Dec. 29, 1936. L. O. PARKER ET AL 2,065,906

IGNITION LOCK

Filed March 12, 1929

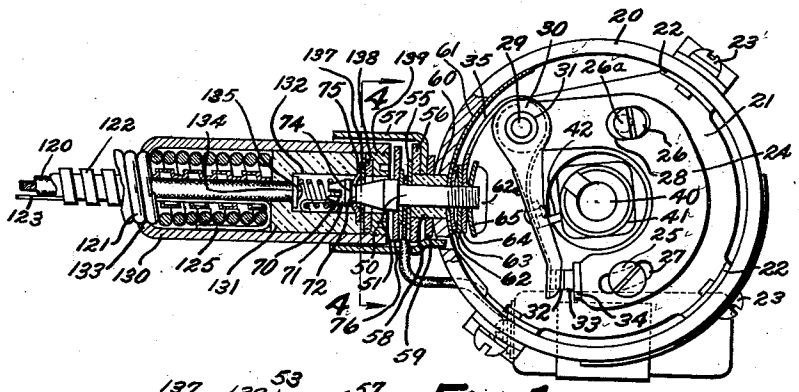


Fig. 1

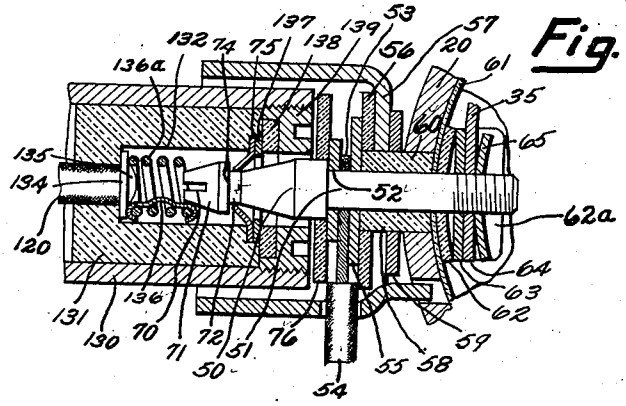


Fig. 2

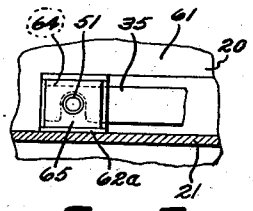


Fig. 3

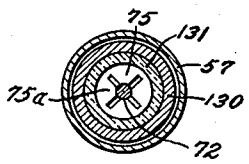


Fig. 4

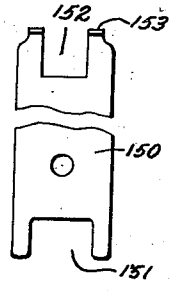


Fig. 5

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Patented Dec. 29, 1936 2,065,906

UNITED STATES PATENT OFFICE

2,065,906

IGNITION LOCK

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Application March 12, 1929, Serial No. 346,402

5 Claims. (Cl. 173—269)

This invention pertains to anti-theft devices and particularly to key controlled means for rendering ignition apparatus inoperative and for securing elements of the ignition against disassembly or removal, and more particularly to key controlled apparatus which will prevent the proper functioning of the ignition timer and will prevent ready removal of the electrical connection thereto.

One object of the invention is to provide for coupling the armored conductor of an ignition lock with a piece of electrical apparatus, such as an ignition timer, in such a manner that the electrical connection cannot be interrupted without great difficulty and without consuming an amount of time that would arouse suspicion. In this connection, it is one of the objects of the invention to provide electrical connections between the conductor and associated apparatus which is rendered particularly inaccessible by reason of the arrangement of the several elements of the structure, and in which said inaccessible connection renders the apparatus to which it is applied practically theft proof, and insures the apparatus against unauthorized use.

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

In the drawing:

Fig. 1 is a longitudinal sectional view of a coupling unit embodying our invention as applied to an ignition timer, a partial plan view of which is shown. Fig. 2 is an enlargement of a portion of Fig. 1. Fig. 3 is a detail showing the association of the elements connecting a terminal stud with an ignition timer. Fig. 4 is a cross section of the coupling unit as viewed substantially on the line 4—4 of Fig. 1. Fig. 5 is a plan view of the special wrench or tool used for assembling and servicing the structure involving our invention.

