

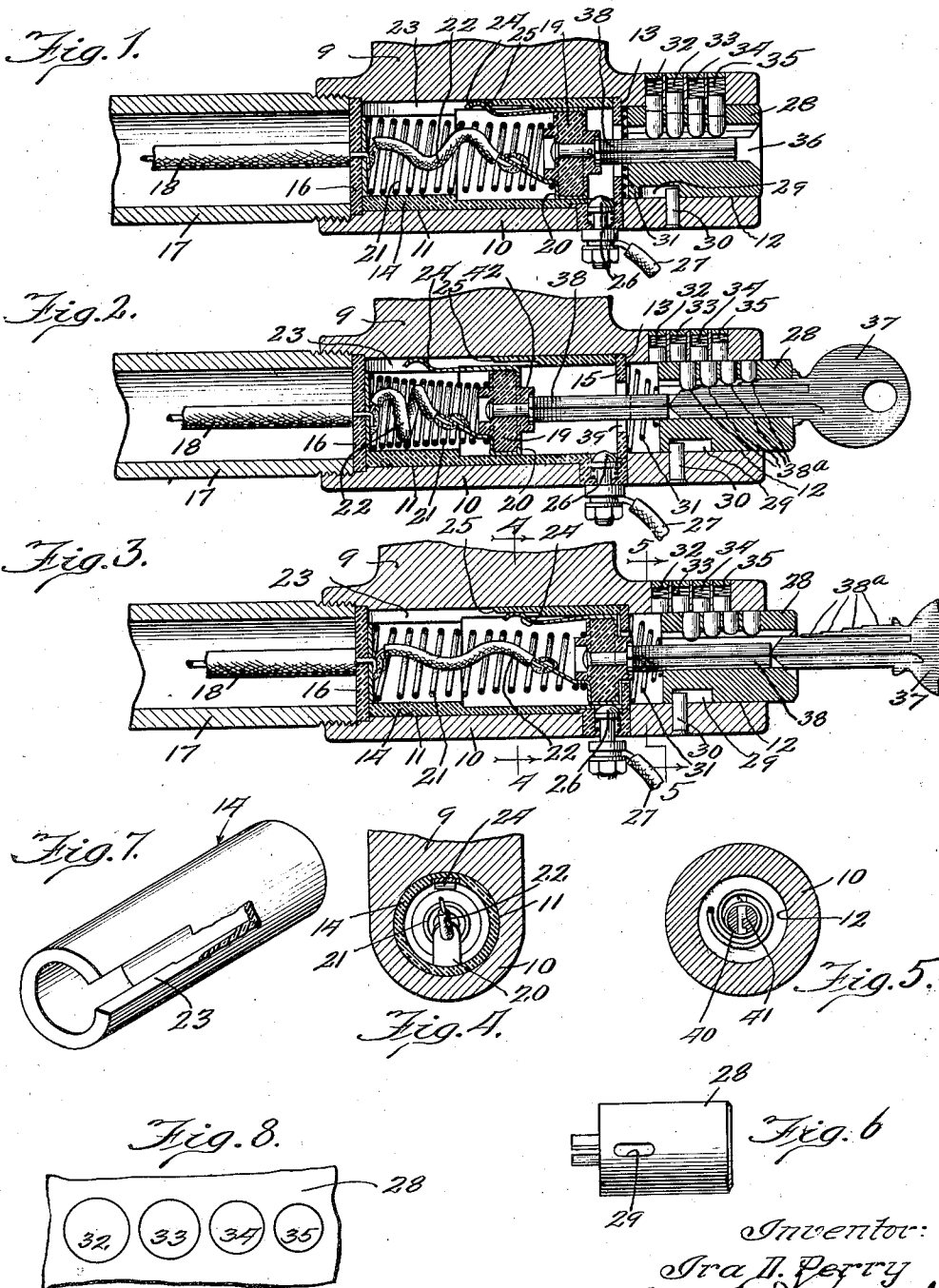
Oct. 27, 1931.

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1,828,747

IGNITION LOCK AND THE LIKE

Filed Feb. 20, 1930



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IGNITION LOCK AND THE LIKE

Application filed February 20, 1930. Serial No. 429,941.

