Nov. 11, 1958 A. H. GREEN 2,859,997

LOCK RETRACTOR MECHANISM

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FIG_1

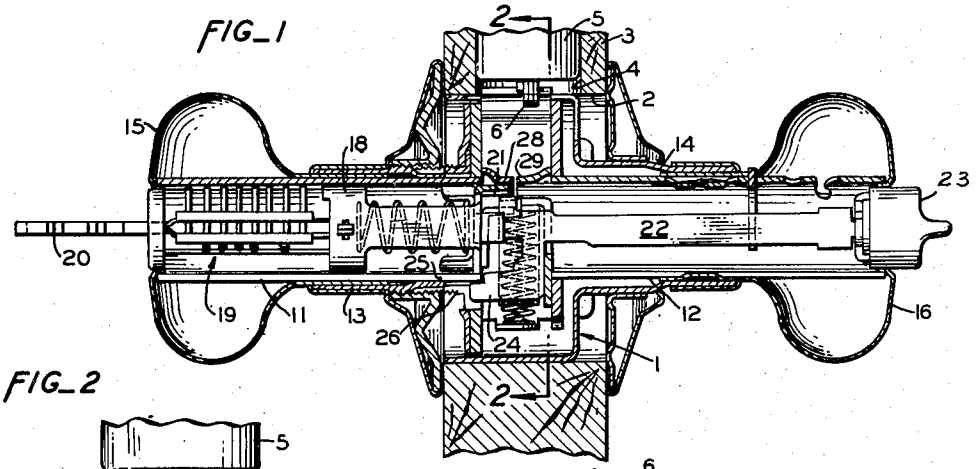


FIG_2

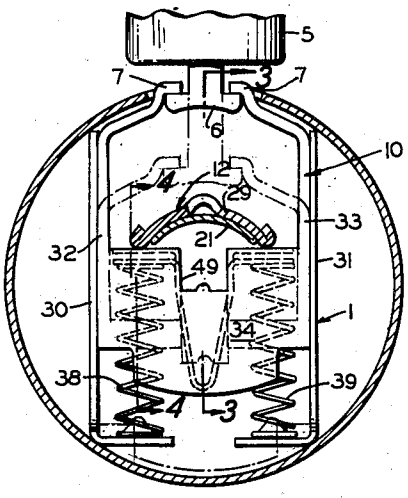


FIG_3

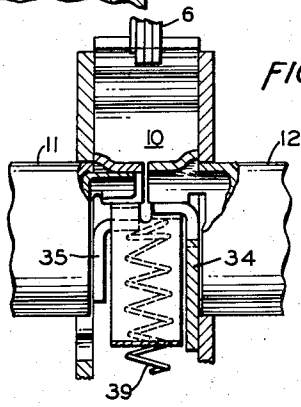


FIG_7

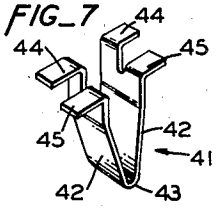


FIG_4

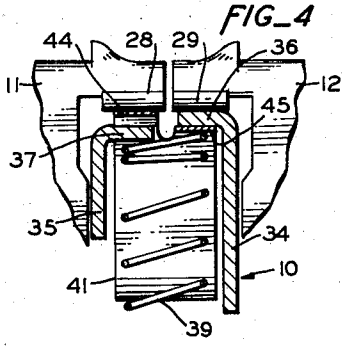


FIG_5

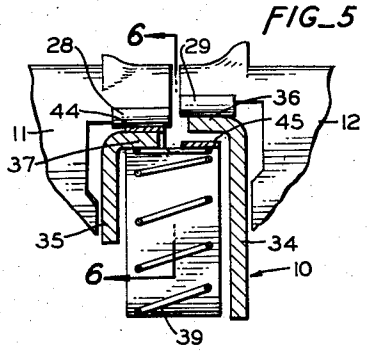
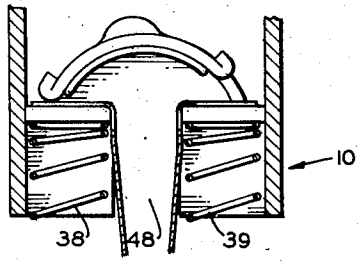


