July 6, 1948. J. B. FREYSINGER 2,444,819

DOOR LOCK

Filed Jan. 27, 1945

2 Sheets-Sheet 1

Fig. 1.

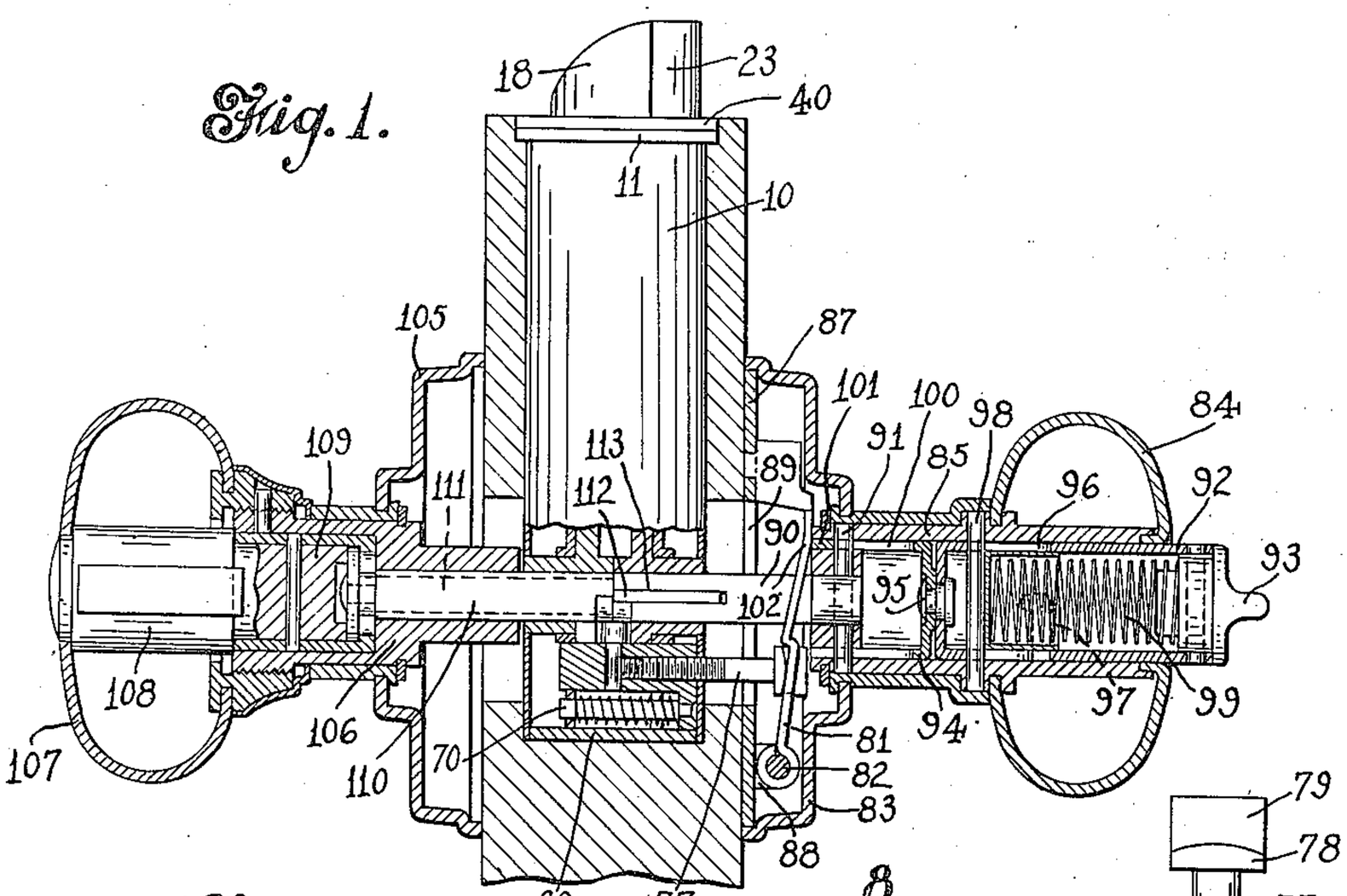

Fig. 2.

