a projecting pin, said other arm being supported on said shaft by a ring having an arcuate slot therein engaging said projecting pin whereby said shaft may be turned a fraction of a revolution before said arm begins to rotate.

JOHN T. BEECHLYN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,480,953	Ream	Jan. 15, 1924
1,541,961	Jacobs et al.	June 16, 1925
1,592,193	Farnsworth	July 13, 1926
1,647,331	Allcutt	Nov. 1, 1927
1,654,867	De Laval	Jan. 3, 1928
2,176,090	McAllister et al.	Oct. 17, 1939
2,277,883	Rich	Mar. 31, 1942