July 16, 1963 F. J. RUSSELL 3,097,872

HOLD BACK RETRACTOR

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Fig. 1

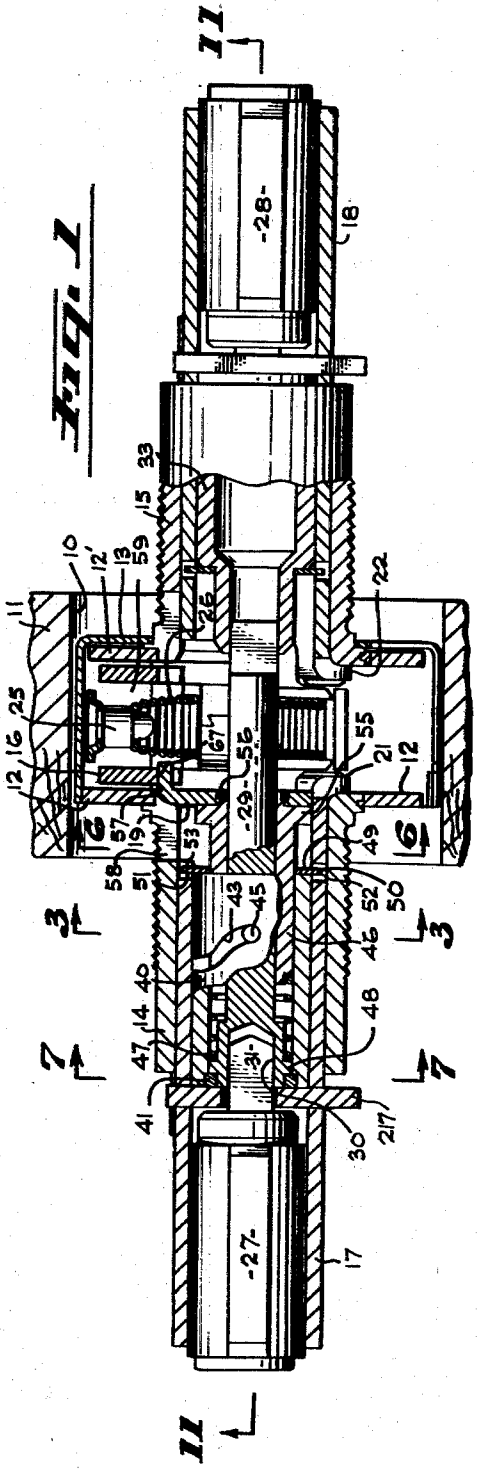
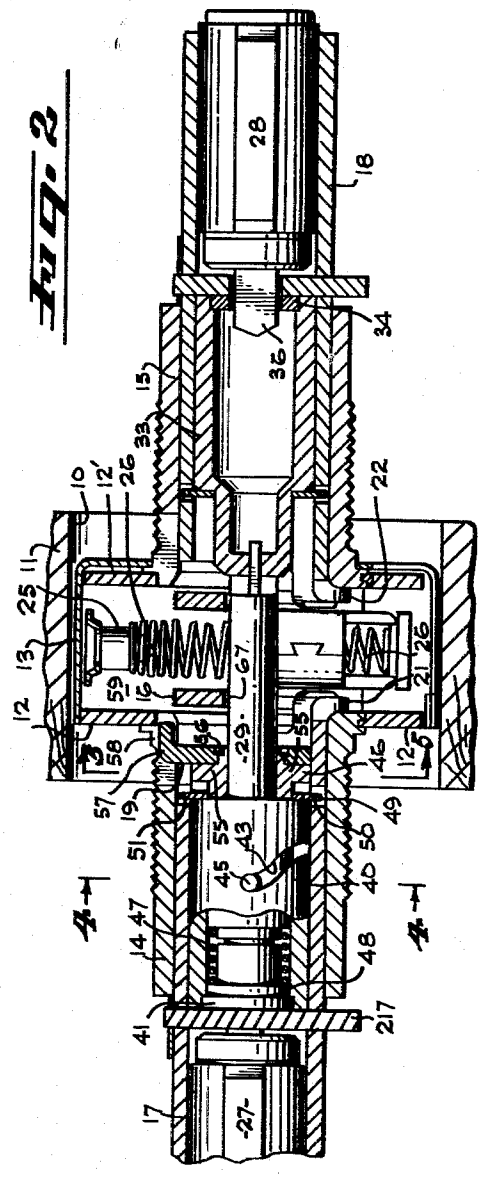



