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ELECTRIC SWITCH AND VARIABLE LINEAR RESISTOR

Filed Oct. 21, 1965

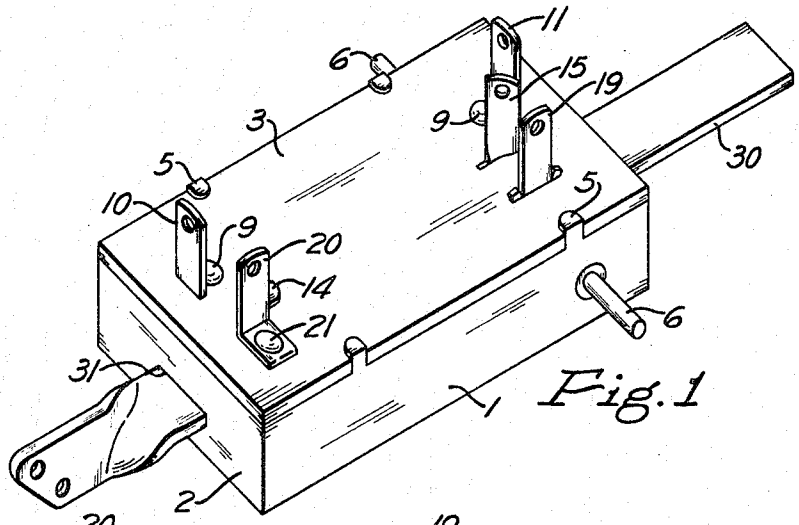


Fig. 1

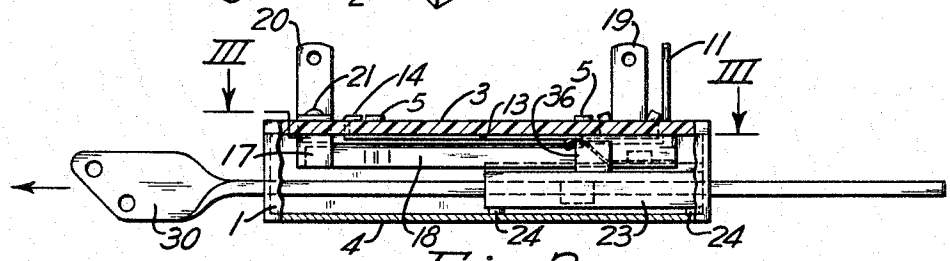


Fig. 2

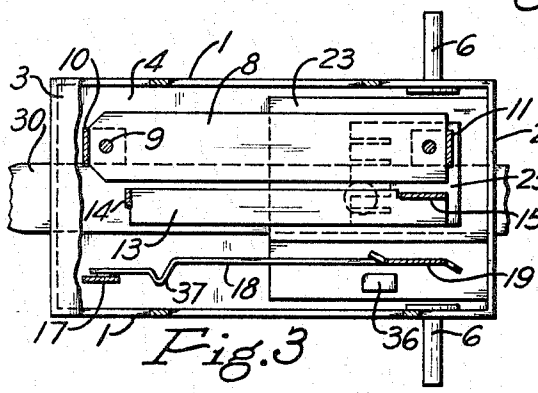


Fig. 3

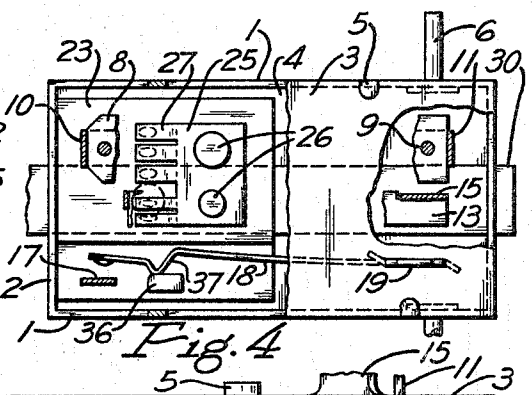


Fig. 4

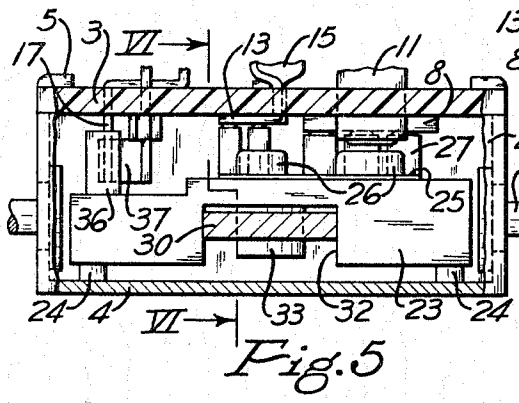


Fig. 5

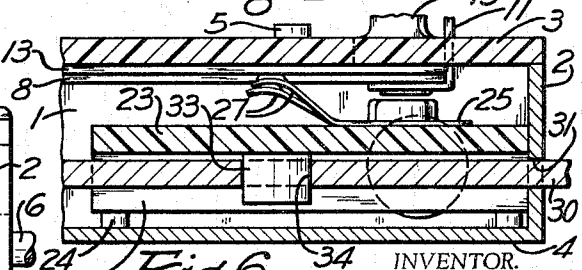


Fig. 6

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ELECTRIC SWITCH AND VARIABLE LINEAR RESISTOR

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ABSTRACT OF THE DISCLOSURE

A flat resistance strip and a flat metal contact strip are mounted beside each other in a rectangular housing and are engaged by a bridging contact carried by an insulating slide. A switch spring contact strip anchored at one end extends beside the other two strips and normally engages a fixed contact. The spring strip has a portion near the fixed contact in the path of a lug projecting from the slide, whereby the spring strip can be moved away from the fixed contact.

It is among the objects of this invention to provide an electric current controlling device of the character just mentioned, in which actuation of a single member controls the opening and closing of the switch and also the electrical resistance in the circuit, which is simple in construction and operation, which can be assembled rapidly, and which is compact and durable.

In accordance with this invention a rectangular housing has a bottom wall and an insulating top wall that are connected by side walls. Extending lengthwise of the insulating wall and secured to its inner surface are a resistance strip and a metal contact strip, to the ends of which terminals are secured. A bridging contact in engagement with the strips is carried by an insulating slide inside the housing. Provision is made for moving the slide and bridging contact lengthwise of the strips. Also inside the housing is a switch spring contact strip that extends on edge lengthwise of the insulating wall beside the other two strips. The contact strip has one end secured to the insulating wall. A fixed switch contact is secured to the insulating wall beside the free end of the spring strip and normally is engaged by it. Terminals are secured to the fixed contact and the fixed end of the spring strip. A lug projects from the slide beside the spring strip on teh same side of the strip as the fixed contact, and the spring strip has a portion near the fixed contact that is in the path of the lug for engagement by it in order to move the spring strip away from the fixed contact when the slide is at one end of the housing. Consequently, moving the slide to one end of the housing opens the switch, while moving it toward the opposite end permits the switch to close to connect the resistance strip into the circuit.

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

FIG. 1 is an isometric view of my control device;

FIG. 2 is a side view thereof with the near wall broken away to show the inside of the unit;

FIG. 3 is a horizontal section taken on the line III—III of FIG. 2;

FIG. 4 is a plan view of the device with the insulating wall partly broken away and with the switch open;

