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E. G. HENRY
COIN OPERATED SWITCH
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Fig. 1.

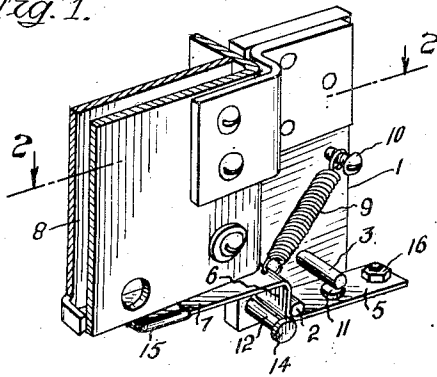


Fig. 2.

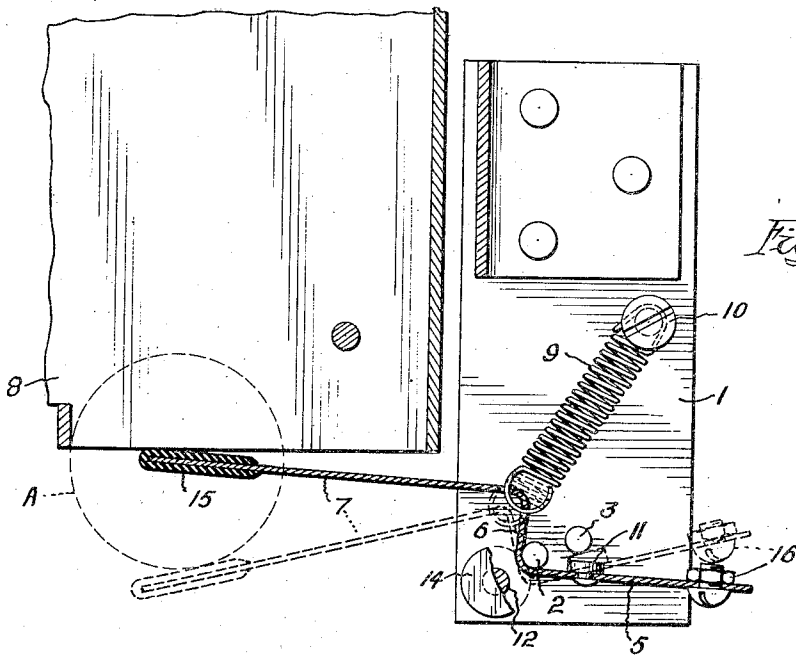
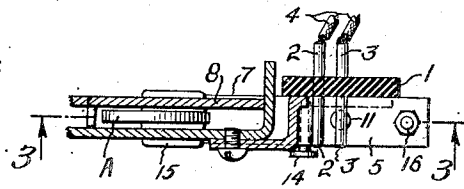


Fig. 3.

Inventor:

E. G. Henry,

By:

Wm. F. Freundreich,

Attorney.

Witness:

E. Camporini

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COIN OPERATED SWITCH

Earle G. Henry, Chicago, Ill., assignor to Buckley Music System, Inc., a corporation of Illinois

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10 Claims. (Cl. 200—85)

There are many coin-controlled systems in which the depositing of a coin or token causes a switch to be closed to initiate the operation of the system. Such switches are necessarily small; when closed, they should offer little resistance to the passage of current; the areas in which contacts are made between the switch elements must be kept clean; they should be so sensitive that the falling coin or token will operate them with certainty, providing the necessary pressure between the contact faces and insuring the rubbing action that serves to keep such faces clean; they should be rugged in the sense that after an adjustment has once been made, it will be preserved indefinitely; and it should be a simple and easy matter to adjust them. The object of the present invention is to produce an inexpensive switch which shall possess, among others, all of the above-mentioned desirable characteristics and advantages.

In carrying out my invention, the parts that must carry the electric current are composed of materials that are good conductors of electricity, while the spring action is obtained from springs composed of materials best suited for that purpose. Thereby, as long as a spring can function as such, there need be no upsetting of the adjustment of the actual switch elements due to deterioration in the spring.

