

[54] **SPRING MOUNTED KEY FOR ELECTRICAL SWITCH**

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**Related U.S. Application Data**

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[52] U.S. Cl. .... **200/42 T, 70/203**  
[51] Int. Cl. .... **H01h 27/00**  
[58] Field of Search ..... **200/42, 42 T, 44; 70/203**

[56] **References Cited**  
**FOREIGN PATENTS OR APPLICATIONS**

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[57] **ABSTRACT**

A key operated electrical switch includes rocker and carrier members connected to the switch casing with a common axle. The rocker and the carrier members are free to rotate relative to one another about the axle with the carrier member moving into a cavity in the rocker. A key is connected by a spring device to the rocker which spring biases the key out of the carrier member. Pressure on the key by the operator moves the same into the carrier member so operation of the rocker will move the carrier member and the key in unison to operate the switch.

**6 Claims, 7 Drawing Figures**

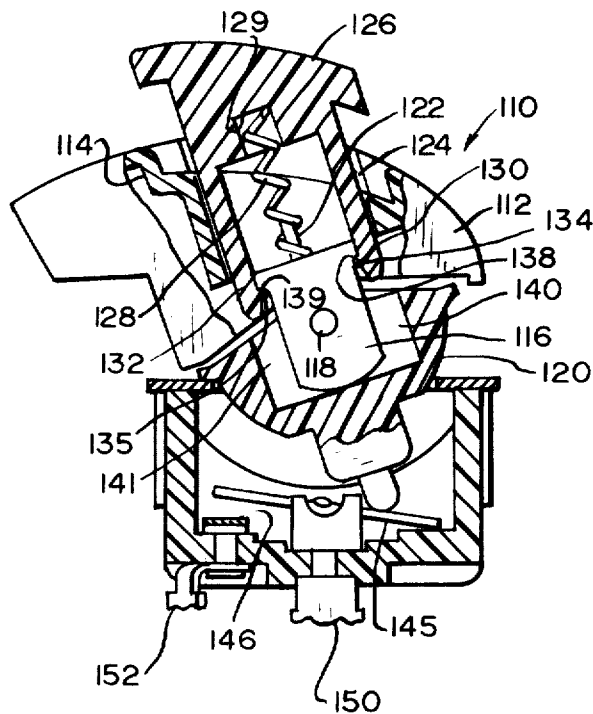


FIG. 1

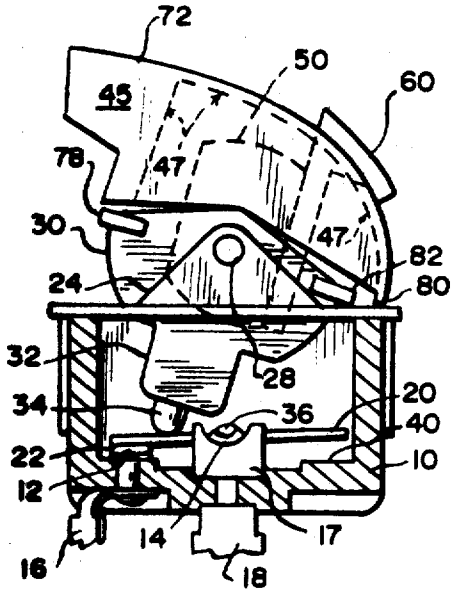


FIG. 2

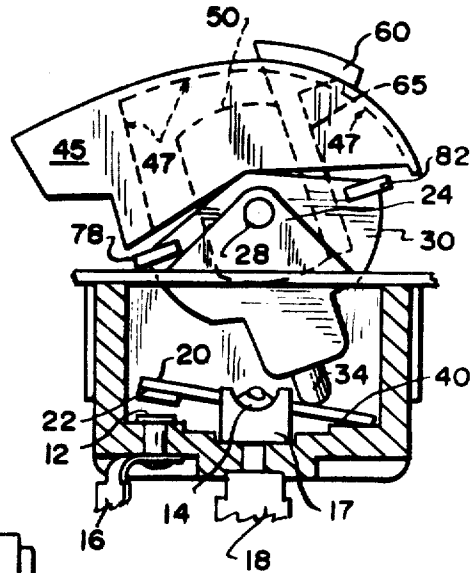


FIG. 3

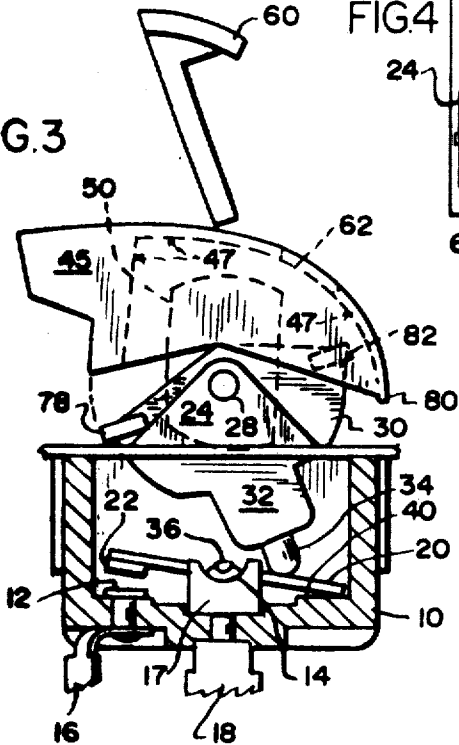


FIG. 4

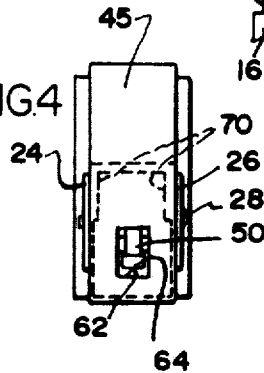
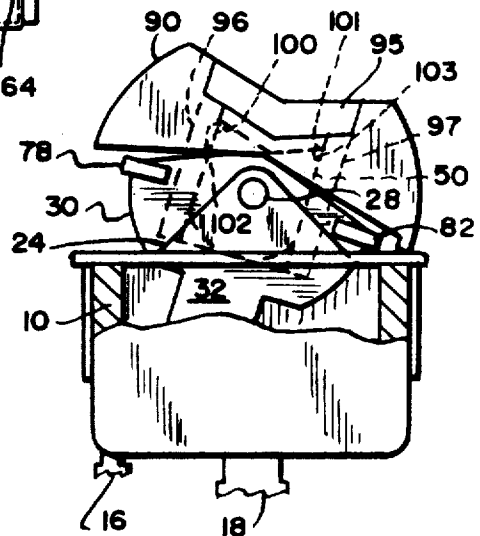


