Feb. 24, 1970 E. A. PFEUFER 3,497,857

COMBINED LINEAR MOTION POTENTIOMETER AND SWITCH

Filed Jan. 4, 1968 2 Sheets-Sheet 1

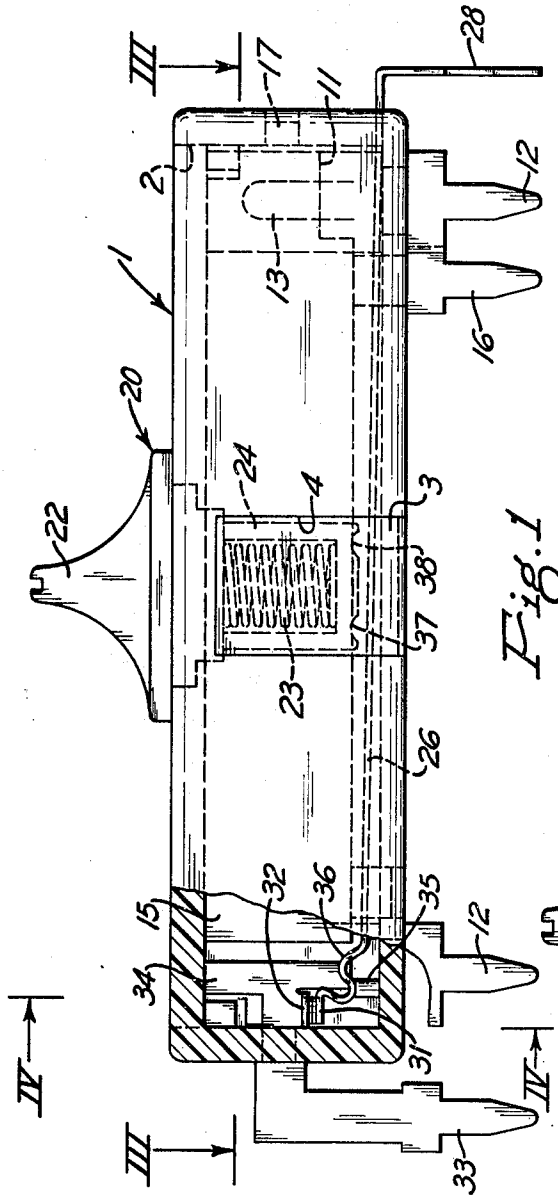


Fig. 1

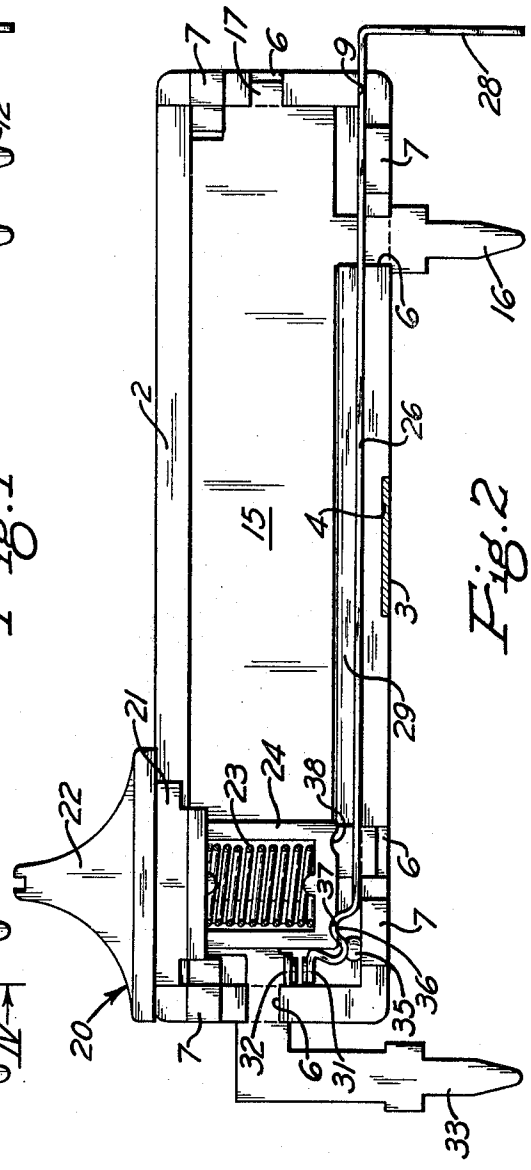


Fig. 2

INVENTOR

EARL PFEUFER

BY Brown, Critchlow, Flick & Peckham

ATTORNEYS.

