

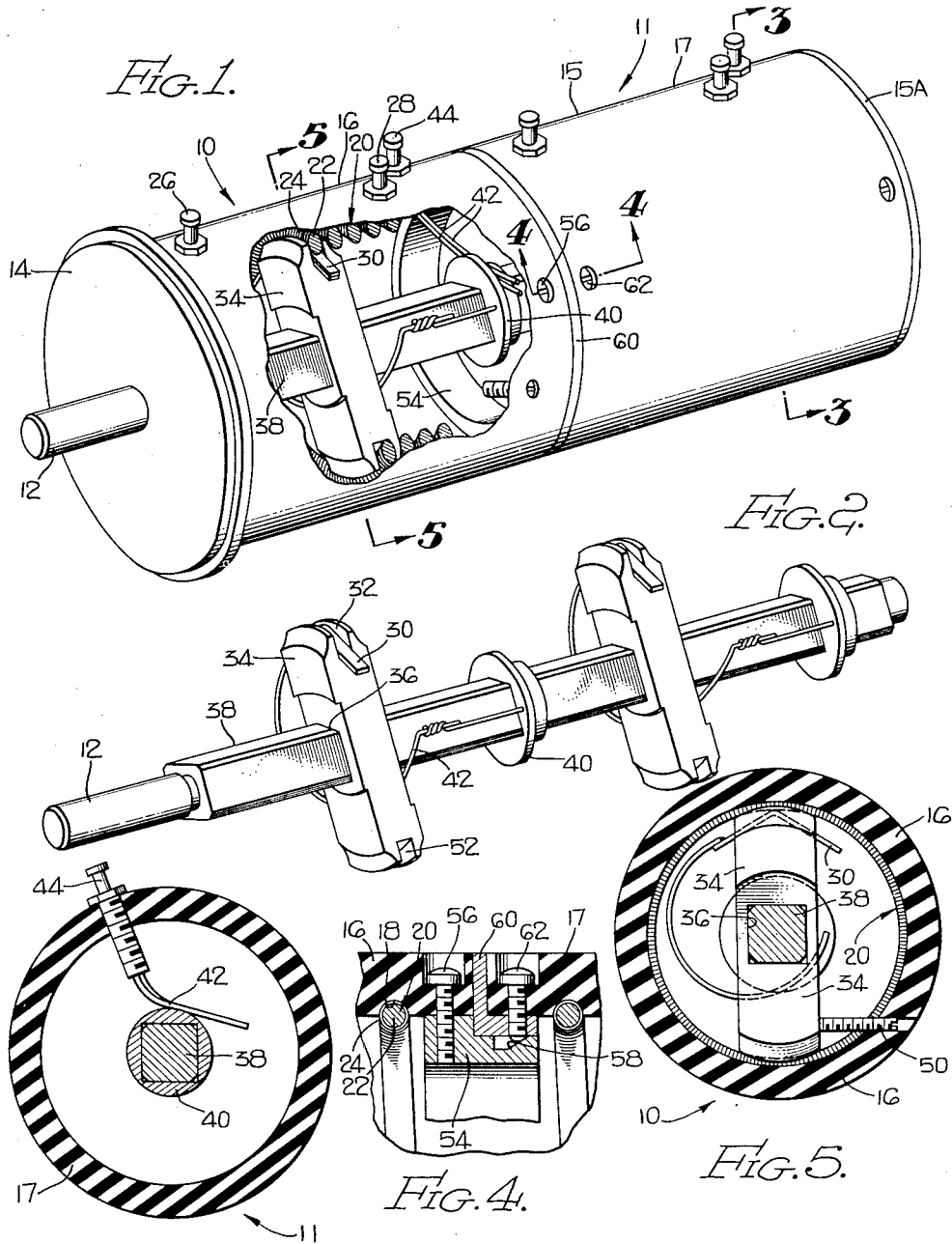
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ADJUSTABLE POTENTIOMETER CONSTRUCTIONS

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ADJUSTABLE POTENTIOMETER
CONSTRUCTIONS

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The present invention relates to an improved adjustable potentiometer construction. It is desirable to provide a potentiometer construction which is simple and inexpensive to manufacture, which is dynamically balanced and in which a large range of resistance values may be selected with good resolution in a structure of relatively small size. These desirable features are accomplished in accordance with teachings of the present invention.