Fig. 2




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Fig. 3

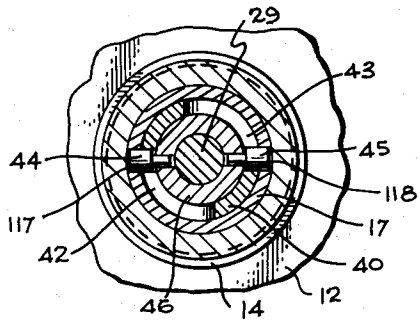



Fig. 4

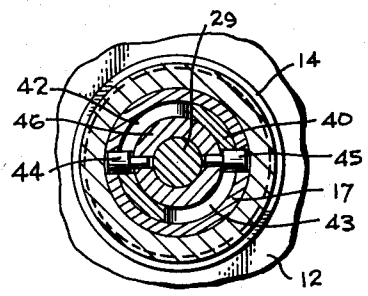



Fig. 5

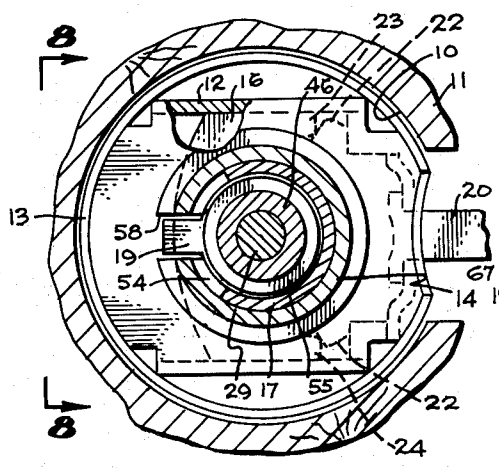
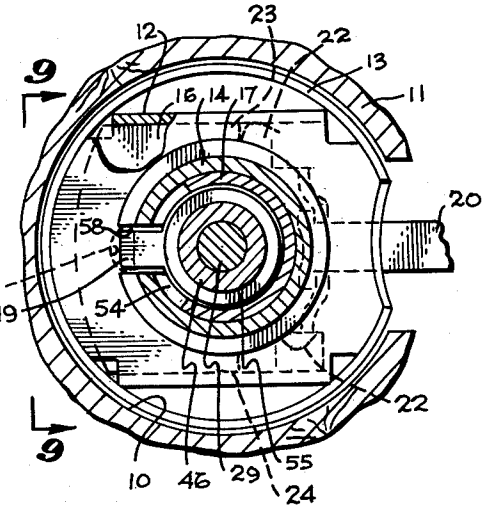



Fig. 6



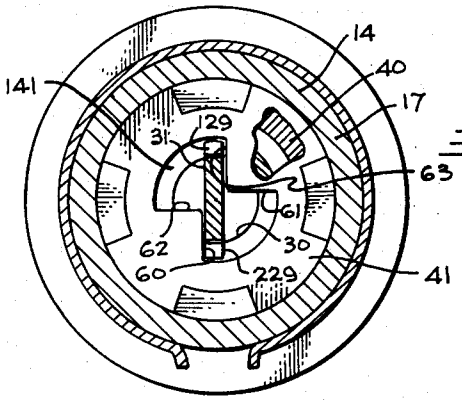
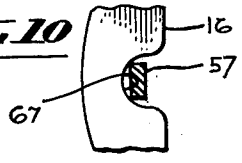