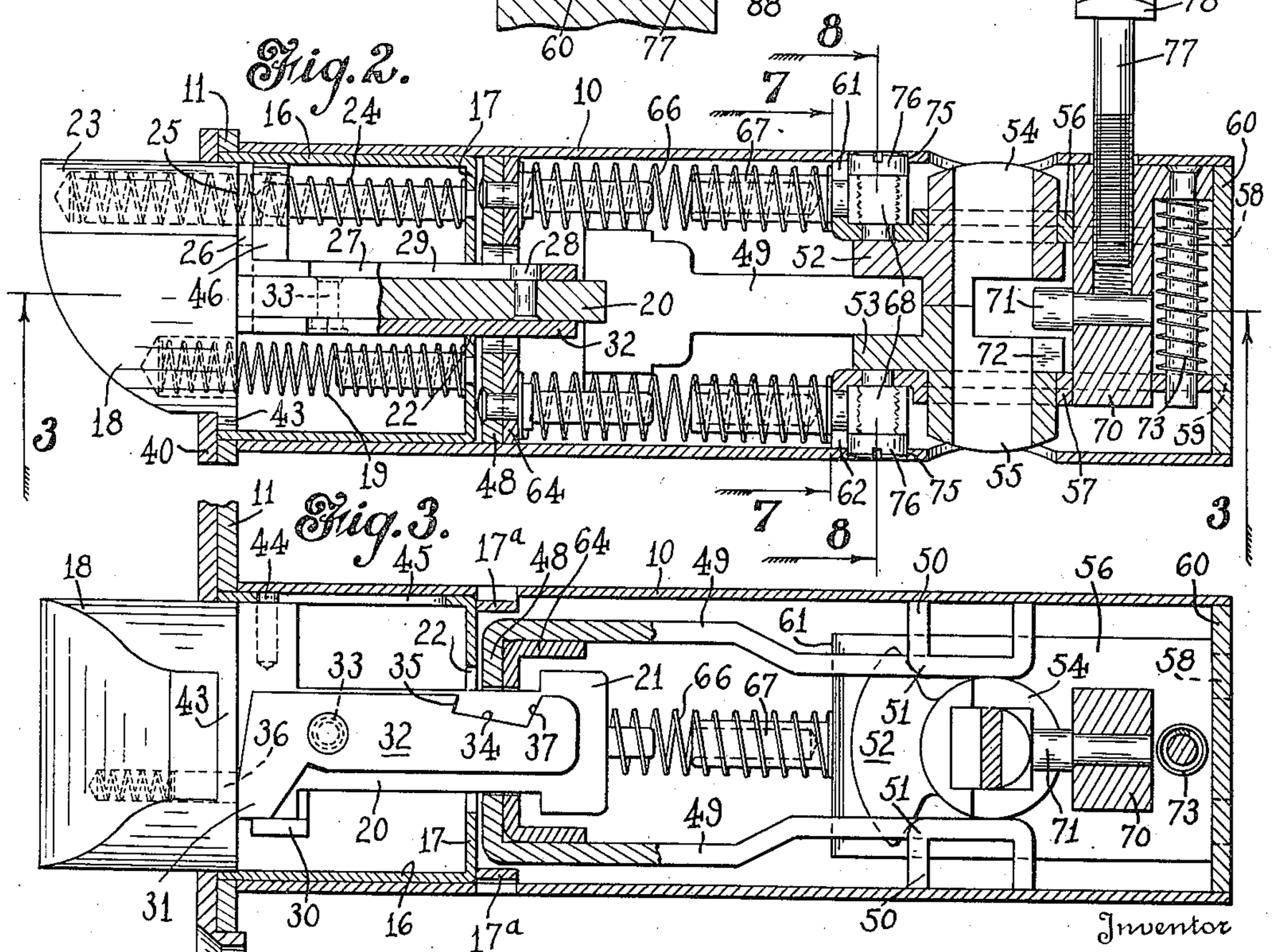

Fig. 3.

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Fig. 4.

