United States Patent [19]

Bang

[11] **3,719,915**

[45] **March 6, 1973**

[54] **COARSE AND FINE ADJUSTMENT POTENTIOMETER**

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[73] Assignee: **Stackpole Carbon Company,** St. Marys, Pa.

[22] Filed: **May 22, 1972**

[21] Appl. No.: **255,588**

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

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

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

[56] **References Cited**

UNITED STATES PATENTS

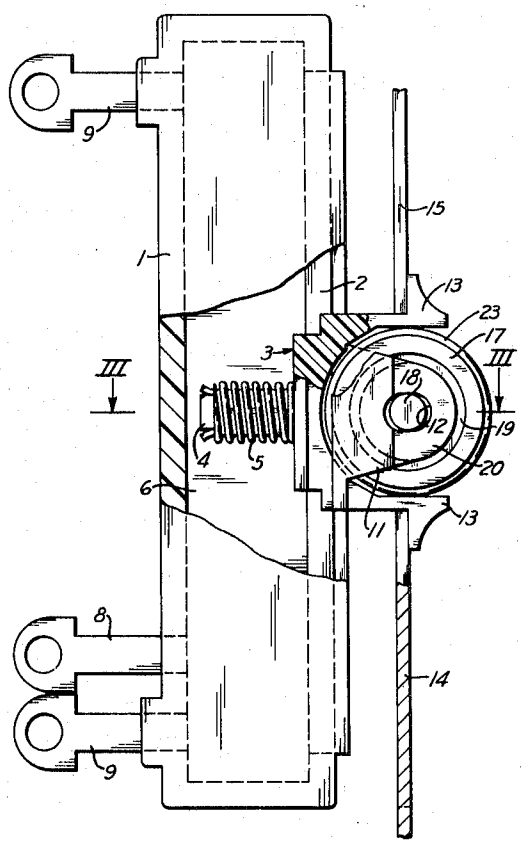
3,504,326	3/1970	Campbell	338/183
3,525,970	8/1970	Olson et al.	338/183
3,555,484	1/1971	Bang	338/183
3,582,860	6/1971	Milovac	338/183
3,617,979	11/1971	Purdy	338/183
3,670,286	6/1972	Bang et al.	338/183 X

Primary Examiner—Harold Broome
Assistant Examiner—D. A. Tone
Attorney—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

The front wall of a linear motion potentiometer case has a longitudinal slot in it, in which is disposed a slide that carries a bridging contact in sliding engagement with resistance and collector elements inside the case. The slide has laterally spaced side walls projecting forward from the slot and provided with a pair of opposed transverse openings elongated forward and receiving the hubs of a wheel fitting between the walls. The wheel is encircled by a friction ring and the hubs are movable rearwardly in the wall openings by finger pressure applied to the front portion of the ring to press it against the case at the opposite edges of the slot so that the ring will roll along the case when the ring is rotated and carry the slide with it.