Feb. 24, 1970 E. A. PFEUFER 3,497,857

COMBINED LINEAR MOTION POTENTIOMETER AND SWITCH

Filed Jan. 4, 1968 2 Sheets-Sheet 2

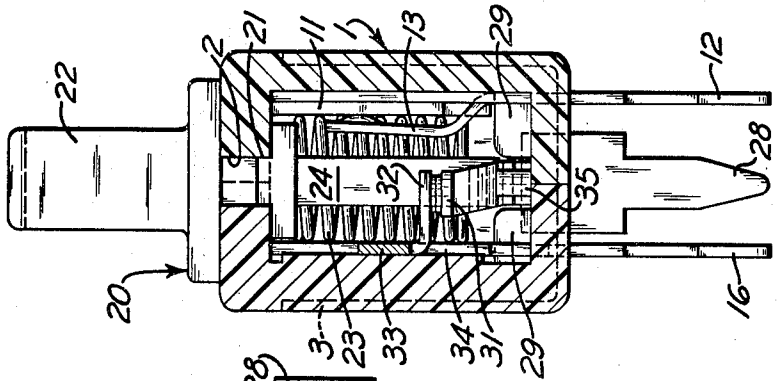


Fig. 4

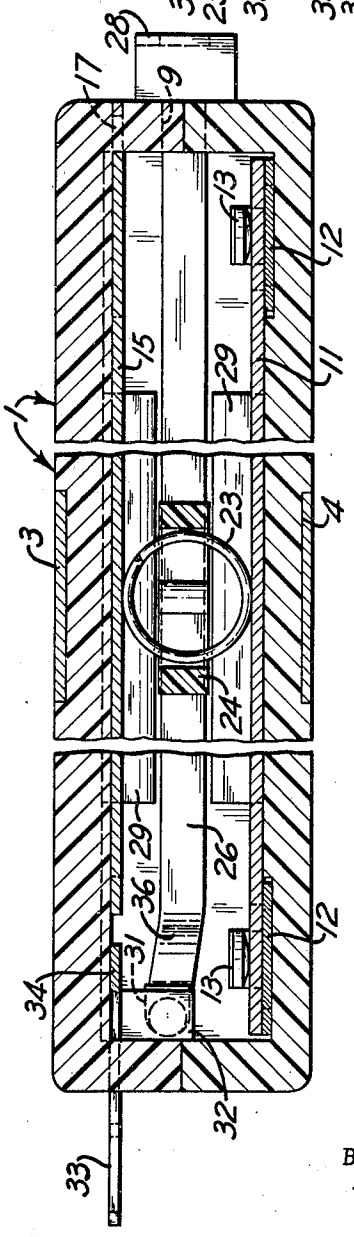


Fig. 3

INVENTOR
EARL PFEUFER

BY Brown, Critchlow, Flick & Peckham
ATTORNEYS.

United States Patent Office 3,497,857 Patented Feb. 24, 1970

3,497,857

COMBINED LINEAR MOTION POTENTIOMETER AND SWITCH

Earl A. Pfeufer, St. Marys, Pa., assignor to Stackpole Carbon Company, St. Marys, Pa., a corporation of Pennsylvania

Filed Jan. 4, 1968, Ser. No. 695,647
Int. Cl. H01c 5/08
U.S. Cl. 338—178 6 Claims

ABSTRACT OF THE DISCLOSURE

A resistance strip and a collector strip are mounted opposite each other in a housing and are engaged by a bridging contact between them carried by an insulating slide. A switch spring contact strip is disposed between the other two strips at one edge thereof and has a free end normally engaging a fixed contact. The spring contact strip has a portion near the fixed contact in the path of the inner end of the slide for engagement thereby to spring the contact strip away from the fixed contact when the slide is at that end of the housing.

It is among the objects of this invention to provide a combined linear motion potentiometer and switch, in which the member that moves the bridging contact also operates the switch, which is simple and inexpensive in construction, which has a minimum of parts, which can be assembled quickly and which is compact and durable.

In accordance with this invention an elongated housing has a front and back wall connected by parallel side walls. A resistance strip is disposed inside the housing along one side wall, and a collector strip is disposed inside the housing along the other side wall. The front of the housing is provided with a central longitudinal slot, in which a slide is mounted for movement lengthwise of the housing. The slide extends inwardly across the strips and carries a bridging contact in engagement with them.

