Aug. 10, 1954 C. GLUBIAK 2,685,792

KEY EJECTOR

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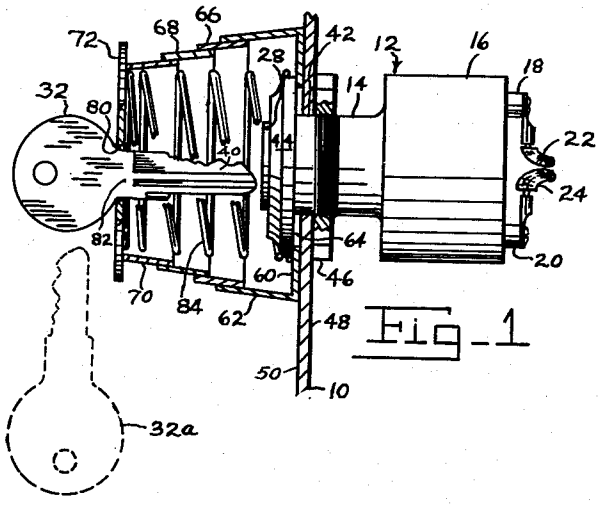


Fig_1

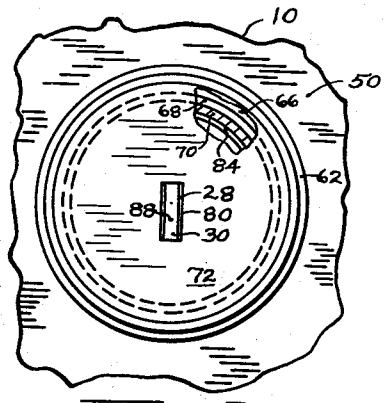


Fig_2

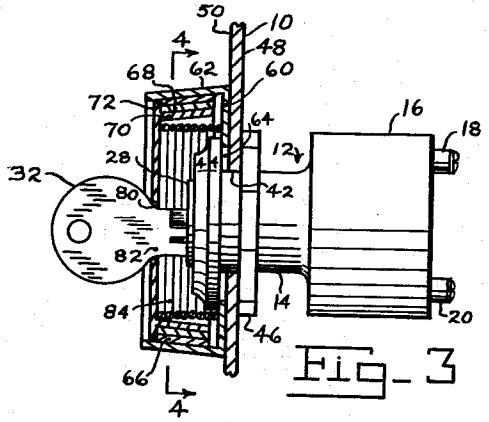


Fig_3

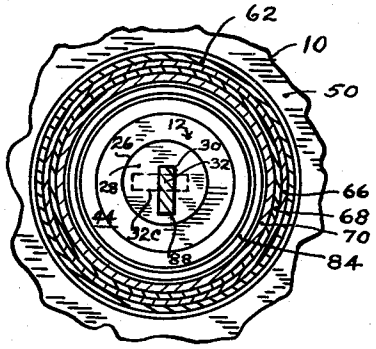


Fig_4

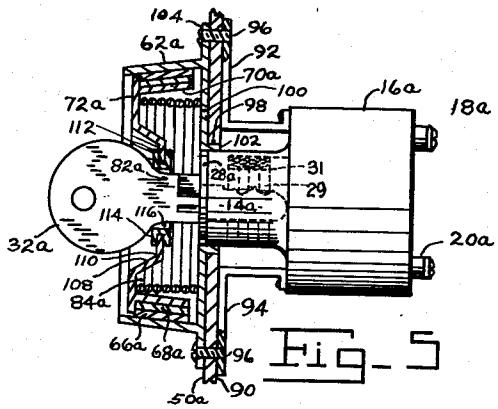


Fig_5

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KEY EJECTOR

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1 Claim. (Cl. 70—388)

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This invention relates to locking devices and to means for controlling the engagement and disengagement of keys with relation thereto.

An object of the invention is to provide a novel and improved locking device in which means is provided for automatically disengaging the key from the locking device when the key is turned to a predetermined position in the locking device, such as to locked or unlocked position as desired.

Another object of the invention is to provide a novel and improved locking device in which, when the key is turned to a predetermined position, such as locked position, or unlocked position, the key is automatically ejected from the locking device.

A further object of the invention is to provide a novel and improved device which may be attached to existing locking devices or used in connection therewith, so that upon turning the key of the locking device to a predetermined position, such for example, as to the unlocked position, or to the locked position, the key is ejected from the locking device, and cannot be re-engaged with the locking device unless upon re-insertion of the key into the locking device, the key is immediately turned to a position different from said predetermined position.

