June 22, 1948. P. H. CHILDRESS 2,443,977

IGNITION SWITCH FOR AUTOMOBILES AND THE LIKE

Filed Dec. 6, 1946

Fig. 1.

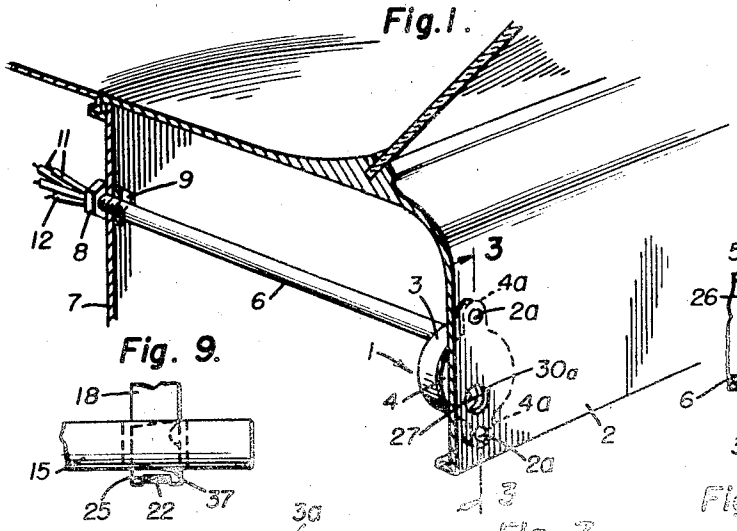


Fig. 10.



Fig. 6.

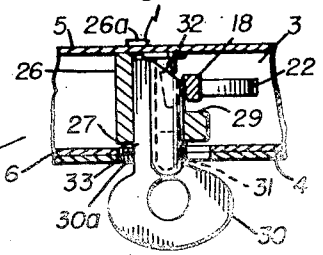


Fig. 9.

Fig. 3.

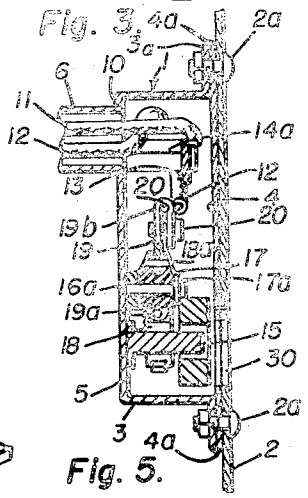


Fig. 7.

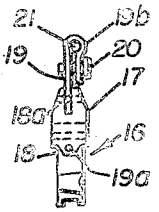


Fig. 2.

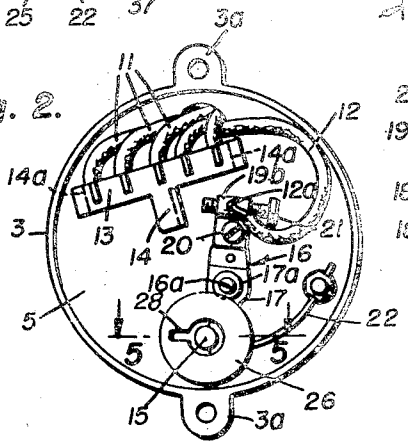


Fig. 8.

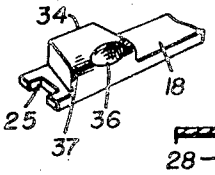


Fig. 5.

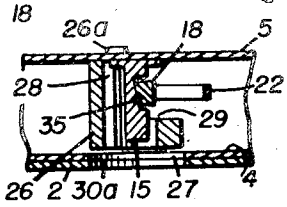
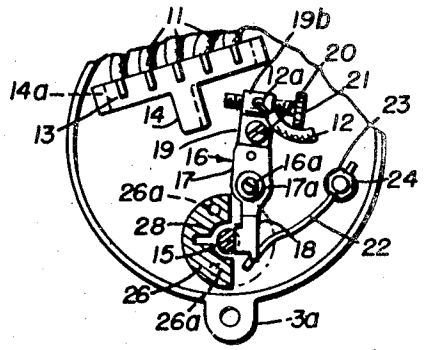


Fig. 4.



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IGNITION SWITCH FOR AUTOMOBILES AND THE LIKE

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Application December 6, 1946, Serial No. 714,509

3 Claims. (Cl. 200—42)

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My invention relates to improvements in ignition switches for automobiles and similar vehicles.