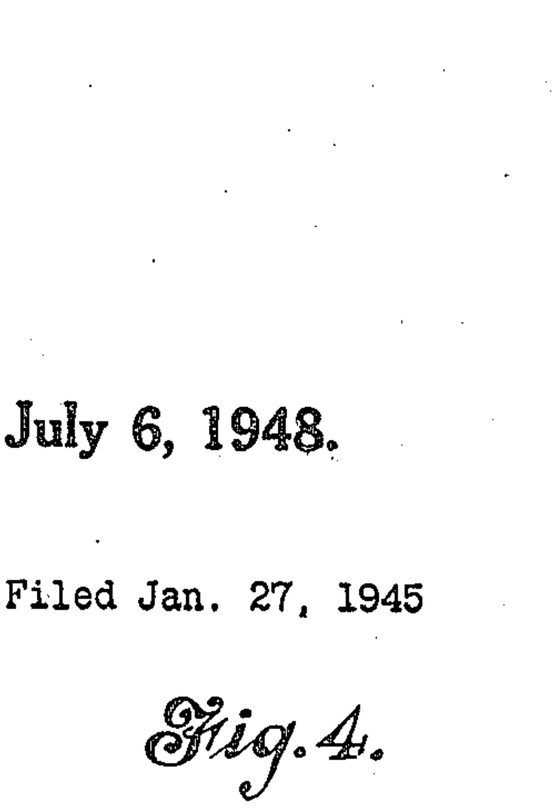


Fig. 5.

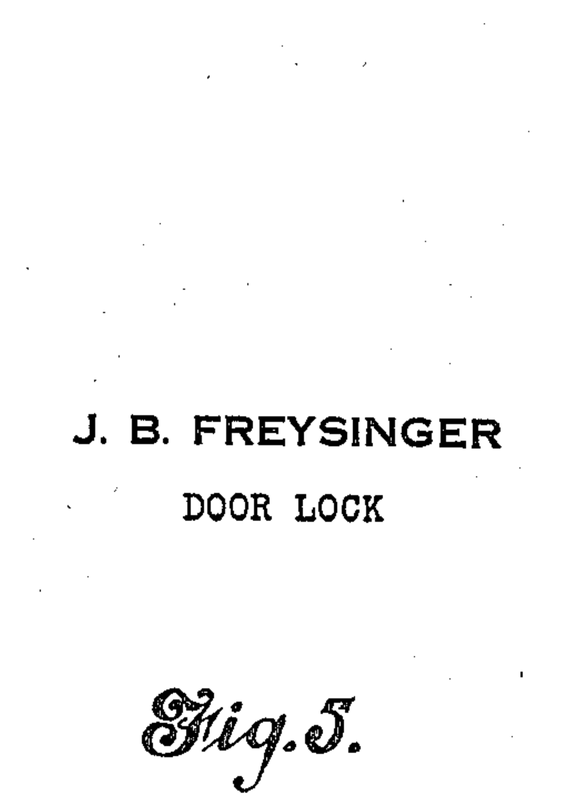


Fig. 7.

