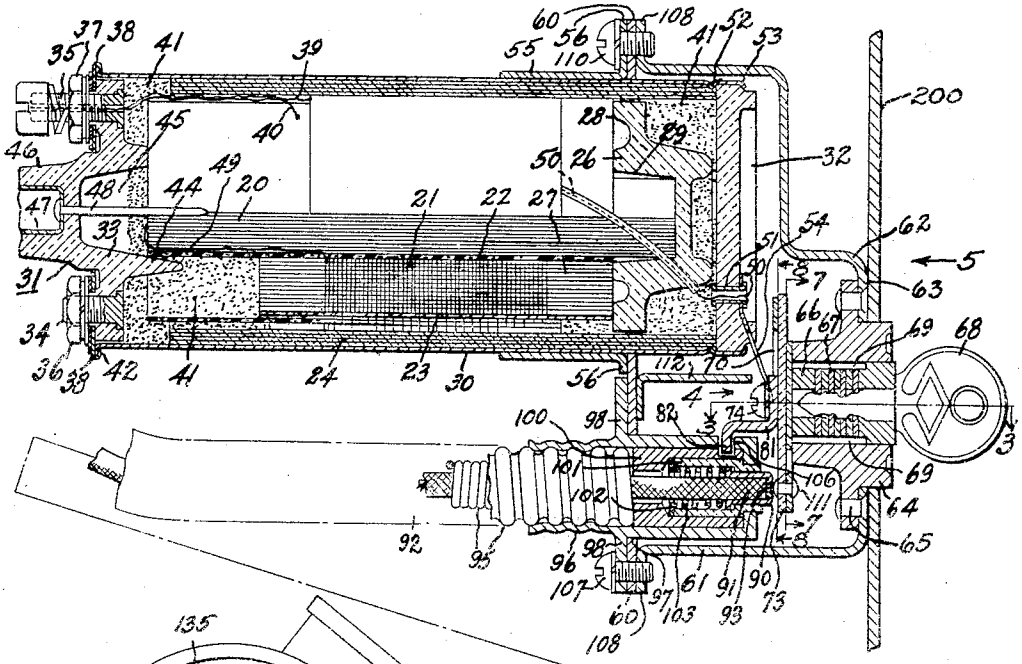
Feb. 28, 1933. H. E. NORVIEL 1,899,350

ANTITHEFT DEVICE

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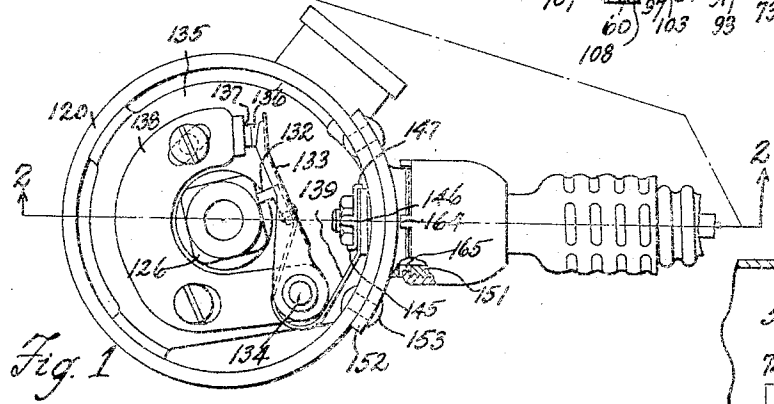