Heretofore, many of the ignition locks of the prior art have failed in functioning to prohibit unauthorized use of apparatus to which they were applied in that they have presented some weakness of structure, or arrangement of parts, which could readily be overcome by the thief, the operativeness of the ignition elements reestablished and the vehicle stolen. Various remedies have been proposed for overcoming such deficiencies of structure, but so far none of them have attained the end to which anti-theft protection is universally assured. The instant application discloses a device which will effectually overcome these difficulties, in that connection is made between a key controlled circuit closer and a piece of electrical apparatus, that will present such an amount of inconvenience to the thief, and render the connection so inaccessible, requiring such an extent of time for reestablishment of the proper functioning relation, that the thief will abandon his objective almost upon the first attempt.

Referring particularly to the drawing, we have illustrated our invention as applied to the timer and circuit breaker mechanism of an ignition apparatus, but it is readily seen that the invention may involve any other unit of the ignition mechanism, for instance the coil. In any event, the particular apparatus is designed to have a novel electro-mechanical connection with an ignition circuit controlling and lock means, which connection can be severed only upon predetermined manipulation of various parts of the apparatus.

In Fig. 1 of the drawing, the unit of apparatus with which the invention has its association, is a timer housing 20 in which is mounted a plate 21, provided with ears 22 threadably receiving screws 23 driven through the housing 20, and providing means of supporting the plate 21 within the housing 20. Within the housing 20, and upon the plate 21, there is provided a contact breaker mounting bracket 24, which is adjustably supported thereon by means of the headed screw 25 and an eccentric headed disc 26, received in slots 27 and 28, respectively, of the bracket 24, the screw 25 being threaded into the plate 21 and the disc 26 having a shank 26a pivotally attached to the plate 21.

Through one end of the bracket 24 there passes a pivot pin 29 which pivotally supports the bracket 24 upon the plate 21, and insulatingly supports a circuit breaker lever 30, by means of a nonconducting sleeve 31 pivoted upon the stud 29. The circuit breaker lever 30 is provided at the free end with a contact 32 which cooperates with a contact 33 secured to an ear 34 upon the end of the bracket 24. The contacts 32 and 33 of the circuit breaker mechanism are urged into contacting relation by means of the contact spring 35 fixed to the lever 30 and extending around the sleeve 31 and connected with a terminal stud 50 mounted in the wall of the housing 20 as will later be described. Centrally of the housing 20 and mounted upon the timer shaft 40, there is provided a cam 41 which co-

operates with a rubbing block 42 of the breaker lever 30 to open and close the contacts 32 and 33 in proper sequence, whenever the motor is operated.

Thus far it will be noted that the circuit breaker lever is insulatingly supported within the housing 20, and that provision is made for making electrical connection outside the housing by way of the contact spring 35 hereinbefore referred to. This electrical connection outside the housing, comprises a terminal stud generally indicated at 50, which is provided with a reduced threaded portion 51 received by the housing 20, and terminating in special provisions for interlockingly and non-demountably making electrical and mechanical connection with the coupling unit of an ignition lock.

In assembling the stud 50 with the electrical apparatus referred to, advantage is taken of particular features for establishing a non-demountable connection therewith, which involves a novel association of the elements of connection as will now be described. Over the reduced end of the stud 51 there are passed successively, a lock washer 52, the terminal clip 53 of a condenser lead 54, where such is used, a hard metal washer 55, an insulating washer 56, a hard metal cup 57, an insulating sleeve 58 and a lock washer 59. It will be noted from the illustration that the elements 52, 53 and 55 are of an internal bore just sufficient to be passed over the reduced portion 51 of the stud 50, and that the sleeve 58 is closely received within the bore of the elements 56, 57 and 59.