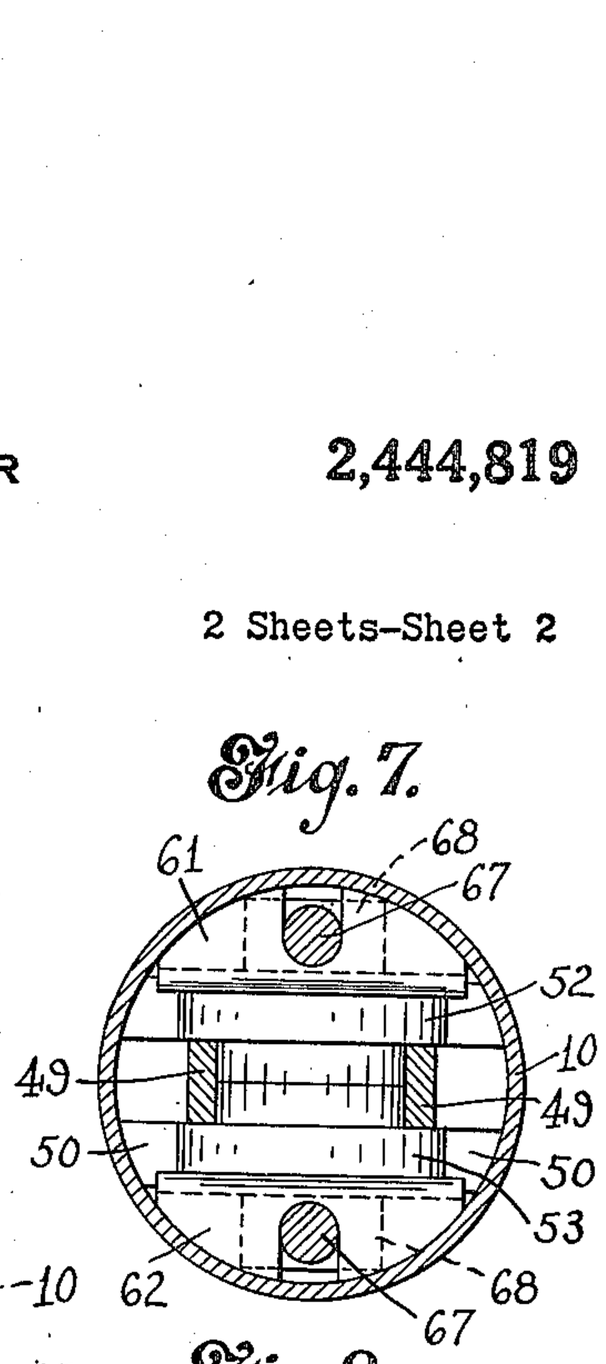


Fig. 8.

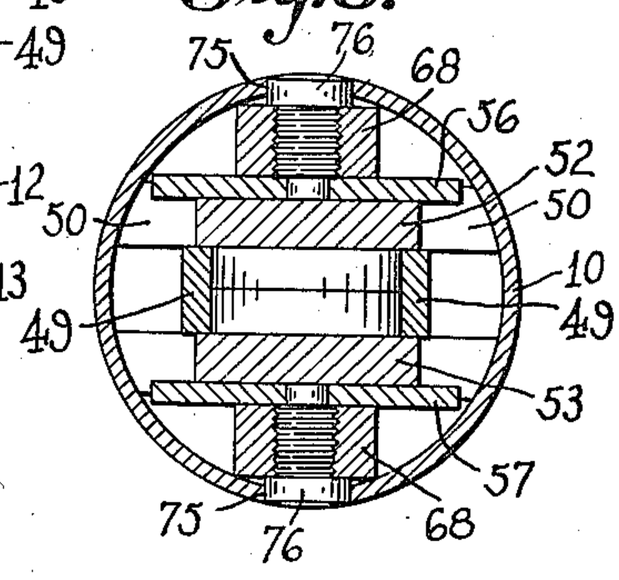


Fig. 6.

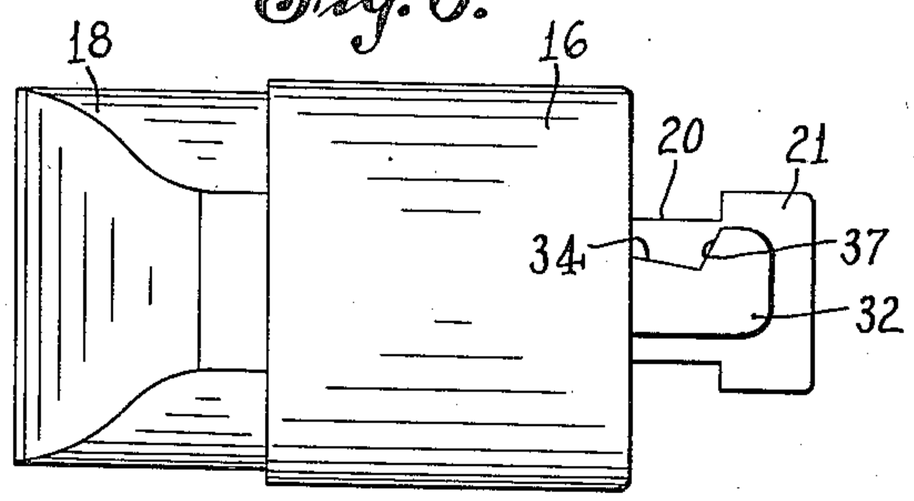


Fig. 9.