Fig. 1

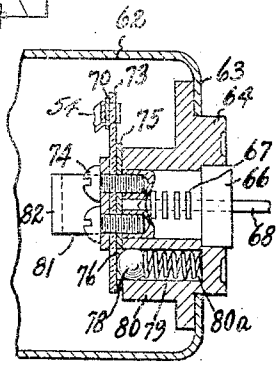


Fig. 3

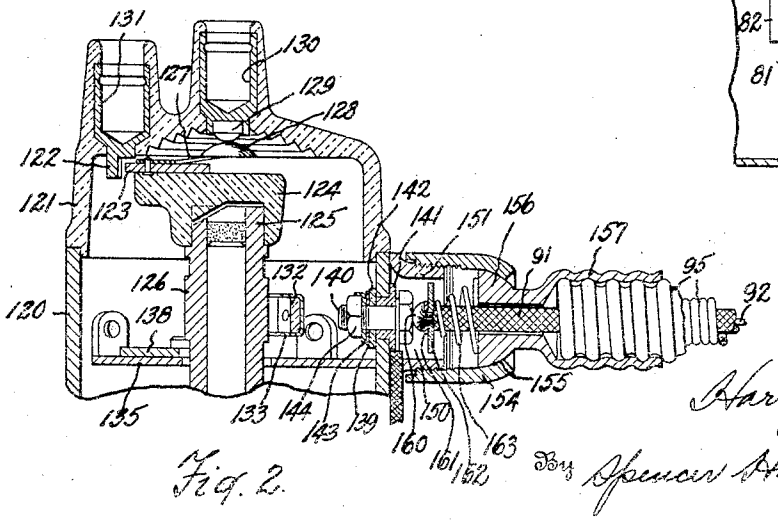


Fig. 2.

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Feb. 28, 1933. H. E. NORVIEL 1,899,350

ANTITHEFT DEVICE

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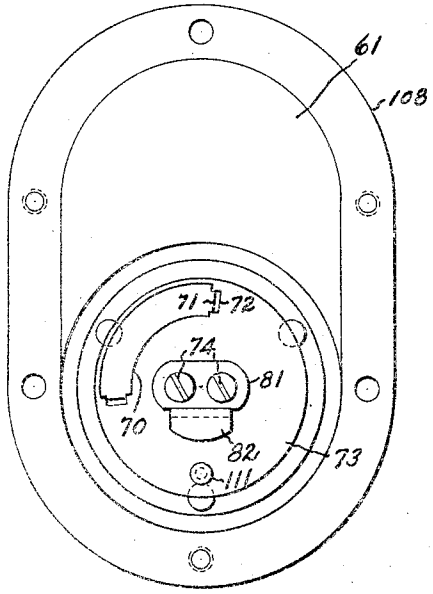