Fig. 7

Fig. 10




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Fig. 11

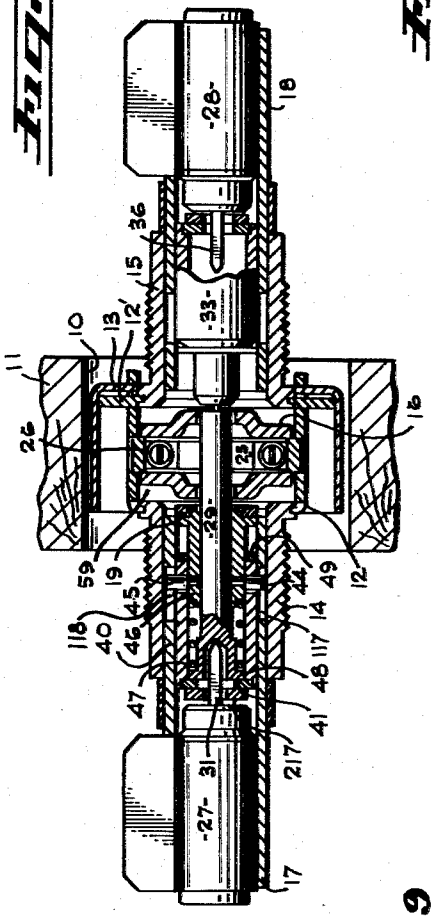



Fig. 8

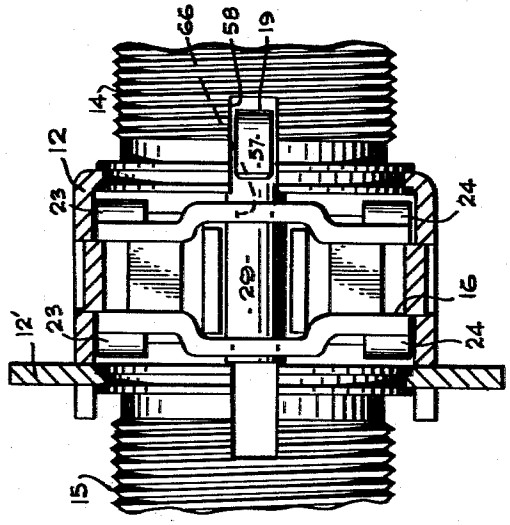
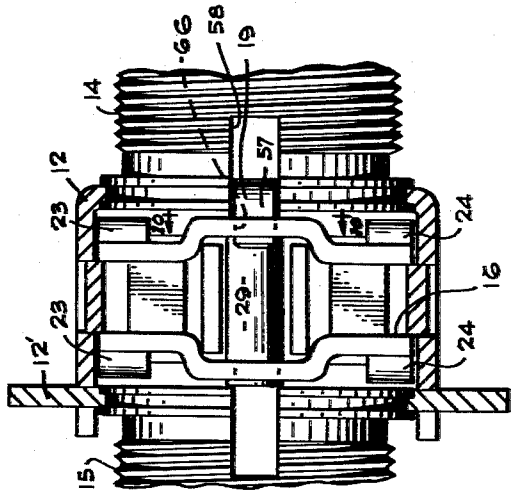



Fig. 9




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# HOLD BACK RETRACTOR

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5 Claims. (Cl. 292—169)

The invention relates to door locks and in particular locks wherein spindles rotate whereby to manipulate a retractor slide which in turn operates a latch bolt. The invention has special reference to a locking mechanism subject to operation by a key or turn button to hold the retractor and hence the latch bolt in retracted position.

When a key is turned in a lock or a button is turned or pressed, as in the case of a privacy lock, some mechanism within the lock must be set in operation to lock against manipulation by the knob on the other side which is ordinarily employed to open the door. The more common expedients resorted to in locks of this kind has been to interpose some blocking device between a stationary part of the lock mechanism and the spindle so that the spindle cannot be rotated. Consequently, when the spindle is incapable of rotation, there is no agency capable of withdrawing the latch bolt; and hence the door is locked. When this expedient is resorted to, the mechanical elements compacted into a device of this kind often become undependable. If the lock is one intended to be locked from either side in order to, say, block rotation of both spindles, each spindle in turn must be provided with some blocking means to anchor it to a stationary portion of the device and preferably also something to carry over motion from the key-actuated lock or button on one side or the other. These circumstances apply also in a modified version of the lock where it is desirable to hold the latch bolt back in unlatched position so that the door can be opened repeatedly without need for turning the knob. The application herein disclosed is a continuation-in-part of the co-pending application Serial No. 98,067, filed March 24, 1961.

It is, therefore, among the objects of the invention to provide a new and improved locking device wherein the mechanism is capable of arresting or blocking movement of the slide after it has been moved to withdrawn position whereby the latch bolt remains unlatched.

Another object of the invention is to provide a new and improved door lock wherein simple expedients are resorted to whereby to transfer motion from a key or button mechanism through the lock by the shortest route, thereby to quickly and positively secure the retractor slide for the latch bolt in withdrawn position.

