

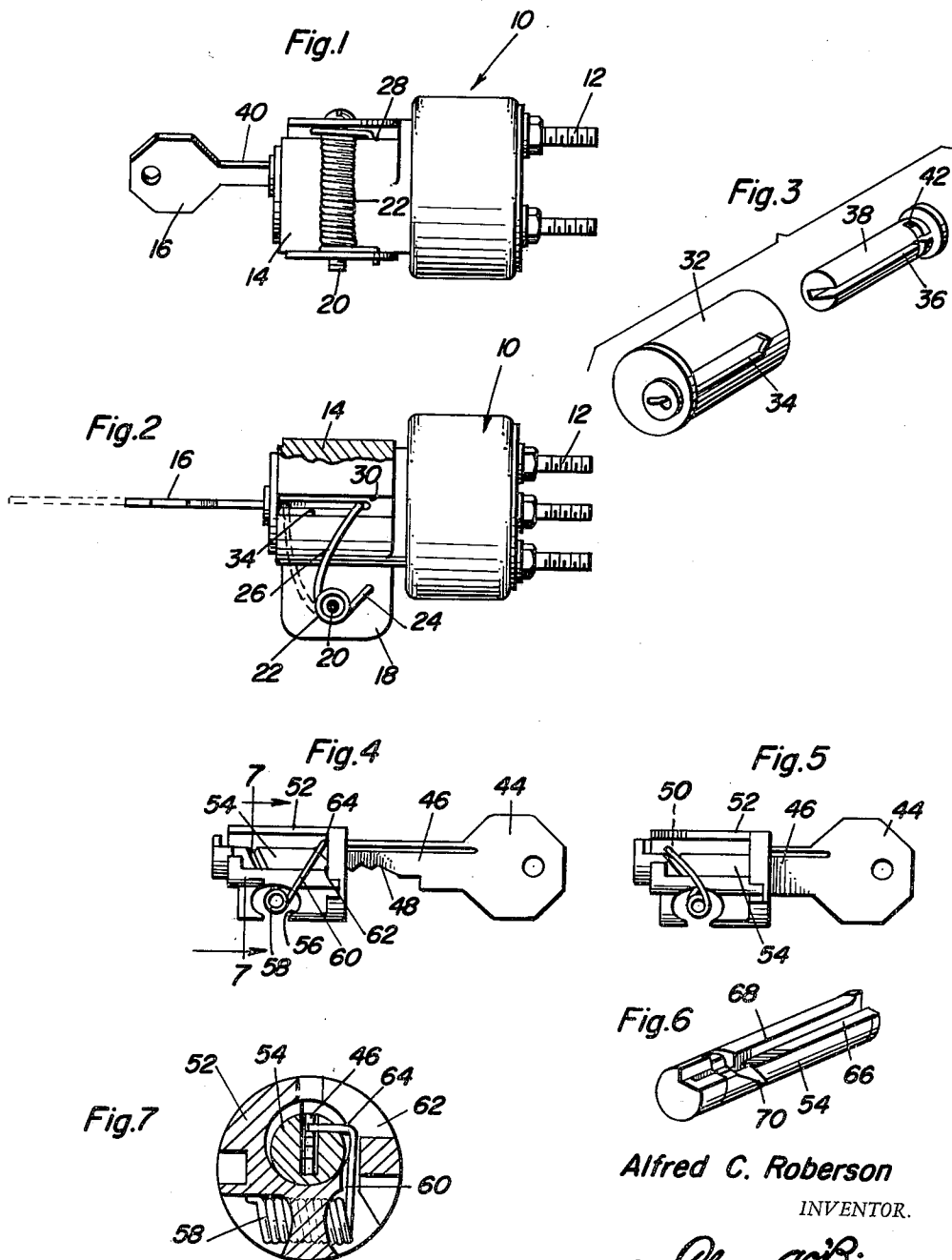
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KEY EJECTING LOCK DEVICE

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KEY EJECTING LOCK DEVICE

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The present invention generally relates to a lock device and more particularly a lock device such as that normally employed in the ignition switch of modern day automobiles in which the lock device incorporates an ejection feature for the key whereby the key will be automatically ejected from the lock device when the key is not performing its function.