Some coin operated switches are open to the objection that a jarring of the box in which they are mounted frequently results in the closing of a switch even though no coin has been deposited. A further object of the present invention is to produce a light, sensitive coin-operated switch that cannot be closed by simply jarring its support.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a perspective view showing the discharge end of a coin chute and one of my improved switches mounted in operative relation thereto; Fig. 2 is a section on line 2—2 of Fig. 1, the coiled spring being omitted; and Fig. 3 is a section, on somewhat larger scale, on line 3—3 of Fig. 2.

Referring to the drawing, 1 represents a small slab of tough insulating material having near

the lower end thereof two parallel contact pieces 2 and 3 projecting forwardly therefrom; these contact pieces being in the form of pins spaced apart a short distance in the lateral direction and one being positioned somewhat higher up on the support than is the other. These pins project rearwardly through the support, their rear ends constituting terminals to which are connected conductors 4 forming part of the circuit to be closed by the switch.

Cooperating with the stationary contacts is a switch lever which, in its simplest form, may consist of a thin flat bar of metal that is a good conductor bent into an L shape so as to provide a long arm 5 that extends more or less horizontally underneath both of the pins 2 and 3, together with a short, upwardly-extending arm 6 that rises past that side of the pin 2 which is most remote from the pin 3. Normally the pin 2 rests in the angle between the arms 5 and 6 and serves as a fulcrum on which the lever may rock. The lever is also provided with what may be termed an operating element or handle, which may be a part of the same bar that constitutes the lever proper. Thus, in the arrangement shown, the bar is made long enough so that the material that is left after forming the short arm 6 of the lever is bent laterally, in the opposite direction from and parallel to the arm 5, as indicated at 7.

In use, the switch is intended to be mounted upon or beside a coin chute such as is conventionally illustrated at 8, with the part 7 lying directly below the chute so as to be in the path of a coin dropping down from the chute. The lower end of the chute may therefore serve as a stop to limit the upward movement of the member 7 of the switch. The movable switch member is held in its idle position, drawn up against the pin 2 so that the latter is seated in the angle between the arms 6 and 7 and with the free end of the operating arm 7 engaged with the lower end of the coin chute, by a light coiled tension spring 9. One end of this spring is hooked through a hole or holes at the juncture of the arm 6 with the operating element 7, while the other end is secured to a screw 10 projecting forwardly from the supporting slab 1. The screw 10 is so placed that the spring 9 extends upwardly and laterally across the pins 2 and 3 and well beyond the latter, so that the pull of the spring is exerted in a diagonal direction serving to draw the lever tightly against the pin 2 and to rock the lever, whenever it is free to do so, into the position shown in full lines in Figs. 1 and 3.