This assembly is then connected with the housing 20 by passing the end of the sleeve 58 through an aperture 60 of the housing wall until the threaded end of the stud 50 is passed through a strip of insulation 61, disposed against the inner wall of the housing, an insulating plate 62, an oblong spacing washer 63, the notched end 64 of the contact spring 35, and finally threaded through the special nut 65, which during the usual method of assembly, does not turn relative to the circuit breaker plate 21 due to the nut 65 being confined by the plate 21. Tightening or loosening of the stud 50 relative to the nut 65 may be accomplished by following either one of two lines of procedure as will presently appear.

It has been stated hereinbefore that the stud 50 is specially provided for making electrical and mechanical connection with certain mechanism outside of the apparatus. In addition to these special provisions, the end of the stud 50 is provided with a screw driven slot or kerf 70, which provides a means for turning the stud 50 and establishing a clamping relation of the elements threaded thereon between the enlarged portion of the stud and the nut 65, thus assuring the retention of the parts in the assembled relation. It will be noted by reference to Fig. 3, that the nut 65 is of special formation, being somewhat dished in cross section and of elongated, rectangular contour, having one dimension considerably greater than the one perpendicular thereto. When in assembled relation with respect to the mounting plate 21 and the stud 50, one of the longer flat sides of the nut 65 is in close proximity to the plate 21, and separated therefrom only by the bent over portion 62*a* of the insulation 62.

In this assembled relation, it will be impossible to turn the nut 65 upon the stud 50, for the corners thereof will not be allowed to pass between the stud 50 and the plate 21. The plate 21 is securely fixed within the housing 20 by the screws 23 driven therethrough and into the lugs 22 of the plate 21 prohibiting movement of the plate relative to the nut and stud. Thus it is seen that the only manner of disconnecting the stud 50, from the electrical apparatus within the housing 20, is either by turning of the screw 50 through the agency of a screw driver or the like and the screw slot 70, or else by disorganizing the structure within the housing 20 so as to allow turning of the nut 65 relative to the threaded portion 51 of the stud 50.

Both of these procedures are rendered extremely difficult as will presently appear from the description that is to follow. Access to the slot 70 of the stud 50 is precluded by mechanism which includes the special provisions of the stud 50 hereinbefore referred to. The connection of the parts within the housing 20 is rather inaccessible for disassociation.

The special provisions of the stud 50 include the conical like head 71, joined to the main body of the stud 50 by the neck 72 thereby providing a shoulder portion 74 which cooperates to form an interlocking connection with a spring metal washer 75, retained within the coupling unit of the lock controlled device. Over the stud 50, and within the cup 57 is forced a non-conducting washer 76 as a shield member disposed against the washer 52. It will be noted from this structure accompanied by the illustration in Fig. 1, that the stud 50 is completely housed within the armor cup 57, and that the head thereof is presented for a one way slip connection with a coupling unit attached thereto.

A key operated unit for controlling the circuit of the timer is electrically connected with the terminal stud 50, through the agency of a connector and coupling unit now to be described. The controller unit is not shown but will be understood to include an electric switch enclosed in a housing adapted to be attached to the instrument board of the vehicle. This switch housing is mechanically connected with a flexible, armored housing enclosing an insulated wire 120 leading from the switch. This armored housing is provided by the spring wire conduit 121 surrounding an armored conduit 122, which in turn surrounds the insulated wire 120 and a cable stress wire 123. The ends of the wire 123 extend beyond the ends of the armored housing and are bent over the ends of the spring wire conduit 121, one end being indicated at 125. It is obvious that this structure prevents any stretching of the armor between the control unit and the coupling unit, which might result in disruption of the structure at large.

The coupling unit having connection with this device, comprises a ferrule 130 which is telescopically received by the cup 57, and which supports an insulating sleeve 131. The sleeve 131 has a central bore 132 of step formation to receive the various elements contributing to the mechanical and electrical connection hereinbefore referred to. One end of the ferrule 130 is placed over the end of the armored housing first described and is staked down to firmly engage the armor 121, as at 133. The electrical conductor 120 is passed through the smallest portion of the bore 132 where it is threaded through a washer 134 disposed in the intermediate portion of the bore 132. The wire of the conductor

is secured to the washer 134 to provide the contact point at 135. The washer 134 being of larger diameter than the smallest portion of the bore 132 and being located in the main or intermediate portion thereof prevents withdrawal of the conductor 120 from the sleeve 131.

