

July 12, 1938.

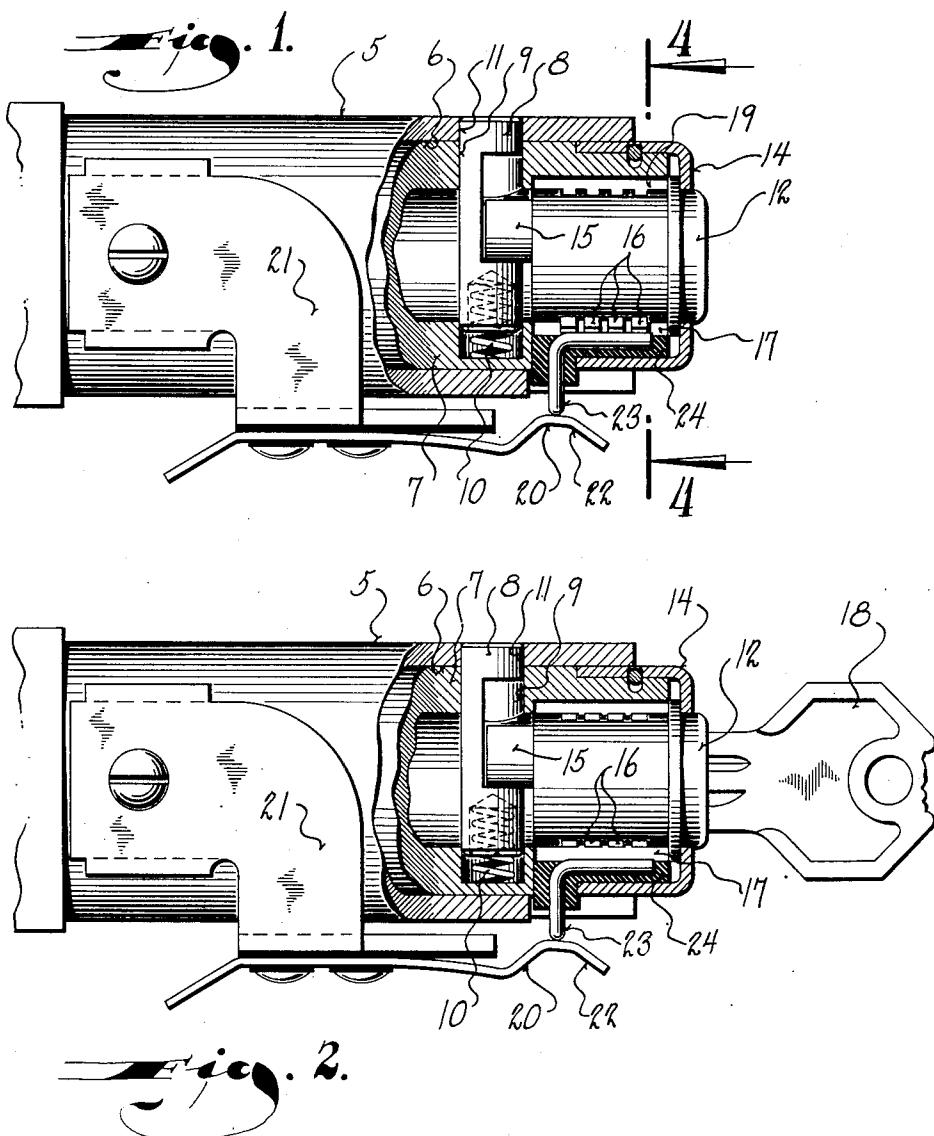
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2,123,507