The arm 5 has on the upper side a small flat button 11 of substantial diameter for making contact with the pin 3. By reason of the fact that the pin is placed higher up on the support than is the pin 2, the button 11 lies well below the pin 3 when the parts are in their normal positions. In other words, the switch is normally open. However, when a coin descends through the chute and strikes the operating arm 7 near its free end, the weight thereof forces this end of the arm down and causes the switch lever to rock in the counter-clockwise direction, as viewed in Fig. 3, upon the pin 2. As the operating member of the switch moves down under the weight of the coin, such as indicated in dotted lines at A in Fig. 3, the button 11 is swung up until it engages with the under side of the pin 3. This contact takes place before the coin has cleared the lower end of the coin chute sufficiently to permit it to roll off the switch handle or operating member. Therefore, the handle end of the lever must travel down still farther before it can become free of the coin. Such further downward movement takes place as a rocking movement on the pin 3 as a fulcrum, whereas the preceding portion of the downward movement consisted of a rocking movement upon the pin 2 as a fulcrum. The spring 9 at all times holds the upright arm 6 of the switch lever against the pin 2 so that, while the lever is rocking on the pin 3, the switch arm 6 is sliding downward in contact with the pin 2; this sliding movement being accompanied by a rubbing action that keeps the cooperating contact surfaces on the pin 2 and switch arm 6 bright and clean. The dotted line position of the switch lever in Fig. 3 illustrates it as having begun its secondary rocking movement, the arm 5 now standing clear of the pin 2 which is engaged only by the arm 6. A still further downward movement results in a bodily sliding movement of the button 11 across the under side of the pin 3, so that the cooperating contact faces on these two elements are caused to rub against each other and are thus kept clean. It will be seen that as soon as the coin rolls off the end of the switch-operating arm, the spring returns the lever to the position shown in full lines in Figs. 1 and 3, quickly breaking the circuit. It will further be seen that the switch lever at all times engages the pin 2, so that the interruption of the circuit occurs between the pin 3 and the lever. Such arcing as occurs upon opening the circuit is between the pin 3 and the button 11, so that the lever itself is not caused to deteriorate because of arcing. The spring itself neither carries current nor is affected by arcing upon the opening of the switch. Therefore, a properly made spring lasts indefinitely; and it can be properly made because the material therefor is chosen for its good qualities as a spring material and not for its conducting quantities or any other purpose. Because of these things the calibration of the spring is not apt to change over a considerable period of time, so that no further attention need be paid to it after it has initially been properly adjusted. In any event, should adjustment be necessary later, this can conveniently be accomplished.

I prefer to provide also a stop to limit the downward movement of the lever. In the arrangement shown, there is a stationary pin projecting forwardly from the supporting member 1 below the base end of the operating arm 7. Before the lever can be swung down far enough to cause any damage or unnecessarily stress any of the parts, the arm 7 strikes the pin 12 and prevents further

downward movement. I also utilize the stop pin 12 to prevent the switch lever from sliding off the pin 2 lengthwise of the latter. This is accomplished by providing the pin 12 with a thin flat head 14 of sufficient diameter to overlap the switch lever at the juncture of the arms 5 and 6 of the latter. The distance from the inner face of the head 14 and the front face of the supporting slab 1 is a little greater than the width of the bar material from which the switch lever is made, thereby providing sufficient clearance to avoid a binding action on the lever during the operation thereof.

The operating arm 7 of the switch is provided at its free end with a pad 15 of soft rubber, or other suitable material that is a non-conductor of electricity, upon which the coin may drop, thereby preventing grounding of the switch lever through the coin and coin chute.

In order to prevent the closing of the switch through a jarring action, which might be occasioned by striking the coin box if fastened to a wall or counter, or by shaking it or slamming it down on the counter if it be unfastened, I connect the spring to the switch lever device at about the center of gravity of the latter. Then, if any movement of the switch lever is brought about by a jarring action, the arms 5 and 7 will travel through equal distances, the button 11 receding from the pin 3 instead of approaching it to complete the circuit. When the arm 5 is short, it may be provided with a little counter-weight 16 to offset the greater weight of the longer or heavier arm 7.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. A switch comprising a stationary contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending past one side of the pin and toward said contact piece for engagement with the latter, said lever having a bearing seat for the pin to enable it to have rocking and sliding movements in a single plane on said pin, and a light spring tending yieldingly to hold the lever against the pin and out of engagement with said contact piece.

2. A switch comprising a stationary contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending past one side of the pin and toward said contact piece for engagement with the latter, said lever having a bearing seat for the pin to enable it to have rocking and sliding movements in a single plane on said pin, and a light spring tending yieldingly to hold the lever against the pin and out of engagement with said contact piece, said bearing seat lying at a substantial distance from each end of the lever to divide it into two arms one of which serves to bridge the gap between the pin and the contact piece while the other is adapted to serve as a switch handle.

