March 6, 1945. M. FALK 2,370,645

DOOR LOCK

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Fig. 1.

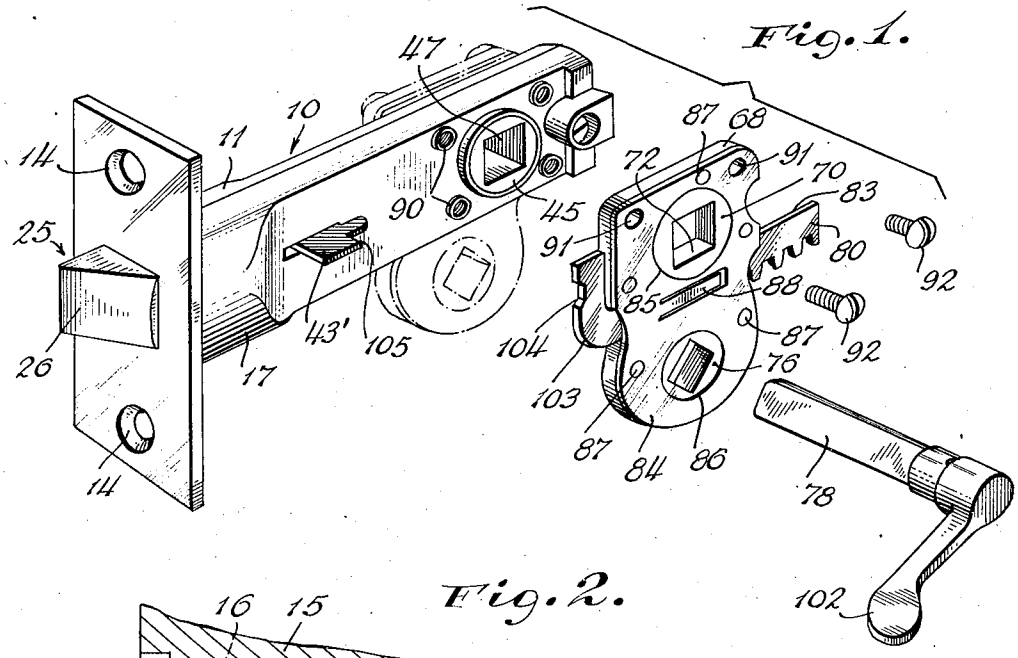
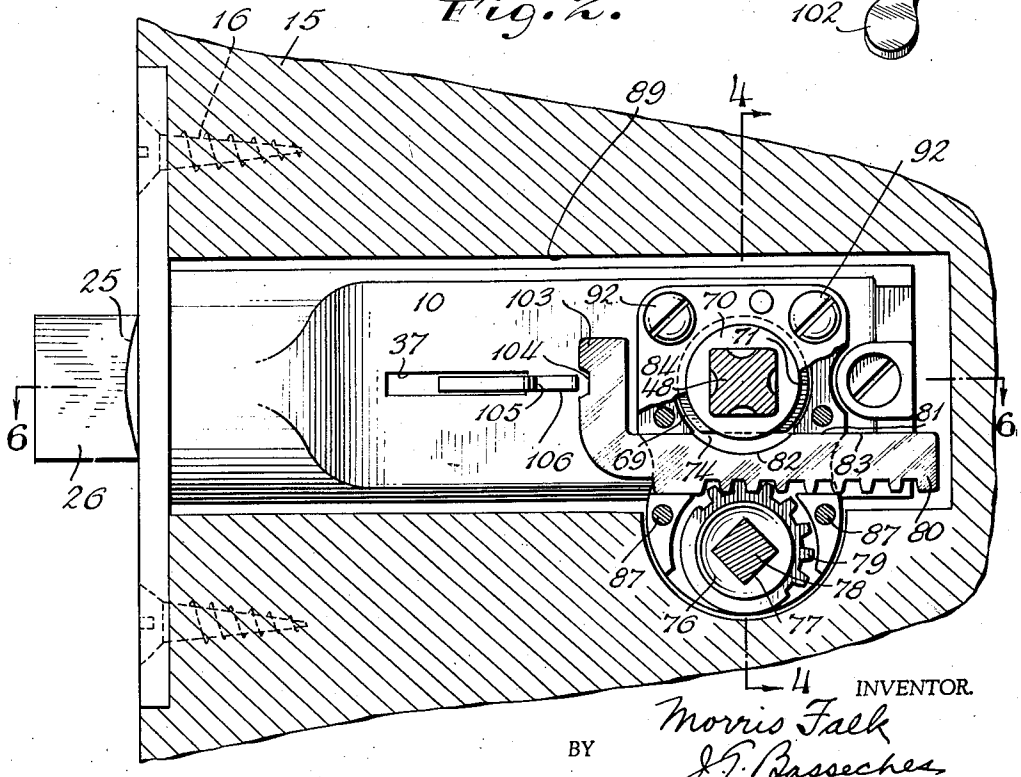


Fig. 2.