FIG_6



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LOCK RETRACTOR MECHANISM

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FIG_8

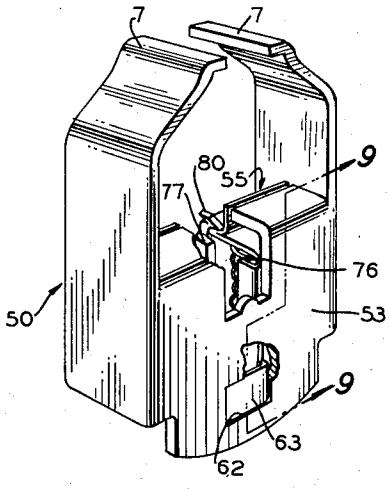


FIG_9

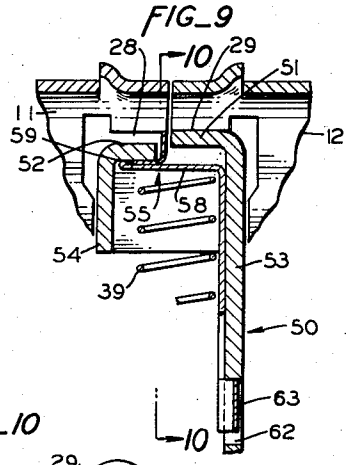


FIG_10

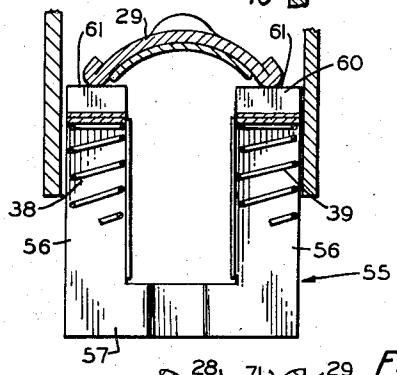


FIG_11

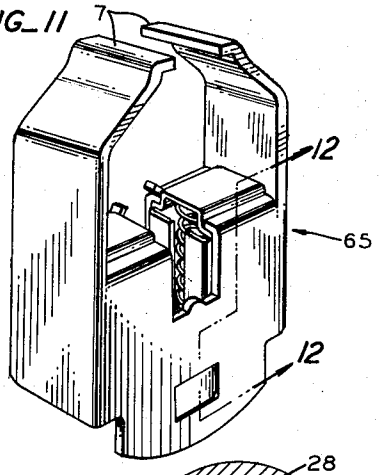


FIG_12

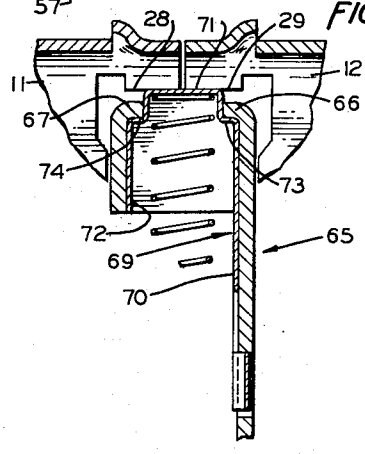
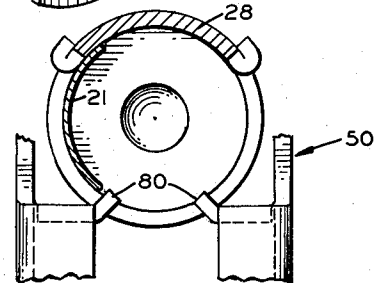


FIG_13



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LOCK RETRACTOR MECHANISM

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Application July 12, 1954, Serial No. 442,473

2 Claims. (Cl. 292—169)

This invention relates to locks and more particularly to the lock retractor mechanism for locks having a latch bolt actuated by a reciprocable retractor which in turn is actuated by rotation of the lock spindles.

Locks of the type contemplated by this invention are provided with a retractor mounted in a housing for translation and independently actuated by the rotation of the inner and outer spindles. Such a retractor is normally urged to an outer position by means of one or more springs for moving the latch bolt to which it is attached to a projected position. The retractor is normally in engagement with the rollback portions of the inner and outer spindles which extend inwardly from opposite sides of the door on which the lock is mounted. These spindles are coaxial and normally independent of each other and their inner ends are almost in meeting relationship within the retractor. Movement of the retractor to retact the latch bolt may thus be effected by rotation of either spindle and the conversion of rotational effort on the spindle to translatory movement of the retractor is through engaging surfaces on the retractor and the spindle rollback elements respectively.