This invention has to do with improvements in ignition locks and the like. The invention relates particularly to improvements in ignition locks for the ignition circuits of automobiles and other vehicles; but it will appear that certain features of the invention are also usable to advantage in connection with locks generally. The features of the invention are, however, peculiarly related to the locks used in connection with the ignition circuits, and for this reason I have illustrated and will describe the invention as used in this connection. In so doing, however, I do not wish to limit the features or the usefulness of the invention except as I may do so in the claims.

One object of the invention is to provide an arrangement which will insure an automatic ejection or throw-out of the key when the lock is turned to the locked or off position in which the ignition circuit is opened. This will prevent the user from leaving the key in the lock when the operation of the motor has been stopped,—that is, at the time when the car is supposed to be "locked."

Another feature of the invention is to provide a construction in which the ignition circuit is grounded within the lock at all times except when the lock has been thrown into the unlocked position with the key eliminated or ejected. In this connection, it is a further object to provide an arrangement such that the act of inserting the key into the lock will itself automatically result in the opening of the ignition current supply connection and in the grounding of the ignition circuit even prior to the time that the lock itself is definitely locked. The arrangement is likewise one in which the discontinuance of the grounding connection and the establishment of the current supply through the ignition circuit will only take place when the key has been ejected or withdrawn from the lock.

A further object of the invention is to provide an arrangement such that the lock barrel can be pushed or moved to the locked position even without the use of the key, thus making it possible for the driver to lock the car, with attendant opening of the current supply

and grounding of the ignition circuit, even without the use of the key.

Another object of the invention is to provide a construction which can be very readily manufactured from sheet-metal parts and parts made by automatic screw-machine operations and from hard rubber or bakelite molded pieces.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings,—

Fig. 1 shows a longitudinal section through a lock embodying the features of the present invention, showing the application of the same to the steering post or a suitable bracket, the lock being in the locked position with the current supply discontinued and the ignition circuit grounded;

Fig. 2 shows a view similar to that of Fig. 1 with the exception that a key has been inserted into the barrel so as to line up the tumblers and unlock the barrel, but the key is still in the barrel so that the sliding contact is still retained in the grounded position and the current supply contact is still inoperative;

Fig. 3 shows a view similar to that of Fig. 2 with the exception that the ejection spring has been allowed to move the contactor block and stem forward to the position where the ground connection is broken and the supply of current is established, the key being ejected from the barrel;

Fig. 4 shows a cross section on the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 shows a cross section on the line 5—5 of Fig. 3 looking in the direction of the arrows;

Fig. 6 shows a side view of the barrel removed from the lock and turned ninety degrees from the position of Figs. 1, 2 and 3;

Fig. 7 shows a fragmentary perspective view of the insulating cylinder in which the movable contact carrier travels; and

Fig. 8 shows a fragmentary face view looking at the side of the barrel opposite to

Fig. 6 and on a greatly enlarged scale so as to show the graduation of sizes of the tumblers.

The lock is shown as being applied to a bracket 9 such as a portion of the steering post or other suitable structure of the car. The mechanism of the present invention is mounted within a housing 10 constituting an extension or member carried by said bracket. This housing is drilled through from end to end so as to establish two consecutive chambers designated 11 and 12, the chamber 11 being of slightly larger size than the chamber 12 and establishing a shoulder 13 at the point where these chambers come together.

The chamber 11 accommodates the electrical contacts, and the chamber 12 accommodates the lock mechanism proper. Mounted within the chamber 11 is an insulated sleeve 14 which sets up against an insulating washer or disk 15 which is set against the shoulder 13. At the back end of the chamber 11 there is another insulating disk or washer 16; and the tube or conduit 17 is threaded into the end of the housing and solid up against the washer 16. This serves also to secure the insulating cylinder 14 in place and drive the same firmly against the insulating washer 15.

The conduit 17 is for the accommodation of the wire 18 which leads to the circuit breaker or other part of the ignition system to which the current is to be supplied.

Slidably mounted within the insulating cylinder 14 is a contact carrier 19. The same comprises a block of insulating material which is encircled by a collar or flange 20 of sheet metal. The edges of this flange 20 are preferably turned down against the faces of the block 19 so as to lock the flange in place thereon and also rigidly connect the parts together. As a matter of fact, the block 19, together with the flange, may be molded as a unit in a single operation.