FIG. 5



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FIG. 6

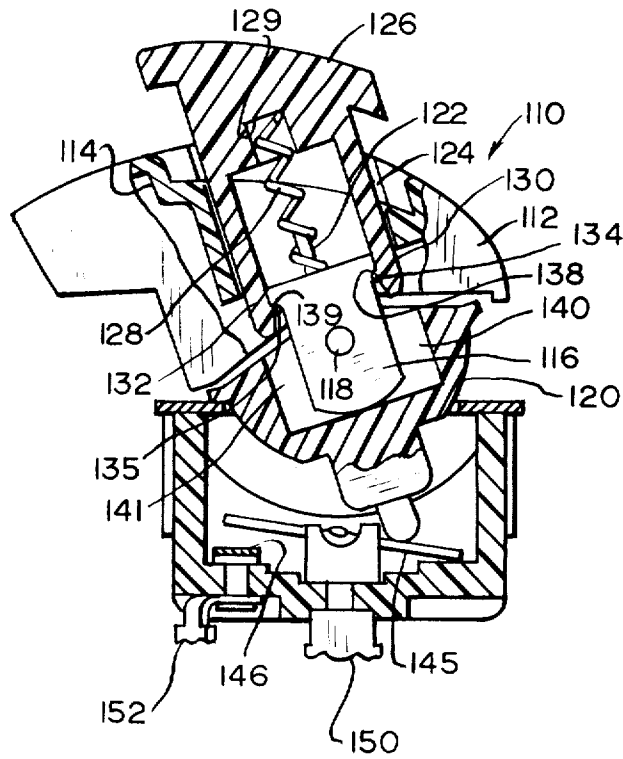
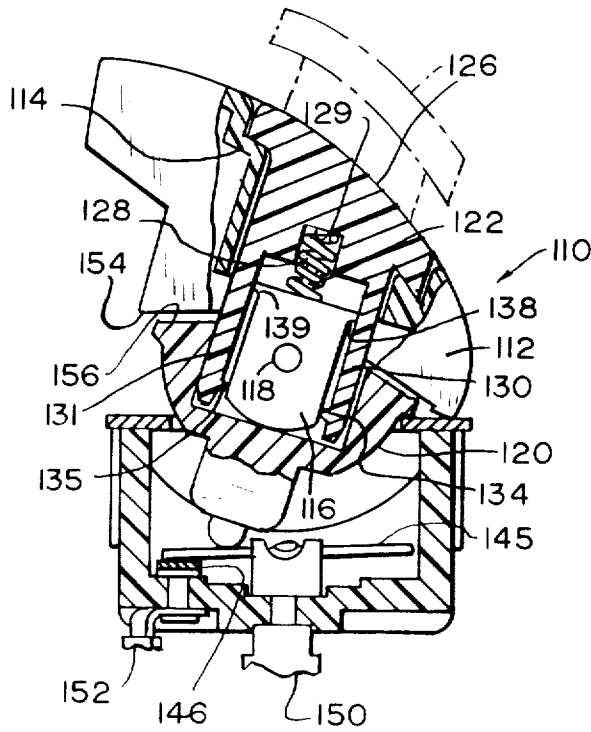


FIG. 7



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**SPRING MOUNTED KEY FOR ELECTRICAL SWITCH****REFERENCE TO RELATED APPLICATION**

This application is a continuation-in-part of application, Ser. No. 101,934, filed Dec. 28, 1970 and assigned to the assignee of this application.

**BACKGROUND OF THE INVENTION**

Although key operated electrical switches are known in the art they generally are of the type wherein the key actually extends into the switch casing and provides the actuator for operating a bridge device to open or close the switch contacts. These type of switches require unique designs which are costly to manufacture. Furthermore, in switches of this design the switch may not be turned on or off without the presence of the key, and generally the key is a separate member from the switch itself and may not be available when it is desired to operate the switch.

**SUMMARY OF THE INVENTION**

It is an object of this invention to provide an economical key operated electrical switch.

It is another object of this invention to provide a key operated electrical switch which may be operated even with the key removed to de-energize the switch with the same being in the "on" position.

It is a further object of this invention to provide a key operated electrical switch wherein the key remains connected to the switch so that the same is available when it is desired to operate the switch.

In one particular embodiment of this invention a key operated electrical switch includes a switch housing which encloses contacts and a bridge member. A carrier member for operating the bridge member to selectively open and close the contacts is rotatably mounted to a pin member or axle which extends between first and second trunions connected to the top of the switch housing. A rocker member has an integral portion which is also rotatably mounted about the axle and extends into the carrier member. In this manner the carrier member and the rocker member are movable relative to one another with the carrier member moving into a hollow portion in the body of the rocker member. A key is removably positioned to extend through the rocker member and into the carrier member. It acts to connect the two so they move in unison and not relative to one another with operation of the rocker to selectively open and close the contacts. With the key removed from the members, the rocker moves relative to the carrier to render the switch inoperative. The key is resiliently connected to the rocker member such that it is normally biased out of the carrier member. Movement of the key by the operator against the spring bias pressure moves the same into the carrier member connecting the carrier and rocker for operation of the switch.