Still another object of the invention is to provide a novel and improved device which may either form a part of, be attachable to, or be used in connection with, a switching device, used for opening or closing or completing an electrical circuit, of a type in which a removable key must be inserted into the switching device and turned to some predetermined position therein, in order to actuate the switching device to open or close the circuit, the novel and improved device being adapted, when the removable key is turned to a predetermined position in the switching device, to automatically eject the key from the switching device, and to block re-engagement of the key therewith upon re-insertion into the switching device unless the key is immediately turned to some other predetermined position therein.

Still a further object of the invention is to provide a novel and improved device of the character described herein, which is simple in design, inexpensive to manufacture, adaptable to use as a part of or in connection with many types of locking and switching devices, being quite effective and automatic in operation.

Other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings, and in which,

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Figure 1 is a sectional elevation showing a portion of an automobile dashboard carrying a locking type ignition switch, and showing my novel and improved key ejection means in extended, key-ejecting position, and indicating in dotted lines the path of the ejected key upon being ejected.

Figure 2 is a front elevational view such as would be seen when looking from the left of Figure 1, omitting the key.

Figure 3 is a sectional elevation similar to that of Figure 1, but showing the key-ejection means in retracted position and the key inserted into the ignition locking device.

Figure 4 is a sectional elevation taken on plane 4—4 of Figure 3.

Figure 5 is a fragmentary sectional elevation similar to that of Figure 1, but showing a modified form of the invention for use on locking devices or ignition locks which do not project beyond the panel, wall or dashboard surface in which they are carried.

Where locking devices are employed, it frequently happens that the user forgets to remove the key from the lock and allows it to remain there. For example, automobiles and trucks commonly use ignition switches which incorporate a lock, into which the ignition key must be inserted and then turned to close the ignition switch, thus completing the electrical ignition circuit and allowing the motor to be started. When the motor is to be stopped, it is only necessary to turn the ignition key to the "off" position, which opens the ignition switch. But the ignition key remains in the ignition lock, and frequently the driver leaves the automobile, forgetting to remove the ignition key and take it with him. This situation is an open invitation to automobile thieves, who, upon seeing the ignition key right there in the ignition lock, enter the car, turn the key to "on" position, and drive off with the car.

The problem has been attacked by car manufacturers by making the same key fit both the ignition lock and the motor car door lock, so that, upon leaving the car, the owner must remove the key from the ignition lock in order to lock the door. However this has not solved the problem, since many owners have merely had duplicate keys made, leaving one in the ignition lock, and retaining one for locking the car door. In addition, many owners, having the best of intentions, but only expecting to be gone a few moments, do not bother to lock their car doors, and sometimes do not return immediately, giving the car thief ample opportunity to steal the car, with the

ignition key right there in sight, ready for use by anyone.

A somewhat similar situation exists with respect to locks on buildings, such as offices and homes, and also garages. Many times, the occupant, having unlocked his or her home door, but being pre-occupied with packages, bundles, or other matters, will enter the house without removing the key from the door lock, and this is an open invitation to anyone to remove the key and hold it for later illegal entry of the building. Or, if the key is left in the lock upon leaving the building, then the prospective thief has only to turn the key in the lock, to gain entry, with no immediate trouble whatsoever.

The present invention provides means whereby it is impossible to leave the key in the lock when the key is turned to that particular position in the lock, at which the key should be removed. Foor example, when the ignition key on an automobile is turned to the "off" position, my device ejects the key automatically from the lock, and it makes it impossible for the key upon re-insertion into the lock, to remain in the lock unless the key is immediately turned to some position other than the "off" position. Having determined at which position in the lock, the key should be ejected, then my device will automatically eject the key upon reaching that position. This makes it impossible for the user to forgetfully allow the key to remain in the lock.

In order to understand clearly the nature of the invention, and the best means for carrying it out, reference may now be had to the drawings, in which like numerals denote similar parts throughout the several views.

