Aug. 29, 1961 M. M. MOORE ET AL 2,998,586

POTENTIOMETER CONSTRUCTIONS

Filed June 26, 1959

FIG. 1.

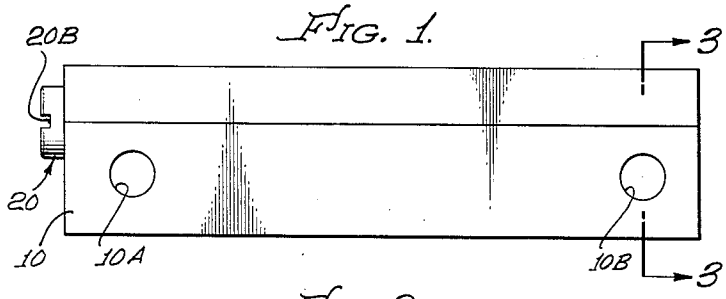


FIG. 3.

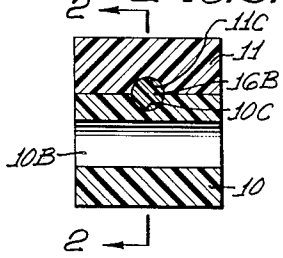


FIG. 2.

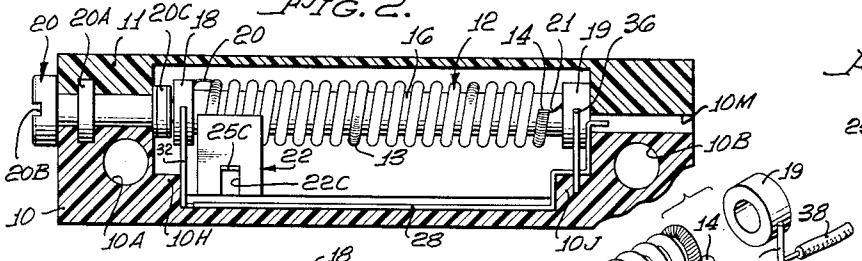


FIG. 11.

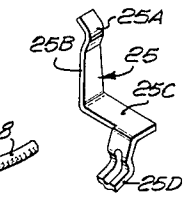


FIG. 6.

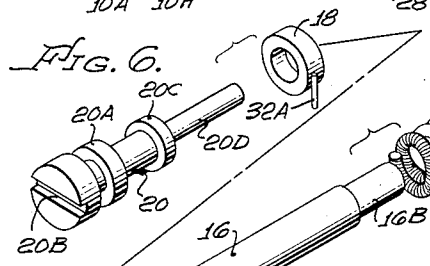


FIG. 4.

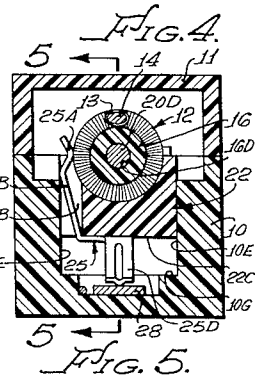


FIG. 8.

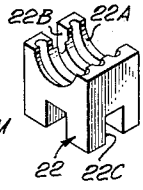


FIG. 7.

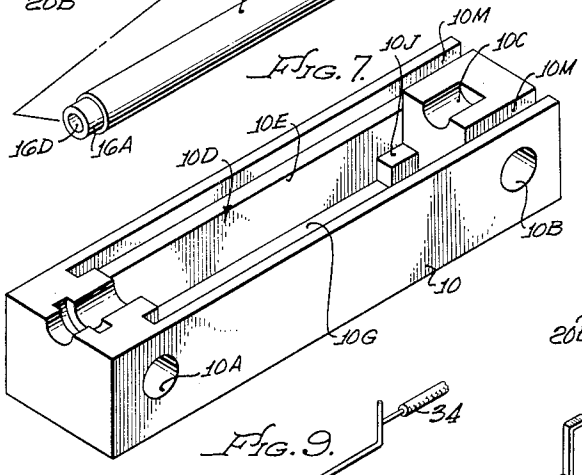


FIG. 5.