In some embodiments it is desirable to have a restricted portion in one end of the hollow opening of the rocker body into which the carrier member rotates. In this embodiment with the rocker positioning the carrier member to close the switch contacts and with the key removed, movement of the rocker member in a direction to open the switch contacts will cause the carrier member to engage the rocker in an interference fit with the restricted portion of the opening in the rocker member, so continued movement of the rocker moves the carrier to open the switch contacts even though the key has been removed. With the contacts open and the key removed any attempt to move the rocker member to close the contacts will cause the rocker to move relative to the carrier member with the carrier moving into the unrestricted opposite end of the hollow portion of the body of the rocker thereby rendering the switch inoperative.

**DESCRIPTION OF THE DRAWING**

FIG. 1 is a side elevation view partially in cross-section of the key operated switch in accordance with this invention;

FIG. 2 is a side elevation view partially in cross-section of the switch of FIG. 1 illustrating a different operating position thereof;

FIG. 3 is a side elevation view partially in cross-section of the switch of FIG. 1 showing the key removed;

FIG. 4 is a top elevation view of the switch of FIG. 3;

FIG. 5 is a side elevation view partially in cross-section illustrating another type of key for operating the switch;

FIG. 6 is a side elevation view in cross-section illustrating the spring device for connecting the key to the switch assembly; and

FIG. 7 is a side elevation view in cross-section and partially in phantom illustrating operation of the switch shown in FIG. 6.

**DETAILED DESCRIPTION**

Referring to FIG. 1 there is shown a switch casing 10 containing a switch mechanism therein which includes contacts 12 and 14, which are electrically connected to terminals 16 and 18. A bridge member 20 has a contact portion 22 on the end thereof which mates with the contact surface 12 to complete the circuit between the terminals 16 and 18 through contacts 14 and 12 and the bridge member 20. A pair of supports or trunions 24 and 26 (FIG. 4) are connected to the switch casing 10 in a spaced relation to one another. A pin member 28 extends between the trunions 24 and 26 and acts as an axle for pivotally and rotatably mounting a carrier member 30 between the trunions. The carrier member 30 has a portion 32 which extends downwardly into the switch casing. A plunger 34 is resiliently mounted (not shown) within the portion 32 in the known manner. A boss portion 36 on the contact 14 provides for detent operation of the bridge member 20.

With the carrier member 30 moved to a first predetermined position, the plunger 34 as viewed in FIG. 1 is on the left hand side of contact 14 and its support 17 and resiliently biases the bridge member and the contact portion 22 to make an electrical connection with the contact 12 of terminal 16 thereby completing the circuit. As shown in FIG. 2 with the carrier member 30 positioned to its second predetermined position, the plunger 34 has now been moved to the right hand side of the contact 14 thereby resiliently biasing the bridge member 20 to break the electrical connection between the contacts 22 and 12. The end of the bridge member 20 opposite the contact portion 22 rests on an insulated step portion 40 within the switch casing with the switch in an "off" position.

A rocker member 45 is provided as the switch operator. The rocker 45 has a hollow cavity or portion 47, a leg member 50 is integrally molded between the walls of the rocker 45, and extends outwardly of the hollow portion 47 downwardly into a cavity in the carrier member 30. This leg portion 50 is also rotatably and pivotally mounted about the axle 28 in the same fashion as the carrier 30. Therefore, the rocker 45 and the carrier 30 may be rotated relative to one another about the axle 28 with the carrier member rotating within the hollow cavity 47 of the rocker 45.

A key member 60 is provided to connect the rocker 45 and the carrier 30 together such that they will rotate in unison about the axle 28 to selectively bridge the contacts 12 and 14 to render the switch "on" and to open the contacts 12 and 14 to render the switch "off." The key 60 is positioned through an aperture 62 (FIG. 4) in rocker 45 and extends downwardly into a keyway 64 which is positioned immediately adjacent the leg 50 of the rocker 45. As can be seen in FIG. 2, the key is shaped to fit the curvature of the rocker and includes a leg 65 which extends into the keyway and wedges against the leg 50 of the rocker 45. This firmly connects the rocker to the carrier permitting the two pieces to move in unison to operate the switch.