Still another object of the invention is to provide a new and improved locking mechanism for the retractor slide of a lock which can be operated by a key or locking button on either side but wherein the mechanism is simplified in order to reduce the number and complexity of parts as well as to improve the strength and dependability of the means for holding the retractor slide in withdrawn position.

Still another object of the invention is to provide a new and improved simple, direct blocking mechanism for holding operating parts of the door lock in position wherein the retractor slide remains withdrawn, the mechanism being such as not to be hampered in its operation by any variation in the arresting positions of the knobs.



With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view of the assembled device in position holding the retractor slide at a withdrawn location by operation of a blocker.

FIGURE 2 is a longitudinal sectional view of the device similar to FIGURE 1 wherein the retractor slide has been released.

FIGURE 3 is a cross-sectional view taken through center line of cam slots on the line **3—3** of FIGURE 1.

FIGURE 4 is a cross-sectional view of the device taken through center line of cam slots on the line **4—4** of FIGURE 2.

FIGURE 5 is a cross-sectional view of the device taken on the line **5—5** of FIGURE 2.

FIGURE 6 is a cross-sectional view similar to FIGURE 5 taken on the line **6—6** of FIGURE 1 showing the retractor slide in retracted position.

FIGURE 7 is a cross-sectional view taken on the line **7—7** of FIGURE 1.

FIGURE 8 is a fragmentary transverse view taken on the line **8—8** of FIGURE 5.

FIGURE 9 is a fragmentary transverse view taken on the line **9—9** of FIGURE 6.

FIGURE 10 is a fragmentary cross-sectional view taken on the line **10—10** of FIGURE 9.

FIGURE 11 is a longitudinal sectional view of the assembled device in locked position as taken on the line **11—11** of FIGURE 1.

In an embodiment of the invention chosen for the purpose of illustration there is shown the necessary parts of a door lock mounted in an opening **10** in a door **11**. The parts consist in part of a two-piece frame **12, 12'** enclosed in a housing **13**, the frame having mounted thereon an outside spindle bearing **14** and an inside spindle bearing **15**. A transversely reciprocating retractor slide **16** is manipulated alternatively by an outside tubular spindle **17** or an inside tubular spindle **18**. The special mechanism featured in the invention herein disclosed consists in the main of what can be generally described as a blocker assembly capable of moving a blocker **19**, shown in cross-section in FIGURES 1 and 2, from the position shown in FIGURE 2 to the position shown in FIGURE 1 where it engages the retractor slide **16**, and holds it in withdrawn position.

To more clearly understand the operation of the device, attention is directed to the structure and relationship of the retractor slide **16** to which is attached a tail-piece **20** of a latch bolt (not shown) so that when the slide is moved in a direction from right to left, as viewed in FIGURES 5 and 6, the latch bolt (not shown) will be withdrawn and the door will be unlatched.

When the retractor slide is unlocked and free to be moved, roll-backs **21** on the outside tubular spindle **17** or roll-backs **22** on the inside tubular spindle **18** are capable of being moved against retractor shoulders **23** or **24**, suggested by broken lines in FIGURES 5 and 6, depending on the direction of rotation, thereby to manipulate the retractor slide. A spring keeper **25** of substantially conventional construction contained within

the housing 13 engages one end of a spring means 26, the other end of which is impressed against the retractor slide in a customary manner in order normally to urge the slide in a direction from left to right, as viewed in FIGURES 5 and 6.

A cam sleeve 40 is rotatably secured within the spindle 17 between a knob retainer 217 and a washer 49, the tabs 50 and 51 of which extend into openings 52 and 53, respectively, in the tubular spindle 17. The cam sleeve 40 includes a dovetail washer 41 which is joined with and a part of the cam sleeve 40. The dovetail washer has a non-circular opening 141 therein as shown in FIGURE 7. This opening includes the shoulders 60, 61, 62, and 63. On opposite sides of cam sleeve 40 are two cam slots 42 and 43 which extend in a somewhat oblique circumferential direction, as is apparent in FIGURES 1, 2, 3, and 4.

Within the inside diameter of the cam sleeve 40 is located a blocker sleeve 46. The blocker 19 is secured to the end of blocker sleeve 46 by means of an annular extension 55 on the blocker sleeve and snap ring 56.