FIG. 5 is an enlarged view from the right-hand end of the device as seen in FIG. 3, but with the end wall broken away; and

FIG. 6 is a further enlarged fragmentary longitudinal section taken on the line VI—VI of FIG. 5.

Referring to the drawings, the body of my control device is formed from a rectangular housing. The housing has side walls **1** and end walls **2** that connect top and

bottom walls **3** and **4**. For the purpose of this description only, the device is shown in such a position that its bottom wall **4** is integral with the side and end walls, all of which may be metal if desired. The separate top wall **3** is formed from electrical insulating material and rests on top of the metal walls, to which it is clamped by ears **5** integral with the upper edges of the side and end walls and bent over the top of the top wall. For certain applications, the side walls may be provided with laterally projecting pins **6** for supporting the housing.

Secured to the lower or inner surface of the insulating top wall of the housing is a strip **8** of electrical resistance material, such as graphite, the ends of which are attached to the overlying wall by rivets **9** that also connect electric terminals **10** and **11** to the strip. The terminals extends up through slots in the insulating wall and project above it.

Extending lengthwise of the housing beside the resistance strip is a metal contact strip **13**. This strip can be on either side of the resistance, but preferably is located at about the center of the insulating wall with the resistance strip off center. One end of the contact strip is provided with an ear **14** that extends up through the overlying wall and is bent over it to clamp that end of the strip in place. One side of the opposite end of the contact strip has a larger and much longer ear **15** that also extends up through the insulating wall, directly above which the ear is twisted to lock that end of the strip in place and to serve as a terminal for connection into an electric circuit.

It is a feature of this invention that inside the housing at the side of the metal contact strip opposite to the resistance strip there is an electric switch formed from a fixed contact **17** and a spring contact strip **18**. The latter extends lengthwise of the housing on edge relative to the insulating wall and has one end secured to that wall. This is accomplished by providing that end of the contact strip with an upwardly projecting terminal portion **19** which extends up through the insulating wall. The opposite edges of the terminal, where they emerge above the insulation, are staked to lock the contact strip in place. The base portion of the terminal is wider than the part that extends through the top wall and therefore spaces the main body of the spring contact from that wall so that its flexing will not be impeded by the insulation. As shown in FIG. 3, the ends of the base portion of the terminal may be bent in opposite directions to help prevent the contact strip from tilting sideways. The outer side of the free end of the contact strip normally engages the fixed contact **17**, which extends up through the insulating wall and may be integrally connected to a terminal **20** that is fastened to that wall by a rivet **21**.