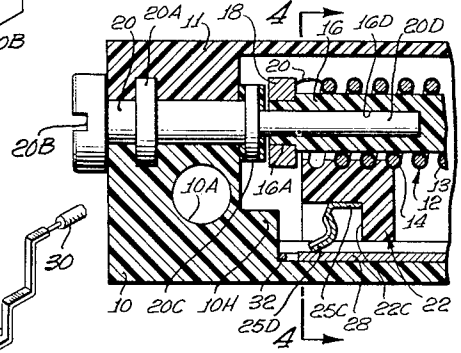


FIG. 9.

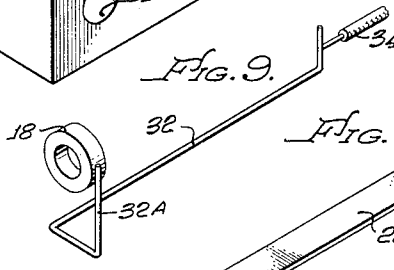
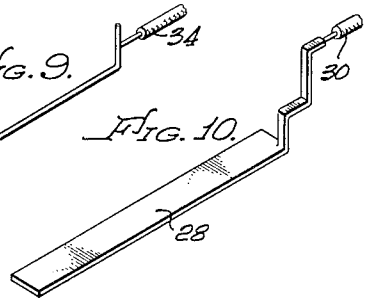


FIG. 10.



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POTENTIOMETER CONSTRUCTIONS

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2 Claims. (Cl. 338—145)

The present invention relates to potentiometer constructions.

An object of the present invention is to provide an improved potentiometer in which a helically-formed resistance element is used as a driving element for the tap or slider thereon.

Another object of the present invention is to provide an improved potentiometer which is simple and inexpensive to manufacture.

Another object of the present invention is to provide an improved potentiometer of this type having a relatively large resistance range and voltage resolution, yet being of small physical size.

Another object of the present invention is to provide an improved potentiometer in which the resistance element itself is moved in effecting an adjustment of the tap or slider thereon.

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 view in side elevation of a potentiometer embodying features of the present invention.

FIGURE 2 is a transverse sectional view taken substantially on line 2—2 of FIGURE 3.

FIGURE 3 is a sectional view taken on line 3—3 of FIGURE 1.

FIGURE 4 is a sectional view taken on line 4—4 of FIGURE 5.

FIGURE 5 is a sectional view taken on line 5—5 of FIGURE 4.

FIGURE 6 is a perspective view of various elements in disassembled form.

FIGURE 7 is a perspective view of a portion of the housing.

FIGURE 8 is a perspective view of the slider.

FIGURES 9, 10 and 11 are perspective views of different components shown in the previous figures.

The potentiometer is incorporated in a case or housing comprising an insulated base member **10** and an insulated cover **11** therefor, the base **10** having apertured portions **10A**, **10B** for convenient mounting.

The resistance element **12** comprises many fine turns of wire **13** wound on a spiral insulated wire **14** with a thin layer of insulation baked on such wire **14** to insulate the wire **13** from wire **14**. Also, the adjacent turns of wire **13** are so spaced to be as close as practical without adjacent turns touching, i.e. short-circuiting.

In the fabrication of such element **12**, the wire **13** may first be coiled on a straight length of insulated wire which is then formed in a spiral as shown. In forming such spiral, the assembly **13**, **14** may be spirally wound around insulated shaft **16** which mounts the resistance element **13** between the two end portions **16A** and **16B** having mounted thereon the slip rings **18** and **19** which are connected respectively to opposite ends of the resistance wire **13** as indicated at **20** and **21**.

The end portion **16B** is sufficiently prolonged to fit in the semi-cylindrical bearing **10C** in the base **10** and in the mating semi-cylindrical bearing **11C** in cover **11**.

The other end of shaft **16** is journalled for rotation using the following construction.

The adjustment pin or stub shaft **20** is rotatably mounted in complementary semi-cylindrical bearings in the base **10** and cover **11** with the flange **20A** on shaft **20** cooperating with complementary grooved portions in such base **10** and cover **11** to prevent axial movement of shaft **20** when the same is rotated by, for example, a screwdriver engaging the screwdriver adjustment slot **20B**. The flange **20A** when cooperating with the said complementary grooved portions also forms a labyrinth which facilitates a sealing effect against environmental contamination. The flange **20C** on shaft **20** is provided for the same purpose.

