March 12, 1968 R. W. SARGENT 3,373,395

HERMETICALLY SEALED MULTI-TRIMMER POTENTIOMETER

Filed Aug. 1, 1967

FIG. 1.

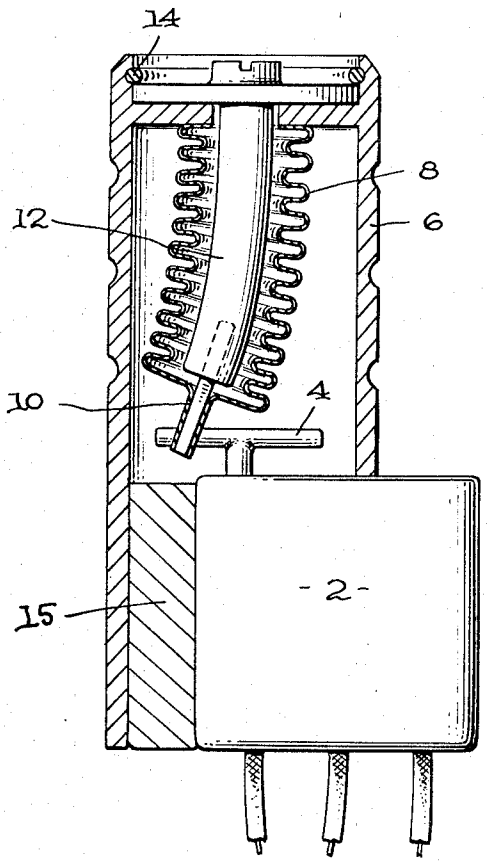
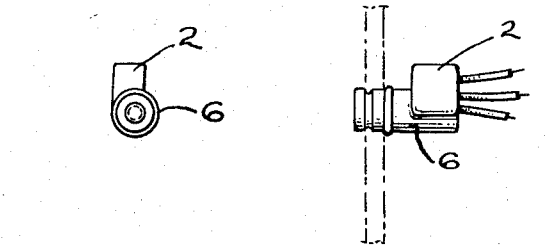


FIG. 2.



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United States Patent Office 3,373,395
Patented Mar. 12, 1968

3,373,395

HERMETICALLY SEALED MULTI-TRIMMER POTENTIOMETER

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Filed Aug. 1, 1967, Ser. No. 657,640
2 Claims. (Cl. 338—164)

ABSTRACT OF THE DISCLOSURE

A sub-miniature multi-turn potentiometer mounted to a solderable metal housing containing a hermetically sealed bent shaft mechanically coupled by means of a crank to the multi-turn potentiometer for adjusting the same within an air-tight environment.

This invention relates to potentiometers and, more particularly, to multi-turn trimmer potentiometers of the type disclosed in Patent No. 3,058,080, issued to Laubenfels, and Patent No. 3,099,809, issued to V. G. Mathison et al.

Generally, multi-turn trimmer potentiometers comprise a single-turn circular resistance element disposed with its member encircling an axis about which a contact carrying slider is moved along the periphery of the resistance element by rotation of a worm in mesh with a worm gear. With the present state of electronics placing a premium on both miniaturization and sensitivity, that is, accuracy of adjustment, it is desirable that such multi-turn potentiometers be hermetically sealed from the atmosphere in an improved manner from that disclosed in applicant's Patent No. 3,184,697, issued May 18, 1965.

Accordingly, it is an object of this invention to provide a multi-turn trimmer potentiometer which is completely sealed in a true hermetic enclosure from the surrounding atmosphere without sacrificing miniaturization and sensitivity of adjustment.

It is another object of this invention to provide an integrated unit which consists of a commercially available sub-miniature multi-turn trimmer potentiometer mounted to a solderable adjustment unit for replacing the conventional rotary hermetic seals and associated trimmer potentiometers.

Briefly, the invention comprises a sub-miniature multi-turn trimmer potentiometer mounted to a solderable metal housing containing a hermetically sealing orbital metal bellows assembly mechanically coupled by means of a crank and T-bar arrangement to the multi-turn potentiometer.

Further objects and advantages of this invention will become apparent from a further reading of the specification and drawings in which:

FIG. 1 is a partial sectional view of the device according to this invention; and

FIG. 2 is a composite front and side detail view of the hermetically sealed multi-turn potentiometer in a mounted position.