Fig. 4

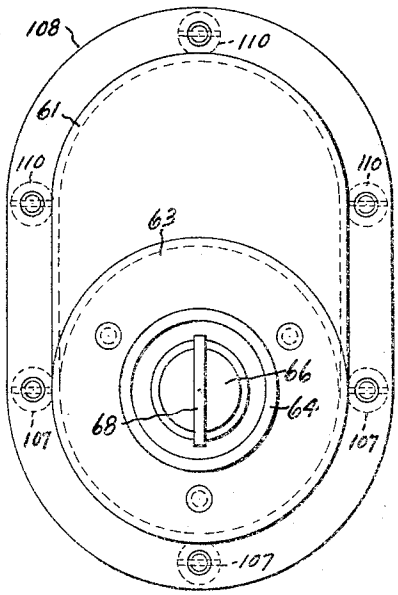


Fig. 5

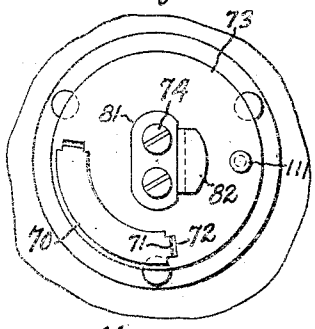


Fig. 6

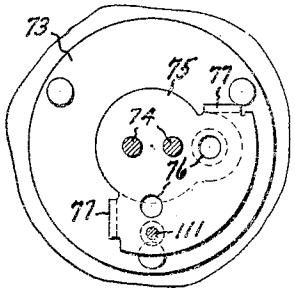


Fig. 7

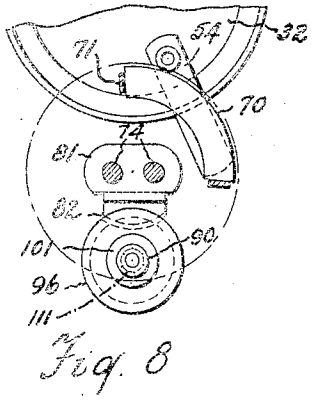


Fig. 8

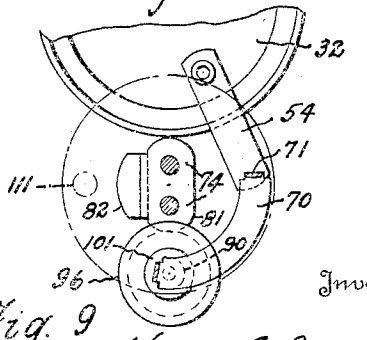


Fig. 9

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Patented Feb. 28, 1933 1,899,350

UNITED STATES PATENT OFFICE

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ANTITHEFT DEVICE

Application filed January 6, 1928. Serial No. 244,992.

This invention relates to apparatus for preventing unauthorized use of electric apparatus, particularly to a key controlled device for preventing the use of the ignition apparatus of an automobile in order to prevent the theft thereof.

One object of the present invention is to provide a structure comprising an electric switch and means for connecting one terminal of the switch with a piece of electrical apparatus located at a distance from the switch, for example, an ignition timer for an internal combustion engine, the connecting means comprising a conductor which is protected by a hard metal armor tube attached to the switch case and to the electrical apparatus, and to provide a key operated means for controlling the switch and for preventing removal of the metal armor from the switch case in order to prevent removal of the wire from the lock-switch so that the purpose of the lock-switch might be defeated.

A further object of the invention is to provide a switch in which one of the stationary contacts is a terminal member directly connected with the armored conductor, said terminal member being located properly for engagement by the movable contact of the switch when the conductor armor is attached to the switch case.

Another object of the invention is to provide for coupling the conductor armor with a piece of electrical apparatus such as an ignition timer in such a manner that the armor cannot be disconnected from the apparatus without great difficulty and without consuming an amount of time such as would arouse suspicion. In this connection, it is one of the objects of the invention to provide electrical connectors or contacts, one permanently attached to the apparatus and the other to the conductor, and to provide for causing these contacts to be engaged when the armor is attached to the electrical apparatus.

Another object of the invention is to prevent the theft or unauthorized use of an automobile by means of a key controlled switch and armored conductor for connecting the switch with the ignition timer, said switch having means for locking the switch in open position for locking the conductor and armor to the switch case, and for locking closed a ground connection with the conductor, so that when the ignition switch is locked in "off" position the ignition timer will be grounded.

A further object of the present invention is to provide an electric switch and armored cable structure having the features mentioned, said structure including an ignition coil which may be assembled with the switch case or removed therefrom for replacement or repairs and which carries a stationary contact of the switch. In this connection, it is an object to hinder the tampering with the ground connection of the switch while the coil is removed from the switch case.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is in part a fragmentary longitudinal sectional view of a switch and ignition coil unit embodying the present invention and cooperating with an armored conductor, a portion of which is shown in section; and Fig. 1 is in part a plan view of an ignition timer to which said armored conductor is attached.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a view looking in the direction of the arrow 4 in Fig. 1 and shows certain parts of the switch in elevation.

Fig. 5 is a front view of the coil and switch

housing looking in the direction of the arrow 5 in Fig. 1.

Fig. 6 is a view of certain parts shown in Fig. 4 in a different position.

Fig. 7 is a sectional view on the line 7—7 of Fig. 1.

Fig. 8 is a sectional view on the line 8—8 of Fig. 1, showing the ignition switch opened and the ground connection established.

Fig. 9 is a view similar to Fig. 8, showing the ignition switch closed and the ground connection broken.