The invention is designed with the primary object in view of providing a simply constructed, inexpensive, key operated switch, for the ignition circuits of automobiles, so arranged that the key must be removed to break the circuit and stop the motor, whereby negligent leaving of ignition keys in automobiles, and stealing of automobiles as a result of such practice will be rendered impossible.

Another object is to provide a switch of the character and for the purpose above set forth which is tamperproof as regards operation to close the switch, by an unauthorized person.

Still another object is to provide an ignition switch which by slight change in the key structure, principally, may be modified within a wide range of variation so as to provide individual ignition switches for a large number of automobiles operative only by individual keys for the different automobiles.

Still another object is to provide an ignition switch which will not readily get out of order, as from wear, is substantially foolproof, and easy to install on any make of automobile.

Other and subordinate objects, also comprehended by my invention, together with the precise nature of my improvements, and the manifold advantages thereof, will be readily understood when the succeeding description and claims are read with reference to the drawing accompanying and forming part of this specification.

In said drawing:

Figure 1 is a view in perspective illustrating my improved switch applied.

Figure 2 is a view in front elevation drawn to a larger scale with the cap member removed and illustrating the position of the parts when the switch is open.

Figure 3 is a view in vertical transverse section taken on the line 3—3 of Figure 1 and drawn to a larger scale.

Figure 4 is a fragmentary view similar to Figure 2 with the key guide shown in transverse section.

Figure 5 is a fragmentary view in horizontal section taken on the line 5—5 of Figure 2.

Figure 6 is a similar view with the key shoved home.

Figure 7 is a view in side elevation illustrating the swingable contact arm in detail.

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Figure 8 is a fragmentary view of the swingable contact arm in perspective.

Figure 9 is a fragmentary view in side elevation of the pilot post and the lower key operated portion of the swingable contact arm.

Figure 10 is a view in end elevation of a modified form of key.

Referring to the drawing by numerals, my improved ignition switch, in the preferred embodiment shown, comprises a switch housing 1 which may be of any suitable form for use on the instrument panel 2 of an automobile, but, preferably, comprises, as shown, a cup-like circular, rear member 3 and a disklike front, cap member 4.

The housing 1 is preferably secured to the instrument panel 2 behind the same by means of screws 2^a which extend through said panel and through pairs of complemental ears 3^a, 4^a on said rear member 3 and said cap member 4, and which together with said screws secure said members together. The bottom of the rear member 3 forms the back 5 of the housing 1. The housing 1 may be formed of any suitable material, preferably a plastic, or a metal if desired.

A tubular conduit 6 of any suitable material, extends from the back 5 of the housing 1, eccentrically thereof, through the dash board 7 of the automobile with jam nuts 8, 9 threaded thereon upon both sides of said dash board. The tube 6 may take various forms and be fixed in any desired manner to the back 5 for instance by solder 10 if the rear members 3 be metal. The housing 1 is thus fixed to the instrument panel 2 and to the dash board 7 with conduit 6 extending rearwardly from the upper portion of said housing. The conduit 6 serves to house the appropriate ends of the circuit wires 11 for connection to one side of the switch, and a wire 12 for connection to the other side of said switch, said wires being extended through said conduit into the housing 1 as best shown in Figures 2 and 3.

A bus bar 13, of conductive material, is mounted in the upper part of the housing 1 adjacent to the conduit 6 to extend parallel with the back 5 and crosswise of said conduit with a depending fixed contact 14 of right angled cross section thereon. The mounting for the bus bar 13 comprises, preferably, a pair of posts on the back 5 of the housing 1 and suitably insulated therefrom, one of which is shown in full lines at 14^a, in Figure 3, and to which the ends of the bus bars 13 are suitably fixed with the ends of the circuit wires 11 fixed thereto by solder, not shown.

A pilot post 15, for an ignition key presently described, extends forwardly from the back 5 of the housing 1 in the lower part thereof and diametrically opposite the conduit 6.