The collar 20 is electrically connected to the wire 18, to which it supplies current. There is a compression spring 21 mounted within the sleeve 14 and seated between the block 19 and the insulating disk 16. This spring normally tends to drive the block 19, which is the contact carrier, clear up against the insulating disk or washer 15 at the other end of the housing, although the contact carrier can be pushed back to a position beyond that shown in Fig. 2.

The electrical connection between the collar 20 and the wire 18 is established by the spring 21; but in order to prevent overheating of said spring, I prefer to also provide a pig-tail 22 connecting the wire 18 and the collar 20 and carrying the bulk of the current.

The insulating sleeve 14 is slotted at one side to provide a longitudinally extending slot 23. There is a spring contact finger 24 reaching backwardly from the collar 20 and working through the slot 23 and riding on

the metal of the bracket 9. This finger therefore serves to establish a ground connection for the wire 18 as long as the finger 24 travels on the grounded metal. At the point 25 where the slot 23 terminates, the thickness of the insulating sleeve 14 is somewhat reduced so that the finger 24 is enabled to travel up easily on to the inside face of the insulation and thus open the grounding connection. This is the condition which exists during the last stages of travel of the contact carrier 19 towards the right under the impulse of the spring 21.

Adjacent to the inner end of the insulating sleeve 14, said sleeve is cut away to receive a contact 26, to which current is supplied from a battery or other source through a wire 27. This contact 26 is properly insulated from the metal housing 10. The parts are so related that as the contact carrier 19 travels towards the right under the impulse of the spring 21, the grounding finger 24 first passes up on to the insulation 25 to discontinue the grounding action, and immediately thereafter the collar 20 makes connection with the contact 26 so as to establish a supply of current from the wire 27 to the wire 18. This is the condition existing at the extreme, right-hand movement of the contact carrier 19, as shown in Fig. 3.

Mounted within the housing 10 and the chamber 12 thereof there is a lock barrel 28. The same can slide in and out without rotation. For this purpose, said barrel is slotted on one side, as shown at 29, to receive the inner end of a pin 30 which extends through the housing and into said slot. Said pin limits the outward movement of the barrel and prevents it from rotating.

There is a spiral spring 31 located between the inner end of the barrel 28 and the insulating disk 15. This spring tends to throw the barrel out into the unlocked or running position.

In one side of the barrel and in the corresponding portion of the housing 10 there are located a series of cooperating sockets within which are placed double tumblers. In the construction illustrated there are four of these sockets, the same being designated 32, 33, 34 and 35. The sockets are of consecutively smaller sizes, as shown in Fig. 8. The sockets of the barrel likewise are of graduated sizes corresponding to those of the housing. Each tumbler is cut into two parts, and springs are placed in the housing sockets which tend to move the tumblers into the locking position of Fig. 1. In such position the barrel 28 is retained at its innermost or locked position.

The barrel 28 is provided with a key slot 36 into which may be inserted the key 37. Said key is relatively flat and has a series of steps 38 on its edge adjacent to the tumblers, said steps being properly proportioned so

that when the key is pushed into the slot the tumblers are all lined up, as shown in Figs. 2 and 3, with their lines of jointer lined up with the surface of the barrel. Such being the case, the barrel can be forced out under the impulse of the spring 31. Due to the graduated sizes of the tumblers, they do not improperly interfere in their consecutive sockets. When the barrel is again pushed inwardly (the key being removed) so as to close up the spring 31, the tumbler sockets will finally line up and allow the tumblers to move into the locking condition shown in Fig. 1.

There is an ejector pin 38 which has its inner end secured to the central portion of the contact carrier 19. Said ejector pin is relatively flat and can work through a hole 39 of the end insulating disk 15, and the ejector pin works into the key slot 36 of the barrel 28. Consequently, as the contact carrier 19 travels back and forth, said ejector pin travels in the key slot. Normally, when the ignition switch is "locked" with the barrel moved into the position shown in Fig. 1, the key being removed, the ejector pin 38 stands well out in the key slot 36. The result is that, in order to insert the key for the purpose of lining up the tumblers and unlocking the device, the injector pin must be pushed away back, carrying with it the contact carrier 19 into the position shown in Fig. 2. During this interval, the ignition wire 18 remains grounded through the finger 24. Furthermore, this operation results in placing the spring 21 under a relatively heavy compression, with corresponding ejecting pressure exerted on the key itself. The result is that immediately the operator lets go of the key, said key will be forcibly ejected from the lock barrel, and this ejection will naturally take place in such a way and at such a time as to throw the key into the operator's hand.