The ignition coil included in the present invention comprises a center magnetizable core 20 which is surrounded by secondary coil 21 wound upon a non-conducting tube 22. The secondary coil 21 is surrounded by primary coil 23 and the latter by a tubular structure 24 formed by placing a sheet of magnetizable material upon a non-conducting sheet and winding both sheets together into a tubular form, preferably by wrapping it around the primary 30. A non-conducting base 26 is attached to the right hand end of the margins of the secondary insulating paper 27 and to one end of the core 20 by suitable plastic insulating material such as beeswax and rosin which when melted is smeared upon the surface 28 of the base 26 and upon the walls 29 of the recess which receives the core wires 20. The assembly of windings, center core 20 and structure 24 is placed within a tubular case 30 which is adapted to receive end members 31 and 32. The end member 31 comprises a non-conducting body 33 which is secured by bolts 34 and 35 and nuts 36 and 37 to a metal disc 38, the bolts and nuts being insulated from the disc 38. Before attaching the cover member 31 to the tube 30, two wires 39 and 40 leading from the windings are threaded through a hole in the bolt 35, and a quantity of sealing compound represented by dotted portions 41 is poured while plastic into the space above the windings and core while the case 30 is held vertically. Then the cover member 31 is placed upon the case 30 and is joined thereto by a seam 42. The inwardly extending annular flange or skirt 44 of the body 33 displaces a considerable quantity of sealing compound and forces it into the spaces between the different parts of the assembly in order to assist anchoring the assembly firmly within the case 30. The recess 45 provided in the skirt 44 receives an end portion of the core 20 and the tube 22 and assists in anchoring the core and windings within the case 30. The body 33 provides a cable receiving socket 46 having a metallic lining 47 which is electrically connected by a nail 48 with the core 20 to which the inside lead 49 of the secondary coil 21 is connected. The wire 40 is the outside lead of the secondary coil and the wire 39 is the inside lead of the primary coil 23. The outside lead of the primary 23 is provided by a wire 50 which passes around the non-conducting base 26 and is threaded through a hollow rivet 51 before the end cover 32 is attached. After a quantity of sealing material 41 has been poured into the end of the tube 30 adjacent the body 26, the end cover 32 is pushed into the tube 30 until it abuts an internal annular bead 52 provided by the tube 30. The cover 32 is attached to the case 30 by spinning a flange 53. Before the cover 32 is assembled with the case 30, it is provided with a switch contact 54 which is attached by the tubular rivet 51. After assembling the cover 32, the wire 50 is secured to the rivet 51 by solder.

The ignition coil case 30 is permanently attached to a sleeve 55 having a flange 56. The flange 56 engages a plate 60 which cooperates with a sheet metal frame 61 to provide a switch case. The frame 61 has a cylindrical extension 62 for projecting through an opening in an instrument board 200; and the front wall 63 of the cylindrical portion 62 is provided with an opening for receiving a key shaft bracket 64 which is attached by rivets 65, having their heads flush with the outside of the case. The key shaft bracket 64 supports a key shaft 66 carrying a plurality of locking bars 67 which, when the proper key 68 is inserted in the shaft 66, are withdrawn from grooves 69 and their ends are located flush with the cylindrical periphery of the shaft. When the proper key 68 is inserted into the shaft 66, the shaft may be turned in order to move a switch contact into circuit making position.

The movable switch contact is provided by the arcuate conducting plate 70, the ends of which are provided with tangs 71 which pass through openings 72 in a non-conducting plate 73. The tangs 71 are bent against that side of the plate 73 opposite the contact 70. The plate 73 is secured by screws 74 to the key shaft 66, these screws securing also a detent plate 75 having detent recesses 76 and stop lugs 77. The detent recesses 76 are spaced 90 degrees and are adapted to receive a ball 78 which is urged by a spring 79 against the plate 75. In this way the contact 70 is yieldingly maintained in its "off" and "on" positions. The movement of the contact 70 is limited to approximately 90° by reason of the engagement of the stop lugs 77 with a boss 80 provided by the bracket 64 for the purpose of providing a cylindrical bore 80*a* for receiving the spring 79 and ball 78. The screws 74 also secure to the shaft 66 a locking plate 81 having a locking lug 82 which is adapted to cooperate with a part which supports the other stationary contact of the switch.