An upright, swingable contact arm 16 is pivoted intermediate its ends, by a fixed stud 16a, on the back of the housing 1 adjacent the bottom thereof, to one side of the fixed contact 14, with an intermediate portion 17 of insulation material through which the stud 16a extends, a lower key operated end portion 18 of case hardened steel, and an upper conductive end portion 19. The end portions 18, 19 are set into the intermediate portion 17 and secured therein by pins 18a, 19a. The end portion 19 is formed with a terminal loop 19b secured by a screw 20 around a contact screw 21 threaded through said loop and adapted to engage the fixed contact 14 in a manner presently seen. The wire 12 is soldered as at 12a to the loop 19b.

A leaf spring 22 has one end suitably fixed in a post 23 on the back 5 of the housing 1, by a nut 24, and its other end bearing against the lower end portion 18 of the swingable contact arm 16 and guided by a notch 25 in said end portion, so that said spring acts to swing said arm 16 to move the upper end portion 19 thereof away from the fixed contact 14, and the lower end portion 18 of said arm toward the pilot post 15 at one side of said post.

A key guide 26 in the form of a mutilated cylinder of suitable material surrounds the pilot post 15 and is fixed to the back 5 of the housing 1 in the bottom portion of said housing and opposite the lower end portion 18 of the swingable contact arm 16, in horizontal alignment with an entrance opening 27, for the key, provided in the cap member 4 of the said housing 1. The key guide 26 is provided with a key shaped guideway 28 therein around the pilot post 15 and in the front portion of the guide, and with a side notch 29 therein opposite the lower end portion 18 of the swingable contact arm 16, and which exposes the pilot post 15 to said portion of said arm 16. A washer 17a on the stud 16a is overlapped by the front end of the key guide whereby said contact arm 16 is secured in place and cannot be removed unless the key guide 26 is removed. The key guide 26 is held in place by screws, as at 26a passing through the back 5 of the housing 1.

An ignition key 30 is provided with a tubular shank 31 having a beveled leading end 32 and a longitudinal radial rib 33, and which fits in the guideway 28 and on the pilot post 15 to be shoved into said guideway 28 along said pilot post. An entrance opening 30a for the key 30 is provided on the instrument panel 2.

Returning now to the pilot post 15 and the lower end portion 18 of the swingable contact arm 16, said lower portion 18 is formed with a side boss 34 adapted to fit, under the urge of the leaf spring 22, into a side notch 35 in the pilot post 15, with a concave beveled edge notch 36 therein adapted to face the beveled end 32 of the key shank 31, when said key is first inserted, but to be countersunk in said notch 35 so as to prevent said beveled end 32 from being shoved past the boss 34. A small corner portion 37 of the boss 34 extends slightly out of the notch 35, when said edge 36 is countersunk in the notch 35, to be engaged by the beveled end 32 of the key shank 31 and be cammed by said end away from the pilot post 15 until the beveled edge 36 is moved out of the notch 35 sufficiently to be engaged by the beveled end 32 of the said key shank

for complete camming of the boss 34 away from the pilot post 15 by sliding of the key shank 31 home on the pilot post 15. The bottom of the notch 35 and the opposed face of the boss 34 are oblique to the axis of the pilot post 15, as shown in Figure 5, for a purpose presently seen.