As shown, there is a panel or wall member 10, which may be any wall, door or the like, in or upon which the locking device is carried. For example, the wall member 10 may for convenience, be assumed to be the dashboard of a motor vehicle, which carries the ignition lock. One form of ignition lock is illustrated at 12, and includes a lock housing shown at 14, integrated with an ignition switch housing shown at 16, the latter having electrical terminals such as those shown at 18 and 20, connected inside the housing 16 to fixed switch contacts adapted to be interconnected by means of a switch blade in any well known manner. When the switch blade is actuated to close the switch, this completes the electrical circuit through the wires 22 and 24, connected in turn to a battery and the primary of an induction coil. The secondary of the induction coil, that is, the high tension side, is connected through a distributor, to the spark plugs of the motor, one at a time, in unison with the interruption of the induction coil current by the distributor, the resultant spark igniting the combustible mixture in the motor cylinders and producing motive power.

The ignition lock housing 14 is provided with a bore 26, in which is turnably disposed a lock cylinder 28 having a slot 30 for the reception of an ignition lock key 32. As is well known in the lock art, a number of pin recesses 31 are formed in the cylinder 28 and the cylinder housing 14, spring pressed pin drivers being disposed in the portions of the recesses formed in the cylinder housing, while matching pins 29 are disposed in each of the portions of the recesses formed in the cylinder 28. Upon insertion of the key shank 40 into the cylinder slot 30, the teeth or serrations on the key shank line up the series of pins and drivers to the exact intersection corresponding to the periphery of the lock cylinder 28, allowing the key to turn the cylinder 28 about its axis, operating the lock. In other words, when the key is inserted in the lock, the cylinder may be turned, between ignition "off" and "on" positions, whereas when the key is removed from the lock, the spring pressed drivers and pins block turning motion of the lock cylinder. As this is all well known in the lock art, it will not be further described in detail, except to say that, when the key is inserted into the lock, as seen in Figure 3, it must then be turned through an angle about the axis of the cylinder, as indicated in dotted lines in Figure 4, to move the ignition switch blade in the switch housing 16, to "switch closed" position, electrically interconnecting the terminals 18 and 20 and completing the electrical ignition circuit, so the engine may be started. When the key is turned back to the vertical position shown in full lines in Figures 3 and 4, then the ignition switch is in "switch open" position, and the engine may not be started.

The outer or leftward portion of the lock cylinder housing 14, as seen best in Figures 1 and 3, is enlarged in diameter after passing through the opening 42 in the dashboard wall 10, forming an integral bezel 44 which is drawn rightwardly by tightening the nut 46 threaded upon the threaded portion of the cylinder housing and adapted to bear against the inner or rightward surface 48 of the dashboard wall 10. I slacken off the nut 46 sufficiently to move the lock bezel 44 away from the front surface 50 of the dashboard wall 10, leaving some clearance therebetween.

Into this space between the surface 50 of the dashboard and the bezel 44, I extend the annular base flange 60 of the telescope base member 62 which itself is a relatively thin hollow frusto-cone. The base flange 60 has an axial opening 64 formed therein to receive the lock housing 14 which extends therethrough, and is held firmly by the bezel 44 against the dashboard surface 50 as the nut 46 is tightened again. It will be understood that, for ease of assembly, the base flange 60 may be made discontinuous, that is to say, be split radially at one or more angularly spaced locations, to form radiating fingers extending between the bezel 44 and the dashboard 50.

Since the integral hollow main telescope base member 62 is a frusto-cone, its inside diameter decreases leftwardly as seen in Figures 1 and 3. A second hollow telescope member 66 fits inside the main base member 62 in the manner shown, being so dimensioned that when moved toward the left as seen in Figure 1, its maximum outside diameter is greater than the minimum inside diameter of the base member 62, with the result that the member 66 can only be extended partly leftward of the base member 62, but cannot be pulled entirely out of member 62. the third hollow telescope member 68 is similarly so dimensioned, being like members 62 and 64, a frusto-cone and hollow, that its maximum outside diameter is greater than the minimum inside diameter of the frusto-cone telescope member 66, with the result that member 68 cannot be pulled entirely out leftwardly of member 66, but remains at least in partial engagement therein.

A fourth hollow frusto-conical telescope member 70 is also similarly dimensioned, so that its

maximum outside diameter is greater than the minimum inside diameter of the hollow frustocone telescope member 68 into which it extends, with the result that the member 70 cannot be pulled entirely leftwardly out of member 68, but is constrained to remain at least partly in engagement therewith upon leftward movement as seen in Figure 1. A cap or cover member 72, is integral with the leftward end of the outer telescope member 70, and is in the form of a disc. It is seen that the radius of the cover member 72 is somewhat greater than that of the member 70, and in fact is almost as large as the minimum outside diameter of the telescope member 66. This is seen clearly in Figure 3, from which it is also clear that the diameter of the disc cover member 72 is less than the minimum inside diameter of the base telescope member 62, so that the disc 72 may easily enter inside the member 62 when moved to retracted position as seen in Figure 3, pushing inwardly, the members 66 and 68.