Heretofore there have been attempts to provide a device for automatically ejecting or extracting the ignition key from the ignition lock when the key is turned to an "off" position. Such devices have met with very little success since they have had an extremely detrimental feature in that all of these devices maintained a constant pressure on the key which caused excessive wear on the key itself and on the tumblers or pins within the lock. Further, this feature rendered the device undesirable on some ignition locks which are constructed so that the key may be taken out even when the key is performing its function or in the "on" position. Thus, in this type of lock, the heretofore known ejectors would eject the key from the lock even though the key was performing its function. Therefore, it is the primary object of the present invention to provide an improved and novel construction in which the spring mechanism which moves the key outwardly when the key is not performing its function has the force thereof transferred from the key to a mounted support which may conveniently be a portion of the lock body, cylinder or barrel which relieves the pressures from the key and from the tumblers and pins when the key is performing its function thereby enabling the device to be used on all types of ignition locks including the type which allows manual extraction of the key while the key and the lock are in the "on" position.

Another object of the present invention is to provide a key ejection apparatus which may be incorporated completely within the confines of the present day lock construction in which only the cylinder of the lock is removed and replaced with all other components of the ignition lock remaining as originally constructed thus maintaining the same size relationships and other structural features as presently incorporated in ignition locks.

A further object of the present invention is to provide a key ejection apparatus incorporating in its construction a novel key blank in which the end of the key has an edge thereof notched for engaging and receiving the spring bias transmitting element.

A still further object of the present invention is to provide a key ejection apparatus in which spring bias is provided with an axial type coil spring in which one end thereof is anchored and in which the other end is movable with the key in an inward and outward direction with the arcuate movement of the point of engagement between the spring and the key being compensated for by the shortening of the arm of the spring as it winds around the spiral or forms a portion of another coil of the spring and in which this arcuate movement is also compensated for by flexure or change in length of the spring arm or movement of the coil in a lateral manner within confines of a specific lateral opening provided therefor.

Still another important object of the present invention is to provide a key ejection apparatus which is simple in construction, easy to use, foolproof, long lasting, adapted to various utilities and generally inexpensive to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of

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construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a bottom plan view of one form of the lock device with the ejection apparatus incorporated therein;

FIGURE 2 is a side elevation of the construction of FIGURE 1 with portions thereof removed for illustrating the construction of the ejection apparatus;

FIGURE 3 is a group perspective view of the modified components of the lock construction;

FIGURE 4 is a side elevation of a modified form of the invention in which the spring device is incorporated within the cylinder of the lock;

FIGURE 5 is a view similar to FIGURE 4 illustrating the key in its innermost position and with portions broken away similar to FIGURE 4 for illustrating the structure of the spring and the relationship thereof;

FIGURE 6 is a perspective view of the valve which has been modified to engage the spring when the same is rotated with the key in a position for performing its function; and

FIGURE 7 is a transverse sectional view taken generally upon a plane passing along section line 7—7 of FIGURE 4 illustrating further structural details of the device.

Referring now specifically to the drawings, the numeral 10 generally designates an ignition lock which may be considered of conventional construction except for the modifications made therein for incorporating the key ejection feature. The ignition lock 10 includes the usual terminals or posts 12 at the inner or rearward end thereof and is provided with a generally cylindrical body 14 which is received in and supported in the proper opening in the dash panel or instrument panel provided in a conventional automobile. An ignition key 16 is provided and the key is usually provided with a series of notches and ridges in one edge thereof, which notches and ridges cooperate with the tumblers or pins in the lock in the usual manner for rotation of the ignition device to the various conditions. In some locks, a master tumbler is provided for retaining the key in the lock when in the performing position whereas other ignition locks do not have a master tumbler and the key can be removed even when in the performing position as well as in the "off" position.

