

July 23, 1968

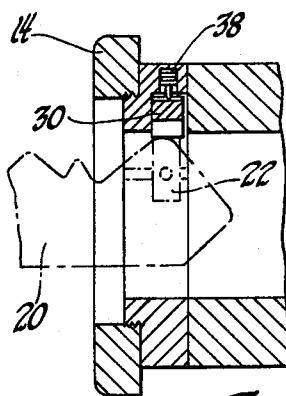
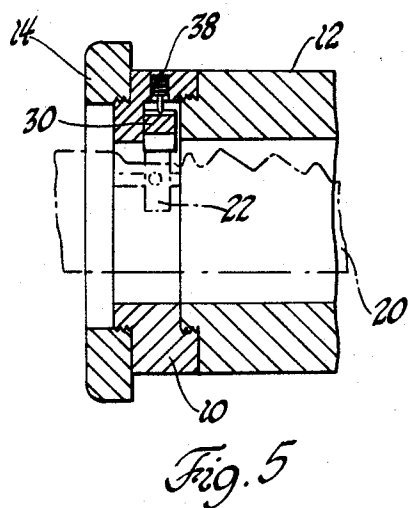
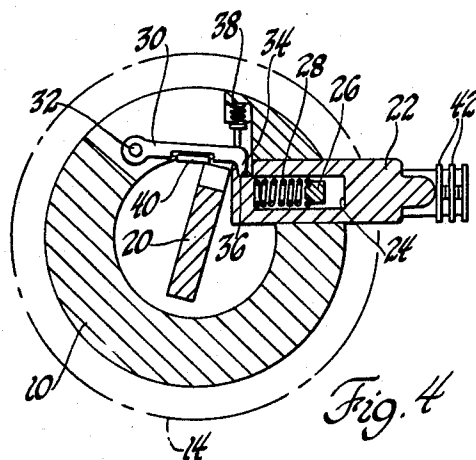
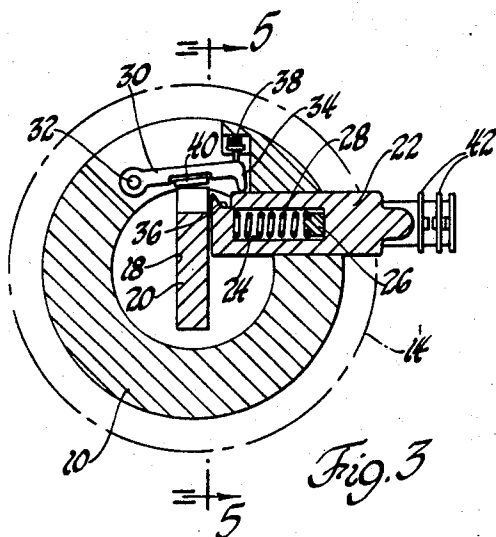
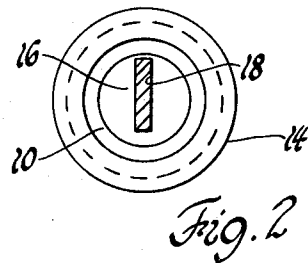
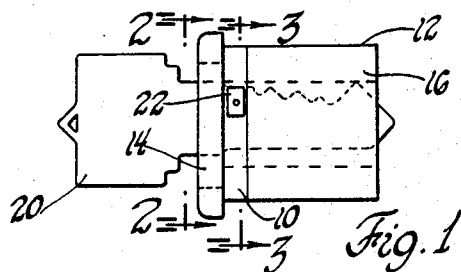
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3,393,540