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Fig. 3.

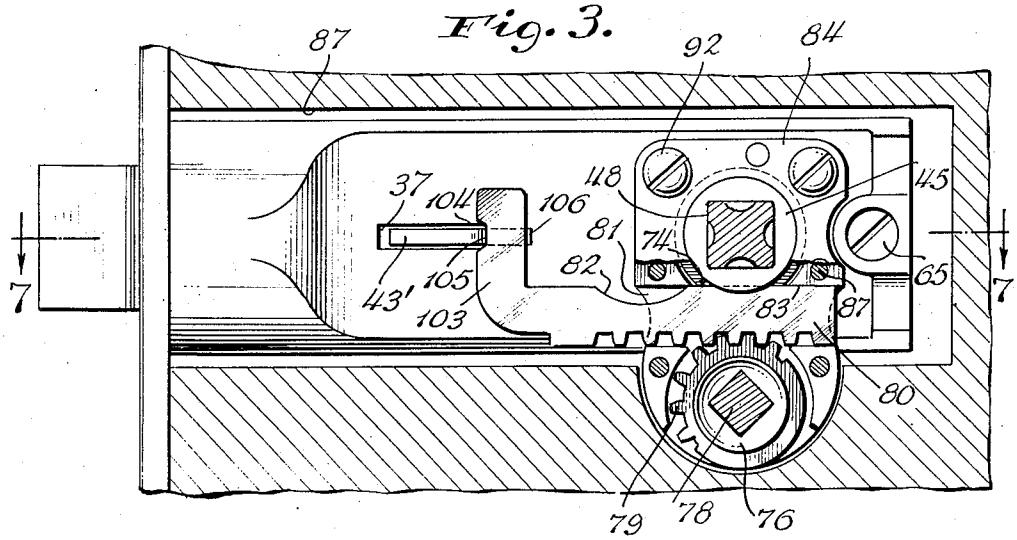
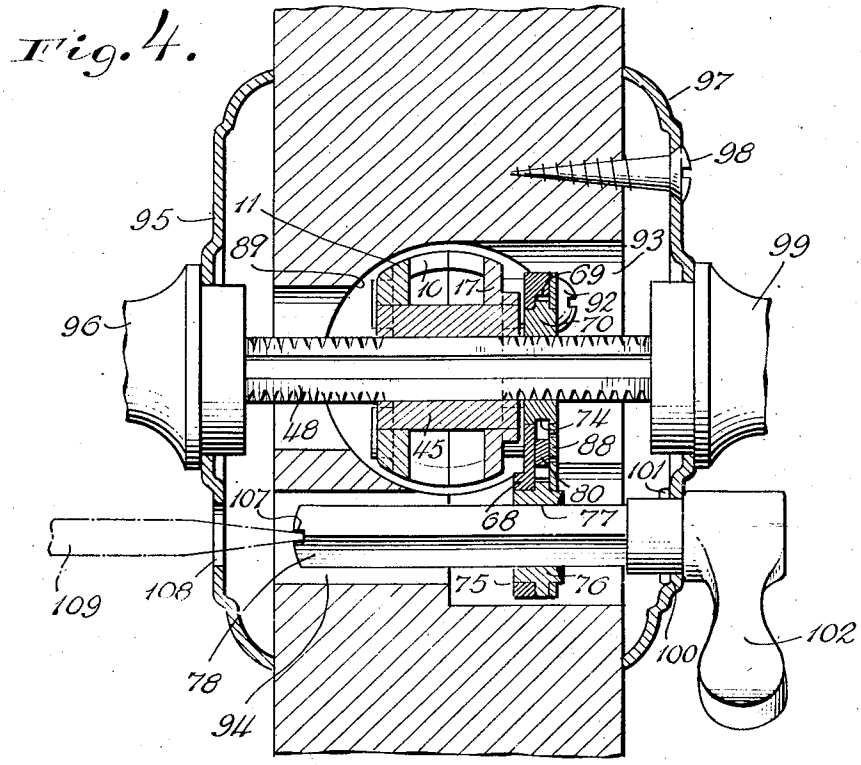


Fig. 4.



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DOOR LOCK

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Fig. 5.