On opposite sides of spindle 17 are located two spindle slots 117 and 118, as seen in FIGURE 11. These slots extend axially along a certain length of spindle 17. Pins 44 and 45, are located in and are a part of blocker sleeve 46 and extend outwardly from said blocker sleeve through cam slots 43 and 42 respectively and also through spindle slots 117 and 118 respectively. Thus, when cam sleeve 40 is rotated in one direction, the action of the cam slots 43 and 42 on pins 44 and 45 make the blocker sleeve 46 and blocker 19 move axially within spindle 17 from left as shown in FIGURE 2 to right as shown in FIGURE 1. The spindle slots 117 and 118 limit the movement of the pins 44 and 45 and therefore the movement of the blocker sleeve 46 to an axial direction within the spindle 17. When cam sleeve 40 is rotated in the opposite direction, the blocker sleeve 46 and blocker 19 move axially within spindle 17 from right as shown in FIGURE 1 to left as shown in FIGURE 2.

To hold a hooked end 57 of the blocker in correct position, there is provided a slot 58 in the outside sleeve bearing 14. The slot extends within the right-hand end of the sleeve bearing, as viewed in FIGURES 1 and 2, into the frame 12 so that the hooked end 57 when properly operated can be passed into a chamber 59 within the interior of the frame 12, 12' to the position shown in FIGURE 1. An opening 54 in outside tubular spindle 17 extends circumferentially about 106° so that the outside tubular spindle 17 can be rotated freely without interference from the blocker 19 in order to manipulate the retractor slide 16 in the normal manner when it is not blocked by blocker 19 (shown in FIGURE 2).

Nonrotatably confined in a conventional manner within the outside tubular spindle is an outside key-operated mechanism 27 which is joined rotationally with a tailpiece 31. The tailpiece 31 extends into the non-circular opening 141 (see FIGURE 7) of the dovetail washer 41. When rotated in one direction by operation of the outside key-operated mechanism 27, the tailpiece 31 engages the shoulders 60 and 63 of the dovetail washer 41, thus rotating cam sleeve 40 in one direction. When rotated in the other direction, the tailpiece 31 engages the shoulders 61 and 62 of the dovetail washer 41, thus rotating cam sleeve 40 in the opposite direction. Though not shown in detail, the same relationship exists between a tailpiece 36 of an inside key-operated mechanism 28 housed in the inside tubular spindle 18 and an extension sleeve 33.

In order to rotationally connect the inside key-operated mechanism 28, its tailpiece 36 and the extension sleeve 33 (all located in the inside tubular spindle 18) with the cam sleeve 40 (located in the outside tubular spindle 17), a shaft 29 is nonrotatably joined at one of its ends to the extension sleeve 33, its other end comprising two shoulders 129 and 229 (see FIGURE 7) which extend through the non-circular opening 141 of the dovetail washer 41. Shaft 29 also includes a shoulder 48 which at all times is urged against the dovetail washer 41 by a coiled spring 47, one end of which bears against shoulder 48 and the other end of which bears against blocker sleeve 46, thus holding shoulders 129 and 229 of shaft 29 within non-circular opening 141 of dovetail washer 41 at all times. The left-hand end of shaft 29 (as shown in FIGURE 1) includes a recess 30 which clears the tailpiece 31. When shaft 29 is rotated by the inside key-operated mechanism 28, the shoulders 129 and 229 (see FIGURE 7) engage shoulders 60, 63 or shoulders 61, 62, respectively, of dovetail washer and thus rotate cam sleeve 40.