In order to vary the resistance and to open the switch when desired, an insulating slide **23** is disposed in the housing. Preferably, this is a rectangular block formed from a molded synthetic plastic. It is slidable along the bottom wall of the housing, and for this purpose may be provided at its corners with projections **24** that space the body of the slide from that wall. The slide carries a bridging contact which engages the resistance strip and the contact strip at all times. The bridging contact preferably is formed from a small piece of spring metal, such as brass, which has a base **25** that may be attached to the slide by rivets **26** projecting from the top of the slide, with which they are integral, and through holes in the contact base. The upper ends of the rivets are enlarged to press the contact against the slide. The contact is provided with a plurality of upwardly inclined spring fingers **27**, the upper ends of which press against the resistance strip and the contact strip. To assure good contact, there are two or more fingers for each strip.

It will be seen that by moving the slide back and forth

in the housing, the resistance in the circuit can be varied. To move the slide, it is preferred that a bar **30** extend through the housing and be slidably mounted in slots **31** in the opposite ends thereof. The bar projects from both ends of the housing. The bottom of the central part of the slide is provided with a longitudinal channel **32** as shown in FIGS. 5 and 6, so that the slide can straddle the bar and engage the bottom of the housing. The slide can be quickly attached to the bar by providing the slide, inside its channel, with an integral boss **33** that is inserted in a hole **34** in the bar. Consequently, when the bar is moved lengthwise in the housing, the slide is moved with it.

In order to permit the switch to be opened, the slide is provided near one edge with an integral lug **36** that projects up into the space between the spring contact strip and the adjacent side of the housing. For most of the travel of the slide in the housing, this lug does not engage the spring strip, but as the lug approaches the fixed contact **17** of the switch it engages an outwardly projecting portion of the spring contact that extends into the path of the lug. This projecting portion can be formed most conveniently by bending the contact strip to provide it with a hump **37**. When the lug engages this hump it pushes the adjacent free end of the spring inwardly away from the fixed contact and thereby opens the switch. Thus, when the slide is at that end of the housing, the switch is open and the resistance strip is taken out of the circuit. The moment the slide starts to move toward the opposite end of the housing, the lug leaves the hump and allows the switch to close and connect the resistance strip into the circuit, the value of the resistance at any given time depending upon the location of the slide lengthwise of the housing.

It will be obvious that this device can be connected into a circuit in different ways and that other electrical units can be connected with it.

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. The combination with a rectangular housing having a bottom wall and an insulating top wall connected by side walls, a flat resistance strip and a flat metal contact strip extending lengthwise of the insulating wall and secured to the inner surface thereof, terminals secured to the ends of said strips, an insulating slide in the housing, a bridging contact carried by the slide in engagement with said strips, and means connected with the slide

for moving it and the bridging contact lengthwise of said strips; a switch spring contact strip extending on edge lengthwise of said insulating wall beside the other two strips and having one end secured to that wall, the free end of the spring strip being movable toward and away from the adjacent side wall of the housing, a fixed switch contact secured to the insulating wall beside the free end of the spring strip and normally engaged by it, terminals secured to the fixed contact and the fixed end of the spring strip, and a lug projecting from said slide beside the spring strip on the same side of it as said fixed contact, the spring strip having a portion near the fixed contact in the path of said lug for engagement thereby to move the spring strip away from the fixed contact when the slide is at one end of said housing.

2. The combination recited in claim **1**, in which said spring strip portion is a reversely bent hump in the spring strip.

3. The combination recited in claim **1**, in which the terminal secured to said spring contact strip is integral therewith and extends through said insulating wall, said terminal being anchored in the insulating wall to rigidly mount the adjoining end of the spring strip thereon.

4. The combination recited in claim **1**, in which the terminal secured to said spring contact strip is integral therewith and extends through said insulating wall, said terminal being anchored in the insulating wall to rigidly mount the adjoining end of the spring strip thereon and having a base portion spacing the spring strip from that wall.

5. The combination recited in claim **1**, in which said slide-moving means is a bar extending through the housing between said slide and bottom wall, the slide being provided with a central channel receiving said bar and engaging said bottom wall on opposite sides of the bar, the housing having end walls provided with aligned openings through which said bar extends.

6. The combination recited in claim **5**, in which the portion of the bar in said channel is provided with a hole, and a boss projects from the slide through said hole to attach the slide to the bar, said lug and boss being integral with said slide.

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