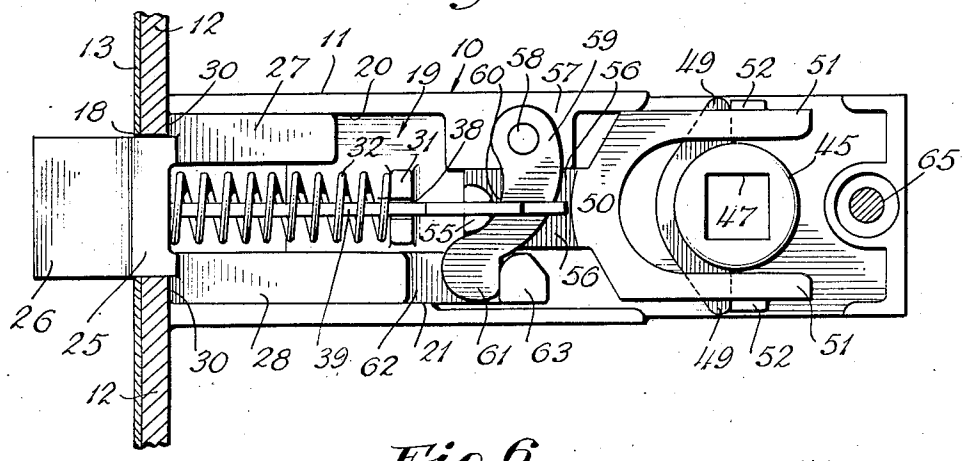


Fig. 6.

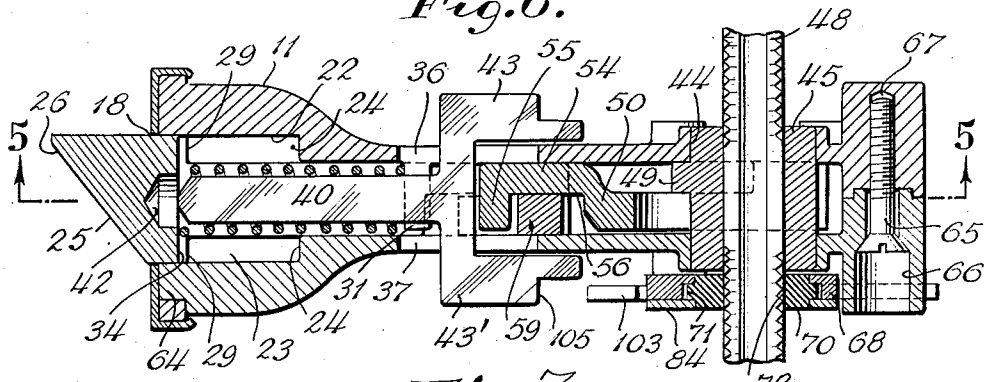


Fig. 7.

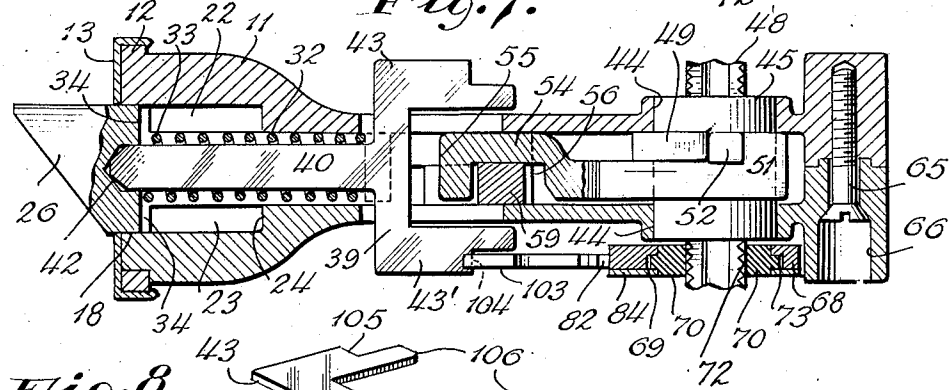
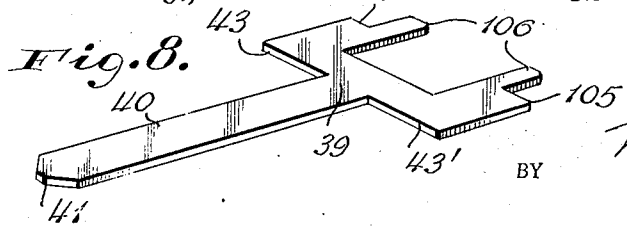


Fig. 8.