Within the intermediate portion of the bore 132 of the sleeve 131, there is placed a flexible wire 136 having its ends fastened to end loops of a contact spring 136a. Spring 136a resiliently urges the ends of wire 136 against the head member 71 of the stud 50 and against the contact 135 of wire 120, and thus insures good electrical connection between the stud 50 and the conductor 120. As earlier described, the largest portion of the stepped bore of the sleeve 131, receives the spring washer 75 and maintains the same in insulated relation with respect to the ferrule 130. This insulated relation is accomplished by placing a hard metal washer 137 within the bore and disposing it against the spring washer 75. This washer 137 reinforces the spring washer 75 and insures against undesirable deformation thereof when attempting to remove the unit from the stud. Against this washer 75 an insulating washer 138 is placed, said washer 138 being retained within the ferrule 130 by a spanner nut 139, threaded within the ferrule 130.

From the structure herein described, it is apparent that a device has been provided which is efficient in its operation, which successfully prevents access being had to the connections of the electrical circuit of the mechanism, and which precludes easy removal of the essential parts thereof. A theft proof device has been provided in which the electrical apparatus is protected in such a way that the circuit therethrough may be opened or closed at will through the agency of a key controlled device, and in which unauthorized use of the mechanism to which the device is attached will be prohibited.

This conclusion follows from the fact that a non-demountable coupling has been made between a lock control unit and a piece of electrical apparatus, and that electrical connections are made within the piece of electrical apparatus which cannot be dissociated without either having access to one of the parts of the coupling when the coupling unit is removed, or else by disturbing certain elements of the electrical apparatus to which the coupling is attached.

Due to the non-demountable connection of the coupling unit and the stud 50, means cannot be readily inserted to turn the stud 50 for separating it from the nut 65. The coupling unit cannot be withdrawn from the stud 50 because of the interlocking relation between the spring washer 75 and the shoulder 74 of the stud 50. In the initial assembled position, it is simple enough to present the coupling unit within the shell 57 so that the head 71 of the stud can be forced through the aperture of the spring washer between the inwardly directed tangs 75a thereof, which then spring into the annular groove 73, but it is an entirely different story when an attempt is made to withdraw the coupling unit from its connection with the stud 50. When such an attempt is made, it only tends to crunch the ends of the tangs 75a and force them deeper into the annular groove 73, which when backed up by the hard washer 137 make withdrawal of the coupling unit from the stud 50 practically impossible.

Thus having rendered the connection of the terminal stud 50 within the apparatus of the housing 20 inaccessible from the exterior of the casing, there remains but one other way to disconnect the parts and that is by manipulation of the elements of the connection within the housing 20. It is obvious that this manipulation must result in the relative rotation of the nut 65 and the threaded end of the stud 50. This, however, cannot be readily accomplished since the mounting plate 21 is rigidly secured to the housing 20 in such close proximity to the nut 65 as to preclude turning of the nut 65 relative to the stud 50.

Due to the structure and the arrangement of the parts of the electrical apparatus within the housing 20, once the stud 50 and the apparatus have been connected there is but one manner in which they can be disconnected. To disconnect these parts it is necessary to remove the screws 23 which connect the mounting plate 21 to the housing 20, so that the plate 21 will be capable of lateral movement or tilting within the housing 20. The mounting plate 21 must then be pushed downwardly at a point near the connection of the terminal stud 50 and spring connector 35, and at the same time the circuit breaker lever 30 must be partially raised from the bracket 24 by sliding along the pivot pin 33 of the bracket 24. When the removal of spring 35 from the stud 50 has been accomplished, the breaker lever 30 and the leaf spring 35 may then be removed from the housing entirely withdrawing it from the pivot pin 29 which will give better access for the removal of the nut 65 from the stud 50.