LOCK SWITCH

Filed Aug. 9, 1935

2 Sheets-Sheet 1



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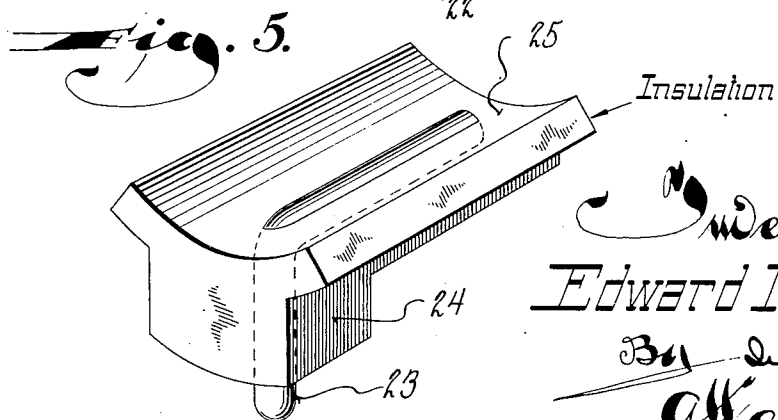
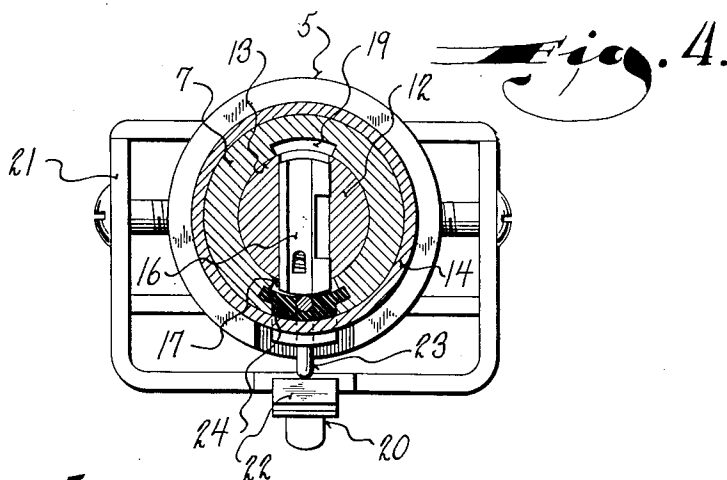
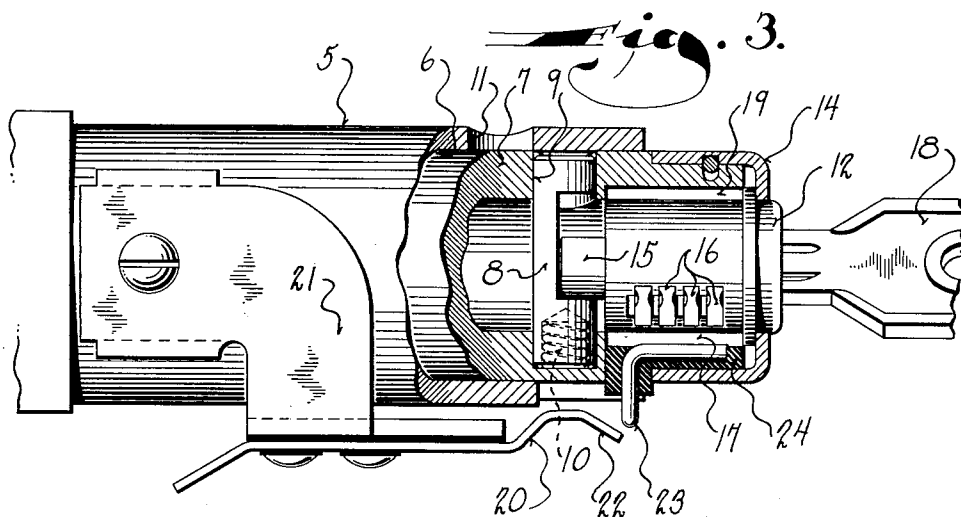
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,123,507

LOCK SWITCH

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Application August 9, 1935, Serial No. 35,491

15 Claims. (Cl. 200—55)

This invention relates to lock switches and has as an object to provide a key controlled lock switch particularly adapted for use in conjunction with automobiles for coordinating the control of an electric circuit with the actuation of a lock having a definite locking function, such as the opening and closing of the ignition switch.