It is therefore an object of the present invention to provide an improved potentiometer construction having one or more of the features indicated above.

A specific object of the present invention is to provide a small compact potentiometer construction which is relatively easy to manufacture commercially.

Another object of the present invention is to provide an improved potentiometer construction in which the resistance element is disposed in a novel manner with respect to a wiper arm so as to allow good resolution and selection of a particular resistance value over a large range.

Another specific object of the present invention is to provide an improved and dynamically balanced potentiometer construction.

Another specific object of the present invention is to provide an improved potentiometer construction in which a square shaft cooperates with a square apertured portion of a brush carrier assembly.

Another object of the present invention is to provide an improved construction whereby two axially aligned potentiometers having a common operating shaft may be accurately aligned electrically.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of two axially aligned potentiometer resistances with the casing of one of the resistances fragmented to show internal construction.

Figure 2 is a perspective view of the shaft assembly in the arrangement shown in Figure 1.

Figures 3, 4 and 5 are sectional views taken substantially on the corresponding lines 3—3, 4—4 and 5—5 of Figure 1.

The two potentiometers 10 and 11 are of the same construction and have a common operating shaft 12. While the drawings show two ganged potentiometers, it will be appreciated that only one or more than two may be so constructed, depending upon the length of the common shaft 12.

The shaft 12 has rounded end portions whereby the same is conveniently journaled for rotation centrally on discs 14 and 15A which are releasably mounted on and form end closure members for the cylindrical housing 15.

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As illustrated, the housing 15 comprises two sections 16 and 17 but, as indicated previously, only one section or more than two sections may be provided.

While the shaft 12 extends through disc 14, it is recessed within a disc 15A.

The cylindrical housing of insulating material is formed with an internal spiral grooved portion 18 within which is disposed and maintained the matching resistance element or assembly 20 with a portion of such assembly extending outwardly of the spiral groove 18. This assembly 20 is of special construction and importance.

The assembly 20 comprises generally an elongated insulated member 22 which may be in the form of a wire having its outer surface coated with a suitable insulating material. Wound or coiled on and along the length of this insulated member 22 is the resistance wire 24.

In practice, the resistance wire 24 is wound on and along the insulated member 22 while the same is straight and being rotated about its axis with the adjacent turns of wire 24 wound or coiled thereon spaced a relatively and sufficient distance apart. After the resistance wire is thus wound or coiled on and along member 22, the same is then formed as a coil of a diameter and turn spacing matching the spiral groove 18 and such that such coil is either self-maintained therein due to its own resiliency or easily maintained therein using a suitable glue or bonding agent for securing such coil with groove 18.

One end of the resistance wire 24 is connected as, for example, by soldering to the terminal 26 on and extending through housing 16 and the other end is connected in like manner to a similar terminal or soldering lug 28.

The resistance wire 24 is contacted by a resilient bowed contact element 30 loosely maintained within the grooved end portion 32 of an arm 34, this grooved portion 32 being so shaped that it partially embraces the protruding portion of the assembly 20 to cause movement of the arm 34 when shaft 12 is rotated.

For this purpose, the arm 34 has a square apertured portion 36 fitted for sliding movement on the square portion 38 of shaft 12.

Mounted on such square portion 38 is a flanged slip ring 40 which is electrically connected to the contact element 30 by a flexible conductor or lead 42. The slip ring 40 is contacted by two cantilever-mounted brush elements 42 in the form of resilient wires having ends thereof secured to terminal 44. These wires 42 are so mounted that they resiliently press against the slip ring 40.