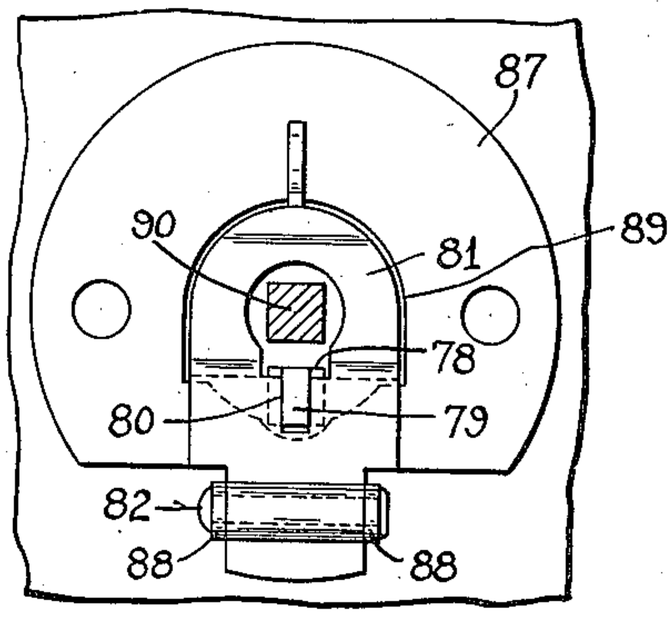
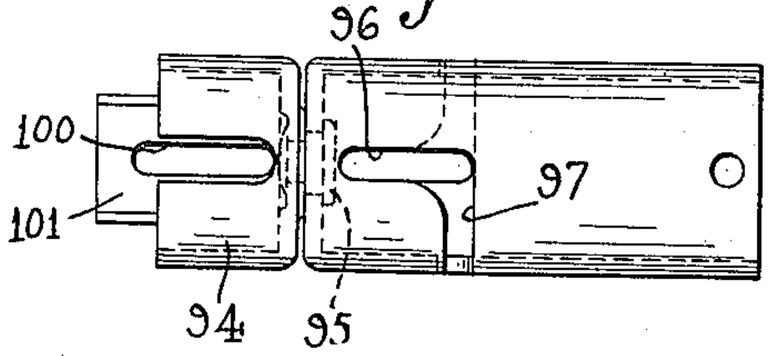


Fig. 10.



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UNITED STATES PATENT OFFICE

2,444,819

DOOR LOCK

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Application January 27, 1945, Serial No. 574,920

12 Claims. (Cl. 292—169)

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This invention relates to door locks, and more particularly to a tubular lock, or one having a case of substantially cylindrical form, which may be inserted in a bore made through the edge of a door. As illustrated, the features of the invention are shown in connection with a lock designed to be used on the front door of a building or dwelling, although it will be understood that the principles of the invention may be applied to locks for other uses, and also may be employed in locks other than tubular locks. In the manufacture of locks, it is desirable to construct the lock so that it may be used with a door of either hand, regardless of which edge of the door may be the hinged edge. This has sometimes been done in the past by constructing the latch bolt of the lock so that it may be reversed in position about its longitudinal axis. However, this requires that the lock be removed from the door, and the cover of the case also removed in order that the latch may be released for reversal. Also this is sometimes impossible with the ordinary lock, particularly when a guard bolt is employed, for in such case the opening in the strike plate is not symmetrical and this opening will not accommodate the latch bolt and guard bolt except in one position.

In the present invention it is contemplated to provide a lock the bolt of which may be reversed without removing the lock from the door, but merely by the removal of a face plate in which the bolt opening is formed. Therefore, a guard bolt may be employed with the present construction, and the opening in the face plate may be made to fit the guard bolt and latch bolt. To reverse the bolt it is only necessary to release the face plate and reverse both the plate and the bolt mechanism.

Another feature of the present invention is that the lock case may be made of unitary tubular construction, in that it does not need to be made in two separable halves for the insertion and removal of the operating mechanism. This mechanism may be inserted into the lock case from the ends thereof in assembled relation, and thereafter secured in place, so that, while the lock is extremely convenient and efficient, it is economical to manufacture. As the case is of tubular construction, it can readily be made of wrought or sheet material instead of being made by casting, as has usually been the practice in the past.

