Jan. 20, 1931. H. A. DOUGLAS 1,789,462

ELECTRIC SWITCH

Original Filed June 14, 1929

Fig. 1.

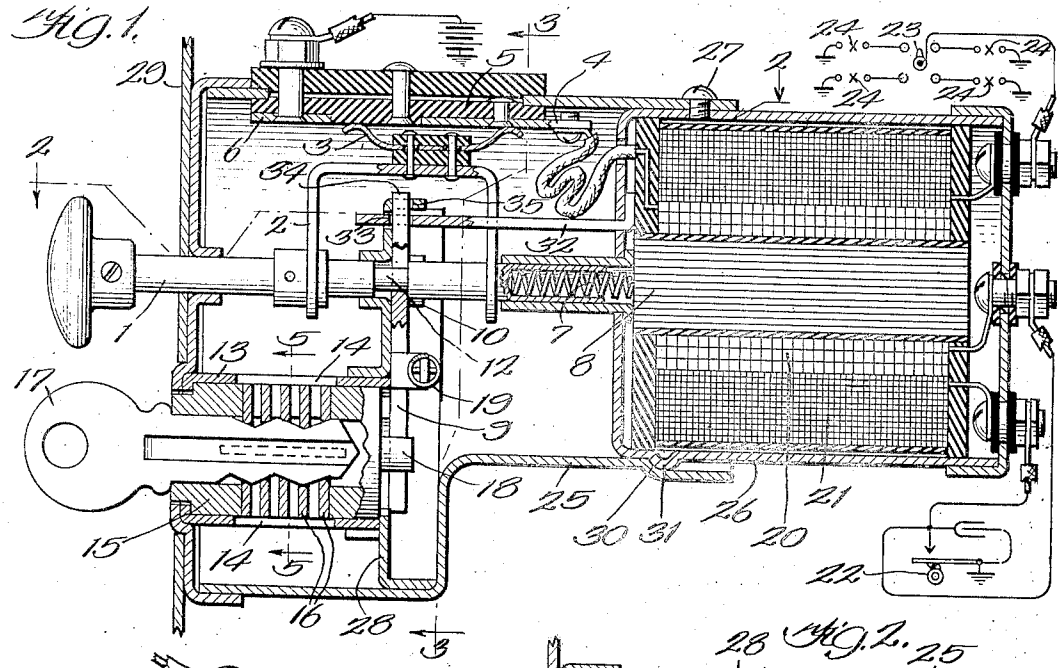


Fig. 2.

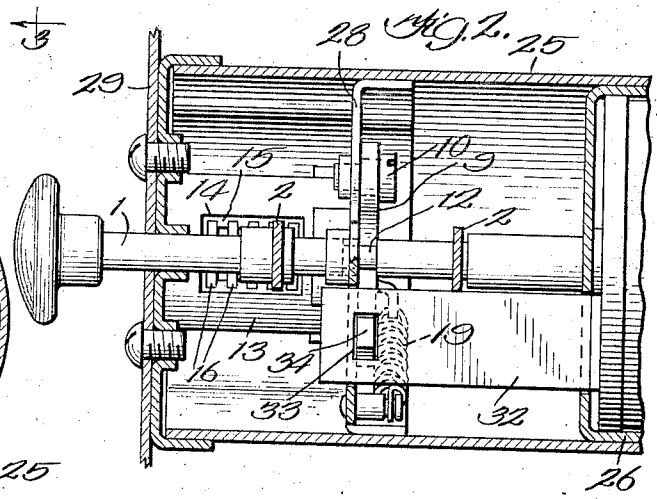


Fig. 3.

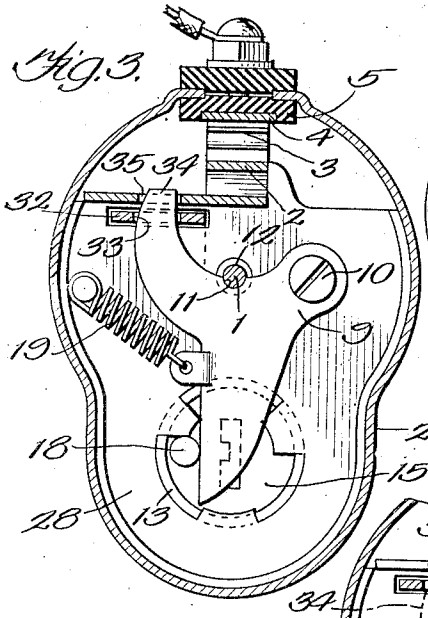


Fig. 4.