The other stationary contact which is electrically connected with the contact 54 by the movable contact 70 is provided by a metal plunger 90 which fits over the insulation 91

of a wire 92 and has an apertured end wall through which the bared end 93 of the wire 92 passes and is soldered to the plunger. The wire 92 extends through a flexible hard-metal armor 95 attached to the switch case and to the housing of an ignition timer to be described. The armor 95 is permanently attached to a sleeve 96 which projects through an opening 97 in the plate 60. The sleeve 96 contains a sleeve 100 containing a non-conducting sleeve 101 and a non-conducting washer 102. The sleeve 101 provides a guide for the sliding movement of plunger 90 and a retainer for a spring 103 which urges the plunger 90 toward the plate 73. There will be sufficient slack in the wire 92 to permit the spring 103 to urge the plunger 90 into engagement with the movable contact 70.

In order to prevent removal of the switch contact 90, the sleeve 96 is provided with a notch 106 which is so located when the parts are assembled that it will receive the locking lug 82 of the locking plate 81 as shown in Figs. 1 and 8. The sleeve 96 is held in proper position so that the notch 106 will be adapted to receive the lug 82 by screws 107 which pass through the flange 98 of the sleeve 96, through the plate 60, and which engage holes tapped in the flange 108 of the case 62.

Other screws 110 secure the flange 56 of the collar 55 to the plate 60 and to the flange 108. The ignition coil may be removed while the switch is locked in open position and while a metal rivet 111 connecting the plates 73 and 75 is locked in engagement with the plunger 90 in order to provide a ground through the switch case and metallic members of the automobile including the metal instrument board 200. While the coil is removed from the case 61, an opening will be left in the plate 60. A partition 112 secured to the plate 60 prevents ready access to the plunger 90 and rivet 111 and makes it difficult to insert a non-conductor between these parts to interrupt the ground connection. Such a manipulation would be especially difficult where the switch is mounted upon the back of the instrument board of an automobile and relatively close to the inside of the top of the automobile cowl plate. The space between the instrument board and the dashboard of the automobile is usually crowded with wires and controls which would make it difficult to insert an instrument between the free edge of the partition 112 and the plate 73.

The manner of connecting the flexible armor 95 with an electrical instrument located at a distance from the switch will now be described. The disclosed embodiment of the present invention includes the connection of the armor 95 with the housing 120 of an ignition timer. The housing 120 supports a distributor head 121 carrying distributor posts arranged in a circular row, one of these posts being shown at 122. A segment 123 is rotated past the posts 122 by a distributor block 124 mounted upon and driven by a shaft 125 providing a timer cam 126. The segment 123 is attached by a leaf spring conductor 127 to a button 128 contacting with a button 129 attached to a metallic socket 130 for receiving a metal terminal clip connected with a wire leading to the secondary coil of an ignition coil. For example, a wire may connect the socket 130 of the distributor head 121 with the socket 47 of the ignition coil cover 31 shown in Fig. 1. The posts 122 are each integral with a metal socket member 131 for receiving a terminal plug connected with a wire leading to a spark plug.

A timer cam 126 cooperates with a rubbing block 132 attached to a breaker lever 133 insulatingly pivoted upon a stud 134 attached to a plate 135 supported within the housing 120. The lever 133 carries a contact 136 for engaging a contact 137 supported by a bracket 138 which is also pivoted upon the stud 134 and is adjustably secured to the plate 135. A leaf spring conductor 139 is connected at one end with a bolt 140 and at the other end to the lever 133 and is biased for urging the lever toward the cam 126. The bolt 140 is insulatingly supported by the housing 120 by passing the bolt through a non-conducting bushing 141 and a non-conducting washer 142. The bolt 140 also passes through an aperture in the end of the spring 139 and through a washer 143. A nut 144 is threaded on the bolt 140 and is tightened in order to secure the bolt and parts connected therewith to the housing 120. After the nut 144 has been tightened, tangs 145 and 146 provided by the washer 143 are bent against the sides of the nut 144, and a tang 147 also provided by the washer 143 is bent against the end of the spring conductor 139 which is preferably a squared end so that the washer 143 is prevented from turning. In this way the nut 144 is locked in securing position. The nut may be soldered to the washer 143 and the washer 143 may be soldered to the spring 139 in order to render more difficult the removal of the spring 139 from the bolt 140.