Referring now to the operation of the described switch. Normally, the swingable contact arm 16 is swung by the spring 22, clockwise as viewed in Figure 4, with the contact screw 21 disengaged from the fixed contact 14, and boss 34 fitted in the notch 35 and engaged with the bottom of said notch 35. The only part of the boss 34 exposed out of the notch 35 is the corner 37 of said boss, as best shown in Figure 9. The switch is now open, as will be clear. To close the switch, the key shank 31 is inserted through the entrance openings 27 and 30a and into the guideway 28 and pushed rearwardly along the pilot 15. As the beveled end 32 of the shank 31 strikes the corner 37 of the boss 34, said boss is initially cammed outwardly of the notch 35 to swing the swingable contact arm 16 counter clockwise, as viewed in Figure 4, and its upper end portion 19, with the screw 21 thereon, toward the fixed contact 14. As the corner 37 rides up the beveled end 32 of the key shank 31, said beveled end 32 engages the beveled edge 36 and the boss 34 is cammed away from the pilot post 15 to an extent such that the screw 21 is engaged with the fixed contact 14 and the switch thus closed. As will be clear, when the switch is thus closed, the key shank 31 is interposed between the pilot post 15 and the boss 34 to maintain the swingable contact arm 16 in switch closing position. Thus the switch is held close by the key 30 and cannot open until said key is withdrawn. By having the boss 34, all but the corner 37 thereof, interposed in the notch 35 of the pilot post 15 when the switch is open, the swingable contact arm 16 cannot be operated to close the switch by a piece of wire or like instrument inserted through the key way 28, nor by similar means. Actually, the corner 37 of the boss 34 constitutes substantially a pin point pick up abutment for engagement by the beveled end 32 of the key shank 31 so that it is practically impossible to engage said corner with any other device except the beveled end 32 of the key shank 31 and in a manner such that the swingable contact arm 16 may be operated in opposition to the spring 22. The slant of the bottom of the notch 35 and the face of the boss 34, provides for beveling the face of the boss 34 to facilitate camming of the boss 34 by the beveled end 32 of the key shank 31 and for a flush fit of the face of said boss in the notch 35 preventing insertion of a tool between said notch and said boss to pry the boss 34 out of the notch 35. By varying the size of the pilot post 15, guideway 28 and key shank 31, a large number of switches may be made for operation by individual keys only. This end may also be achieved by varying the shape of the rib of the key shank, as shown at 38 in Figure 10, with corresponding variation in shape of the guideway 28.

The foregoing will, it is believed, suffice to impart a clear understanding of my invention, without further explanation.

Manifestly, the invention, as described, is susceptible of modification without departing from the inventive concept, and right is herein reserved to such modifications as fall within the scope of the appended claims.

What I claim is:

1. A switch for use in the ignition circuit of

an automobile comprising a housing having a back opening therein for the extension of circuit wires into the housing, said housing having a front key entrance opening in the same, a pilot post fixed in said housing in the axis of the key entrance opening, a contact arm pivoted in said housing for swinging in relatively opposite directions with one end opposed to one side of said post, and adapted to engage the same upon swinging of said arm in one direction, spring means in said housing for swinging said arm in said one direction, a key having a tubular shank for insertion through said entrance opening and sliding along said post to interpose the shank between said post and arm and thereby swing said arm in the opposite direction, coacting camming devices on said key shank and said arm respectively for swinging said arm as said shank is slid along said post, a fixed contact in said housing for engagement by said arm when said arm is swung in said opposite direction, means on said arm for connecting one of said circuit wires thereto, and means in said housing for connecting the other circuit wires to the fixed contact.

2. A switch of the class described comprising a housing having a key entrance opening therein, a fixed contact in the housing, a pivoted contact arm in said housing swingable in opposite directions to engage and disengage the fixed contact, respectively, a key piloting post in said housing axially aligned with said opening and having a side notch therein, a boss on one end of said arm adapted to be entered in said notch when said arm is swung to disengage said fixed contact, spring means for swinging said arm to disengage the same from the fixed contact, a key having a tubular shank for insertion through said opening and sliding along said post forwardly, a beveled end on said shank for camming engagement with

said boss to cam the same out of the notch and swing said arm into engagement with the fixed contact when said shank is slid forwardly, said boss having a corner exposed out of said notch for camming engagement by said beveled end to initially cam the boss outwardly of the notch sufficiently for engagement by said cam end subsequently, and coacting devices in said housing and on said key shank for preventing said shank from turning on said post.

3. A switch of the class described comprising a housing having a key entrance opening therein, a fixed contact in the housing, a pivoted contact arm in said housing swingable in opposite directions to engage and disengage the fixed contact, respectively, a key piloting post in said housing axially aligned with said opening and having a side notch therein, a boss on one end of said arm adapted to be entered in said notch when said arm is swung to disengage said fixed contact, spring means for swinging said arm to disengage the same from the fixed contact, a key having a tubular shank for insertion through said opening and sliding along said post forwardly, a beveled end on said shank for camming engagement with said boss to cam the same out of the notch and swing said arm into engagement with the fixed contact when said shank is slid forwardly, said boss having a corner exposed out of said notch for camming engagement by said beveled end to initially cam the boss outwardly of the notch sufficiently for engagement by said cam end subsequently, and coacting devices in said housing and on said key shank for preventing said shank from turning on said post comprising a key guide surrounding said post and having a grooved guideway therein, and a rib on said shank for sliding in said groove.

PATRICK H. CHILDRESS.