Between the two strips there is a switch spring contact strip that extends along the inner surface of the back of the housing and has a stationary end. The opposite or free end of the contact strip normally engages a fixed contact mounted in the housing between the contact strip and the front wall of the housing. The contact strip also has a portion near the fixed contact disposed in the path of the inner end of the slide for engagement by it in order to spring the contact strip away from the fixed contact when the slide is at that end of the housing.

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

FIG. 1 is a side view, with a piece of the rear wall broken away;

FIG. 2 is an inside view of half of the unit, with the switch open;

FIG. 3 is a longitudinal section taken on the line III—III of FIG. 1; and

FIG. 4 is a cross section taken on the line IV—IV of FG. 1.

Referring to the drawings, the elongated rectangular housing **1** of the potentiometer may be formed of a molded plastic or other suitable rigid material. The top or front wall of the housing is provided with a central longitudinal slot **2** through it extending nearly the full length of the housing. The housing preferably is made from two molded half sections that have meeting edges extending from front to back across the end walls of the housing and lengthwise along its bottom or back wall. The meeting edges of the two molded half sections may be joined together in any suitable manner, such as by a

spring clip **3** snapped into recess **4** in the back and side walls of the two sections.

Each of the meeting edges of the half sections is provided with notches **6** and tongues **7**. The tongues on each half section fit in the notches in the other half section so that the two sections interlock with each other. The tongues are shorter than the notches so that rectangular openings are left at the outer end of the tongues for a purpose to be described. A shallow opening **9** extends through each end wall of the housing at the same level as the adjoining inner surface of the back wall. This opening is formed partly in each half section of the housing.

Disposed inside the housing, flat against one side wall, is a straight flat strip **11** to which electric resistance material has been applied. Electric terminals **12** are connected to opposite ends of the strip and extend out of the housing. The terminals may take various forms, but preferably each is formed from a narrow flat metal strip that has a spring tongue **13** struck out of its inner end portion. As shown in FIG. 4, this tongue and the opposed portion of the terminal straddle and tightly clamp the resistance element between them. The terminal extends out of the housing through one of the openings in its back wall and has lateral projections that engage the outer surface of that wall to prevent the terminal from being pushed into the housing.

Disposed flat against the inner surface of the other side of the housing is a metal collector strip **15**, which is provided near one end with an integral terminal **16** that extends out through an opening in the back wall of the housing. The same end of the collector strip is provided with an ear **17** projecting into an opening **16** in the adjacent end of the housing. There is no problem in assembling the strips and terminals with the housing, because it is done before the two half sections of the housing are joined together.

Movable lengthwise of the housing is a slide **20** made of insulating material and the opposite sides of which are provided with parallel longitudinal grooves **21** that receive the side walls of the slot **2** in the front of the housing, whereby the slide is locked in the housing but can be moved back and forth along the slot. The slide has actuating knob **22** that projects from the housing. The slide extends inwardly across the resistance and collector strips, from both of which it is spaced. This inner portion of the slide carries a bridging contact **23** that engages both strips to electrically connect them. One way of making the inner portion of the slide is in the form of a rectangular frame **24**, in which a flexible metal coil is carried. The coil projects from opposite sides of the frame and is compressed laterally slightly by the two strips that it engages. Each of the two strips that the wire coil presses against will be slidingly engaged by each convolution of the coil, thereby providing a multiplicity of contacts with each strip.

It is a feature of this invention that the housing also contains an electrical switch that is operated by the slide. Accordingly, a metal spring contact strip **26** extends along the inner surface of the back wall of the housing between the resistance strip and the collector strip. One end portion of the contact strip extends out through opening **9** in the adjoining end of the housing and then is bent at right angles to form a rearwardly projecting electric terminal **28**. The contact strip fits tightly in the slot, which thereby anchors that end of the strip. The opposite or free end of the strip is at the opposite end of the housing. It is highly desirable to provide the inside of the back wall of the housing with a pair of laterally spaced ledges **29** that are integral with it and with the side walls also, as shown in FIG. 4. These ledges stop short of the termi-

nals that extend out of the back of the housing. The ledges space the resistance and the collector strips from the back wall and provide a groove between them, in which the contact strip is disposed. The two ledges therefore prevent any lateral movement of the contact strip that otherwise might occur if its free end were free to swing laterally by causing the opposite end to prevent sliding in the end wall slot.