Although the translation of the retractor is normally achieved only through rotation of the spindles which it engages, it is desirable to prevent translation of the retractor due to sidewise movement of a spindle or tilting of a spindle relative to its axis of rotation. It will be understood, of course, that movement of the spindle other than rotation is resisted by the bearings in which the spindle is mounted. However, if the bearings become worn or if for some other reason clearances in the lock mechanism increase, it is desirable, especially in the case of the outer spindle, to prevent even slight translation of the retractor through tilting or oscillation of the lock spindle. This result is particularly desirable in installations where, due to warping of the door or jamb, or for other reasons, there is a relatively large clearance between the edge of the door and the adjacent jamb so that the latch bolt need only be retracted very slightly to be released from its associated strike plate.

It is therefore the main object of the present invention to provide a lock retractor mechanism in which rotation of the spindle is required to effect translation of the retractor with which it is associated.

Another object of the invention is the provision of a simple and inexpensive means adapted to be employed with conventional cylindrical locks for enhancing the security of the same by preventing unlocking of a lock except through pure rotation of the lock spindle.

Other objects and advantages will be seen in the following specification and the attached drawings wherein:

Fig. 1 is a horizontal cross section through a conventional cylindrical type lock showing the manner in which the invention is used.

Fig. 2 is a cross section through the locks as taken along lines 2—2 of Fig. 1 and showing the retractor mechanism. Some of the lock elements are omitted for clarity.

Fig. 3 is a cross section through the retractor as taken along lines 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary view similar to Fig. 3 showing the retractor and rollbacks in normal position.

Fig. 5 is a view similar to Fig. 4 but showing the outer spindle rotated slightly from its normal position.

Fig. 6 is a cross section as taken along lines 6—6 of Fig. 5.

Fig. 7 is a perspective of the slide element of the retractor.

Fig. 8 is a perspective showing a modified form of the retractor.

Fig. 9 is a section through the retractor as taken along lines 9—9 of Fig. 8.

Fig. 10 is a section through the retractor as taken along lines 10—10 of Fig. 9.

Fig. 11 is a perspective of another modified form of the invention.

Fig. 12 is a section through the retractor of Fig. 10 as taken along lines 12—12 of Fig. 11.

Fig. 13 is a side elevation of the retractor taken from the inner spindle side showing the operation of the cam means for increasing the translation of the retractor.

In detail, and referring to Fig. 1, the invention is adapted to be employed in any conventional lock having a housing generally designated 1 received in a transverse bore 2 in a door 3.

A bore 4 at right angles to bore 2 is provided in which is received the latch bolt housing 5 provided with a latch bolt having an extension 6 formed so as to be received between a pair of opposed flanges 7 (Fig. 2) on the latch bolt retractor generally designated 10.

For the purpose of actuating retractor 10, outer and inner spindles designated 11, 12 respectively are provided and are rotatably supported in sleeve bearings 13, 14 carried by housing 1. Spindles 11, 12 are respectively provided with knobs 15, 16 for turning the same.

Rotatable within the outer spindle 11 is a lock spindle 18 which is provided with a locking mechanism generally designated 19 at its outer end and which mechanism is adapted to receive a key 20 (Fig. 1). The inner end of lock spindle 18 is free to rotate within spindle 11 to permit the lock spindle extension 21 to actuate the retractor in a manner to be described.

Carried by the inner spindle 12 is a locking bar 22 provided at the end adjacent knob 16 with a button 23 by means of which the bar 22 may be moved axially to the left as seen in Fig. 1 to lock the outer spindle 11. Locking is accomplished by means of a keying member 24 carried by the inner end of the bar 22 and which member is adapted to be received within registering slots 25, 26 in the outer spindle 11 and the housing 1 respectively for keying the outer spindle to the housing.

The adjacent ends of the outer and inner spindles 11, 12 are respectively provided with rollbacks 28, 29 (Figs. 1, 2). The retractor 10 is slidably mounted between two opposed walls 30, 31 of housing 1 (Fig. 2) for translatory movement from an outer position with the latch bolt projected, to an inner position with the latch bolt retracted and as shown in dotted lines in Fig. 2.

The retractor 10 is preferably bent to a box-like rectangular shape from a unitary section of sheetmetal to provide a pair of opposite end walls 32, 33, which slidably engage housing walls 30, 31 respectively, and a pair of opposed sidewalls 34, 35 which are normal to the axis of spindles 11, 12.

