United States Patent

Bang et al.

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[45] **June 13, 1972**

[54] POTENTIOMETER ADJUSTABLE BY ROTATABLE DRUM

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[52] **U.S. Cl.** **338/180,** 338/183

[51] **Int. Cl.** **H01c 9/02**

[58] **Field of Search** 338/180, 181, 183, 176

[56] **References Cited**

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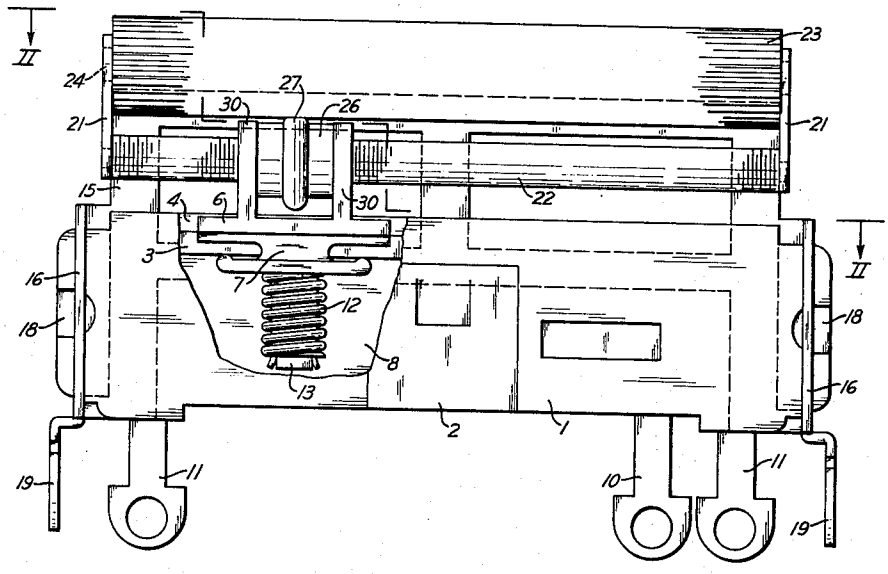
[57] **ABSTRACT**

The front wall of the elongated case of a linear motion potentiometer is provided with a longitudinal slot, in which a slide is disposed. The slide carries a bridging contact inside the case, where it engages spaced parallel resistor and collector elements. In front of the case and parallel to the slot are a stationary lead screw and a manually rotatable cylindrical drum, both supported from the case. The drum, when rotated, rotates internally threaded cylindrical means mounted on the screw and thereby moves it along the screw and drum. The slide is connected with the rotatable means so that the slide will be moved lengthwise of the case when the drum is rotated.

8 Claims, 4 Drawing Figures



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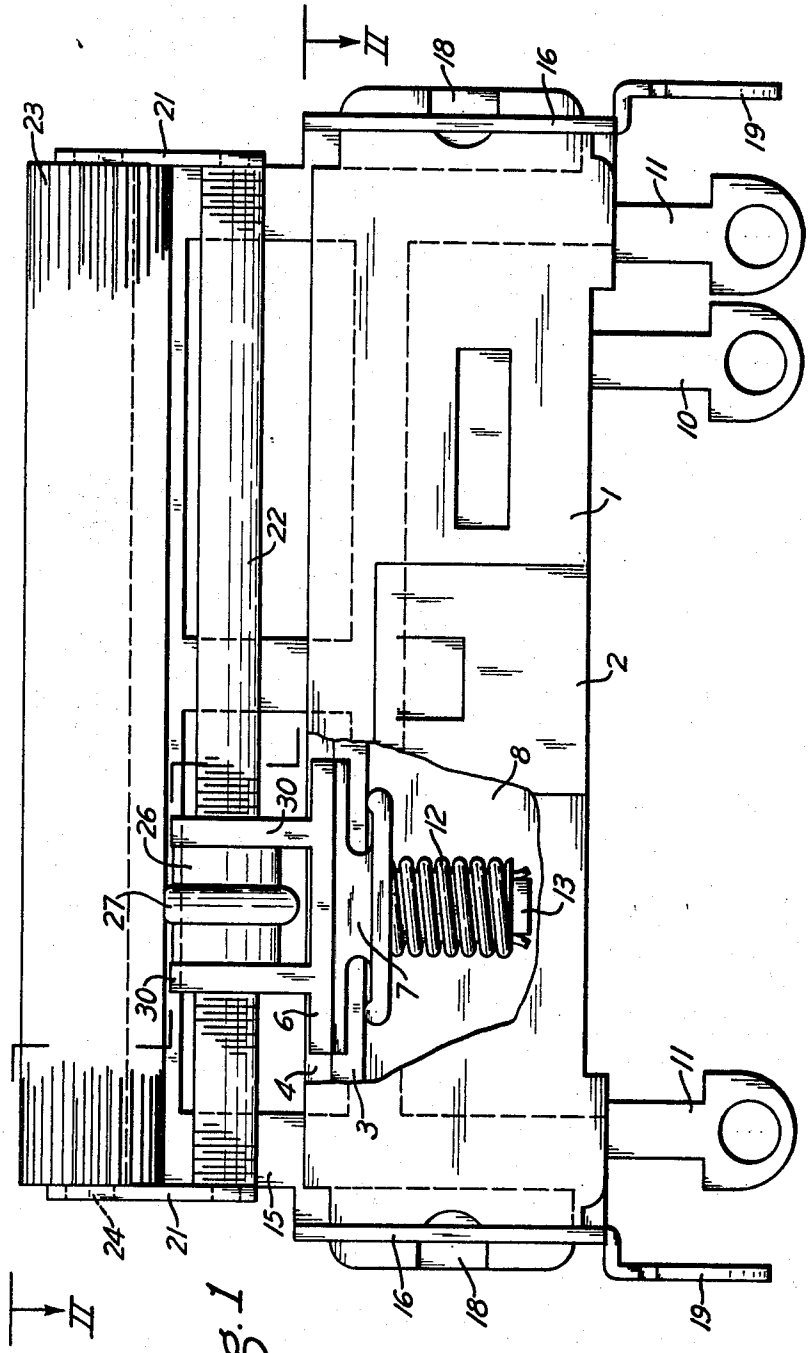