Furthermore, this outward movement of the contact carrier also results in carrying the contact collar 20 to the position of engagement with the contact 26 after the finger 24 has ridden up onto the insulation 25.

On the inner end of the lock barrel 28 there is a pair of fingers 40 and 41 (see Fig. 5) which lie at the sides of the ejector pin 38, and which fingers may reach through the hole 39 of the insulating disk 15. There is a boss 42 on the inner face of the contact carrier 19 and in position to be engaged by the inner ends of the fingers 40 and 41 when the lock barrel 28 is pushed back into the locked position of Fig. 1. This backward pushing is sufficient to carry the contact carrier 19 back to a point where the collar 20 disengages from the contact 26 and where the finger 24 rides onto the grounding metal of the housing or bracket. The result is that the movement or forcing of the lock barrel

28 into the locking position simultaneously results in movement of the contact carrier 19 to the position where the supply of current is discontinued and the ignition wire is grounded. It is therefore impossible to lock the barrel without accomplishing these results.

In the normal operation of this device, it will be understood that the switch is unlocked by the use of the key, which key is naturally ejected from the lock by the push pin; and the device is afterwards locked and thrown out of service by simply pushing the barrel back in the flush position of Fig. 1. It will also be understood that it is impossible to retain the key in the lock except by actually holding it there against the ejecting force of the ejector pin. The result is that it is impossible to unintentionally leave the key in the lock; and, furthermore, the ejection of the key from the lock naturally takes place at the time the operator is locking the switch, which is the time when his hand is ready in position to receive the key as it is ejected from the lock.

It will also be understood that the ejector feature herein disclosed may be used to advantage in connection with locks intended for many other purposes besides the locking of ignition circuits of automobiles, etc. Therefore, while I have herein shown and described only a single embodiment of the features of my present invention, still I do not intend to limit myself thereto except as I may do so in the claims.

I claim:

1. In a device of the class described, the combination with a lock having a longitudinally movable lock cylinder and tumblers normally locking said cylinder against such movement, together with a key for insertion into the lock cylinder to line up the tumblers and unlock the cylinder, of a contact carrier movable towards and from the lock cylinder, an ejector pin connected to said contact carrier and having its forward end working into the key opening of the lock cylinder, spring means tending to move the contact carrier and ejector pin forwardly to carry the pin into the key opening for the purpose of expelling the key therefrom, a ground contact carried by the contact carrier and establishing a ground connection except when the contact carrier is moved to its forward position adjacent to the lock cylinder, and a current supply connection adjacent to said forward position to make contact with the contact carrier when the same is moved fully forward, substantially as described.

2. In a device of the class described, the combination with a lock cylinder which is movable longitudinally between locked and unlocked positions, tumblers for locking the cylinder in the locked position, spring means tending to move the cylinder forwardly to

the unlocked position, and a key for insertion into said cylinder to line up said tumblers and permit the cylinder to move forwardly into the unlocked position, of a contact carrier movable towards and from the lock cylinder, an ejector pin connected to the contact carrier and having its forward end working into the key opening of the lock cylinder, spring means tending to move the contact carrier and ejector pin forwardly to carry the ejector pin into the key opening and expel the key therefrom and also to move the contact carrier to the extreme forward position, a current supply contact adjacent to the extreme forward position of the contact carrier, and means in conjunction with the lock cylinder and contact carrier for preventing movement of the contact carrier to the extreme forward position when the lock cylinder stands at its inserted or locked position, substantially as described.

3. In a device of the class described, the combination with a longitudinally movable lock cylinder, together with tumblers for normally locking the same at its inner or locked position, and spring means tending to move the lock cylinder forwardly to the unlocked position, together with a key for insertion into the lock cylinder to line up the tumblers and unlock the cylinder, of a movable contact carrier adjacent to the lock cylinder, means in conjunction with the lock cylinder and contact carrier for retaining the contact carrier in one longitudinal position when the cylinder is locked and allowing the carrier to move to another longitudinal position when the cylinder is unlocked, an ejector pin connected to the contact carrier and having its forward end working into the key opening of the lock cylinder, and spring means tending to move the contact carrier and ejector pin forwardly to carry the ejector pin into the lock cylinder and expel the key therefrom, substantially as described.

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