The present invention incorporates a pair of parallel lugs 18 extending laterally from the body 14 and which may be integral therewith either by mounting thereon or casting the lugs integral therewith when the body is made. Extending transversely between the lugs 18 is a mounting pin or shaft 20 for an axial coil spring 22 which has an offset arm 24 at one end thereof anchored to one of the lugs 18. The other laterally extending arm 26 is elongated and extends upwardly alongside of the body 14 and extends laterally inwardly by virtue of an intumed end portion 28 which extends through a slot 30 in the body 14. Also disposed in the body 14 is a cylindrical lock cylinder 32 that is slotted as indicated by the numeral 34 and the finger 28 also extends in through the slot 34 and into a groove or slot 36 in the lock barrel 38 which normally receives the shank of the key 16. The upper or smooth edge 40 of the key 16 is provided with a notch therein for receiving and engaging the pin 28 on the spring arm 26 thus moving the same inwardly from the dotted line position shown in FIGURE 2 to the full line position shown in FIGURE 2 thus biasing the spring 22 and urging the key 16 outwardly.

As illustrated in FIGURE 3, the barrel 38 is provided with a transverse notch or slot 42 in communication with the groove or slot 36 for receiving the finger 28 when the barrel 38 is rotated from the "off" position to a key func-

tioning position thus disengaging the spring from the key and engaging the finger 28 with the barrel 38.

It is pointed out that the barrel 38 is assembled in the cylinder 32 in a substantial and rigid manner and the cylinder 32 is mounted in the body 14 in a substantial manner, that is, the spring pressure exerted on the barrel 38 will not cause any material wear in these components whereas such spring pressure would cause wear on the key ridges and notches and on the corresponding tumblers or pins in the lock thus subjecting the movable components to excessive wear. The particular construction of the arm 26 is noted in that the arm is actually bowed so that any pressure of a lateral nature exerted on the arm 26 will result in further arcuate bowing. Further, the arcuate movement of the finger 28 is compensated for somewhat by the shortening in length of the arm 26 as it forms partially another loop or spiral in the coil spring as it moves inwardly thereby eliminating any tendency to bind in the various slots. If it is desired to reduce friction further, the finger 28 may be provided with a roller thereon for reducing friction and wear.

In the operation of this form of the invention, the key having the notch therein is inserted in the usual manner and some force is necessary to force the key inwardly which also carries the pin 28 inwardly. As the key reaches its innermost position it is rotated to a functioning position, the pin 28 is disengaged from the key and engages the transverse notch or groove 42 whereby all the pressure of the bias spring will be received on the barrel 38 rather than on the key. When the key is again turned to the "off" position, then the spring finger 28 will once again engage the key and automatically eject the same from the lock mechanism.

Another form of the invention is illustrated in FIGURES 4-7 and that includes a similar key 44 having a shank 46 with the usual notches and recesses together with projections with this edge being designated by the numeral 48 and with the key having a notch 50 therein the same as the notch in the key 16. In this form of the invention, the entire structure is incorporated into the lock cylinder 52 which rotatably receives the barrel 54 in the usual manner and which is pinned thereto in the usual manner. In this form of the invention, the lock cylinder 52 is provided with a transverse open sided aperture 56 which is longitudinally elongated and which receives an axial coil spring 58 therein. This portion of the lock 52 normally receives the ends or tumblers and one end of the spring 58 is anchored to the cylinder 52 and the other end forms an arm 60 extending upwardly through a slot 62 with the upper end thereof terminating in an turned end 64 which rides along a flattened surface 66 forming one edge of a groove 68 in the barrel 54. When the key 46 is inserted into the barrel 54, the inwardly extending end 64 will be disposed in the path of movement of the rear edge of the notch 50 whereby the notch 50 will pick up the inwardly extending end 64 and move the same inwardly to a position in alignment with a transverse cam groove 70 in the barrel 54 which will receive the transverse end 64 when the barrel 54 is rotated thereby completely disconnecting the spring 58 from the key.