The cover member 72 has a slot opening 80 formed therein, which may be rectangular in shape as seen best in Figure 2, to receive the neck portion 82 of the key 32 loosely. In other words, the cover member 72 is relatively thin, and its opening 80 is large enough so that the key 32 will not be retained therein when the parts are in their extended positions of Figure 1, so that the key 32 will fall down under the influence of gravity, as indicated by the dotted line position 32*a* in that figure. However, since the rectangular shape of the opening 80 corresponds to that of the key neck 82, turning the key about the axis of the lock cylinder 28, as to the dotted line position 32*c* in Figure 4, will cause the disc cover 72 to turn with the key.

A spring 84 is disposed inside the telescope assembly formed by the telescope members 62, 66, 68 and 70, exerting pressure between the telescope base flange 60 and the inner surface of the cover member 72, so that the parts are biased toward extended position shown in Figure 1, as contrasted with the contracted positions shown in Figure 3. The key 32 is inserted through the opening 80 in the cover member 72 as seen in Figure 1, and pushed rightwardly so that the right end of the key shank enters the slot 88 in the lock cylinder 28, which slot 88 is then in vertical position. When the working portion of the key shank, that is the toothed portion, has entirely entered the cylinder 28, it is seen that the neck of the key has also carried the cover member 72 in a rightward direction with it, compressing the spring 84, as seen in Figure 3.

At the same time, the telescope member 70, being part of or integrated with the discs 72 has also travelled therewith to the position shown in Figure 3, and the outer margin of the cover 72 has also pushed in a rightward direction, inside the main member 62, the other two telescope members 66 and 68. As was explained previously, and as is well known in the key art, the entry of the key inside the lock cylinder 28, assuming that it is the right key for that lock, has so aligned the pins inside the cylinder 28, that there is no obstruction now to turning the lock cylinder about its axis, and the key 32 may now be turned, as, for example, to the dotted line position shown in Figure 4, carrying with it the lock cylinder 28, and also the cover disc 72 as it turns. This completes the circuit between the ignition switch terminals 18 and 20, so that the engine may be started.

As is well known in the art, ignition locks are so constructed that when the key is turned to "ignition on" position, as shown in dotted lines in Figure 4, the lock engages the ignition key in such a manner as to prevent its being withdrawn from the lock. Hence, upon turning the ignition key from the position vertical as seen in Figure 3, to the dotted line position shown in Figure 4, the lock 14 will securely hold the key 32 against being withdrawn leftwardly therefrom. This in turn will lock the telescoped parts 66, 68, 70, 72 and the spring 84 in compressed or retracted positions shown in Figure 3, but with the cover member 72 and the key 32 being turned angularly as the key is now in dotted line position shown in Figure 4.

The ignition switch being in the "on" position, the driver can start the engine and drive off with the car. When he stops the car, he then turns the ignition key 32 back to its initial vertical position shown in Figure 3 and in solid lines in Figure 4, which automatically disengages the internal detent inside the lock 14 from the ignition key 32. The spring 84 is now free to exert pushing or spreading force toward the left, automatically pushing the telescoped parts leftwardly to their extended positions shown in Figure 1. At the same time, the momentum of the spreading action, carrying the key with it, tends to throw or eject the key 32 from the opening 80 in the cover member 72, and in any event, since the opening 80 is so large as to exert no hold on the key, the key drops as indicated in dotted lines at 32*a* in Figure 1, onto the car floor.

The action of the spring 84 is instantaneous and automatic, so that if the driver, upon turning his ignition key to "off" position, does not catch the key 32, it will be ejected from the lock in any event, and must fall onto the floor of the car. However, the instantaneous pressure of the spring 84 upon his hand when he turns the key to "off" position, will necessarily awaken him to the need for grasping the key and holding it as it is ejected from the cover member 72. Hence he can take it and put it in his pocket as he leaves the car. If, however, he forgets, then the key is ejected from the member 72 and falls onto the floor, where at least it is out of sight of any prospective automobile thieves or "joy-riders".