This shaft **20** has its end **20D** of reduced diameter fitted into the apertured or bored end portion **16D** to provide a friction or slip connection therebetween.

A slider **22** in the form of a half nut (FIGURE 8) has a screw-threaded portion **22A** with the same matching "thread" convolutions as the "thread" defined by resistance element **12**. This slider **22**, also in the form of a block, is slidably mounted in the base **10** in the rectangular channel **10D** defined by the side walls **10E** and **10F** and the "floor" **10G**, being guided thereby for movement between the two stops or abutments **10H**, **10J**.

The slider **22** of insulating material carries the electrical conducting tap **25** (FIGURES 4 and 11) which makes electrical contact with the resistance wire **13** on only a portion of one convolution of the spiral **12**. This tap **25** is generally double L-shaped as seen in FIGURE 11 with the bowed portion **25A** adapted to engage the wire **13**, with the portion **25B** recessed in the slide slot **22B** (FIGURE 4), with the portion **25C** confined in the slide slot **22C** and with the end **25D** engaging the contact strip **28** (FIGURES 4 and 10) resting in base **10**.

The contact **25** of resilient nature thus has one of its ends **25A** resiliently pressed against the resistance wire **13** and the other one of its ends resiliently pressed against the contact strip **28**.

This contact strip **28** extends the full length of the channel in base **10** and is connected electrically to a suitable binding post on the casing base **10** or, as illustrated, may be connected to a flexible insulated lead **30** which extends through base aperture **10M**.

External connections to the two slip rings **18** and **19** may be accomplished in similar manner. As illustrated, slip ring **18** is contacted by the upstanding resilient end **32A** of wire **32** which is bent to snugly fit and be self-retained in the base channel **10D**. Such wire **32** may be connected to a stationary binding post suitably mounted on base **10** or suitable external connection may be made to wire **32** by a flexible insulated lead **34** extending through channel **10M** (FIGURE 2).

Suitable connection may be made to the other slip ring **19** by a resilient wire **36** (FIGURE 2) having one of its ends fitted into a bore in base **10** with an intermediate portion of such wire **36** being either connected to a binding post or to a flexible insulated wire **38**, also extending through the base bore **10M** for external connection.

Thus, it will be appreciated that the potentiometer described has many uses. For example, a fixed voltage may be applied to the ends of the resistance element **13** through slip rings **18** and **19** and corresponding contacts **32**, **36** which are connected to external leads **34** (FIGURE 9) and **38** (FIGURE 6). A voltage is thus developed on the movable tap **25** and this voltage may be adjusted by adjustment of the stub shaft **20**.

Upon rotation of shaft **20**, the shaft **16** and the resistance element **12** thereon is also rotated, causing the slide block **22** carrying contact **25** to move axially where-

upon different portions of resistance element 12 are contacted by contact 25. Such movement of slide block 22 may continue until the slide block engages either abutment or stop 10H or 10J at either one of the limits of travel of block 22 whereupon continued rotation of the stub shaft 20 results in slippage between it and the main shaft 16, i.e. the driving connection 20D, 16D is automatically rendered ineffective at the two limits of movement.

It will thus be seen that the spirally wound resistance element 12 serves not only as such but also has a lead screw for producing sliding movement of its tap. This construction allows adjustment with little mechanical effort.

It will also be seen that the entire unit may be sealed using conventional sealing means between the base 10 and its lid 11 and between the base 10, shaft 20 and lid 11. Also, a potting compound may be used to seal openings through which the three flexible leads extend.

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. A potentiometer comprising a spirally wound resistance element, means producing rotation of the same while limiting axial movement of the same, and a slider engaged and moved by said element into engagement with different portions of said element, said slider comprising a generally rectangular block in the form of a half nut engaging a plurality of convolutions of said element, a base, said element being rotatably mounted on said base, and said slider being slidably mounted in a groove in said base.

2. A potentiometer as set forth in claim 1 in which a resilient contact element is self-retained on said slider between said slider and said base.

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