Fig. 1

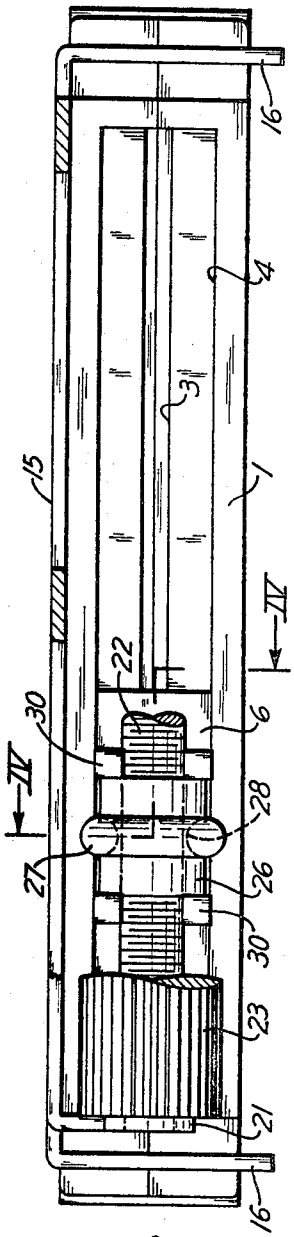

Fig. 2

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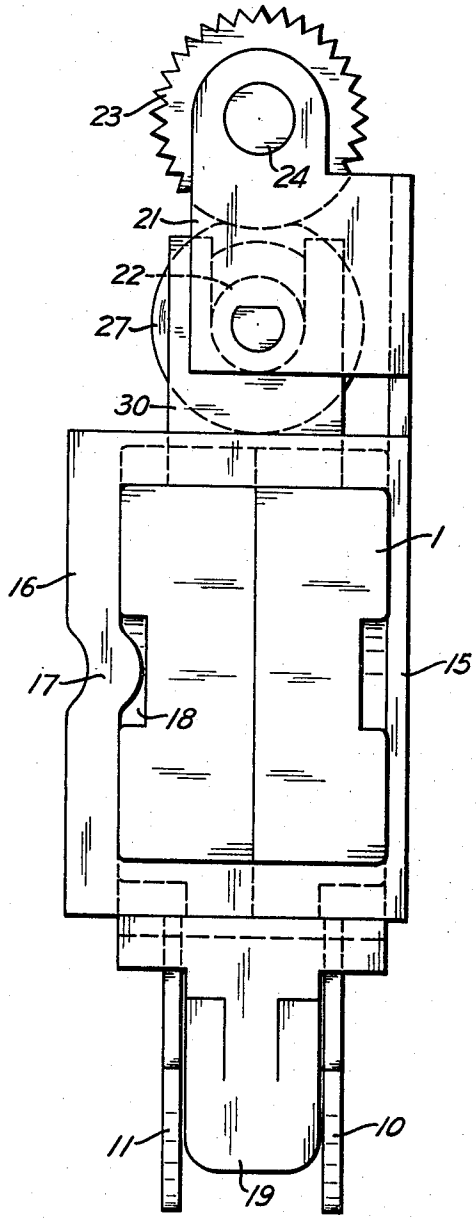