SAFETY LOCK SWITCH

Filed Oct. 31, 1966

2 Sheets-Sheet 1



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SAFETY LOCK SWITCH

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2 Sheets-Sheet 2

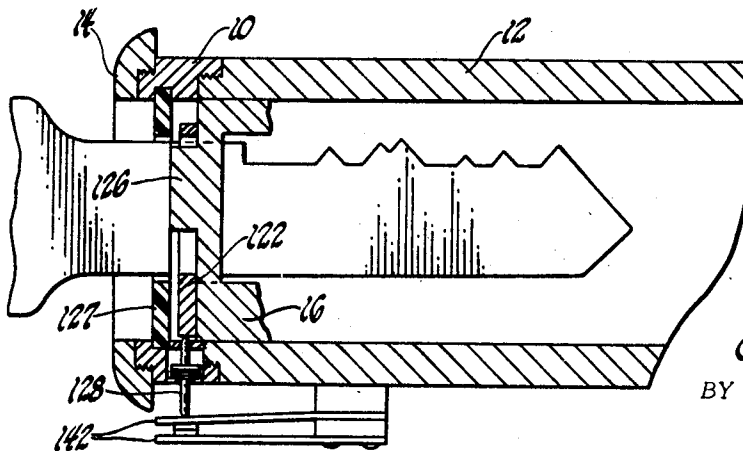
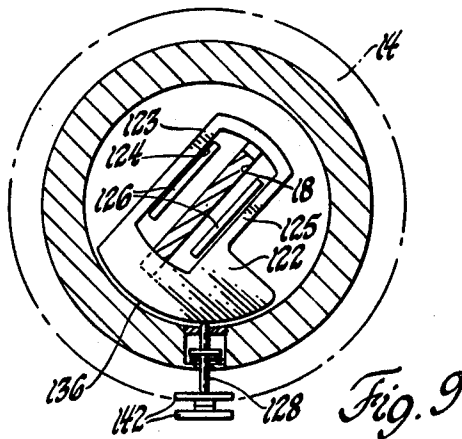
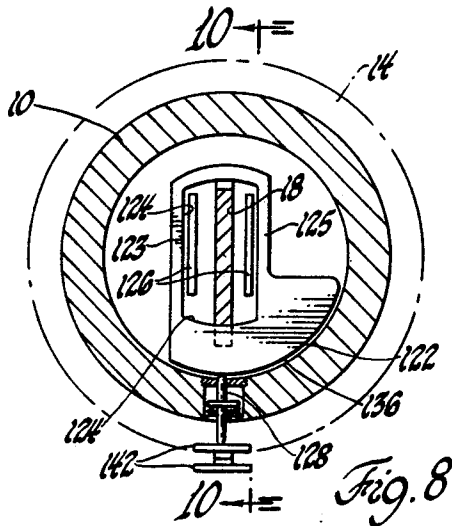
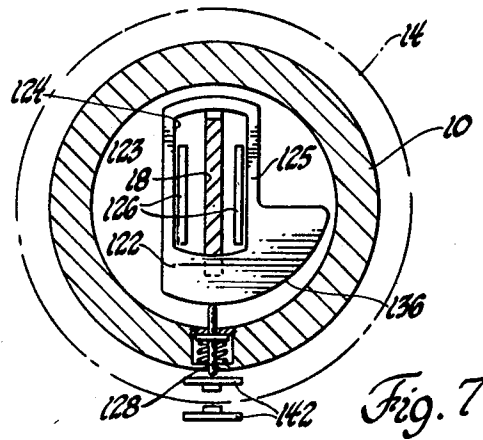


Fig. 10

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3,393,540

SAFETY LOCK SWITCH

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This invention relates to key operated locks in general and more particularly to key operated switches and the like for use in electrical power supply systems.

Key operated switches are most commonly known as used in automotive and other vehicles in the electrical system which provide ignition spark control for the vehicle engine. The key operated ignition switch enables only authorized persons to start and drive a vehicle and is therefore an important security measure.

Unfortunately, ignition keys and like means in other electrical control systems are too often forgotten and left in the switching device which they safeguard. This is particularly true with automotive vehicles where distractions at the last moment in parking a car, carelessness and plain absentmindedness cause the key to be left in the ignition switch after the engine is turned off.

It is an object of this invention to provide a device for use with key operated electrical switches and the like which requires that the key be removed from the switch before the electrical circuit is broken.

It is an other object of this invention to provide means whereby standard type key switches may be modified to incorporate the requirement of key removal without extensive and costly tooling changes.

Still another object of this invention is to provide a key operated switching device wherein normal accessory positions for operating other electrical equipment is available with or without the security feature mentioned.

These and other objects will be more apparent in the discussion which follows of two like but different embodiments of the present invention and which makes reference to the accompanying drawing.

In the drawings:

FIGURE 1 is a side elevation of an ignition type lock cylinder and key with the safety device of this invention incorporated therewithin.

FIGURE 2 is a front end view of the key lock shown in the first drawing figure.