It will be apparent from this description that rotation of shaft 12 produces not only rotation of arm 34 but also sliding movement of arm 34 along the square portion of shaft 12 so that the contact element or wiper 30 contacts continuously different portions of the resistance wire 24. Such movement of arm 34 is preferably limited at each end of its travel by adjustable stop means illustrated herein as a screw 50 adjustably threaded on casing 16 to contact the arm 34.

Preferably the rotating part of the potentiometer is dynamically balanced and mechanical stability imparted thereto by making, as illustrated, the arm 34 symmetrical about its axis of rotation with a second grooved end portion 52 partially embracing and contacting a protruding portion of the assembly 20.

When two or more potentiometers are assembled, the cylindrical housing elements of the same are adjustably secured together using the following construction.

A ring 54 is mounted within housing 16 by machine screws 56 with the annular cam surface portion 58 of the ring extending within housing 17. An L-shaped ring 60 is sandwiched between the ends of the housings 16

and 17 and threadedly receives the circumferentially spaced machine screws 62 which pass through enlarged portions of housing 17 and engage the cam portion 58 to secure the housings 16 and 17 together. This construction is particularly useful in those instances where it is desired to adjust the electrical alignment of an electrical system in which two such potentiometers are electrically connected. For this purpose, the machine screws 62 are loosened to allow one of the housings 16 or 17 to be rotated with respect to the other to obtain the desired electrical alignment or phasing, after which these screws 62 are fastened to rigidly secure the housings 16 and 17 together.

This construction in which the brush carrier is driven at two places serves to equalize the moments of force and substantially eliminates the possibility of jamming. This arrangement imparts a balanced rotational characteristic in which the masses are of equal magnitude symmetrical to the axis of rotation, thus rendering the same particularly useful for adjustment by a servo motor.

It is noted further that by providing two wipers or brush elements on the same side of the slip ring as shown in Figure 1, the assembly is facilitated, resonant frequencies of different magnitudes result to thereby substantially eliminate the possibility of an open circuit under vibrational conditions.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

We claim:

1. An adjustable potentiometer construction including a housing which has its inner surface provided with a spiral groove, an elongated insulated member, resistance wire coiled around said insulated member and along the length thereof to form an assembly in which the axis of the coiled resistance wire corresponds to the axis of said member, said assembly being formed as a spiral coil and being maintained in said spiral groove, a shaft rotatably mounted in said housing, said shaft having a flat portion extending generally parallel with the axis of said spiral coil, an arm slidably mounted on said flat portion and having a grooved end partially encircling and engaging a portion of said assembly whereby rotation of

said shaft produces movement of said arm along said shaft, an electrical contact element in said grooved end contacting said resistance wire, a slip ring mounted on said shaft, a flexible lead connecting said contact element to said slip ring, a resilient electrical brush supported on said housing and contacting said slip ring, three terminals mounted on said housing, two of which terminals are each connected respectively to correspondingly opposite ends of said resistance wire, and a third one of said terminals being connected to said brush.

2. A pair of constructions as set forth in claim 1 in which the housing of one of said pair is releasably secured to the housing of the other of said pair and in which said shaft is common to said pair of constructions and extends through both housings, and means for releasably securing said two housings together, said means comprising a ring mounted in one of said housings and having an annular extension with a cam surface thereon extending into the other housing, a ring sandwiched between said housings and having a threaded portion thereof extending to said other housing in a position between said other housing and a cam surface, and threaded fastening means passing through said other housing and through said threaded portion and having an end contacting said cam surfaces so that when and as said fastening means is tightened said end engaging said cam surface causes said housings to be tightly drawn together and fastened together.

3. A construction as set forth in claim 1 in which said housing is generally cylindrical with two discs forming closed ends of the same, said shaft having rounded portions journaled for rotation in said discs, and said arm has a square apertured portion through which a square portion of said shaft extends.

4. A construction as set forth in claim 3 in which said arm is in the form of a bar symmetrically disposed around the axis of rotation of said shaft with a second end thereof being also grooved to partially encircle and contact a second portion of said assembly which is disposed generally diametrically opposite the first mentioned portion of said assembly.

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