This switch, therefore, operates like any rocker switch with the key in position. However, it provides an excellent safety feature for instance with power tools and the like where the operator by removing the key is able to render the switch inoperative until the key is replaced.

A further safety feature can be provided in this switch. If the switch is in the "on" position as shown in FIG. 1, and for some reason the key 60 is removed, the operator can still turn the switch off in case of an emergency. To provide this a projection 70 is formed within the cavity 47 of the rocker 45 simply by extending the thickness of the walls of the cavity at the end 72 of the rocker 45 thereby restricting the opening therein. As shown in FIG. 1, with the carrier member in the first predetermined or "on" position should the key 60 be removed, movement of the rocker 45 relative to the carrier 30 toward the second predetermined or "off" position will cause the wall 70 forming the cavity 47 to interfere with the stop member 78 extending from the carrier 30 such that continued movement of the rocker will operate the carrier to open the bridge and break the contacts. However, with the key removed and the switch turned off in this manner, as can be seen in FIG. 3, any attempt to move the rocker 45 in a manner to close the switch contacts simply causes the rocker 45 to move relative to the carrier member 30 with the cavity 47 of the rocker 45 rotating about the carrier 30.

It should be noted that the member 78 not only provides an interference fit with the cavity wall 70 in the manner heretofore described, but it also serves as a stop (FIG. 3) to set the first predetermined or "on" position of the carrier 30 against the spring pressure of the plunger 34. Likewise, the member 82 serves as a stop to set the second predetermined or "off" position of the carrier 30. With the key 60 removed from the rocker 45 and the carrier, the beak portion 80 of the rocker 45 provides the stop action against extreme rotation of the rocker 45 about the carrier 30.

In the switch embodiment shown in FIG. 5, corresponding parts of the switch as shown in FIG. 1 are given like numbers. In this embodiment, the principal difference is that the rocker 90 takes on a different shape than the rocker 45 of the switch shown in FIG. 1. Furthermore, the key 95, rather than having one leg 65 as does the key 60 of the switch of FIG. 1, has two legs 96 and 97. These legs fit into two keyways provided on either side of the leg 50 which is connected to the rocker 90. It should also be noted that raised portions 100 and 101 are located on legs 96 and 97 of the key 95 and are matched with corresponding ledges 102 and 103 of the rocker 90 such that they provide a detent action when the key is properly inserted into the switch when joining the rocker 90 and the carrier member 30.

Referring to FIGS. 6 and 7 there is seen a further embodiment of this invention wherein the switch 110 includes a rocker member 112 which has a hollow body portion generally defined by the walls 114. A leg member 116 is integral with the rocker 112 body and extends downwardly and outwardly of the hollow portion thereof. The leg member 116 of the rocker is rotatably connected about the axle 118 as is the carrier member 120 as heretofore described. As in the previous embodiment the rocker 112 can move relative to the carrier member 120 about the axle 118 with the hollow body portion of the rocker 112 moving about the carrier member 120.

A post 122 is molded on top of the leg 116 of the rocker 112 and extends upwardly into the key receiving space 124 in the rocker member. A spring member 128 is positioned by the post 122 in the rocker portion and extends upwardly into a cavity 129 in the key 126. The key 126 further includes first and second leg portions 130 and 132 each of which have projections 134 and 135 extending therefrom and oppositely disposed from one another. The leg portion 116 of the rocker has first and second shelf portions 138 and 139 integrally molded therewith. The length of the spring member 128 is selected so that with the key positioned in the rocker member 112 the spring will bias the projections 134 and 135 on each of the key legs into engagement with the shelf portions 138 and 139 of the leg portion 116 of the rocker to resiliently connect the key 126 to the rocker member.

On either side of the leg portion 116 of the rocker 112 where it extends into the carrier member 120 are keyways 140 and 141. In operation the operator moves the key 126 against

the bias of spring 128 so the leg portions 130 and 132 of the key move into the keyways 140 and 141 of the carrier member as shown in FIG. 7. Subsequently movement of the rocker 112 will move the bridge 145 into engagement with the contact 146 thereby connecting the terminals 150 and 152. When the operator releases his finger from the key 126, the spring 128 biases the key upwardly to remove the leg portions 130 and 132 thereof from the keyways 140 and 141 in the carrier member to disconnect the rocker member from the carrier member.