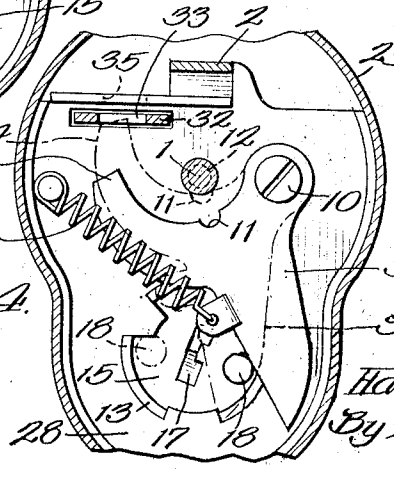
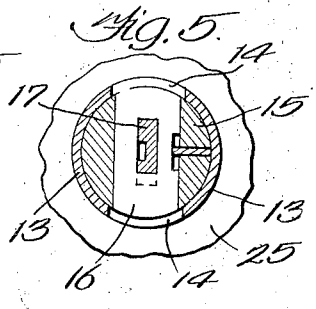


Fig. 5.



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UNITED STATES PATENT OFFICE

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN

ELECTRIC SWITCH

Original application filed June 14, 1929, Serial No. 370,865. Divided and this application filed February 3, 1930. Serial No. 425,545.

My invention relates to electric switches and has a number of objects and advantages in view, the present invention being a division of my original application, Serial No. 370,865, filed June 14, 1929.

A switch constructed in accordance with one characteristic of the invention is inclusive of a contact actuating member, preferably in the form of a plunger, a spring operable upon this member to move it to one of two alternative positions to effect one circuit adjustment, said member being movable against the force of said spring to the other alternative position to effect another circuit adjustment and a lock having an adjustable member operable thereby and engageable with the contact actuating member to hold the latter member in the position to which it is placed against the force of said spring. In the preferred embodiment of the invention the lock, in itself being operated, operates upon the adjustable lock member to withdraw this member from its holding engagement with the contact actuating member.

In accordance with another characteristic of the invention I employ a coupling having two complemental members, one in a unitary structure with the element, such as an ignition circuit transformer for which the circuit that is governed by the switch is provided, and the other in a unitary structure with the lock, the lock including adjustable means operable thereby and engageable with the contact actuating member and with the coupling member that is in a unitary structure with the aforesaid element to hold the contact actuating member in the position to which it is placed against the force of said spring and to lock the two coupling members together when the contact actuating member is in this position. These coupling members are desirably locked together when the lock controlling key is removed from the lock, so that the switching mechanism and the transformer or other element controlled thereby are not separable when the key is absent. In the preferred embodiment of the invention the complemental coupling members constitute two parts of a housing that encloses the transformer or other element and the switch controlling the same.

The invention will be more fully explained in connection with the accompanying drawing in which Fig. 1 is a longitudinal sectional view illustrating the preferred embodiment of the invention; Fig. 2 is a sectional view on line 2—2 of Fig. 1; Fig. 3 is a sectional view on line 3—3 of Fig. 1; Fig. 4 is a view illustrating parts of Fig. 3 in different positions; and Fig. 5 is a sectional view on line 5—5 of Fig. 1.

The electric switch illustrated includes a contact actuating plunger 1 on which is rigidly secured an inverted U-shaped bracket 2. This bracket carries a bridging leaf spring contact arm 3 which is secured, at its midportion, to the base of the bracket. The right hand end of the contact arm 3 is in constant engagement with an elongated contact 4 which is provided upon an insulating carrier 5. The other end of the contact arm 3 is brought into and out of engagement with the contact 6 also carried upon the mounting 5. As illustrated when the plunger is inwardly depressed to its limit the contacts 3 and 6 are separated and when the plunger is in its outermost position these contacts are engaged. A coiled spring 7 is desirably received within the hollow inner end of the plunger 1, this spring pressing, at its inner end, upon an abutment 8 and, at its outer end, upon the plunger. When the plunger is moved inwardly to open the circuit governed by the switch it compresses the spring 7. When this spring is free to expand it automatically places the switch in a circuit closing position. As illustrated the plunger is held in a circuit opening position by means of an adjustable member 9. This adjustable member is in the form of an arm which is pivotally mounted at 10. The arm has an arcuate notch 11 which is adapted to receive the reduced intermediate portion 12 of the plunger when the arm is swung sufficiently toward the plunger. When the reduced plunger portion 12 is received in the notch 11 the parts margining this notch are interposed between the larger parts of the plunger between which the part 12 intervenes. The spring 7 forces