Referring now to FIG. 1, the multi-turn potentiometer **2** is a miniaturized commercially available model constructed in a known manner to those skilled in the art. According to the principles of this invention, the potentiometer **2** is provided with an adjustment shaft **4** in the form of a T-bar, as shown. Mounted to the potentiometer **2** is a filler member **15** and a solderably cylindrical metal housing **6** which has soldered to its internal flange a flexible metal bellows **8**, the opposite end of which has a pin **10** soldered thereto for providing an air-tight flexible chamber. A bent shaft **12** is rotatably mounted to the top of the cylindrical housing **6** and a suitable snap-retaining ring **14** is interposed between an outer flange of the

housing **6** and the collar portion of the shaft **12**, as shown, to secure the shaft **12** in its mounted position. The inner end of the shaft **12** is provided with a bore centrally located therein for rigidly receiving one end of the pin **10** by means of running fit. The other end of the pin **10** bears against a portion of the T-bar **4**. A slit in the outer end of the shaft **12** is provided for engagement with a screwdriver or the like so that the shaft may be rotated.

In FIG. 2, there is shown the integrated unit which can be manufactured in standard resistance ratings with provisions for the screwdriver adjustment at one end and the flexible leads or terminals at the other end of the device. The outside cylindrical portion of the housing may also have a tin surface suitable for soft soldering when mounted as shown.

In operation the multi-turn potentiometer **2** may be adjusted by rotating the bent shaft **12**, which causes the outer end of the pin **10** to bear against the T-bar shaft **4** and rotating the same for a required adjustment. Thus, a multi-turn potentiometer **2**, which is constructed according to this invention, may be adjusted in a hermetically sealed environment by means of rotary motion transmitted by the bent shaft **12** through the swiveling flexible metal bellows **8** to the T-bar shaft which, in turn, rotates a suitable contact carrying slider along the length of a circular wound resistance within the potentiometer **2**.

Although only a single embodiment of the invention has been depicted and described, it will be apparent that this embodiment is illustrative in nature and that a number of modifications in the apparatus and variations in its end use may be effected without departing from the spirit or scope of the invention as defined in the appended claims.

That which is claimed is:

1. In a multi-turn potentiometer having a circular wound resistance and a rotatably mounted T-bar rotor adjustment member extending therefrom, a solderable metal housing mounted on said potentiometer and enclosing said T-bar member, a bent shaft member extending into said housing in one end thereof, said shaft member having an outer end portion substantially coaxial with said housing and having an inner end portion offset with respect to the axis of said housing, said outer end portion of said shaft member being rotatably mounted on said housing and having an inner end portion offset with respect to the axis of said housing, said outer end portion of said shaft member being rotatably mounted on said housing and having means positioned thereon for rotating said inner end portion of said shaft member freely about the axis of said housing, a fluid-tight bellows member of flexible metal disposed about said shaft member from said one end of said housing to said inner end portion of said shaft member, said bellows member being bonded about the periphery of one end thereof to said housing member in hermetically sealed relationship therewith adjacent said one end of said housing, the other end of said bellows member being sealed inwardly of said housing from the inner end portion of said shaft member and cooperating with said housing to provide a hermetic seal, and a pin member in sealing engagement with said other end of said bellows extending from the inner end of said shaft member and engaging said T-bar member, whereby said T-bar member is rotated by rotation of said shaft member about the axis of said housing.

2. In a multi-turn potentiometer having a rotatably mounted T-bar rotor adjustment member extending from said potentiometer, a solderable metal housing mounted in an offset relation on said potentiometer and enclosing said T-bar member, a bent shaft member extending into said metal housing in one end thereof, said shaft member having an outer end portion substantially coaxial with

said housing and having an inner end portion offset with respect to the axis of said housing, said outer end portion of said shaft member being rotatably mounted on said housing and having means positioned thereon for rotating said inner end portion of said shaft member freely about the axis of said housing, a fluid-tight bellows member of flexible material disposed about said shaft member from said one end of said housing to said inner end portion of said shaft member, said bellows member being bonded about the periphery of one end thereof to said housing member in hermetically sealed relationship therewith adjacent said one end of said housing, the other end of said bellows member being sealed inwardly of said housing from the inner end portion of said shaft member and thus cooperating with said housing

to provide a hermetic seal and a pin member extending from the inner end of said shaft member and engaging said T-bar member, whereby said T-bar member is rotated by the rotation of said shaft member about the axis of said housing.

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