One object of the present invention is to provide a door lock having a projecting latch bolt which may be reversed about its longitudinal axis without removing the lock from the door.

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A still further object of the invention is to provide a lock of tubular or cylindrical form, having a latch bolt slidably and rotatably received in the main case, whereby this bolt may be removed from the case or reversed in position in the case without detaching the latter from the door.

A still further object of the invention is to provide a door lock which may be economically manufactured and which, at the same time, comprises all of the features necessary in a lock for any common type of door.

A still further object of the invention is to provide a door lock of substantially tubular form, provided with a guard bolt to prevent the forcing of the latch bolt, the parts being so arranged that the guard bolt and latch bolt may be reversed in position about the longitudinal axis of the case, without removing the lock from the door.

A still further object of the invention is to provide a lock of the character described above, provided with a detachable face plate having an opening to snugly receive the lock bolt and guard bolt, the face plate being normally secured to the lock to hold the bolt in place, but being detachable therefrom to permit withdrawal of the bolt from the lock or reversal of the bolt and face plate about the longitudinal axis of the lock.

A still further object of the invention is to provide improved knob-dogging mechanism for a door lock.

A still further object of the invention is to provide a door lock having a laterally closed substantially cylindrical case, and operating mechanism for the lock, which may be assembled without the case and inserted through the ends thereof, and thereafter secured in position in the case.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a view of my improved lock mounted upon a door, certain parts being shown in section;

Fig. 2 is a longitudinal sectional view through the lock case;

Fig. 3 is a view substantially on line 3—3 of Fig. 2, certain parts being shown in elevation;

Fig. 4 is a front elevational view of the lock;

Fig. 5 is a front elevational view of the main lock case with the face plate and bolt case removed;

Fig. 6 is a front elevational view of the bolt case

with the bolt and associated mechanism therein;

Fig. 7 is a transverse sectional view on line 7—7 of Fig. 2;

Fig. 8 is a transverse sectional view on line 8—8 of Fig. 2;

Fig. 9 is a front elevational view of the actuating lever of the knob-dogging mechanism; and

Fig. 10 is a detail elevational view of the push-button mechanism mounted in the knob mechanism.

To illustrate a preferred embodiment of my invention, I have shown a door lock comprising a main case 10 of tubular shape. This case is closed except at its ends, and may be formed as a unitary seamless tube, if desired. A front plate 11 is secured to the tubular case 10 adjacent the front end of the latter so as to project outwardly therefrom, as shown in Fig. 5. This plate may be secured to the body of the case by means of ears 12 formed on the latter, these ears being secured in recesses 13 at the front of the plate. The plate 11 is provided with openings 14 for fastening members, such as screws or the like, and with a central opening 15 which registers with the interior diameter of the tubular case 10.

Within the front portion of the case 10 is slidably and rotatably received a bolt case 16, which, as shown, is of cup-shaped form having a rear or bottom wall 17, and this case fits snugly within the main case 10 against stops 17a struck from the main case 10. Slidably mounted within the bolt case is a latch bolt 18 spring-pressed to protracted position by the usual spring 19, which acts against the bolt at its front end and against the wall 17 of the bolt case at its rear end. Secured to the bolt 18 and extending rearwardly therefrom is a bolt stem 20 having on its rear end a crosshead 21, the stem and crosshead extending through an opening 22 in the rear wall 17 of the bolt case. Also slidably mounted in the bolt case is a guard bolt 23 held in protracted position by a spring 24 acting against the member 17, the body of this guard bolt being provided with an annular recess or channel 25 to receive the laterally turned forked end 26 of a dog-controlling slide 27. As shown in Fig. 2, this slide is disposed closely against the bolt stem 20, and guided thereon by a pin 28 extending into a slot 29 on the slide 27.

The slide 27 is provided with a laterally turned lug 30 adapted to engage the toe 31 of a dogging lever 32 pivoted on the bolt stem at 33, this dogging lever being provided at its upper edge with a recess or notch 34 having a forward abrupt edge 35 designed to engage the edge of the opening 22 in order to dog the latch bolt against retraction. As shown in Fig. 3, the laterally turned lug 30 stands under the toe 31 of the dogging lever 32 and holds the edge 35 of the recess 34 out of contact with the edge of the opening 22. However, when the guard lever is retracted by contact with the strike plate, and the slide 27 is moved rearwardly, the dogging lever will be released by the member 30 and will be moved in a counter-clockwise direction by the spring-pressed plunger 36.