the right hand one of these two larger parts of the plunger against the arm 9 which thus serves as a stop to prevent the spring from moving the plunger to a circuit closing position. The adjustable member or arm 9 is controlled by a lock. In the embodiment of the invention illustrated this lock is inclusive of a stationary shell 13 having diametrically opposite wide slots 14 formed therethrough and enclosing a rotatable tumbler barrel 15 which carries tumblers 16. In the absence of a key these tumblers project into said slots 14, or one of them, to hold the tumbler barrel from rotation, the lock then being in locking adjustment. When the key 17 is inserted it withdraws the tumblers from the slot or slots 14 that received the ends of the tumblers so that the tumbler barrel may then be turned by turning the key. The tumbler barrel carries a pin 18 which projects inwardly from the inner end of the barrel and is located upon one side of the barrel axis. The adjustable lock controlled member or arm 9 is held in engagement with this pin by means of a spring 19. When the tumbler barrel is turned to a position in which the tumblers are in register with the slots 14 and in which position the key 17 may be withdrawn, the pin 18 permits the spring 19 to turn the arm 9 in a clockwise direction to engage this arm with the plunger 1. If the plunger is fully pressed inwardly the notch 11 will receive the reduced plunger portion 12 to hold the plunger in its depressed position. If the plunger is not depressed, the arm 9 will engage the larger part of the plunger that is to the right of the plunger portion 12, the arrangement being such that the plunger may thereafter be depressed, whereupon the locking engagement of the member 9 with the plunger will be established upon the reception of the plunger part 12 within the notch 11. When the plunger is thus held in its depressed position, the circuit governed by the switch is closed. When the key is inserted and is turned to turn the tumbler barrel the member 9 is withdrawn from holding engagement with the plunger, whereupon the spring 7 places the plunger in its outer and circuit closing position. The switch of my invention is of particular service in controlling the ignition circuit of the internal combustion engine of an automotive vehicle. When the invention is thus employed the abutment 8 may also be the magnetizable core of a transformer whose primary 20 is directly in series with the switch and whose secondary 21 is in serial relation with the grounded interrupter 22 and the rotating arm 23 of a timer switch, the stationary contacts of this switch being connected with the sparking plugs 24.

In the preferred embodiment of the invention a housing is provided for the switch and transformer, this housing serving to guard against unauthorized access to the switch and transformer. This housing is desirably made in two portions 25, 26, these portions being held in assembly by a screw 27. The stationary shell 13 of the lock is desirably rigidly secured to the front wall of the housing portion 25 and to a partial partition 28 that is secured to and within the housing portion 25, the shell being between said front housing wall and said partition. The plunger 1 passes through said front housing wall and through the dash board or other mounting 29 which carries the housing. The housing portions 25 and 26 are desirably in telescopic relation, the portion 26 being preferably inserted within the inner end of the portion 25. These two housing portions are provided with motion limiting formations 30 and 31 which define the extent to which the housing portion 26 may be inserted within the housing portion 25.

The housing portion 25 is thus in one unitary structure with the lock and the housing portion 26 is in one unitary structure with the transformer. In order to prevent the separation of the two housing portions while the lock key is withdrawn and while the circuit of the transformer primary 20 is locked open I cause the adjustable lock member 9 to hold the housing portions together. To this end an arm 32 is carried by and projects forwardly from the housing portion 26. This arm has an opening 33 in its forward end in which the prong 34 of the arm 9 is received when the key is withdrawn and preferably whether or not the plunger is fully depressed. The housing portion 25 and the housing portion 26 in conjunction with the arm 32 thus constitute two complemental coupling members one in a unitary structure with the lock and the other in a unitary structure with the transformer, the lock adjustable means 9 being a part of the unitary structure that includes the housing portion 25 and the lock and serving to hold the coupling members together when the lock key is withdrawn so that said coupling members cannot then be separated, even though the assembling screw 27 be removed. In order to prevent undue strain upon the arm 9 in case the assembling screw 27 is removed and the housing portion 26 is rearwardly pulled upon, I also provide an opening 35 in the upper end of the partition 28 this opening being normally permanently in register with the opening 33 so that it may receive the prong 34 when the lock key is withdrawn. If the housing portion 26 should be rearwardly pulled upon the partition 28 will cooperate with the member 9 to resist this action, this said member 9 being thereby protected. Certain claims relating to lock

switch are included in the original of this application, hitherto mentioned.