As shown in FIGS. 1 and 2, the free end of the contact strip **26** is bent to extend toward the front of the housing and then is bent out toward the adjacent end wall to form a flat contact **31**. Between this contact and the front wall there is a fixed contact **32** that extends laterally, as shown in FIGS. 3 and 4, toward the side wall of the housing along which the collector strip extends. The adjacent end of the collector strip is spaced far enough from the end of the housing to provide room for the inner end of a terminal **33** integrally connected with the fixed contact and extending out through a slot **6** in the end wall. Outside the housing the terminal makes a right angle turn and extends rearwardly parallel to the other terminals. The inner end of terminal **33** preferably has an integral extension **34** that engages flat against the side wall of the housing and extends in back of as well as in front of the fixed contact to help steady it. The spring contact **31** engages the fixed contact to maintain the switch closed as long as the slide is not at that end of the housing, as shown in FIG. 1. A considerable length of the spring contact strip **26**, extending inwardly from its free end, is spaced from the back wall of the housing while the switch is closed. To avoid any possibility of the switch not closing, a suitable slightly compressed resilient or spring device may be mounted between contact **26** and the back wall of the housing to urge the contact toward fixed contact **32**. A tiny block **35** of sponge rubber, for example, can be used for this purpose.

To open the switch, the slide is moved toward the fixed contact. Just before it reaches that contact it engages a portion of the contact strip in its path and springs the free end of the strip away from the fixed contact as shown in FIG. 2. The portion of the contact strip thus engaged preferably is a hump **36** that is formed in the strip close to its free end. The inner end of the slide engages this hump and slides onto it, thereby pushing the free end of the strip toward the back wall of the housing and opening the switch to take the resistance strip out of the circuit. As soon as the slide moves lengthwise of the housing away from the hump, the contact strip moves forward and engages the fixed contact again. The value of the resistance at any given time depends on the location of the slide lengthwise of the housing. To help hold the slide in its switch-opening position, and also to give the operator the "feeling" that the slide has opened the switch, the inner end of frame **24** may be provided with a notch **37** that will receive hump **36**. A similar notch **38** at the other side of the frame will serve the same purpose if the slide is reversed when inserted in the housing, thereby making it unnecessary to insert the slide in any particular way.

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 combined linear motion potentiometer and switch, comprising an elongated housing having front and back walls connected by parallel side walls, a resistance strip disposed inside the housing along one side wall, electric terminals engaging the opposite ends of the strip, a collector strip disposed inside the housing along the other side wall and provided with a terminal, the front of the housing being provided with a central longitudinal slot therethrough, a slide mounted in said slot and movable lengthwise thereof, the slide extending inwardly across said strips and spaced from both, a bridging contact carried by the slide in engagement with both strips, a switch spring contact strip extending along the inner surface of said back wall between said resistance and collector strips and having a stationary end and a free end, a terminal connected with said stationary end of the contact strip adjacent one end of the housing, a fixed contact mounted in the opposite end of the housing between said free end of the contact strip and the front wall of the housing, a length of the contact strip adjacent the fixed contact normally being spaced from said back wall to hold said free end against the fixed contact, and a terminal connected with the fixed contact, the spring contact strip having a portion near the fixed contact in the path of the inner end of the longitudinally movable slide for engagement thereby to spring the contact strip away from the fixed contact when the slide is at that end of said housing.

2. A combined linear motion potentiometer and switch according to claim **1**, in which said spring contact strip portion is a reversely bent hump in the contact strip.

3. A combined linear motion potentiometer and switch according to claim **1**, in which all of said terminals extend rearwardly away from said housing.

4. A combined linear motion potentiometer and switch according to claim **1**, in which the switch terminals extend out of the opposite ends of the housing and then rearwardly, and said resistance and collector terminals extend through the back wall of the housing.

5. A combined linear motion potentiometer and switch according to claim **1**, in which said fixed contact extends part way across the housing from said other side wall from a point between the collector strip and adjacent end of the housing, and said last-mentioned terminal extends through said adjacent end of the housing and is integrally connected to the fixed contact beside said other side wall.

6. A combined linear motion potentiometer and switch according to claim **2**, in which the inner end of the slide is provided with a notch for receiving said hump when the switch is open.

References Cited

UNITED STATES PATENTS

3,389,365	6/1968	Matthews et al.	338—200
3,375,446	3/1968	Guyton	338—198 X
2,457,095	12/1948	Strother	338—200 X

LARAMIE E. ASKIN, Primary Examiner

A. T. GRIMLEY, Assistant Examiner

U.S. Cl. X.R.

200—166; 338—198