Another object of this invention is to provide a lock switch combination wherein the circuit being controlled is broken at two places, one of which is controlled by the insertion and removal of the key, and the other by the motion of the movable element or elements of the lock mechanism.

A further object of this invention is to provide such a lock switch combination which is practical in all respects.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view in side elevation with parts broken away and in section illustrating a lock switch combination embodying this invention;

Figure 2 is a view similar to Figure 1 but showing the manner in which insertion of the key breaks the electric circuit;

Figure 3 is another view similar to Figure 1 but showing the parts in another position;

Figure 4 is a cross section view taken through Figure 1 on the plane of the line 4—4; and

Figure 5 is a perspective view of one of the elements of the lock switch combination.

Referring now more particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numeral 5 designates a fixed housing bored as at 6 to slidably receive a lock casing 7. The casing 7 through its sliding movement may control any mechanism (not shown), as for instance, an ignition switch of an automobile. However, the invention is not limited to an ignition switch combination and any other instrumentalities may be actuated by the sliding movement of the casing 7.

The casing 7 is locked against sliding movement by a locking bolt 8 movable in a transverse bore 9 in the casing 7 and projectible by an expansive spring 10 into a keeper recess or aperture 11 in the housing. The bolt 8 is retractible out of the keeper recess to free the casing 7 for longitudinal sliding movement by the turning of a lock cylinder 12 rotatably mounted in a bore 13 in the casing 7. A cap 14 fixed to the front end of the casing 7 holds the cylinder in position in the casing with its inner end so disposed with respect to the bolt 8 that an eccentric driving cam 15 carried by the cylinder engages the locking bolt to provide the necessary driving connection between the cylinder and the bolt.

The lock cylinder 12 has a plurality of tumblers 16 movable transversely within the cylinder and yieldingly projectible into a tumbler receiving groove 17 formed in the casing in communication with its bore 13. As long as the tumblers 16 are engaged in the groove 17, the lock cylinder is held against rotation in a position in which the locking bolt is projected into its operative locking position holding the casing in its innermost locked position. The tumblers are retractible out of the groove 17 by the insertion of a key 18 into the cylinder and to accommodate the motion of the tumblers during insertion and removal of the key, the casing has an auxiliary tumbler receiving groove 19 diametrically opposite the groove 17.

From the description thus far, it will be observed that by turning the lock cylinder through the medium of its proper key, the locking bolt 8 is retractible out of the aperture 11 to free the casing 7 for sliding movement.

In locks of the type to which this invention is particularly directed, the casing is generally yieldingly urged outwardly of its housing so that as soon as the bolt is retracted out of the recess or aperture 11, the casing 7 is spring pressed outwardly. This motion of the casing actuates the instrumentalities which the lock controls.

The motion of the casing 7 when unlocked in the manner described and also the insertion and removal of the key, is utilized to open and close an electric circuit, and to this end the housing 5 mounts a live terminal 20 in any suitable manner as by having the same fixed to a bracket 21 secured to the housing. The terminal 20 is, however, insulated from the bracket 21 and is arranged to have an electrical conductor soldered or otherwise secured thereto.

The forward end of the terminal 20 is shaped to provide a spring contact finger 22 which engages

with a contact 23 carried by but insulated from the sliding casing 7. The contact 23, as best shown in Figure 5, is in the form of an angularly bent piece of wire and is embedded in a block of insulating material 24. This block of insulating material 24 is in turn embedded in and forms part of the casing 7.

It will be observed that the contact 23 has one leg disposed substantially radially with respect to the cylinder with the outer extremity thereof exposed for engagement with the spring contact finger 22. The other leg of the contact 23 is partially exposed throughout its length and projects up from the curved inner surface 25 of the block of insulation, which as best shown in Figure 4, forms the bottom wall of the longitudinal tumbler receiving groove 17. The location of this exposed leg of the terminal 23 with respect to the disposition of the tumblers 16 is such that when the tumblers are projected into the groove 17 any and all of them will engage this exposed portion of the contact 23.