The head of the bolt 140 is located within a recess 150 provided by the tubular extension 151 of a plate 152 which is attached by rivets 153 to the housing 120. The tubular extension 151 is threadedly engaged by a coupling 154 having a spherical seat 155 for receiving a corresponding spherical surface provided by the head 156 of a socket member 157 which is permanently attached to the armor 95 as shown in Figs. 1 and 2. The ends of the armor 95 are permanently connected with the sleeve 96 and with the socket member 157 by squeezing the parts 96 and 157 against the spiral ridges of the outer jacket of the armor 95. The insulated wire 92 passes through the socket 157 and terminates within the recess 150 where its bared end 160 is sol-

dered to a washer 161 abutting a non-conducting washer 162 which abuts the end of the insulation 91 of the conductor 92. A spring 163 located between the head 156 of the socket 157 and the washer 162, yieldingly urges the soldered end 160 of the conductor 92 into engagement with the head of the bolt 144. Thus it is seen that the attaching of the armor 95 to the ignition timer housing 120 provides for electrically connecting the wire 92 with the insulated terminal of the timer. Thus the ignition timer is connected with the plunger 90 which forms one of the contacts of the ignition switch. After the coupling member 154 has been screwed to the plate 152, one of the tangs 164 provided by the coupling 154 is bent into a hole 165 provided by the tubular extension 151. Thus it will be difficult to untwist the coupling member 154 in order to disconnect the armor 95 from the ignition timer housing 120 and the wire 92 from the insulated terminal bolt 140. The parts 152, 154 and 157, like the armor 95, are constructed of hardened metal so as to resist cutting with a hack-saw.

The ignition coil, lock-switch and armored conductor are usually assembled together, and are attached to some part of the automobile, preferably by mounting the switch case upon the instrument board. The free end of the armor carrying the parts 157 and 154 is passed through a hole in the dashboard and may be connected with the ignition timer before the timer is assembled with the engine frame. The swivel joint provided by the parts 154 and 156 facilitates the manipulation of the timer in order to assemble it with the engine frame, the armor 95 being relatively stiff and offering substantial resistance to bending. This swivel joint obviously permits locating the socket member 157 otherwise than at right angles to the axis of the timer housing 120 and therefore permits the placing of the armor 95 in a position which might not otherwise be permitted if the armor 95 were rigidly attached to the timer housing 120. In any possible relation of the parts 157 and 154 while the latter is connected with the timer housing, the contact 160 will remain in engagement with the bolt 140.

When the switch is in the position shown in Figs. 1, 4 and 8, the circuit between the ignition coil primary winding 23 and the insulated terminal 140 of the timer will be interrupted since the contact 70 is separated from the contact plunger 90. When the switch contact 70 is in this position, the locking lug 82 which is rotatably supported by the key shaft 66, is received by the notch 106 provided by the sleeve 96. At the same time, the contact plunger engages the rivet 111 in order to connect the insulated terminal 140 of the timer with ground through the switch case, instrument board 200 and other metallic parts of the automobile. When the switch shaft 66 is in the position shown in Figs. 1, 4 and 8, the key 68 may be removed to permit the locking bars 67 to move into the lower groove 69 shown in Fig. 1. Therefore, the ignition switch may be locked in open position and the grounding switch locked in closed position; and the wire which connects the switch with the ignition timer is locker to the switch case. The wire 92 is locked to the switch case by the lug 82 which cooperates with the sleeve 96. Since the sleeve 96 carries a flange 98 abutting the plate 60, the switch case members 60 and 61 cannot be separated while the ignition switch is locked.