3. A switch comprising a stationary horizontal contact pin and a stationary contact piece spaced apart from each other in the horizontal direction, a switch lever extending at one end underneath said pin and toward the contact piece for engagement with the latter, the lever having thereon a bearing seat for the pin to enable it to

slide up and down on and rock upon the pin, a light tension spring tending constantly to hold the lever against the pin and in such angular position as to be out of engagement with said contact piece, and stops for engagement with the other end of the lever to limit the rocking movements thereof.

4. A switch comprising a stationary horizontal contact pin and a stationary contact piece spaced apart from each other in the horizontal direction, an L-shaped switch lever having one arm extending underneath said pin and toward the contact piece for engagement with the latter and the other arm extending upwardly past the pin on the side farthest away from the said contact piece, a light tension spring tending constantly to hold the lever with the pin seated in the angle thereof and in such angular position as to be out of engagement with said contact piece, and an operating element extending laterally from the upper end of the upright arm of the lever in the opposite direction from the other arm.

5. A switch comprising a stationary horizontal contact pin and a stationary contact piece spaced apart from each other in the horizontal direction, an L-shaped switch lever having one arm extending underneath said pin and toward the contact piece for engagement with the latter, and the other arm extending upwardly past the pin on the side farthest away from the said contact piece, a light tension spring tending constantly to hold the lever with the pin seated in the angle thereof and in such angular position as to be out of engagement with said contact piece, an operating element extending laterally from the upper end of the upright arm of the lever in the opposite direction from the other arm, and stops to limit the rocking movements of the lever.

6. A switch comprising a stationary contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending past one side of the pin and toward said contact piece for engagement with the latter, said lever having a bearing seat for the pin at a point remote from the ends thereof to enable it to have rocking and sliding movements in a single plane on said pin, and a light spring connected to the lever at the center of gravity thereof and tending yieldingly to hold the lever against the pin and out of engagement with said contact piece.

7. A switch comprising a stationary contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending past one side of the pin and toward said contact piece for engagement with the latter, said lever having a bearing seat for the pin to enable it to have rocking and sliding movements in a single plane

on said pin and also on the contact piece, and a light spring tending yieldingly to hold the lever against the pin and out of engagement with said contact piece.

8. A switch comprising a stationary horizontal contact pin and a stationary contact piece spaced apart from each other in the horizontal direction, a switch lever extending at one end underneath said pin and toward the contact piece for engagement with the latter, the lever having at a point remote from both ends thereof a bearing seat for the pin to enable it to slide up and down on and rock upon the pin, a light tension spring connected to the lever at the center of gravity of the latter and tending constantly to hold it against the pin and in such angular position as to be out of engagement with said contact piece, and stops for engagement with the other end of the lever to limit the rocking movements thereof.

9. A switch comprising a stationary horizontal contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending under the pin and toward said contact piece for engagement with the latter, said lever having between the ends thereof a bearing seat for the pin to enable it to have rocking and sliding movements in a single plane on said pin and also on the contact piece, and a light spring connected to the lever at the center of gravity thereof and tending yieldingly to hold the lever against the pin and out of engagement with said contact piece, said bearing seat lying at about the center of gravity of the lever to divide it into two arms one of which serves to bridge the gap between the pin in the contact piece while the other is adapted to be forced down by a coin or token placed thereon and thus close the switch.

10. A switch comprising a horizontal stationary contact pin and a stationary contact piece spaced apart from the pin, a switch lever extending under the pin and toward said contact piece for engagement with the latter, said lever having a bearing seat for the pin to enable it to have rocking and sliding movements in a single plane on said pin and also on said contact piece, said bearing seat lying at a substantial distance from each end of the lever to divide it into two arms one of which serves to bridge the gap between the pin in the contact piece while the other is adapted to serve as a switch handle; a light coiled spring exerting on the lever, at a point on the lever that is on the opposite side of the said seat from that on which the contact piece is located, a pull that is upward and laterally toward said contact piece; and a stop to arrest the upward movement of the handle when it is about horizontal.

EARLE G. HENRY.