Sidewalls 34, 35 are bent over to provide flanges 36, 37 respectively about centrally of the retractor 10. Heretofore, flanges 36, 37 or their equivalent have been positioned so as to simultaneously abut the rollbacks 28, 29 of spindles 11, 12. However by the present invention

flanges 36, 37 are offset relative to each other longitudinally of the retractor 10. As best seen in Fig. 4, flange 36 is positioned so as to engage rollback 29 of inner spindle 12 with flange 37 spaced from rollback 28 of spindle 11. The retractor 10 is urged by springs 38, 39 (Fig. 2) toward the latch bolt housing 5 at all times, and this movement is limited only by the engagement of flange 36 with rollback 29 of spindle 12 (Fig. 4). Thus it will be apparent that any rotation of spindle 12 immediately retracts the retractor 10 against the urging of springs 38, 39. Furthermore, any oscillation or sidewise movement of spindle 12 which urges rollback 29 against flange 36 will result in retraction of retractor 10, if only slightly. However such retraction by movement of the inner spindle is not objectionable as it does not affect the security of the lock.

Extending between the opposite endwalls 32, 33 is a slide element generally designated 41 which is generally U-shaped and including a pair of opposed legs 42 integrally connected by a closed end 43. At the free ends of legs 42 the same are formed to provide a pair of generally coplanar oppositely outwardly directed flanges 44 which are adapted to be received between flange 37 and rollback 28. Also provided are another pair of flanges 45 similar to flanges 44 but closer to the closed end 43 of element 41. As best seen in Fig. 4, slide element 41 is positioned within retractor 10 with flanges 44 between flange 37 of the retractor and rollback 28 of spindle 11, and flanges 45 are positioned between flanges 45 and springs 38, 39.

The springs 38, 39 bear against the flanges 45 of element 41 and also against the flange 37 so that both the retractor and the element 41 are urged toward the rollbacks 28, 29 of spindles 11, 12 respectively. The effect of this is that, although a slight rotation of inner spindle 12 immediately causes translation of the retractor, a slight rotation of outer spindle 11 moves only the U-shaped element 41 against the yieldable resistance of spring 38 or 39 depending upon the direction of rotation of the spindle. However upon further rotation of the outer spindle, flange 44 abuts flange 37 causing retraction of the retractor (Figs. 5, 6).

It should be noted that the legs 42 of element 41, in addition to integrally securing flanges 44 together for movement as a unit, also act as retainers for springs 38, 39.

Wall 35 of retractor 10 is provided with a central opening 48 (Fig. 6) to receive the inner keying member 24 of locking bar 22 (Fig. 1). This keying member is omitted from Figs. 2–6 for clarity. Similarly the wall 34 is provided with a slot 49 for receiving the locking bar 22 which is also omitted from Figs. 2–6. Flanges 36, 37 do not extend to the central portion of the retractor 10 for the above reasons and it is therefore necessary that means be provided to retain springs 38, 39 in place as shown in Fig. 2.

With respect to the operation of element 41 it may be said that the same is a slide inasmuch as it is supported within the retractor 10 for movement between outer and inner positions as shown in Figs. 4, 5 respectively. In addition, it will be noted that springs 38, 39 urge said slide and the retractor simultaneously outwardly toward the latch bolt.

A modification of the invention is shown in Figs. 8–10 wherein the retractor generally designated 50 is similar to retractor 10 hereinbefore described except in certain respects which will be noted. In this case flanges 51, 52 are provided corresponding to flanges 36, 37 of retractor 10 and opposite sidewalls 53, 54 correspond to sidewalls 34, 35.

In lieu of slide element 41 there is provided a slide element generally designated 55 of somewhat different construction. Slide 55 is also generally U-shaped having a pair of legs 56 (Fig. 10) connected together at their corresponding ends by piece 57. The free ends of legs

56 are each bent at right angles to provide a transverse portion 58 extending between sidewalls 53, 54 bent back upon itself to provide a shorter parallel portion 59 (Fig. 9). The legs are then bent at right angles to provide short longitudinally extending flanges 60 having outer edges 61 which are adapted to abut the rollbacks 28, 29 of spindles 11, 12.

Springs 38, 39 engage the transverse portion 58 of slide element 55 and urge the shorter transverse portion 59 against flange 52 which in turn urges the retractor 50 toward projected position.

Sidewall 53 of retractor 50 is provided, with a preferably rectangular opening 62 and the cross piece 57 of slide element 55 is joggled to provide an offset portion 63 which is received within opening 62 (Figs. 8, 9). In this manner additional guide means is provided for slide element 55 and, in addition, the cross piece 57 does not interfere with the keying member 24 carried by the locking bar 22 (Fig. 1). It will also be noted that the sides of opening 62 that are parallel to the rollback engaging edges of guide element 55 may provide stops for limiting the travel of said guide element in addition to the stops provided by flange 52 and rollback 28.