Consequently, when the casing is in its locked innermost position of longitudinal movement and the key is withdrawn from the cylinder so that its tumblers are projected into the groove 17 to engage the contact 23, the live terminal 20 will be grounded to the structure of the lock through the contact 23 and the tumblers. As soon as the key is inserted to retract all of the tumblers out of their locking positions, the circuit is opened.

Besides being broken by the insertion of the key, the circuit is also opened as a result of outward projection of the casing 7 when the same is freed by retracting the locking bolt out of the keeper recess or aperture 11. Hence, it will be seen that the switch mechanism of this invention is capable of interrupting an electric circuit at two places, one of which is controlled entirely by the insertion and removal of the key, while the other is controlled by the motion produced during actuation of the lock to and from its locked position.

This makes the combination of this invention admirably suited to the coordination of the control of an electrical circuit with the opening and closing of an automobile ignition switch, and while not limited thereto the invention is thus particularly applicable for use in the manner shown in the co-pending application of John W. Fitz Gerald, Serial No. 25,447, filed June 7th, 1935.

For purposes of illustration, assuming that the lock switch of this invention is used for the control of a door lock as shown in the aforesaid co-pending application, the operation will be as follows:

As long as the ignition switch is open, in which position it is held by the lock casing when the same is secured in its locked innermost position, the electric circuit controlling the door locking mechanism will be grounded as noted hereinbefore. Upon insertion of the key, the circuit being controlled will be immediately opened and then if the cylinder is turned to permit outward projection of the lock casing 7, the electrical circuit being controlled will be further opened by the disengagement of the contact 23 from the spring finger 22. This second break in the circuit precludes its closure by withdrawal of the key when the ignition switch is closed.

Upon again opening the ignition switch by pressing in the lock casing, the contact 23 will be re-engaged with the spring finger 22, but the circuit being controlled will still be opened and will remain open until the key is withdrawn.

Thus it will be seen that the grounding of the circuit through withdrawal of the key is possible only when the lock is in its locked condition.

What I claim as my invention is:

1. In combination with a key operable lock having a casing, a cylinder in the casing and a tumbler movable in the cylinder and biased to a locking position from which it is movable by a key, switch means comprising cooperable contacts one of which is the tumbler, the other contact being engaged by the tumbler only when the key is removed and the tumbler is in its locking position.

2. In combination with a key operable lock having a casing, a cylinder in the casing and a spring pressed tumbler in the cylinder movable against the force of the spring by a key, a switch for controlling an electrical circuit, said switch comprising the tumbler as one of its contacts and a contact carried by but electrically insulated from the casing as its other contact, and said insulated contact being located so as to be engageable by the tumbler only when the tumbler is freed from the holding effect of the key.

3. In combination with a key operable lock having a casing, a cylinder in the casing and spring pressed tumblers in the cylinder movable against the force of the spring by a key, a switch for controlling an electrical circuit, said switch comprising any one of the tumblers as one of its contacts and a contact carried by but electrically insulated from the casing as its other contact, and said insulated contact having a part engageable by all of the tumblers only when the tumblers are freed from the key.

4. In a key operable lock, a bored casing having a tumbler receiving groove communicating with its bore, a cylinder in the bore, a tumbler in the cylinder yieldingly projectible into the tumbler groove to lock the cylinder against rotation and retractible from the groove by a proper key inserted into the cylinder, and an electric switch having one of its contacts located in one of the walls of the tumbler receiving groove to be electrically engageable by the tumbler which forms its other contact when the tumbler is freed from the holding effect of the key so that said switch is closed upon removal of the key.

5. A lock switch comprising, a stationary housing, a lock mechanism movable therein to and from a locked position, means for securing said mechanism in locked position including a key controlled lock cylinder, spring propelled tumblers in the cylinder, a live stationary terminal, and a contact carried by but insulated from the movable lock mechanism and engageable with the live terminal when the lock mechanism is in its locked position, said contact being engageable by one of the spring propelled tumblers when the key is removed and the tumbler is in its spring urged position whereby a circuit connected with the live terminal may be grounded through the lock mechanism and whereby the ground connection for said circuit is breakable by insertion of the key and also by movement of the lock mechanism out of its locked position.