6 Claims, 6 Drawing Figures



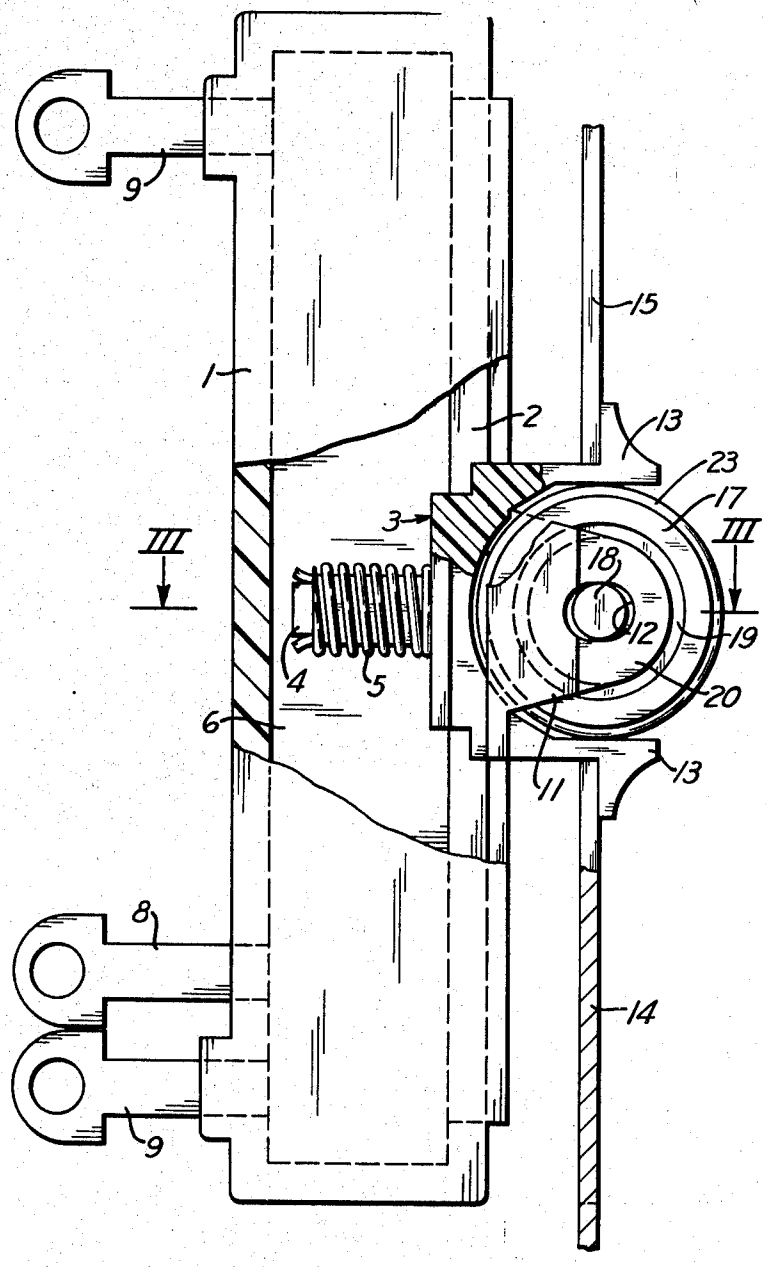

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15
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III
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III
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Fig. 2