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Patented Mar. 6, 1945 2,370,645

UNITED STATES PATENT OFFICE

2,370,645

DOOR LOCK

Morris Falk, Leominster, Mass., assignor to Independent Lock Company, Fitchburg, Mass., a corporation of Massachusetts

Application March 5, 1941, Serial No. 381,893

6 Claims. (Cl. 292—359)

My present invention relates generally to door locks, and has particular reference to that type of device generally referred to as bathroom locks. Still more particularly, my invention relates to door locks of tubular construction wherein a latch bolt is mounted for reciprocation, including a novel assembly of latch reciprocating parts to provide a compact construction.

Still more particularly, my invention relates to a door knob spindle operated latch, and locking mechanism therefor, still further particularized by including resetting mechanism for the locking construction.

In certain phases of my invention, this application is a continuation in part of my application for Auxiliary latch, Serial No. 335,704, filed May 17, 1940, now Patent No. 2,293,645, granted August 18, 1942 and in other phases, relating to locking mechanism for the latch operating spindle, my invention is an improvement of my application for Knob spindle lock, Serial No. 229,050, filed September 9, 1938, now Patent No. 2,234,912, granted March 11, 1941.

For the purpose of explaining the general nature of my invention, it may be pointed out that the present device is primarily intended for use on a door of a bathroom or the like, in which a latch bolt is retracted by a rotary spindle grasped by a door knob, which latch bolt is normally spring projected into an orifice of a strike plate mounted upon the frame of the door, to hold the door in locked position.

My invention has as its objective, an association of parts which allows the entire mechanism to be contained within a substantially tubular housing, the latch bolt being mounted for axial reciprocation into and out of the end of the housing. As a result, the installation of the present lock is greatly facilitated since it may be inserted endwise into a substantially cylindrical hole drilled into the edge of the door, and requiring simple transverse drillings to locate the lock in position.

Still more particularly, my invention has as an object thereof the provision of a lock of compact assembly, preferably in the form of a tubular housing in which a latch bolt extends adjacent one end thereof and includes retractor means operated by rotation of the door knob spindle, and wherein, within such housing, mechanism is provided for the retraction of the latch bolt whereby a rotary movement of the latch operating spindle transmits motion of magnified reciprocal character to the latch bolt.

A still further object of my invention resides in providing in a latch, preferably one wherein a spring projected latch bolt is retracted by a latch operating spindle, of locking mechanism for said latch operating spindle wherein a simple rotary movement may throw the lock mechanism into locking engagement with the latch operating spindle, and further characterized by the feature that the locking means for the latch operating spindle is of compact construction for assembly with a tubular housing of the latch, requiring only simple drilling operations in the door to locate the same, and still further characterized by providing the locking means for the latch operating spindle which may be located in a variety of positions, whether or not the door operates inwardly, outwardly, or swings either to the right or to the left.

My invention still further has as an object thereof the provision, in latch bolts of the character described, of locking mechanism therefor, more particularly characterized by effecting the locking action in relation to the latch operating spindle, and further characterized by including resetting mechanism for the locking means, whereby accidental positioning of the locking mechanism in locking engagement with the latch operating spindle will be overcome, in that my invention provides that upon inward projection of the latch bolt, with the locking means for the latch operating spindle in the locked position, when the latch bolt strikes the strike plate of the door frame, the locking mechanism will be reset, to permit operation of the latch operating spindle.

Among the important features of my invention are the special configurations and relative arrangements of the various parts of the device, including those heretofore mentioned, whereby the desire simplicity and compactness of assembly are achieved.

To attain these objects and advantages, and such further objects and advantages as may be pointed out hereafter or become apparent as this description proceeds, I make reference to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a perspective exploded view of my assembly, with portions thereof shown in dotted lines to show alternative positions of the locking means for the latch operating spindle;

Figure 2 is a fragmentary side view of my device, with the locking mechanism for the latch operating spindle positioned to permit rotation of the latch operating spindle;

Figure 3 is a side view similar to Figure 2, with

the locking mechanism for the latch operating spindle positioned to hold the latch operating spindle in locked position;

Figure 4 is a transverse, fragmentary sectional view taken on the line 4—4 of Figure 2, with the rose plates and lock operating spindle shown in position;

Figure 5 is a fragmentary, longitudinal sectional view taken on the line 5—5 of Figure 6;

Figure 6 is a transverse fragmentary sectional view taken on the line 6—6 of Figure 2, with the locking means in position to permit rotation of the latch operating spindle;

Figure 7 is a view similar to Figure 6, taken on the line 7—7 of Figure 3;

Figure 8 is a perspective view of the lock resetting link.