Figure 5 illustrates a modified form of the invention, which may be applied to those automobiles in which there is no bezel 44 on the outer surface 50 of the dashboard as was shown in Figure 1. In this class of ignition locks, the ignition switch housing 18*a* may be secured to the rearward surface 90 of the dashboard 50*a* by any suitable means, such as by brackets 92 and 94 which are secured to the surface 90 of the dashboard by means of screws 96. The ignition lock housing 14*a* extends through the opening 98 in the dashboard, with some clearance. The shank of the key 32*a* is adapted to enter the lock cylinder 28*a*, in the same manner as in the lock shown in Figure 1, it being seen that the left surface of the cylinder 28*a* extends little if any distance beyond the surface 50*a* of the dashboard, such extension being exaggerated for clarity of illustration only.

To allow the toothed shank of the key 32*a* to enter the lock cylinder 28*a*, I employ an arrangement of telescoped parts 62*a*, 66*a*, 68*a* and spring 84*a* similar to those of Figures 1 and 3, with certain modifications explained below. The main base telescope member 62*a* now has its integral base 100 extending all the way radially inward

to an axial opening formed therein with a diameter slightly larger than the outside diameter of the lock housing 14*a*, and has an integral bushing or collar 102 extending rightwardly as seen in Figure 5, into the space between the inner surface of the opening 98 in the dashboard, and the outer surface of the lock housing 14*a* so as to be seated therein.

The base 100 also has an outer flange 104 radiating outwardly along the surface of the dashboard, with openings formed therein to receive the shank of the screws 96, so that the screws 96 may hold the ignition lock in position and at the same time hold the key ejecting device securely in position in relation thereto and properly centered. To allow the key 32*a* to be inserted into the recessed lock cylinder 28*a*, I form in the central portion of the cover member or disc 72*a*, a recess or depression 108 having a floor 110 with a circular central opening 112. A washer 114 has an outwardly open peripheral groove formed therein to receive the margin of the circular central opening 112, so as to be freely turnable in relation to said opening 112, while being retained thereupon. The neck 82*a* of the key 32*a* enters a vertically elongated rectangular slot 116 formed through the washer 114, the slot 116 having the same general size as the slot 80 shown in Figures 1 and 2, so as to exert no retaining force at all upon the key when it is being ejected as in Figure 1.

The washer 114 may also be employed in the form shown in Figure 1, in which case the turning of the key will turn only the washer, and not the entire cover member 72, and similarly, in the form shown in Figure 5, will not turn the cover member 72*a* being freely turnable in relation thereto as the key 32*a* is turned. In any event, the washer 114 is made quite thin, its thickness being exaggerated in the drawing of Figure 5 for clarity of illustration only, and hence the key 32*a*, when the parts move to extended position corresponding to Figure 1, will be readily ejected from the device as already explained.

It is clear then that my novel and improved key ejecting device may be employed with all types of locks, and ignition key-operated switches in automobiles, for automatic and instant ejection of the key from the lock when it is turned to a predetermined position such as to the "ignition off" position. It is foolproof and requires no mental operation at all on the part of the automobile operator.

Although I have described my invention in specific terms, it will be understood that various changes may be made in size, shape, materials and arrangement without departing from the spirit and scope of the invention as claimed.

I claim:

A key ejection device comprising a base flange adapted to be secured against a dashboard, wall or the like in overlying relation to a lock carried by said dashboard, a first frusto-conical telescoping member integral with and extending outwardly from said base flange, a second hollow frusto-conical telescoping member extending into said first telescoping member and having a maximum outside diameter greater than the minimum inside diameter of said first telescoping member, a third hollow frusto-conical telescoping member extending into said second telescoping member and having a maximum outside diameter greater than the minimum inside diameter of said second telescoping member, a fourth hollow telescoping frusto-conical member extending into said third telescoping member and having a maximum outside diameter greater than the minimum inside diameter of said third telescoping member, a plate carried by and movable with said fourth telescoping member, and having a slot formed therein to receive a key to be ejected, and arranged to turn with said key, resilient means acting between said base flange and said plate for maintaining said members in extended telescoped positions, whereby, upon insertion of a key into said plate and movement of said key into engagement in said lock, and compressment of said resilient means, said members are moved to retracted positions near said lock, means for maintaining said key in said engaged position against withdrawal from said lock upon its being turned to unlocked position, whereby, upon turning said key to locked position, said resilient means forces said members to extended positions, carrying said key out of engagement with said lock, and ejecting said key from said lock.

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