The operation of the modification shown in Figs. 8–9 is somewhat different from that of the device of Figs. 2–6. In the latter case the rollback 28 engages only the slide 41 whereas the rollback of Figs. 8–10 engages the flange 52 of retractor 50 after the slide 55 has been depressed a distance equal to the amount of offset between flanges 51, 52.

A still further modification of the invention is shown in Figs. 11, 12 wherein the retractor 65 is identical to retractor 50 of Figs. 8–10 except that the flanges 66, 67 of retractor 65 that correspond to flanges 52, 51 of retractor 50 are coplanar and somewhat narrower.

The slide 69 of Figs. 11, 12 is also bent from sheet metal and includes the same U-shaped form as slide 55. However, in this case, the free ends of the legs 70 are jogged to provide an offset flat portion 71, received between the flanges 66, 67 of retractor 65 and projected past said flanges by the springs 38, 39. The slide 69 is provided with portions 72 parallel to legs 70 so as to be slidable within retractor 65 and is also provided with shoulders 73, 74 which engage flanges 66, 67 and thus act as stops to limit outward movement of the slide. In this case it will be noted that both rollbacks 28, 29 are in engagement with the flat portion 71 of slide 69 thus preventing actuation of the retractor by either the outer or inner spindles except by rotation of one of said spindles.

Upon rotation of either spindle, it will be seen from Fig. 12 that the spindle first depresses the slide element and then engages the retractor to retract the same.

In each of the modified forms above described it is desirable to provide flanges 76, 77 bent at right angles to the sidewalls of the retractor (Fig. 8) to prevent shifting of the springs 38, 39 and thus duplicate the function of the legs 42 of the slide 41 (Fig. 7).

Inasmuch as the angular rotation of the outer spindle available for conversion into translation of the retractor is reduced by the interposition of slide elements 41, 50 and 65, it may be desirable to multiply the translatory movement of the retractor. This is especially true in the case of the lock spindle 18 which is formed so that the extension 21 (Fig. 13) has a smaller radius than the outer rollback 28.

In order to insure adequate retraction of the retractor the same may be provided with cam lugs 80 (Figs. 8, 13) which extend slantingly toward each other and in the path of travel of the spindle extension 21 thus increasing the travel of the retractor for a given rotation of the lock spindle. It is important to note that the action of springs 38, 39 is such that the spindles are normally in a predetermined angular position relative to the housing 1. Inasmuch as the outer spindle

11 is always urged to the same normal angular position relative to the housing, the slots 25, 26 in the spindle and housing respectively remain in alignment to receive the keying member 24 on locking bar 22.

It is to be understood that the very specific description of the invention herein made should not be taken as restrictive of the same as it is obvious that minor variations in design may be resorted to without departing from the spirit of the invention.

For example, the opening 62 may be extended to the adjacent edge of retractor 50 to form a slot if desired. In such case the inner slide may be readily detached from the retractor. The advantage of the form shown in Figs. 8 and 11 is that the inner slide may be snapped into the retractor due to the resiliency of the cross piece 57 (Fig. 10). In this manner the slide is permanently mounted in the retractor.

I claim:

1. In a lock having inner and outer knob spindles provided with rollbacks, a retractor connected with the bolt of said lock and slidably supported for translation from an outer position with said bolt projected, to an inner position with said bolt retracted, spring means urging said retractor to said outer position and into engagement with said rollbacks at all times, said retractor including lost motion means yieldably urged into engagement with the rollbacks of one of said spindles to permit limited rotation of said one spindle while said retractor is stationary, said retractor being formed to provide a pair of surfaces adapted to be engaged by the rollbacks of said outer spindle, each of said surfaces comprising a first portion in a plane at right angles to the path of travel of said retractor and a second surface in continuation of said first surface and slantingly disposed relative to said path, said portions being relatively positioned whereby initial rotation of the adjacent rollback from a neutral position engages said first portion for retracting said retractor and continued rotation of said adjacent rollback engages said slanting portion for augmenting the translatory movement of said retractor for a given angular movement of the associated spindle.

2. A latch bolt retractor adapted to be mounted in a lock set for translatory movement along the axis of the latch bolt of a lock set, said retractor being provided with a pair of surfaces adapted to be engaged by the rollbacks of said outer spindle, each of said surfaces comprising a first portion in a plane at right angles to the path of travel of said retractor and a second surface in continuation of said first surface and slantingly disposed relative to said path, said portions being relatively positioned whereby initial rotation of the adjacent rollback from a neutral position engages said first portion for retracting said retractor and continued rotation of said adjacent rollback engages said slanting portion for augmenting the translatory movement of said retractor for a given angular movement of the associated spindle.

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