Fig. 3

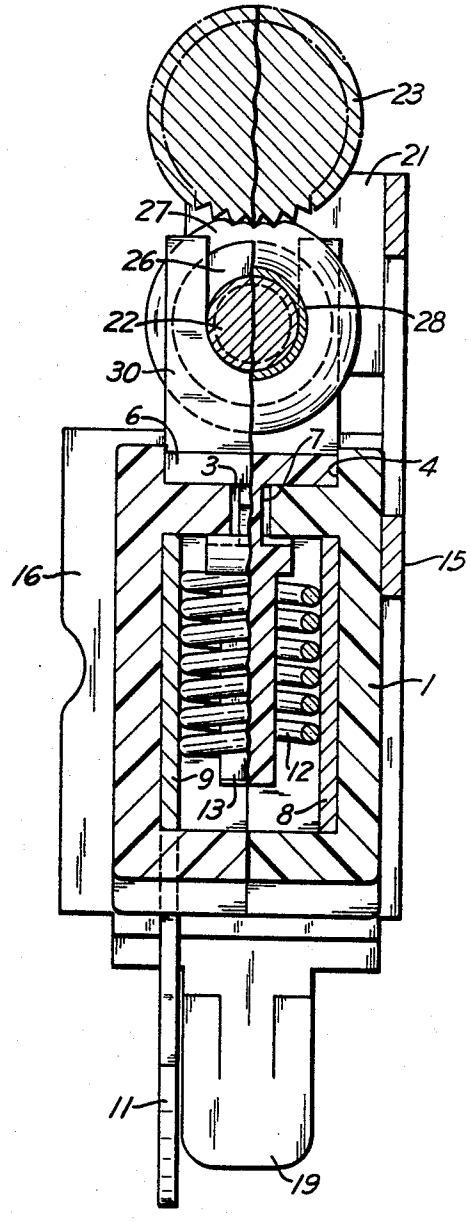

Fig. 4

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POTENTIOMETER ADJUSTABLE BY ROTATABLE DRUM

A linear motion variable resistor is known, in which a short internally threaded member is rotatably mounted on a rack bar extending lengthwise of the device so that when the rotatable member is turned its engagement with the sectional threads of the bar will cause it to move along the bar and adjust the resistance. If such a device is mounted behind a panel that has a slot in it, from the front of which the rotatable member projects so that it can be turned from in front of the panel, the appearance is not good because the slot reveals the rack bar and other parts behind it at the opposite ends of the rotatable member, and for different adjustments of the resistance the rotatable member is located different distances from the ends of the slot.

It is among the objects of this invention to provide a linear motion potentiometer of the general type just referred to, in which the rotatable member is concealed behind a long rotatable drum that also covers the bar or screw on which the rotatable member is mounted.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a side view partly broken away;

FIG. 2 is a front view thereof, taken on the line II—II of FIG. 1;

FIG. 3 is an enlarged end view; and

FIG. 4 is a cross section taken on the line IV—IV of FIG. 2.

Referring to the drawings, the long rectangular case 1 of a linear motion potentiometer may be formed from any suitable material, such as a molded plastic or other rigid material. Preferably, the case is made from two molded half sections that meet along a central longitudinal plane extending through the front and back of the case. The two half sections may be held together by a central spring clip 2. The front wall of the case has a longitudinal slot 3 through it extending lengthwise of the case for most of its length. Preferably, the slot opens outwardly into a rectangular recess 4 in the outer surface of the front wall.

Slidably mounted in the case slot is a slide 6 that has laterally opening grooves 7 receiving the side walls of the slot so that the slide is locked in the slot and can move only lengthwise of it. Inside the case a metal collector strip 8 and an electric resistor strip 9 are mounted on opposite sides of the case. The collector strip is provided with a terminal 10 that extends out through the back of the case, and metal terminals 11 clamped onto the ends of the resistor strip likewise extend through the back. Between the two strips and in engagement with them there is a bridging contact that is carried by the slide. This contact may be a wire coil 12 encircling a central post 13 projecting rearwardly from the slide.

In accordance with this invention, a metal bracket is rigidly mounted on the case. This bracket has a flat body 15 engaging one side of the case and extending forward away from it. The bracket also has end portions 16 bent into parallel relation with each other and provided with openings that receive the ends of the case. The ends of the bracket therefore form frames around the ends of the case and are tightly connected to it by deformed portions 17 projecting into recesses 18 in the side of the case, as shown in FIG. 3. These same ends of the bracket may be provided with rearwardly extending tabs 19, by which the unit can be rigidly mounted in a supporting panel or circuit board.