When the contact 70 has been turned by the key 68 to the position shown in Figs. 6 and 9, the contact 70 will bridge the contact 54 and the plunger 90, and the ground connection will be interrupted by moving the rivet 111 away from the plunger 90 at the same time the locking lug 82 will be separated from the sleeve 96 so that the armored conductor 92 may be separated from the switch and the switch case 61 separated from the plate 60.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A lock-switch comprising a case, having apertures in a wall thereof, members for closing said apertures and projecting into the case, stationary switch contacts insulatingly supported by said members, a movable contact for engaging the stationary contacts, and key operated means for moving the movable contact and for preventing removal of one of the stationary-contact supporting members from the case.

2. A lock-switch according to claim 1 in which one of the aperture covers is removable from the case while the switch is locked, and in which access through the uncovered aperture in the case to the contact which is locked to the case is prevented by a partition located within the case and extending between the apertures through which the stationary contacts are removable.

3. A lock-switch according to claim 1 in which one of the members for closing an aperture in the switch case is provided by an end portion of an ignition coil which insulatingly supports one of the switch contacts.

4. A lock-switch comprising a metal case, a stationary contact insertable through an opening in the case and attached thereto and insulated therefrom, another stationary contact within the case, a movable contact for bridging the stationary contacts, another movable contact for grounding one of the

stationary contacts on the switch case, and key operated means for moving the bridging contact out of engagement with the stationary contacts and moving the grounding contact into engagement with a stationary contact and vice versa, and for locking the movable grounding contact in engagement with said stationary contact and for preventng removal of said stationary contact, while grounded, from the switch case.

5. A theft-preventing device for automotive vehicles comprising, in combination, a switch having stationary contacts and a key operated device for connecting the stationary contacts, a conductor for connecting one of the stationary contacts, a tubular armor attached to the switch case supporting and enclosing said conductor, means supporting one of the stationary contacts from the tubular armor, and means operated by the key-operated device for preventing removal of the armor and contact from the switch case when the stationary contacts are not connected.

6. A theft-preventing device, comprising a pair of switch contacts, one of which is provided at the end of a wire, detachably connected tubular members enclosing the wire and contacts, a wire armor enclosing the wire and universally connected with one of the tubular members, means separably connecting the tubular members together, and means resiliently maintaining the contacts in engagement for various positions of the separable connecting means.

7. A lock switch comprising a case having an opening, a removable plug insertable through said opening, a relatively stationary switch contact insulatingly supported by the plug, said plug being recessed, and a locking member rotatable into the plug recess to prevent unauthorized removal of the plug supported contact.

8. A lock switch comprising a case having an opening, a tubular conductor armor attachable to the case and supported from said opening, a stationary switch contact insulatingly carried by the conductor armor and insertable through the case opening, and means including a recess in the conductor armor for securing the switch contact within the case and for preventing unauthorized removal.

9. A theft-preventing device for automotive vehicles comprising, in combination, a switch having stationary contacts and a key operated device for connecting the stationary contacts, a conductor for connecting one of the stationary contacts, a tubular armor attached to the switch case enclosing said conductor, means supporting one of the stationary contacts from the tubular armor, and means operated by the key-operated device for preventing removal of the armor and contact from the switch case and for grounding the conductor when the stationary contacts are not connected.

10. A theft-preventing device for automotive vehicles comprising, in combination, a switch having stationary contacts and a key operated device for connecting the stationary contacts, a conductor for connecting one of the stationary contacts, a tubular armor attached to the switch case enclosing said conductor and carrying one of the stationary switch contacts, and means providing for grounding said stationary contact when the stationary contacts are not connected.

In testimony whereof I hereto affix my signature.

HARRY E. NORVIEL.