It is noted that the opening 56 is enlarged in relation to the coil spring 58 and during movement from the position illustrated in FIGURE 4 to the position illustrated in FIGURE 5, the coil spring 58 may move longitudinally or vertically within the confines of the opening 56 to compensate for the arcuate swinging movement of the arm 60 and the longitudinal reciprocation of the projecting pin 64.

The construction of the invention may also be used with a single barrel lock in which the entire barrel rotates with the key. In this instance the groove 42 or 70 would be disposed directly in the outer surface of the rotatable barrel.

While in each instance, the rotatable barrel is shown

with the spring bias receiving means, it is pointed out that the structure could be reversed and the cylinder could take the spring bias pressure rather than the barrel by extending the slot 34 all of the way to the end of the cylinder with there being a projection on the key for engaging the spring finger whereupon the spring finger would engage a notch in the cylinder 32 when the cylinder 32 is rotated.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A key ejection lock mechanism comprising a lock body having a cylinder therein with the cylinder having a barrel, said body, cylinder and barrel being assembled in a manner to prevent longitudinal movement therebetween, said barrel adapted to receive an operating key, spring means carried by said lock mechanism and including a projecting finger extending into engagement with the key when the key is inserted into the barrel and for movement inwardly with the key, means on said barrel in alignment with the inner end of the key when the key is in innermost position for receiving the thrust of the finger on the spring means and transferring such thrust to said barrel when the barrel and key are rotated to key functioning position.

2. The combination of claim 1 wherein said spring means is disposed exteriorly of the body, said body, cylinder and barrel being provided with slots for receiving the projecting finger, the means on the barrel for receiving the thrust of the finger including a transverse recess communicating with the slot therein for receiving the thrust of the finger when the barrel is turned to key functioning position.

3. A key ejection lock mechanism comprising a cylinder having a barrel therein, said cylinder and barrel being assembled in a manner to prevent longitudinal movement therebetween, said barrel adapted to receive an operating key whereby the barrel may be rotated in relation to the cylinder, spring means carried by said lock mechanism and including a projecting finger extending into engagement with the key when the key is inserted into the barrel and for movement longitudinally inwardly with the key, means on said barrel in alignment with the inner end of the key when the key is in innermost position for receiving the thrust of the finger on the spring means and transferring such thrust to said barrel when the barrel and key are rotated to key functioning position, said spring means being mounted on and carried by the cylinder, said cylinder and barrel being provided with slots, said finger extending through the slots in the cylinder and barrel, said means on the barrel for receiving the thrust of the finger including a peripheral groove communicating with the slot in the barrel for receiving the thrust of the finger when the barrel is turned to key functioning position.

4. A key ejecting lock mechanism comprising a lock body including a first member and a second member rotatably mounted within the first member, said first member and second member being assembled in a manner to prevent longitudinal movement therebetween, said second member adapted to receive an operating key, spring means carried by one of said members and including key engaging means adapted to extend into engagement with the key when the key is inserted into said second member whereby the key engaging means will be moved inwardly with the key when the key is inserted into the second member thereby tensioning the spring means, means on one of said members in alignment with the inner end of the key when the key is in its innermost position for receiving the key engaging means when the

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second member and key are rotated to key functioning position, the rotation of the key to function position separating the key from the key engaging means whereby the force exerted on the key engaging means by the tensioned spring is applied to said means on one of said members.

5. A key ejecting device for a lock comprising a spring device carried by the lock, means on said spring device for engagement with the key and urging the key longitudinally outwardly of the lock when the key is in inoperative position, said lock including a rotatable key receiving member, and a stationary support member rotatably receiving said key receiving member, said key receiving member including abutment means engageable with the key engaging means on the spring device when the key is rotated to functioning position and disengaged from the key engaging means on the spring device when the key is rotated to inoperative position whereby the

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abutment means on the key receiving member receives the force exerted by the tensioned spring device, said key receiving member being in the form of a rotatable barrel, said abutment means on the barrel receiving the key engaging means including a recess in alignment with the inner end of the key when the key is in its innermost position in the barrel, said recess including a wall forming an abutment receiving the thrust of said key engaging means when the barrel is turned to key functioning position and the key disengaged from the key engaging means.

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