Having described my invention, I claim:

1. An electric switch including a contact actuating member; a spring operable upon this member to move it to one of two alternative positions to effect one circuit adjustment, said member being movable, against the force of said spring, to the other alternative position to effect another circuit adjustment; an element for which the circuit controlled by the switch is provided; a lock; and a coupling having two complemental members, one in a unitary structure with the aforesaid element for which the circuit is provided and the other in a unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the contact actuating member and with the coupling member that is in a unitary structure with the aforesaid element to hold the contact actuating member in the position to which it is placed against the force of said spring and to lock the two coupling members together when the contact actuating member is in this position.

2. An electric switch including a contact actuating plunger; a spring pressing outwardly upon the plunger and serving to place it in its outer position to effect one circuit adjustment, said plunger being movable inwardly, against the force of said spring, to an alternative position to effect another circuit adjustment; an element for which the circuit controlled by the switch is provided; a lock; and a coupling having two complemental members, one in a unitary structure with the aforesaid element and the other in a unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the plunger and with the coupling member that is in a unitary structure with the aforesaid element to hold the plunger in the position to which it is placed against the force of said spring and to lock the two coupling members together when the plunger is in this position.

3. The structure of claim 1 wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

4. The structure of claim 2 wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

5. An electric switch including a contact actuating member; a spring operable upon this member to move it to one of two alternative positions to effect one circuit adjustment, said member being movable, against the force of said spring, to the other alternative position to effect another circuit adjustment; a transformer having the circuit of one of its windings governed by the switch; a lock; and a housing for the transformer and switch having separable portions, one portion being in one unitary structure with the transformer and the other being in another unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the contact actuating member and with the housing portion that is in a unitary structure with the transformer to hold the contact actuating member in the position to which it is placed against the force of said spring and to lock the two housing portions together when the contact actuating member is in this position.

6. An electric switch including a contact actuating plunger; a spring pressing outwardly upon the plunger and serving to place it in its outer position to effect one circuit adjustment, said plunger being movable inwardly, against the force of said spring, to an alternative position to effect another circuit adjustment; a transformer having the circuit of one of its windings governed by the switch; a lock; and a housing for the transformer and switch having separable portions, one portion being in one unitary structure with the transformer and the other being in another unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the plunger and with the housing portion that is in a unitary structure with the transformer to hold the plunger in the position to which it is placed against the force of said spring and to lock the two housing portions together when the plunger is in this position.

7. The structure of claim 5 wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

8. The structure of claim 6 wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

9. An electric switch including a contact actuating plunger; an element for which the circuit controlled by the switch is provided; a lock; and a coupling having two complemental members, one in a unitary structure with the aforesaid element for which the circuit controlled by the switch is provided and the other in a unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the plunger and with the coupling member that is in a unitary structure with the aforesaid element to

hold the plunger in one adjustment and to lock the two coupling members together when the plunger is in this position.

10. The structure of claim 9 wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

11. An electric switch including a contact actuating plunger; a transformer having the circuit of one of its windings governed by the switch; a lock; and a housing for the transformer and switch having separable portions, one portion being in one unitary structure with the transformer and the other being in another unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the plunger and with the housing portion that is in a unitary structure with the transformer to hold the plunger in a position to which it is placed and to lock the two housing portions together when the plunger is in this position.

12. An electric switch including a contact actuating member; an element for which the circuit controlled by the switch is provided; a lock; and a coupling having two complemental members, one in a unitary structure with the aforesaid element for which the circuit controlled by the switch is provided and the other in a unitary structure with the lock, said lock including adjustable means operable thereby and engageable with the contact actuating member and with the coupling member that is in a unitary structure with the aforesaid element to hold the contact actuating member in one adjustment and to lock the two coupling members together when the contact actuating member is in this position, wherein a spring operates upon the adjustable means of the lock to plate this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment and wherein a spring operates upon the adjustable means of the lock to place this means in its holding adjustment, the lock, in itself being operated, operating said adjustable means to withdraw the same from its holding adjustment.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.