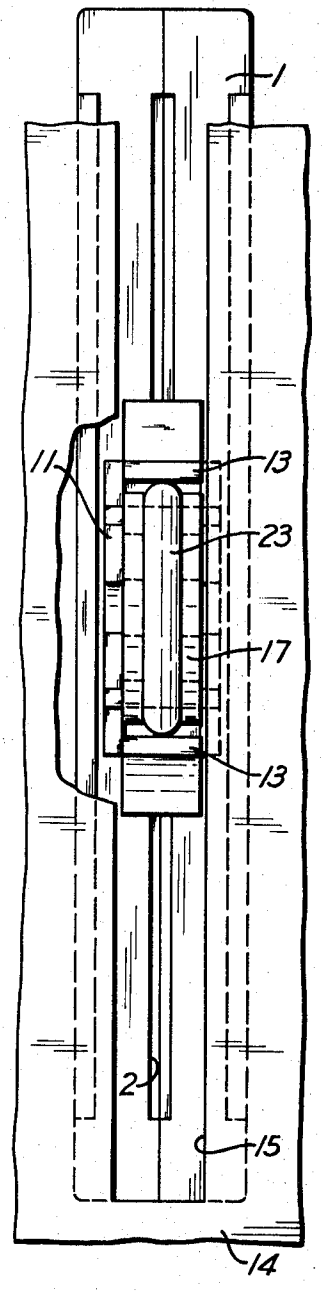

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Fig. 1

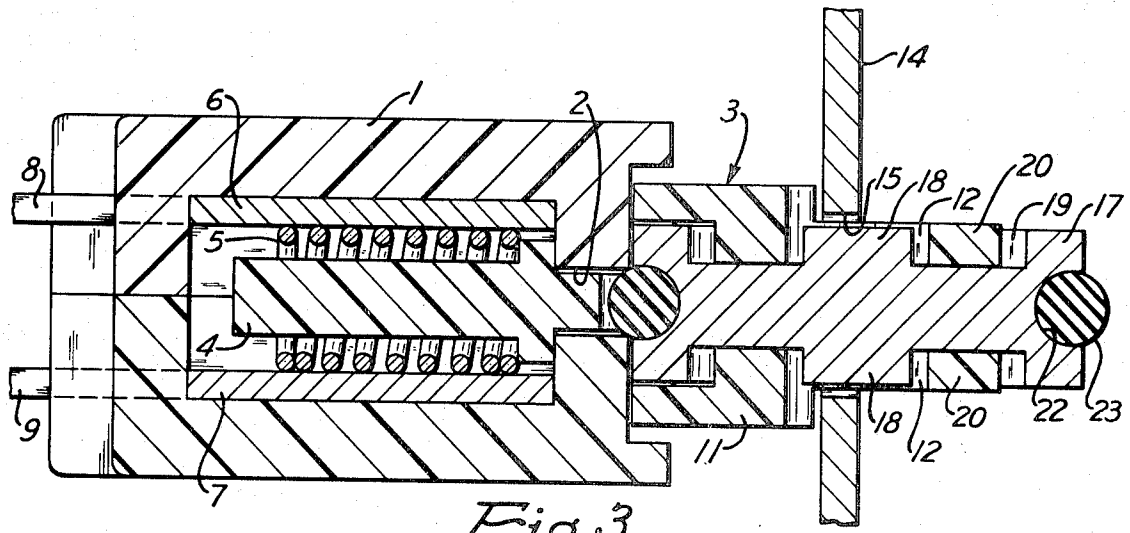


Fig. 3

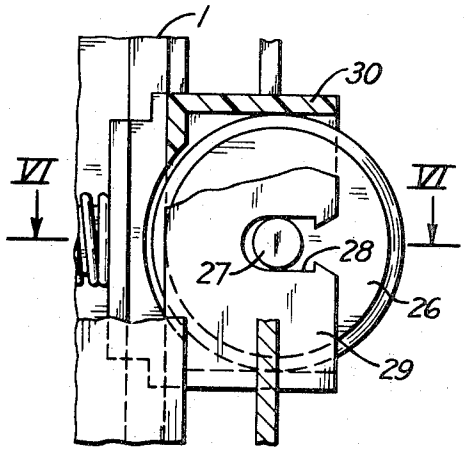


Fig. 5

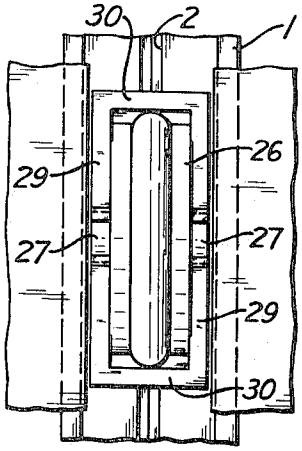


Fig. 4

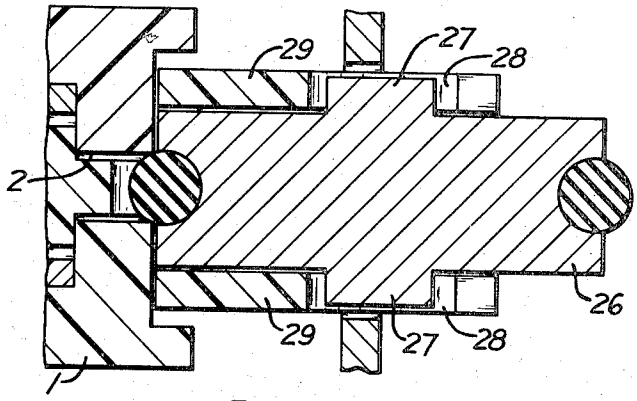


Fig. 6

COARSE AND FINE ADJUSTMENT POTENTIOMETER

Linear motion potentiometers are well known. One type is disclosed in my U.S. Pat. No. 3,362,004, in which a slide is movable along a slot in the front of a case to move a bridging contact along resistance and collector elements inside the case. A similar potentiometer is shown in U.S. Pat. No. 3,504,326, but it is capable of finer adjustment because the slide can be moved by turning a friction ring that engages a special side wall projecting forward from the slotted side of the case. To turn the friction ring a knob has to be twisted.