Making reference to the drawings, there is shown a housing 10, preferably of substantially tubular cross-section, comprising a rear section 11, die cast integrally with the plate 12. The plate may be surface-veneered with brass sheathing 13, and through this sheathing and plate orifices 14 are provided for affixation to the door 15 by the screws 16, when the plate is countersunk in the door frame, as will be readily understood.

The section 11 is provided with the cover section 17, of complementary design. The rear section 11 and cover section 17 terminate into an orifice 18, formed in the plate 12.

The rear section 11 is countersunk at 19, to provide an upper guide wall 20 and a lower guide wall 21. This recessed portion is deepened at 22 and 23, to provide a recess corresponding to the orifice 18 adjacent the forward end of the housing, thereby forming a shoulder portion 24, spaced from the orifice 18.

Within the recesses thus described, I provide a latch bolt 25, having a camming nose 26. The latch bolt 25 is adapted slidably to enter the orifice 18.

Rearwardly of the latch bolt 25, there are provided guide fingers 27 and 28, substantially axially positioned transversely in relation to the latch bolt, thereby forming the shoulders 29 to each side of the fingers. The fingers 27 and 28 are disposed to either side of the latch bolt 25, thereby forming stops 30.

It will be observed that with this construction, the latch bolt may be projected through the orifice 18 to the limits permitted by the projections provided by the stops 30.

Disposed from the section 11, there is provided a stud 31, serving as the abutment for a latch projecting spring 32, which presses at its opposite end 33 against the rear face 34 of the bolt 25, between the fingers 27 and 28. The rear section 11 and the cover section 17 of the housing are formed with oppositely disposed slots 36 and 37, thereby also forming the stud 31 into a pair of upstanding fingers defining a guide slot 38 therebetween.

With the slots 36, 37 and 38 thus provided, I position a slider 39. This slider is formed with a finger 40, which is directed through the slot 38 and enters the orifice through the spring 32, serving as a spring mount.

The end 41 of the finger is forwardly disposed to enter the centering orifice 42 formed in the latch bolt 25. The slider 39 is formed with winged sections 43 and 43', adapted to pass, respectively, through the slots 36 and 37.

Other functions of the slider 39 will appear hereinafter as this description proceeds.

Rearwardly of the housing, the rear section 11 and the cover section 17 are orificed to form a bearing 44, within which is disposed the collar 45, the ends 46 of which rotate within the bearing portions 44. This collar is formed with a keying orifice 47, adapted to receive the spindle 48. Disposed to the exterior of the collar 45, and preferably integral therewith, I provide roll back cams 49. These cams are positioned in close adjacency to the rear section 11. With the collar 45 and the roll back cams thus positioned, I provide a reciprocal link 50, having spaced arms 51, riding slidably against the roll back cams 49. These arms 51 are each provided with downwardly disposed shoulders 52, arranged to be engaged by the roll back cams 49.

The link 50 is formed with an offset 54 at its forward end, which terminates in a lug 55, the face of which is arcuately curved, thereby providing a recess 56, normally lying adjacent a seat 57, which seat has an upstanding pivot pin 58 upon which is rotatably positioned a lever 59, lying transversely across the housing. This lever is formed with a concave bearing surface 60, engaged by the lug 55. The end 61 of the lever 59 is seated within a recess 62 formed in one face of the finger 28, the end 63 whereof is engaged by the end 61 of the lever 59.

The construction thus far described is finally assembled by superimposing the cover member 17 over the rear section 11, by having the front end formed with a tongue 64, which enters an orifice in the plate 12. The opposite end of the cover member 17 is affixed to the rear section 11 by the passage of a fastening element, such as a screw 65, through the orifice 66, engaging a complementary orifice 67 formed in the rear section 11.

The construction thus far described, where formed into a tubular latch, has novel features in that rotation of the spindle 48 through the medium of the collar 45, which in turn swings the roll back cams 49 either clockwise or counterclockwise, serves to reciprocate the link 50 by engagement of the roll back cams 49 with the shoulders 52. The reciprocal movement is transmitted through the lug 55 to the lever 59 which, in pivoting about the pin 58, transmits reciprocal movement to the latch bolt 25, where it engages the end 63. The reciprocal movement imparted to the link 50 is thereby multiplied so that a small rotary movement of the collar 45 magnifies the reciprocal movement of the latch bolt 25. In the illustration given, a two-fold magnification of the movement is secured.