These parts must be held in such a relation while a special wrench is inserted and applied to the nut 65 to allow turning thereof. This becomes a very difficult operation since there is such a limited space within which a finger or instrument may be inserted to press down and hold the plate 21. This leaves but little remaining space for manipulation of the circuit breaker lever 30 to be held in partially separated relation with the bracket 24, and for inserting and manipulating even a special wrench, such as that shown in Fig. 10, that may function to turn the nut 65.

When the elements of the apparatus have been thus associated the disconnection of the parts is by no means complete. Hardly has more than a start on the separation been made. The mounting plate 21 and the breaker lever 30 must be held in the disassociated position while a wrench or wrenches are being applied to the nut 65 in order to turn the corners thereof past the near point of the plate 21. Due to the difference in diameter, or cross dimensions of the nut 65, either a double ended wrench must be used or else two wrenches must be used. If separate wrenches are used one is first applied to the nut across one dimension, and then exchanged for the other wrench which may be applied to the nut across the other dimension. In the case of the double ended wrench, first one end must be applied to the nut, giving it a partial turn, then the wrench must be reversed and the opposite end applied to the nut in order to continue turning the same.

This procedure of holding down the plate 21, and holding up the breaker lever 30 with one hand, while applying and changing the wrench or wrenches to and from the nut 65 with the other hand, until the nut 65 has been sufficiently

unthreaded from the stud 50, becomes very tedious and consumes considerable time. But this procedure must be followed until the connection is sufficiently loosened at least, to allow the removal of the slip connection of the leaf spring 35 from the stud 50, and from between the spacer 63 and the nut 65. Here the spring washers 52 and 59 perform a second function. In addition to locking the parts against turning they magnify the amount of relative rotation that must be made between the stud and nut before the elements carried by the stud 50 are loosened sufficiently to permit removal of the slip connection 64 from the stud 50, thus increasing the difficulty with which the parts are disassembled.

It has been stated that either of two procedures may be followed in tightening or loosening the connection of the stud 50 with the apparatus within the housing. One of these procedures is by way of turning the stud 50, by means of the slotted head 70, which has already been described. The other alternative has been described in part, in that it has been shown how the plate 21 must be displaced within the cup 20 before the nut 65 may be turned upon the stud 50, for separation of the parts. Similarly the connection may be initially made by the reverse thereof, or by threading the various elements onto the stud 50, including the nut 65, before the plate 21 is fixed within the cup 20. It will be found, however, that the earlier recited method is by far the simpler and requires less time to accomplish.

However, much time will have been consumed in the manipulation of the parts thus far described, and as soon as the clamping relation of the nut 65 and the stud 50 has been sufficiently loosened to permit removal of the leaf spring 35 from the connection, then further removal of the nut 65 from the stud 50 is equally as difficult if not more so than in the initial instance. As will be noted from the illustration in Fig. 1, the nut 65 is somewhat arc shaped in cross section, and is rather tightly threaded upon the stud 50. By this structure, turning of the nut 65 when the parts are in the loosened relation will tend also to turn the stud 50 within the sleeve 58 and the remaining elements having engagement therewith. Thus, after the connection has been sufficiently loosened and far before removal of the parts can be accomplished, or complete disconnection made, means must be provided in addition to holding the plate 21 in the depressed condition, for holding the stud 50 against turning in its support in the housing 20, while the nut 65 is being turned for removal therefrom.

Besides being extremely inconvenient to accomplish, this manipulation of the parts will require such an amount of time to accomplish, that it will far exceed the exposure that the thief cares to give to the public for detecting his purpose.

While this structure is designed and constructed so as to preclude the thief from making off with the vehicle, or making it practically impossible for him to recondition the apparatus thereof for operation, means are provided for readily servicing the associated elements of the structure when the occasion may arise. In Fig. 5 there is illustrated a double ended wrench 150 of special design for manipulation of the parts in assembling and disassembling the connection. One end of the wrench 150 is notched as at 151 for engaging the greater dimension of the nut 65, while the other end is notched as at 152 for application to the smaller dimension of the nut. The wrench is further provided with a pair of lateral extensions providing lugs or pins 153 which function as a spanner wrench for use on the nut 139.