It may be stated that the opening 22 is sufficiently large at its central portion to permit the passage therethrough of a crosshead 21, but is reduced at one side in order to present a shoulder to be engaged by the forward edge 35 of the opening 34. At the rear edge of this opening is a beveled surface 37, which, as will be described hereinafter, is designed to be engaged by the bolt

actuator to swing the lever 32 in a clockwise direction and thus release the dogging lever 32 from the member 17 so that the bolt may be retracted.

A face plate 40, shown more especially in Fig. 4, is designed to be disposed flatwise against the plate 11. This plate is provided with hollow lugs or short sleeves 41 designed to enter the openings 14 to hold the front plate 40 against rotation, and to receive screws to secure the lock to the door. It will be seen that, when these screws are removed, the face plate 40 may be moved slightly to the left, as shown in Fig. 3, and disengaged from the front plate 11 of the main case of the lock, or, alternatively, it may be slipped completely off the bolt 18. As shown in Fig. 4, the face plate 40 is provided with an opening 42 of irregular shape to snugly receive the main latch bolt 18 and the guard bolt 23, so that, while these bolts reciprocate freely through the face plate, they are held against rotation relatively thereto. When the face plate is secured to the front plate 11, it will, as shown in Fig. 3, hold the bolt case 16 within the main case, as the edges of the opening 42 project over the front edge of the bolt case 16, and it also limits the protraction of the bolt 18, as the latter is provided with a shoulder 43 (Fig. 2) which abuts a portion of the face plate. This, however, is not relied upon to hold the bolt 18 within the bolt case, as the stem 20 of the bolt is provided with an outwardly projecting pin 44 slidably received in a slot 45 formed in the bolt case 16, the length of the slot limiting the movement of the bolt 18. This will hold the bolt and associated parts in assembled position in the bolt case 16, as it will be seen that the rear portion or tail 46 of the guard bolt 23 also abuts the head of the latch bolt.

Mounted in the case 10 rearwardly of the bolt case 16 is the mechanism for retracting the latch bolt and the mechanism for dogging one of the knobs, usually the outside knob, against movement. This mechanism comprises a retracting yoke consisting of a yoke head 48 and spaced rearwardly projecting legs 49. These legs may be provided with outwardly turned ends 50 to engage the wall of the case and guide the retractor in its movements, these ends being formed on laterally projecting portions 51 designed to be engaged by inner and outer rollbacks 52 and 53, respectively, these rollbacks being secured upon hubs 54 and 55.

The hubs 54 and 55 are rotatably mounted respectively in supporting members 56 and 57, these members being secured at their rear ends at 58 and 59 to the rear closure member 60 of the case. The members 56 and 57 extend forwardly from the rear of the case and are provided at their forward ends with outwardly turned slotted portions 61 and 62, the ends of which bear on the wall of the case 10, as shown, for example, in Fig. 7.

The head 48 of the retractor may be reinforced by a U-shaped member 64, and this member and the head 48 are provided with keyhole slots 65, shown more especially in Fig. 5, the longest dimension of this slot being sufficiently great to receive the crosshead 21 and rear end of the lever 32 when the crosshead is turned to a proper position to register with the longer dimension of the slot. This, as shown in Fig. 4, will be approximately an angle of 45° with the vertical. When the crosshead 21 is inserted through the slot 65 and turned through an angle of approximately 45°, it will be engaged with the retractor so as to be actuated thereby.

Springs 66 (Fig. 2) urge the retractor to its forward position, these springs acting against the head 48 of the retractor at their forward ends, and at their rear ends acting against the outwardly turned portions 61 and 62 of the mounting or bearing members 56 and 57. Guide pins 67 are embraced within the rear ends of these springs, these pins extending through the slots in the members 61 and 62 and being secured to blocks 68 resting upon the mounting members 56 and 57.