The construction as thus far described is particularly novel in that in a tubular casing provided by me, the parts are nested together compactly, while securing the requisite withdrawal of the latch bolt. It will also be observed that while rotary movement of the collar 45 will serve to withdraw the latch bolt 25 the latch bolt may be disposed against the pressure of the spring 32, without the transmission of any movement to the collar by reason of the reciprocal movement which is transmitted in respect of the link 50. However, the inter-engagement of the end 63 of the finger 28 with the end 61 of the lever 59 serves to draw the lever into proper position in respect of the roll back cams 49 when the spring 32 projects the latch bolt outwardly, as where it may enter the strike plate orifice of the door frame (not shown).

The latch thus far described may be operated by a door knob spindle and has novel compact

features, without further alteration. However, I find it desirable, where this latch is to be used for bath room doors, to include a locking device. While the locking device of my application Serial No. 229,050, is readily adaptable for this purpose, I will now describe my improved knob spindle locking device.

For this purpose I provide a plate 68, having an orifice 69 in which a substantially circular member 70 is mounted, having a bearing shoulder 71 engaging the orifice 69. This substantially circular member 70 is formed with a keying orifice 72, adapted to be mounted in keying engagement with the latch operating spindle 48. This circular member 70 has a peripheral flange 73 which is recessed at 74 for purposes which will appear hereinafter.

Adjacent the bottom of the plate 68, there is provided an orifice 75 within which is mounted a rack pinion 76, for rotary movement. The rack pinion 76 is provided with a keying orifice 77, arranged to receive the lock operating spindle. The teeth 79 of the rack pinion engage a rack bar 80 mounted for transverse reciprocation in a slot 81 formed in the plate 68. The rack bar 80 is formed with a recess 82, leaving the major portion or upper surface 83 unrecessed.

To complete the assembly of the locking means thus far described, I provide a cover plate 84, orificed at 85 and 86, serving as exterior bearing portions for the substantially circular member 70 and the rack pinion 76. The cover member may be held in position by rivets 87, thereby holding the circular member 70 and the rack pinion 76 in position, as well as to provide a guide for the rack bar 80.

Friction may be imparted to the rack bar 80, and to compensate for a difference in thickness of the rack bar 80, a resilient tongue 88 is struck from the cover plate 84, which presses down along the side walls of the rack bar 80.

The locking means for the latch operating spindle thus described embodies some of the features of my invention for Knob spindle locks, Serial No. 229,050, as will appear more clearly hereinafter, and while the plate 68 may be for a separate assembly on the exterior face of the door, such as beneath the escutcheon plate through which the latch operating spindle is disposed, I prefer in this assembly, after the tubular housing 10 is positioned within the door orifice 89, to position the locking means for the latch operating spindle to one side of said lock, and for this purpose I provide the casing rear section 11 and cover section 17 with screw threaded orifices 90. Orifices 91 are formed through the plate 68 and cover 84 in complementary position with the upper or lower pairs of orifices 90. Screws 92 may there be used to affix the locking assembly to the casing 10. For this purpose, the rear section 11 and cover portion 17 are tapered, thereby to receive the plate 68 in abutting position. Attachment is made to align the keying orifice 47 of the collar 45 and the keying orifice 72 so that the latch operating spindle 48 may pass through the orifices 47 and 72.

Mortising of the door with an opening 93 will serve to receive the locking means to one side of the housing 10, as more clearly shown in Figure 4. The opening 93 terminates into a transverse boring 94, into which the lock operating spindle 78 may extend.

The assembly as shown in Figure 1 is intended for a door which opens outwardly about hinges to the right of the door. Should it be found desirable to invert the position, as where the door may swing inwardly, and to invert the latch bolt 25, the locking means may be positioned as shown in dotted line in Figure 1, the orifices 90 being positioned to receive the locking assembly in a variety of positions upon a choice of any pair of the orifices 90.

With the assembly thus far described, it will be observed that locking means have been provided for a door lock and for the latch operating spindle thereof wherein, upon positioning of the tubular casing in the door orifice 89, with the locking assembly thereafter affixed in position, the outer escutcheon plate 95 is placed in position. Thereafter, the outer knob 96 and the latch operating spindle 48 are placed in position by passing the spindle 48 through the orifice 47 and thence through the orifice 72. The inner escutcheon plate 97 is then affixed by the screws 98 and the inner knob 99 is then mounted upon the interior end of the latch operating spindle 48, in a manner readily understood. The inner escutcheon plate 97 is provided with a bearing orifice 100, mounting the locking operating spindle 78, and is held in this position by the cross pin 101, a cross handle 102 being disposed in convenient position beneath the knob 99.

With the assembly thus far described, it will be understood that the latch operating spindle may be rotated in a clockwise and counterclockwise direction, to retract the latch bolt 25, as already described.

In the normal position of the latch operating spindle 48, as shown in Figure 2, the peripheral recess 74 of the circular member 70 is adapted to be interfitted by the unrecessed edge portion or upper edge 83 of the rack bar 80, which serves as the locking element.