It is among the objects of this invention to provide a linear motion potentiometer which permits both coarse and fine adjustments to be made, which permits both adjustments to be made by moving a finger lengthwise of the potentiometer, which has extremely simple and inexpensive means for making fine adjustments, and in which the fine adjustment member can be quickly slipped into place during assembly.

The invention is illustrated in the accompanying drawings, in which

FIG. 1 is a front view of a potentiometer behind a panel that is broken away;

FIG. 2 is a side view of the potentiometer, shown partly in section;

FIG. 3 is an enlarged cross section taken on the line III—III of FIG. 2; and

FIGS. 4, 5 and 6 are fragmentary views of a modification corresponding to FIGS. 1, 2 and 3, respectively.

Referring to FIGS. 1, 2 and 3 of the drawings, the long rectangular case 1 of a potentiometer has a front wall provided with a central slot 2 extending lengthwise of the case for nearly its full length. Slidably mounted in the slot for movement lengthwise of the case is a slide 3 that has laterally opening grooves in its opposite sides receiving the front wall of the case at the opposite sides of the slot to hold and guide the slide. The purpose of the slide is to support and move a bridging contact. For this purpose, the slide may be provided with a post 4 that extends rearwardly in the case and that is encircled by a metal coil 5 that serves as a bridging contact engaging a metal collector strip 6 and an electrical resistance strip 7 located at opposite sides of the inside of the case. The collector strip is provided with an integral terminal 8 that extends through the bottom or back of the case, and each end of the resistance strip is connected to another terminal 9 likewise extending through the back.

The portion of the slide outside of the case has laterally spaced side walls 11 projecting forward from it and provided with a pair of opposed transverse openings 12 that are elongated forward a slight amount. These two walls are not connected together at their front ends, so that the front ends of the walls can be sprung apart slightly for a purpose to be explained later. The slide and post 4 and side walls 11 are preferably molded in one piece from a suitable plastic. Although the side walls could be grasped in the fingers to move the slide back and forth along the case, it is preferred to provide end walls 13 for that purpose. They project forward from the slide about the same distance as the side walls, but are independent of them. When the potentiometer is mounted in place behind a panel 14 provided with a slot 15, the front portions of end walls 13 will project from the front of the panel and

can be used for moving the slide back and forth to make coarse adjustments of the potentiometer.

It is a feature of this invention that fine adjustments also can be made. Accordingly, between side walls 11 of the slide there is a small wheel 17 that has hubs 18 rotatably disposed in the wall openings 12. The width of the openings is substantially the same as the diameter of the hubs so that the hubs can move only lengthwise; i.e., forward and backward, of the openings. The central portion of the wheel has substantially the same thickness as its rim portion, so the hubs are formed by providing each side of the wheel with an annular recess 19 concentric with the wheel. The hubs form the inner walls of these recesses. Since the hubs do not project, at least a noticeable distance, beyond the rim portion of the wheel, the side walls 11 of the slide have annular portions 20 that are disposed in the wheel recesses so that openings 12 can receive the hubs.

The outer surfaces of the side walls, at least in front of the hub openings 12, are substantially flush with the outer ends of the hubs as shown in FIG. 3. Preferably, however, these flush surfaces extend back at least as far as lines close to the rear ends of the openings. Consequently, everything in front of these lines is no thicker than the wheel itself, with the result that the panel slot need be only wide enough to receive the wheel 17. Such a narrow slot has the advantage that less of the potentiometer can be seen through it than otherwise would be the case.