In front of the case the bracket has another pair of parallel end portions 21, but these are for supporting a lead screw and a rotatable drum. The lead screw 22 is located a short distance in front of the case and is parallel to the slot 3, which it overlies. The ends of the screw are rigidly mounted in the bracket ends 21 so that the screw cannot turn. Directly in front of the screw, but spaced a short distance from it, is a long cylindrical drum 23 provided at its opposite ends with trunnions 24 rotatably mounted in holes in the ends of the bracket. It is desirable that the drum be knurled. The axes of the drum and screw preferably lie in the central longitudinal plane of the case slot, as shown in FIGS. 3 and 4.

There are means rotatably mounted on the screw for movement along it and for engagement by the drum, preferably frictional engagement. This rotatable means may be formed from a cylindrical nut 26 threaded on the screw and encircled by a friction ring 27 that is secured to it and pressed against the drum. Preferably, the nut is provided with a central peripheral annular groove 28 and the ring is a resilient O-ring tightly engaging the nut in the groove but projecting from it. It will be seen that when the drum is rotated by a finger or thumb, its engagement with the friction ring will cause it to rotate the nut, which will then move lengthwise along the screw. The ring moves lengthwise of the drum as both of them are turning. In place of a friction ring, the nut could be provided with gear teeth and the drum likewise could have teeth extending from end to end. However, such a construction requires great accuracy of manufacture, so the friction ring is preferred.

Means is provided for connecting the nut 26 with the slide 6 so that the latter will be adjusted along the case by the nut as the latter travels along the screw. A preferred way of doing this is to provide the slide with a pair of parallel bifurcated members 30 extending forward from it and straddling the screw. These two members engage the opposite ends of the nut so that the slide will be moved whenever the nut moves, regardless of the direction of movement of the nut along the screw.

Although a lead screw has been described herein, it will be realized that all that is required is that the member on which the circular nut travels have enough of a screw thread to cause the nut to move along it when the nut is rotated. Therefore, a rack bar with broken or sectional threads could be used just as well and is intended herein to be covered by the term "lead screw."

When the potentiometer disclosed herein is mounted behind a panel, with the drum in a slot in the panel and projecting a short distance in front of it for easy manipulation, the drum will fill the slot and conceal everything behind it, whereby a good appearance is provided. Furthermore, the appearance of that area of the panel will not change when the potentiometer is adjusted, because the drum does not move lengthwise with the slide but always remains in the same position. Also, if it is desired to be able to obtain even finer resistance adjustments with rather coarse adjustments of the drum, a smaller diameter drum can be used to change the "gear" ratio between the drum and the rotatable nut. By widening the panel slot a little, the slide can be provided with a pointer that can be seen and which will indicate the position of the slide.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. A linear motion potentiometer comprising an elongated case having a front wall provided with a longitudinal slot therein, spaced parallel resistor and collector elements mounted in the case and extending lengthwise thereof, a slide disposed in said slot, a ridging contact in the case carried by the slide in engagement with both of said elements, a stationary lead screw in front of the case parallel to the slot, a manually rotatably cylindrical drum adjacent said screw and parallel thereto, means mounted on the case rigidly supporting the screw and rotatably supporting the drum, internally threaded cylindrical means rotatably mounted on the screw for movement along it and the drum, said rotatably means being engaged by the drum for rotation by it, and means connecting said rotatable means with the slide for moving the slide lengthwise of the case.

2. A linear motion potentiometer according to claim 1, in which said rotatable means includes a circular nut and a friction ring encircling it and secured tightly thereto, said ring frictionally engaging the drum.

3. A linear motion potentiometer according to claim 1, in which said rotatable means includes a circular nut provided with a peripheral annular groove, and a resilient ring in said groove tightly engaging the nut and frictionally engaging the drum.

4. A linear motion potentiometer according to claim 1, in which said connecting means include forwardly extending projections of said slide engaging the opposite ends of said rotatable means.

5. A linear motion potentiometer according to claim 1, in which said connecting means include bifurcated members extending forward from said slide and straddling said screw, said members engaging the opposite ends of said rotatable means.

6. A linear motion potentiometer according to claim 1, in

which said drum-supporting means is bracket means clamped onto the opposite ends of the case and having parallel end portions provided with openings receiving the ends of said drum and screw.

7. A linear motion potentiometer according to claim 6, in which said bracket means has a side portion extending along one side of the case and integrally connecting said end portions.

8. A linear motion potentiometer according to claim 6, in which said bracket means has a side portion extending along one side of the case and integrally connecting said end portions, and said end portions surround the ends of the case and tightly engage them.

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