In the position shown in Figure 2, the rack bar 80, which constitutes the locking element, has the recess 82 so that the unrecessed portion of the peripheral flange 73 may pass by the recessed portion 82 of the rack bar or locking element 80. However, by aligning the edge 83 with its unrecessed portion interfitting with the recessed portion 74 of the circular member 70, the latch operating spindle 48 will be held in locked position due to the flat interengagement of the surfaces which are now in contact with each other, as will be more clearly evident from an inspection of Figure 3. This position is achieved when the rack pinion 76 is rotated in a counter-clockwise direction from the position shown in Figure 2, to the position shown in Figure 3. Conversely, rotation of the rack pinion 76 in a clockwise direction from the position shown in Figure 3 to that shown in Figure 2 will position the recessed portion 82 of the locking element or rack bar 80 to interfit with the unrecessed periphery of the substantially circular member 70, thereby permitting the latch operating spindle to be rotated in a clockwise or counter-clockwise direction for retracting the latch bolt.

It will thereby be observed that while some of the novel features of my prior application Serial No. 229,050 are utilized, such locking action is achieved by a reciprocating movement of the locking element which, in the present invention, is in the form of the rack bar 80.

I avail myself of this reciprocating movement of the locking element in the form of the rack bar 80 to accomplish additional novel features.

It is found that accidentally the locking means may be set into position locking the latch oper-

ating spindle. Should this occur with the door ajar, it will be evident that upon closing the door, the latch bolt 25, upon striking the strike plate of the door casing, will thereby engage the strike plate orifice and lock the door. Should the room be unoccupied or enclose a child unacquainted with the operation of the device, unusual means may be necessary to gain access to the locking mechanism. To avoid this accidental locking of the latch operating spindle, I provide the rack bar 80 with an extension branch 103, disposed upwardly and transversely to the slots 36 and 37. This extension branch is also provided with a notch 104, which is aligned with the winged sections 43 and 43'. These latter members are formed with shoulders 105, inwardly disposed from the fingers 106.

It will be observed that where a condition of the locking mechanism is obtained to lock the latch operating spindle, as shown in Figures 3 and 7, the rack bar 80 is projected so that the extension branch 103 is such as to interengage the notch 104 with the shoulder 105 of the slider 39. Should this condition exist with the door ajar, upon closing the door the latch bolt will be projected inwardly as it strikes the strike plate of the door casing, thereby projecting the slider 39 to the position shown in dotted lines in Figure 6.

This action will serve to move the rack bar 80 to the position shown in Figures 2 and 6, thereby aligning the recessed portion 82 to the unlocking position, releasing the locking mechanism and permitting rotation of the latch operating spindle 48 or, in other words, resetting the locking means to a position where the latch operating spindle may be rotated in a clockwise or counter-clockwise position.

While the primary utility of my device is in connection with bathroom doors, it will be understood that other applications of this device will occur to those skilled in the art. Thus, also, while the lock resetting mechanism has been described as avoiding the hazard or inconvenience of locking the latch operating spindle, my locking mechanism being controlled by a rotary movement of the lock operating spindle 78, this spindle may be utilized for operating the locking mechanism from the exterior side of the door.

For this purpose, the lock operating spindle 78 may be provided with a keying slot 107, accessible through an orifice 108 formed in the outer escutcheon plate 95 so that such instrumentality as a key or screw driver 109 may be used to unlock the locking mechanism, should some occupant of the room have placed the locking mechanism into locking position.

It will further be understood that while the primary application of my device is intended for bath room locks, I may mount upon the outer escutcheon plate 95, some key operated mechanism adjacent the orifice 108, whereby the lock operating spindle 78 may be operated for locking or unlocking the locking means for the latch operating spindle by some other key controlled mechanism.

It will also be observed that while my mechanism may include all of the features, that is, the compact multiple retraction mechanism for the latch bolt, the locking means for the latch operating spindle and the resetting device for the locking means, my invention is not intended to be limited to the assembly of all of these features in one mechanism, but that these features have utility separate and apart from each other, as encompassed by the appended claims.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is—

1. Locking means for a door lock having a latch bolt and a latch operating spindle, said lock including an assembly whereby rotation of said spindle will retract the latch bolt, the combination comprising a plate assembly positionable to one side of said lock and through which said latch operating spindle may extend, said plate assembly including a lock operating spindle, complementary locking means comprising a substantially circular member and a locking element operatively carried, respectively, by said spindles for effecting locking of said latch operating spindle by rotary movement of said lock operating spindle, said member including an orifice therethrough and through which said latch operating spindle may extend in keying engagement, and being formed and mounted on said plate to permit rotation for retraction of the latch bolt, said member including a peripheral recess adapted to be interfitted by an unrecessed portion of said locking element operated by said lock operating spindle, said locking element comprising a slidable section including a recess, so that the unrecessed portion of the member may pass by the recessed portion of said element to permit rotation of said latch operating spindle, and upon alignment of said element slidably, with its unrecessed portion interfitting with the recessed portion of said member, said latch operating spindle will be held in locked position.