The wheel is encircled by a friction ring that is rigidly mounted on it. Preferably, the periphery of the wheel is provided with an annular groove 22 (FIG. 3) that is semicircular in cross section and that contains a rubber O-ring 23 that tightly engages the wheel and projects radially from it. Due to the elongated openings 12 for the wheel hubs, the friction ring normally only lightly touches the case and in some instances may even be spaced from it slightly. When the portion of the slide projecting from the panel slot is moved back and forth to make coarse adjustments of the potentiometer, the ring will generally slip along the case and not turn. On the other hand, when fine adjustment is desired, a finger is laid on the exposed front portion of the friction ring and a slight pressure is applied to the ring as the finger is moved lengthwise of the case. This causes the wheel to turn and simultaneously presses the ring against the case at the opposite edges of the case slot so that as the ring rotates it will roll along the case. The wheel, through its hubs, therefore moves the slide lengthwise of the case. It is considerably easier to control turning of the wheel only a slight amount than to control pushing of the slide directly the same distance, whereby very fine adjustments can be made.

In the modification shown in FIGS. 4, 5 and 6 of the drawings, the opposite sides of the wheel 26 are flat and the hubs 27 project laterally from it into elongated openings 28 in the forwardly projecting side walls 29 of a slide. These walls engage the opposite sides of the wheel. The side walls are joined by end walls 30. In order to insert the hubs in the wall openings, the front ends of the latter are open to receive the hubs, as shown in FIG. 5, but the front ends are narrower than the hubs and therefore must be sprung apart slightly to permit the hubs to be pressed back into the openings.

The required resiliency can be obtained by molding the slide and its projecting walls from a plastic. Preferably, the opposite sides of the restricted front ends of each opening diverge forward so that when the hubs are pressed rearwardly against them a wedging action is produced that spreads the sides further apart until the hub snaps past them. It will be seen that with this potentiometer coarse and fine adjustments can be made in the same way as with the one first described, but that a somewhat wider panel slot is required because the thickness of the side walls of the slide are added to the thickness of the wheel, as can be seen in FIGS. **4** and **6**.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I 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.

I claim:

1. A coarse and fine adjustment linear motion potentiometer comprising an elongated case having a front and back connected by side walls, the front of the case having a longitudinal slot therein, resistance and collector elements disposed in the case lengthwise thereof, a slide disposed in said slot and movable lengthwise thereof, a bridging contact inside the case carried by the slide in sliding engagement with said elements, said slide having laterally spaced side walls projecting forward from said slot and provided with a pair of opposed transverse openings elongated forward, a wheel fitting between said walls and having hubs rotatably disposed in said openings and movable only lengthwise thereof, and a friction ring encircling the wheel and rigidly mounted thereon, said hubs being movable rearwardly in said openings by finger pressure applied to the front portion of the ring to press the ring against the case at the opposite edges of said slot so that the ring will roll along the case when the ring is rotated and carry the slide with it.

2. A potentiometer according to claim **1**, in which said wheel is provided in each side with an annular recess around the adjoining hub, the thickness of the central hub portion of the wheel is substantially the same as its rim portion around said recesses, said side walls have annular portions disposed in said recesses, and the outer surfaces of said side walls in front of said openings are substantially flush with the outer ends of the hubs.

3. A potentiometer according to claim **2**, in which said substantially flush surfaces extend back to lines close to the rear ends of said elongated openings.

4. A potentiometer according to claim **2**, in which said slide has end walls projecting forward beside said ring for gripping between the fingers to move the slide along the case, and the front end portions of said end walls are substantially as narrow as said wheel.

5. A potentiometer according to claim **1**, in which the opposite sides of said wheel are flat and said hubs project from them into said openings, the front ends of said openings are open but narrower than the hubs, and the sides of said front ends of the openings are adapted to be sprung apart by pressure of the hubs against them to permit the hubs to be snapped into the openings.

6. A potentiometer according to claim **5**, in which said slide has end walls joining said side walls.

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