As in the aforescribed embodiments if it is desired the rocker and carrier can be so designed such that a portion 154 (FIG. 7) of the rocker member will engage a portion 156 of the carrier member with the rocker being rotated from the closed or on position to open the switch contacts thereby permitting the operator to turn the switch to the off position without utilizing the key 126.

What has been described, therefore, is a simple and economical key operated switch wherein the key is physically connected to the switch at all times thereby reducing the possibility of the key becoming separated from the switch and rendering the same inoperable.

I claim:

1. In a key operated electrical switch including a switch housing enclosing a switch mechanism therein, first movable means coupled to the switch housing for operating the switch mechanism, rocker means coupled to the switch housing and being movable relative to the first means, and a key member for selectively connecting the first means and the rocker means by extending through the rocker means and into the first means so movement of the rocker means moves the first means and the key member in unison therewith to operate the switch, the improvement comprising resilient means connecting the key member to the rocker member and biasing the same out of the first means so the rocker member moves relative to the first means thereby rendering the switch inoperable, the key member being moved against the bias of said resilient means into the first means for connecting the rocker member and the first means for operating the switch.

2. The key operated electrical switch of claim 1 further including second means mechanically cooperating with one of the first means and the rocker means for operably connecting the first means and the rocker means only with the switch in the "on" position and with said resilient means biasing the key member out of the first means, whereby movement of the rocker means acts through said second means to move the first means to turn the switch off.

3. A key operated electrical switch including in combination, a switch housing enclosing contact means and a bridge member, a carrier member for operating said bridge member for selectively opening and closing said contact means, an axle supported by said switch housing, said carrier member being rotatably mounted to said axle, said carrier member movable between a first "on" position and a second or "off" position for operating said contact means, a rocker member having a body with a hollow portion therein and a leg member integral with said body and extending outwardly of the hollow portion, said leg member extending into said carrier member and being rotatably mounted about said axle, said carrier member and said rocker member being movable relative to one another about said axle with the hollow portion of said rocker member rotating about said carrier member, key means having a leg portion, and connecting means including spring means resiliently connecting said key means to said rocker member, whereby applying pressure to said key means moves the same against the spring pressure to extend said leg portion thereof through said rocker member and into said carrier member thereby connecting said rocker member to said carrier member so the same move in unison with said key means to selectively open and close said contact means, and with the pressure from said key means being removed, said spring means biases the same to move said leg portion thereof from said carrier member so said rocker member moves relative to said carrier member rendering the switch inoperative.

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4. The key operated electrical switch of claim 3 wherein said connecting means includes said leg portion of said key means having detent means for engaging said rocker member with said spring means biasing said leg portion of said key means from said carrier member to thereby hold said key means in position in said rocker member.

5. The key operated electrical switch of claim 3 further including means integral with one of said carrier member and said rocker member for connecting said members so the same move in unison with said key means being biased by said spring means to remove said leg portion thereof from said carrier member with said rocker member and carrier member being positioned to close said contact means thereby permitting said rocker member to be moved to open said contact means.

6. The key operated electrical switch of claim 3 wherein said key means has a body portion and first and second leg portions, and wherein said leg portion of said rocker member

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extends into said carrier member, the combination further including a keyway in said carrier member on either side of said leg portion of said rocker member, a post on said leg portion of said rocker member, and a coil spring mounted on said post and extending between said first and second leg portions of said key means and engaging said body portion thereof, each said leg portion of said key means including connecting means for engaging a part of said leg portion of said rocker member, said spring biasing said key means so said connecting means of each of said leg portions thereof engages said part of said leg portion of said rocker member to connect said key means to said rocker members, and pressure by the switch operator on said key means moves said leg portions thereof against the pressure of said spring into the keyway in said carrier member to connect said carrier member and said rocker member for operating the switch.

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