2. Locking means for a door lock having a latch bolt and a latch operating spindle, said lock including an assembly whereby rotation of said spindle will retract the latch bolt, the combination comprising a plate assembly positionable to one side of said lock and through which said latch operating spindle may extend, said plate assembly including a lock operating spindle, complementary locking means comprising a substantially circular member and a locking element operatively carried, respectively, by said spindles for effecting locking of said latch operating spindle by rotary movement of said lock operating spindle, said member including an orifice therethrough and through which said latch operating spindle may extend in keying engagement, and being formed and mounted on said plate to permit rotation for retraction of the latch bolt, said member including a peripheral recess adapted to be interfitted by an unrecessed portion of said locking element operated by said lock operating spindle, said locking element comprising a slidable section including a recess, so that the unrecessed portion of the member may pass by the recessed portion of said element to permit rotation of said latch operating spindle, and upon alignment of said element slidably, with its unrecessed portion interfitting with the recessed portion of said member, said latch operating spindle will be held in locked position, said locking element comprising a rack bar interconnected by a pinion gear to said lock operating spindle for imparting slidable movement to said element.

3. Locking means for a door lock having a latch bolt and a latch operating spindle, said lock including an assembly whereby rotation of said spindle will retract the latch bolt, the combination comprising a plate assembly positionable to one side of said lock and through which said latch operating spindle may extend, said plate as-

sembly including a lock operating spindle, complementary locking means comprising a substantially circular member and a locking element operatively carried, respectively, by said spindles for effecting locking of said latch operating spindle by rotary movement of said lock operating spindle, said member including an orifice therethrough and through which said latch operating spindle may extend in keying engagement, and being formed and mounted on said plate to permit rotation for retraction of the latch bolt, said member including a peripheral recess adapted to be interfitted by an unrecessed portion of said locking element operated by said lock operating spindle, said locking element comprising a slidable section including a recess, so that the unrecessed portion of the member may pass by the recessed portion of said element to permit rotation of said latch operating spindle, and upon alignment of said element slidably, with its unrecessed portion interfitting with the recessed portion of said member, said latch operating spindle will be held in locked position, said locking element comprising a rack bar interconnected by a pinion gear to said lock operating spindle for imparting slidable movement to said element, said rack bar including an extension branched therefrom lying in the path of movement of a portion movable by the latch bolt.

4. In a lock having a substantially tubular housing and a reciprocable latch-bolt therein which is independently depressible to a retracted position, and in which the latch-bolt is controlled by a door-handle spindle operating a retractor and a slidable link connected by a lever to the latch bolt to secure a retraction of said bolt for a multiple distance of the movement of the link, and including locking means for said spindle, movable by a rotatable spindle, the combination therewith of means forming a connection between said latch-bolt and said second spindle transmitting the reciprocable movement of said latch-bolt upon being independently depressed to cause rotary movement of said second spindle and to set said locking means in a position permitting manual rotation of said first spindle.

5. In a lock having a substantially tubular housing and a reciprocable latch-bolt therein which is independently depressible to a retracted position, and in which the latch-bolt is controlled by a door-handle spindle operating a retractor, and including locking means for said spindle, movable by a rotatable spindle, the combination therewith of means forming a connection between said latch-bolt and said second spindle transmitting the reciprocable movement of said latch-bolt upon being independently depressed to cause rotary movement of said second spindle and to set said locking means in a position permitting manual rotation of said first spindle comprising a pinion member connected with said locking means, driven by a toothed member connected with the latch-bolt.

6. Locking means for a door lock having a latch-bolt and a latch operating spindle, said lock including an assembly whereby rotation of said spindle will retract the latch-bolt, the combination comprising a plate assembly positionable to one side of said lock and through which said latch operating spindle may extend, said plate assembly including locking means comprising a substantially circular member having a keying orifice through which said spindle may extend and a pinion connected with and driving a locking element, said pinion having a keying orifice through which an operating spindle therefor may extend, said member including a peripheral edge portion adapted to be interfitted by a portion of the locking element to hold said member against rotation.

MORRIS FALK.