In operation, let it be assumed that the parts are in latch bolt released position, as shown in FIGURE 2, which would also prevail with respect to the parts as shown in FIGURES 4, 5, and 8. The blocker 19 and its hooked end 57 is withdrawn and the retractor slide 16 is free to reciprocate when acted upon by one or another of the roll-backs 21 or 22. Obviously the roll-backs are operated by actuation of the tubular spindles in the customary fashion which is the movement depended upon for withdrawing the latch bolt (not shown) through the agency of the tailpiece 20. In this position the cam slot 43 visible in FIGURES 3 and 4 is rotated to a position such that the pin 45 is at the outer end as shown in FIGURE 2. When the outside key-operated mechanism 27 is then manipulated, the tailpiece 31 is rotated in a counterclockwise direction (see FIGURE 7), which in turn rotates the cam sleeve 40. This motion forces the pins 45 and 44 down the cam slots 42, 43 and since the pins can only move axially, being channeled in outside tubular spindle slots 117, 118, the pins in consequence will shift axially from left to right, as viewed in FIGURES 1 and 2, until they reach the other ends of the cam slots, as shown in FIGURE 1. Before the foregoing adjustment is made, however, one spindle or the other is rotated in the customary fashion to withdraw the retractor slide to the position of FIGURES 1 and 6. This may, for example, be done by rotating the spindle 17 counter-clockwise as viewed in FIGURE 6 so that the upper roll-back 22 moves against the upper retractor shoulder 23.

As the pins 44 and 45 are shifted axially, so also is the blocker sleeve 46 shifted axially from left, as shown in FIGURE 2, to right, as shown in FIGURE 1. The hooked end 57 slides freely in the slot 58 until it enters the chamber 59. Since the retractor slide 16 is in withdrawn position, an aperture 67 therein will assume a position of alignment with the hooked end 57. The hooked end will therefore enter the aperture 67, as shown in FIGURES 1, 9, and 10, the rear edge of which serves as a shoulder bearing against the hooked end 57 under pressure of the spring 26. When in this position the retractor slide 16 cannot move from left to right as viewed in FIGURE 6 even though the spindles 17 and 18 are released. Accordingly, the latch bolt will remain in withdrawn position and the door on which it may be mounted may be opened at will without need for rotating either of the spindles.

When the device thereafter is to be released, the tailpiece 31 of the outside key-operated mechanism 27 is rotated in a contrary or clockwise direction (see FIGURE 7). This causes the cam sleeve 40 to be rotated in a corresponding direction and movement will force the pins 44 and 45 along the respective slots 43 and 42 to the opposite ends which will cause the pins and the attached blocker sleeve 46 to be moved in a direction from right to left, as viewed in FIGURES 1 and 2. This movement is accompanied by a corresponding movement of the blocker 19 and the hooked end 57 from the position of FIGURE 1 leftward to the position of FIGURE 2, within the slot 58. Thereafter the retractor slide is again free for manipulation in the customary fashion by operation of the tubular spindles.

It is possible also to use the device in the form herein described as a lock for locking the latch bolt in ex-

extended position shown in FIGURE 2, and the spindles this the retractor slide is permitted to remain in the extended position shown in FIGURE 2, and the spindles remain in normal position as suggested in connection with FIGURE 5. The cam sleeve is then rotated as previously described, for example, by manipulation of the key-operated mechanism and the tailpiece **31**. When the cam is rotated counter-clockwise, as viewed in FIGURE 3, the pins **45**, **44** will be shifted from the outer ends of the respective cam slots (see FIGURE 2) to the inner ends of the respective cam slots (see FIGURE 1). This will force the blocker **19** and the hooked end **57** to move toward the right as viewed in FIGURE 1 until the hooked end falls behind the adjacent rear edge of the retractor slide **16**. Presence of the hooked end **57** behind the slide effectively blocks the slide from movement from a latch bolt extended position and hence the latch bolt (not shown) will remain locked, but subject to unlocking by reverse operation of the cam and the blocker.

The operations of blocking the slide in hold-back position as well as locking and unlocking, as accomplished by manipulation of the outside key-operated mechanism **27** and its tailpiece **31**, may alternately be accomplished by manipulation of the inside key-operated mechanism **28** and its shaft **29**. In effect, the mechanism **28** substitutes for the mechanism **27**, and the shaft **29** substitutes for the tailpiece **31**.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A door lock for withdrawing a latch bolt, said lock comprising a relatively stationary frame having a bearing member on at least one side thereof, a tubular spindle rotatably mounted on the bearing member and having roll-back means thereon, a latch retractor slide member reciprocatably mounted in said frame for movement in transverse direction and means on the slide engageable with said roll-back means for operation thereby, a latch bolt member in engagement with said latch retractor slide member whereby said latch bolt member may be retracted when said latch retractor slide member is reciprocated by said roll-back means but whereby said latch bolt member may be moved by end pressure independently of said latch retractor slide member, and a blocker assembly for said slide comprising a first cam element within said tubular spindle, a second cam element in operating engagement with the first cam element, actuating means extending through the spindle from one of the cam elements to the exterior, and a blocker in operating engagement with one of the cam elements whereby said blocker is slidable in response to actuation of said cam elements between blocking and unblocking positions, said retractor slide having a shoulder means in alignment with the blocker when the retractor slide is in withdrawn position and engageable with said blocker when the blocker is advanced to blocking position whereby the retractor slide is withheld in said withdrawn position.