6. In a lock switch combination, a lock mechanism movable to and from a predetermined position, means for controlling the movement of said mechanism including a key controlled lock cylinder, spring propelled tumblers in the cylinder, a stationary live terminal with which an electric circuit is connectible, and a contact carried by the lock mechanism and engageable with the live terminal when the lock mechanism is in

said predetermined position and disengageable therefrom upon movement of the lock mechanism out of said position, said contact being engageable by one of the spring propelled tumblers when the tumbler is freed from the holding effect of the key and is spring propelled to a predetermined position whereby the circuit connected with the live terminal may be grounded through said contact, the tumbler engaged therewith and the lock mechanism.

7. In a key operable lock, a bored casing having a tumbler receiving groove communicating with its bore, a cylinder in the bore, a spring propelled tumbler in the cylinder yieldingly projectible into the tumbler receiving groove to lock the cylinder against rotation and retractible from the groove by a proper key inserted into the cylinder, a block of insulating material embedded in the casing so as to provide a bottom wall for said tumbler receiving groove, and an electric contact embedded in said block of insulating material with a portion thereof exposed to be engageable by a tumbler projected into the groove by its spring upon being freed from the holding effect of a key whereby an electric circuit connected with said contact may be grounded through the tumbler and the lock mechanism.

8. In a key operable lock having spring propelled tumblers returned to locking position upon removal of the key, an insulated contact disposed in position to be contacted by a tumbler in its locking position, said tumbler and contact constituting the cooperating contacts of an electric switch which is closed upon removal of the key.

9. In a key operable lock having spring propelled tumblers returned to locking position upon removal of the key, an insulated contact disposed in position to be contacted by any of said tumblers in locking position so that the insulated contact and any one of the tumblers in locking position constitute the cooperating contacts of an electric switch which is closed upon removal of the key.

10. In a key operable lock having spring propelled tumblers returned to locking position upon removal of the key, all of said tumblers being electrically grounded, an insulated contact adapted to be contacted by a tumbler in locking position so as to be grounded by such tumbler upon removal of the key.

11. In a cylinder lock, transverse spring propelled tumblers adapted to be moved to unlocked position by a key in opposition to their springs,

and an insulated contact positioned so as to form a resting abutment for said tumblers when in locking positions so that said insulated contact and any one of the tumblers constitutes the cooperating contacts of a switch which is closed upon removal of the key.

12. In a cylinder lock, including transverse spring propelled tumblers and a casing having a slot for the reception of said tumblers in their locked positions, an insulated contact disposed in said casing slot in the path of said tumblers to be electrically contacted thereby upon being propelled to their locked positions.

13. A key controlled lock switch comprising a stationary housing, a movable lock cylinder in the housing, spring propelled tumblers in the cylinder adapted to be moved by a key, a stationary contact carried by the housing, a movable contact carried by the cylinder to engage the stationary contact in certain positions of the cylinder, and a second contact connected to said movable contact, said second contact being arranged to be contacted by said spring propelled tumblers.

14. A key controlled lock switch responsive to removal of the key, comprising a stationary housing, a movable lock cylinder in the housing, spring propelled tumblers in the cylinder adapted to be moved by a key inserted into the cylinder, a stationary contact carried by the housing, a movable contact carried by the cylinder to contact the stationary contact in a predetermined position of the cylinder, and a second contact connected to said movable contact and adapted to be contacted by said spring propelled tumblers upon removal of the key, whereby closing of a circuit including said contacts requires the coincidence of movement of the lock cylinder to said predetermined position and the removal of the key.

15. A key controlled lock switch responsive to the removal of its key, comprising a stationary housing, a stationary contact carried by the housing, a lock cylinder having rotary and axial sliding movements in the housing, a movable contact carried by the cylinder to engage said stationary contact in a predetermined axial position of the cylinder in the housing, and spring propelled tumblers in the lock cylinder adapted to be yieldingly engaged with the movable contact upon removal of the key.

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