With this special tool, the parts of the structure can be more readily serviced. But under the most favorable conditions considerable time is required for disconnecting the parts once they have been assembled. While the special wrench 150 makes it easier to disconnect the parts, the procedure is the same and extremely difficult. In application of the wrench 150 to the nut 65, it must be reversed between each quarter turn of the nut, throughout the entire procedure.

In reassembling the connection, it is advisable to remove the spring lock washer 75 from the unit, access to which may be had through removal of the spanner nut 139, and replace it with a new one. This procedure allows reassembly of the parts in much less time, since the stud 50, which has been freed from the old and deformed locking washer 75, may be threaded successively with the parts of the assembly and driven into the nut 65 as previously described. The coupling unit carrying the new locking washer 75 is then forced in position over the stud 50, and the connection is complete.

It is therefore seen that the device that we have disclosed effectively prohibits the thief from reconditioning, or even so much as tampering with the ignition device, and thus insures against disturbance of the vehicle from the position in which it is left by the operator. Further, those futile attempts that the thief may make for reconditioning the apparatus to its proper functioning relation do not materially affect the operativeness of the associated units, so that the owner may upon returning to his car, start and drive it away without difficulty.

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. In a self-locking electrical connector, the combination comprising a housing, a terminal stud having a portion which extends within said housing to make an electrical connection with an instrument therein, means within the housing and cooperating with said stud portion to secure said stud to said housing by rotation of that portion of the stud exterior to the housing, means including a part of the instrument within the housing for preventing rotation of first recited means, and means for enclosing the exterior portion of the stud and including a part non-detachably connectible therewith and rotatable about the stud without rotation of the stud relative to the first mentioned housing.

2. In a self-locking electrical connector, the combination comprising a housing, a terminal stud having a portion which extends within said housing to make an electrical connection with an instrument therein, means within the housing and cooperating with said stud portion to secure said stud to said housing by rotation of that portion of the stud exterior to the housing, means within the housing for preventing rotation of the means cooperating with the stud without disrupting parts of the said instrument, and means for enclosing the exterior portion of the stud and including a cup-shaped member secured

by the stud to the housing, and including a member telescopically engageable with the cup-shaped member and having a non-detachable connection with the stud yet capable of rotation about the stud without altering the relation of the stud and housing.

3. In a self-locking electrical connector, the combination comprising a housing, a terminal stud having a portion which extends within said housing to make an electrical connection with an instrument therein, a nut within the housing and cooperating with said stud portion to secure said stud to said housing by rotation of that portion of the stud exterior to the housing, means including a portion of the instrument within the housing for preventing rotation of the nut, and means for enclosing the exterior portion of the stud and rotatable about the same without disturbing the relation between the stud and housing, and including a part non-detachably connectible with the stud.

4. In a self-locking electrical connector, the combination comprising, a housing, a terminal stud insulatingly suported on said housing and having electrical connection with parts within, a hard metal cup, a non-rotatable nut within the housing, said stud having a reduced shank passing through said cup and the wall of said housing and threadedly connected with the non-rotatable nut within the housing, and means cooperating with the cup for completely enclosing the head of the stud and including a part non-detachably connected to, and freely rotatable about the stud for increasing the resistance of separation of the connector.

5. In a self-locking electrical connector, the combination comprising a housing, a terminal stud insulatingly supported on said housing and having electrical connection with parts within, said stud having a head providing a screw driver slot, and a reduced shank joined thereto by a shoulder, an armored cup substantially enclosing said head and disposed about the shank of said stud and having means interlocking with said housing to prevent relative rotation thereof, means for securing the stud and the armored cup to said housing and requiring rotation of the stud by its slotted head, and means non-detachably engaging the head of the stud and rotatable about the same, for completely enclosing the stud and preventing access to the slot of the head, whereby separation of the connector is prevented.

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