FIGURE 3 is an enlarged cross section of the key lock modification of this invention as seen in the plane of line 3—3 of the first drawing figure.

FIGURE 4 is a similar to the last mentioned drawing figure with certain parts shown in different operative positions.

FIGURE 5 is a cross-sectional view of the key lock modification of the third drawing figure as seen in the plane of line 5—5 thereon.

FIGURE 6 is similar to the last mentioned drawing figure with the key partly withdrawn and parts shown in different operating positions.

FIGURE 7 is a cross-sectional view of a like but different key lock modification, without the key.

FIGURES 8 and 9 are similar to the last mentioned drawing figure with the key in the lock and parts shown in different operative positions.

FIGURE 10 is a cross-sectional view of the key lock modification shown in the seventh drawing figure as seen in the plane of line 10—10 thereon.

This invention may be incorporated within a standard key lock switch such as is used for the ignition switch on most automotive vehicles. Or, it may be provided as a sub-assembly part for use therewith.

In the drawings, the sub-assembly arrangement is shown in which an intermediate part 10 is provided be-

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tween the lock cylinder 12 and the chrome ring part 14 normally provided on the vehicle instrument panel.

Within this small intermediate part is the working mechanism of one of the embodiments of this invention which will now be described.

The lock cylinder 12 is of the conventional type which includes an outer housing having a tumbler 16 in which is provided a key slot 18. The proper key 20 for the lock permits the tumbler to be turned in one direction or the other to make a suitable electrical connection (not shown) to the engine ignition system.

The intermediate part 10 is essentially a ring of sufficient width to receive a slider 22 through a side wall for reciprocal movement relative to the key slot 18. The slider includes a guide slot 24 in which is received a pin 26 to limit travel towards the key slot and spring 28 is provided in the guide slot to bias the slider in that direction.

Immediately over the top end of the guide slot is provided a latching member 30. One end is pinned for pivotal movement, as at 32, and the other end is formed to include a latching pawl 34 for holding engagement within a notch 36 in the slider 22.

The latching member 30 is biased by spring means 38 for engagement with the top edge of the slider 22 and for seating engagement in the notch 36, when permitted. When it is disposed in holding engagement with the slider, the latching member crosses over the top end of the key slot 18. This is to provide for engagement by the key 20 when the key is removed from the key slot; as will later be discussed.

A small roller 40 may be provided on the lower edge of the latching members 30 to guard against wear, where engaged by the key 20, if desired.

Mounted outside the lock cylinder, separate or thereon, and near the end of the slider 22 is a normally open switch, shown as a pair of contacts 42. This switch may operate a warning light or be part of the electrical circuit of the ignition system. In the first instance the warning light would be lit while the contacts are closed, or, if in the ignition circuit, electrical power would be provided to the ignition circuit until the contacts are separated.

Considering now the embodiment of FIGURES 1-6:

When a key 20 is inserted in the key slot 18 of a lock tumbler 16, it passes through the intermediate part 10 and under the latching member 30. The latching member rests on the top edge of the slider 22 behind the notch 36 and the slider is biased towards the key and key slot so that the switch contacts 42 are open.

With the key 20 fully inserted within the lock cylinder, for its intended purpose, the part of the shank near the head of the key is sufficiently narrow, or is made to include a depression, so that the latching member 30 may be engaged in the notch 36 of the slider 22. To position the slider for this engagement, the key 20 is turned, as shown in FIGURE 4, to move the slider so that the latching pawl 34 falls into place. This also causes the slider to close the switch contacts 42 and to hold them closed.

Only when the key 20 is removed from the lock cylinder, so that one of its higher teeth (and preferably the last one) trips the latching member 30 is the slider released and the contacts 42 broken.

Accordingly, the key lock ignition switch shown is provided with a secondary switch which must be inactivated to either turn off a warning light or finally cut the ignition to the engine.

Only the proper key can be turned in the ignition switch and only in turning the key is the safety switch set. Returning the key to the neutral or accessory position is not enough to break the secondary circuit once it has been made. This is accomplished only when the key is removed

sufficiently from the key slot to trip the latching means 30 that holds the slider 22 in contact making engagement with the secondary switch.

A second variation of this invention is shown in FIGURES 7-10.

Where possible, like members indicate like parts from the previous discussion and those in the 100 series are similar but different.