2. A door lock comprising a relatively stationary frame having a bearing member on at least one side thereof, a tubular spindle rotatably mounted on the bearing member and having roll-back means thereon, a latch retractor slide member reciprocatably mounted in said frame for movement in transverse direction and means on the slide engageable with said roll-back means for operation thereby, a latch bolt member in engagement with said latch retractor slide member whereby said latch bolt member may be retracted when said latch retractor slide member is reciprocated by said roll-back means but whereby said latch bolt member may be moved by end pressure independently of said latch retractor slide member, and a blocker assembly for said slide comprising a first cam element within said tubular spindle, a second cam element in operating engagement with the first cam element, actuating means extending through the spindle from one of said cam elements to the exterior, and a blocker in operating engagement with the other of said cam elements whereby said blocker is slidable in response to actuation of said cam elements between blocking and unblocking positions, said retractor slide having a shoulder means in alignment with the blocker when the retractor slide is in withdrawn position and engageable with said blocker when the blocker is advanced to blocking position whereby the retractor slide is withheld in said withdrawn position.

3. A door lock comprising a relatively stationary frame having a bearing member on each side thereof, a tubular spindle rotatably mounted on each of said bearing members and each said spindle having roll-back means thereon, a latch retractor slide member reciprocatably mounted in said frame for movement in transverse direction and means on the slide engageable with said roll-back means for operation thereby, and a blocker assembly for said slide comprising a first cam element within one of said tubular spindles, a second cam element in operating engagement with the first cam element, actuating means extending through the spindles from one of the cam elements to the exterior on both sides of the lock, and a single blocker in operating engagement with the other of said cam elements whereby said blocker is slidable in response to actuation of said cam elements between blocking and unblocking positions, said retractor slide having a shoulder means in alignment with the blocker when the retractor slide is in withdrawn position and engageable with said blocker when the blocker is advanced to blocking position whereby the retractor slide is withheld in said withdrawn position.

4. A door lock comprising a relatively stationary frame having a bearing member on at least one side thereof, a tubular spindle rotatably mounted on the bearing member and having roll-back means thereon, a latch retractor slide member reciprocatably mounted in said frame for movement in transverse direction and means on the slide engageable with said roll-back means for operation thereby, and a blocker assembly for said slide comprising a cam member mounted in said spindle and having an obliquely extending camway thereon, a second cam member within said spindle having a cam element extending into camming engagement with said camway, one of said cam members being movable axially, actuating means extending through the spindle from the other of said cam members to the exterior, and a single blocker in operating engagement with the cam member which is movable axially whereby said blocker is slidable in response to actuation of said cam elements between blocking and unblocking positions, said retractor slide having a shoulder means in alignment with the blocker when the retractor slide is in withdrawn position and engageable when the blocker is advanced to blocking position whereby the retractor slide is withheld in said withdrawn position.

5. A door lock comprising a relatively stationary frame having a bearing member on at least one side thereof, a tubular spindle rotatably mounted on the bearing member and having roll-back means thereon, a latch retractor slide member reciprocatably mounted in said frame for movement in transverse direction and means on the slide engageable with said roll-back means for operation thereby, and a blocker assembly for said slide comprising a cam sleeve rotatably mounted in said spindle and having an obliquely extending camway thereon, a blocker having a slide-engaging portion thereof at a location spaced radially outwardly relative to said sleeve,

said blocker having an axially movable and non-rotatable mounting in said sleeve, and a pin on said blocker extending into engagement with said camway, rotatable actuating means extending through the spindle from said sleeve to the exterior, said blocker being slidable in response to actuation of said sleeve between blocking and unblocking positions, said retractor slide having a shoulder means in alignment with the blocker when the retractor slide is in withdrawn position and engageable with said blocker when the blocker is advanced to blocking position whereby the retractor slide is withheld in said withdrawn position.



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