The slider 122 is, in this instance, provided across the face of the tumbler 16 with an opening 124 through which the key slot is accessible. The side wall edges 123 and 125, about the opening 124, guide on lands 126 formed and protruding from the end of the lock tumbler for such purpose.

The slider is disposed within the intermediate part 10 behind a freely rotatable cover shield 127 through which only a key slot is provided. The slider could be made to guide on this member if desired and thereby avoid any tooling revision as regards the tumbler.

A spring loaded detent 128 is provided within the outer wall of the intermediate part 10 and serves to bias the slider upwardly so that its lower edge covers part of the key slot access. When a key is inserted in the key slot the slider is depressed and the detent serves to close the switch contacts 142 much in the manner previously described.

In this second embodiment, the slider 122 includes a switch holding cam part 136 on one side so that the switch contacts 142 stay closed as the key and tumbler are turned and turn the slider with them.

As used in the ignition control circuit for a vehicle engine, this second safety switch would have its contacts 142 arranged to hold the circuit once made but would not make the circuit when first closed. Otherwise, the key switch would be by-passed.

As will be appreciated, when the key 20 is placed in the key slot 18 the slider 122 is depressed and it is held depressed until the key is removed. Accordingly, in this second embodiment the key must be completely removed to enable the contacts of the secondary switch to separate.

If the cam part 136 is provided on only one side, as shown, the key may be turned to the accessory position to break the secondary contact. Since the secondary switch contact should be in a holding circuit, it may include an arcuate cam part on the other side as well, with some relief between the two to cut the ignition circuit but still operate such as a warning light.

From the foregoing two embodiments of this invention shown and described, it will be appreciated that the safety lock feature is relatively inexpensive to provide and practically fool-proof in operation.

The switch operating device of the first group of drawing figures may be provided by a simple modification at the neck of a standard lock cylinder, and the operating device of the last group of drawing figures by a slight modification at the front end of the cylinder. Or, as mentioned, an intermediate part including all of the operating mechanism for the secondary switching device may be provided for use with standard key lock cylinders and the like.

In an ignition switch arrangement, there is an advantage to having the secondary switch maintain the electrical connection to the ignition system so that the key must be removed to turn off the vehicle engine. No one will leave a car running and if they must both turn off the primary ignition switch and remove the key, there is an absolute assurance that the key will not be left in the switching device.

The switching devices may also be provided in multiples for ignition locks or other uses, where desired. This is best seen with respect to the second embodiment where two or more cam sliders could be stacked and have the cam operating part provided on a side edge, or the top, for operating other switching contacts. This may be used where a key can be reversed or where different switching functions, as for instrument safety signal lights, are to be operated separate from the switch activated in turning the key.

Without further discussion it should be obvious that numerous other variations, modifications and combinations are conceivable and within the scope of this invention.

Although two preferred embodiments have been specifically shown and described in detail herein, it will be appreciated that this has been done to illustrate the scope of the present invention and without intent to unnecessarily limit the invention thereto in any regard. Accordingly, such improvements, modifications and alterations as come to mind and are within the spirit of this invention and not specifically excluded by the language of the hereinafter appended claims are to be considered as inclusive thereunder.

We claim:

1. A switch operating device, comprising;
a key lock cylinder having a key slot receptive of a key therewithin; a slider disposed near the front end of the lock cylinder and reciprocal normal thereto,
an electrical switch disposed for actuation by said slider, means for biasing said slider relative to said key slot and for activation relative to said switch upon rotation of a key in said slot,
and latch means operable upon rotation of a key in said slot to hold said slider in actuating engagement with said switch and for the release thereof upon removal of the key from said slot.
2. The switch operating device of claim 1,
said latch means having shoulder holding engagement with said slider.
3. The switch operating device of claim 2,
said latch means being disposed for holding engagement with said slider between teeth of a key in said slot and for disengagement therefrom by a key tooth in the removal of the key from said slot.
4. The switch operating device of claim 3,
said latch means including a pivotal member extending transversely across said key slot and having a pawl disposed for engagement with said slider,
said slider including a shoulder notch receptive of said pawl in holding engagement therewithin,
and means biasing said pivotal member for engagement of said pawl in said shoulder notch following lateral movement of said slider effected by rotation of said key.

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