Slidably mounted in the members 56 and 57 is a dogging member 70 carrying a dogging pin 71 designed to enter a slot 72 in the hub 55 of the outer rollback 53, so as to dog this rollback and the outer knob against movement. This dogging slide 70 is urged to a neutral or inoperative position, as shown in Fig. 2, by a spring 73 acting against the outer mounting plate 57.

It will be apparent that all of the actuating mechanism situated rearwardly of the bolt case or cup 16 may be assembled without the case. That is, the mounting plates 56 and 57 may be secured to the rear closure member 60, and all of the parts assembled in these plates in their proper position. They may then be thrust longitudinally into the case 10 in assembled relation through the rear end thereof, until they reach the position shown in Fig. 2, in which the member 60 closes the rear end of the case. At this time the blocks 68 will lie opposite openings 75 in the case, and screws 76 may be inserted through these openings and threaded into the blocks 68 to secure the parts against removal. Thus the case 10 may be made in one piece and does not have to be constructed with a detachable cover in order to secure the parts therein.

After the actuating mechanism has been assembled in the case, the bolt assembly shown in Fig. 6 may be slidably inserted in the front end of the case and freely rotated to the proper position to cause the crosshead 21 to register with the longest dimension of the opening 65 so that the bolt stem may be inserted through this opening. After the crosshead is so inserted, the bolt is rotated to the proper position which is desired so as to face in the proper direction. As has been described, the bolt and bolt case are freely rotatable within the main case 10, so that the bolt may be freely rotated and caused to face in either direction. After the bolt has been rotated to the proper position, the face plate 40 is placed upon the lock, with the sleeves 41 disposed in the openings 14 of the front plate. This positioning of the face plate not only secures the bolt case 16 from removal from the main case, but also holds it against rotation.

After assembly of the lock as above described, an operating pin 77 may be threaded into the dogging slide 70, this pin being provided with a head 78 having an upper reduced portion 79 adapted to be slidably received in an opening 80 in a lever 81 pivoted at 82 within the inner rose 83, as will be hereinafter described. This lever 81 is, as stated, designed to slide freely over the portion 79 of the pin 77 and engage the larger or laterally projecting portion 78 so as to move the pin 77 downwardly when the lever is swung toward the door from its normal position, shown in Fig. 1.

It is, of course, understood that the pin 77 is not connected with the slide 70 until after the lock case has been mounted in the door, but when this has been done the parts are then ready for application of the knobs and associated knob mechanism. The inner knob is shown at 84, and

comprises a knob spindle 85 rotatably secured to the rose 83, the rose being provided with a base plate 87 having thereon upstanding lugs 88 to support the pivot 82. The plate 87 is provided with an opening 89 for the passage of the inner spindle 90 secured to the knob shank 85 by the pin 91.

The knob shank is hollow, and slidably mounted therein is a pushbutton mechanism to operate the dogging slide 70. This mechanism comprises an outer cup-shaped member 92 having a button 93 at the end thereof, and a second cup-shaped member 94 secured bottom-to-bottom to the member 92 and rotatably secured thereto by means of the rivet 95. The member 92 is provided with a pair of diametrically opposite L-shaped slots, these slots having longitudinal portions 96 and laterally directed portions 97. Passing through these slots is a pin 98 secured in the rotatable knob shank 85. It will be seen that the member 92 may be freely pushed inwardly until it reaches the end of the longitudinal slots 96, after which it may be rotated as permitted by the laterally extending slots 97. A spring 99 normally holds the member outwardly, but it will remain in its inward or dogging position when the pin 98 is positioned in the lateral slots 97. Whenever the member 92 is turned to position to register the slot portions 96 with the pin 98, the springs will force the member 92 outwardly.

The element 94 is shown more particularly in Fig. 10, and is a cup-shaped member provided with longitudinally extending diametrically disposed slots 100 and a projecting tailpiece 101 adapted, as shown in Fig. 1, to engage the free end 102 of the lever 81. The slots 100 slidably receive the pin 91 so as to secure this member against rotation with respect to the knob shank 85, but permit it to move longitudinally. Therefore, it will be seen that when the pushbutton structure is thrust inwardly, the free end of the lever 81 is moved inwardly to depress the pin 77 and thus dog the outside knob. After the member 92 has been moved inwardly to a sufficient extent to cause the pin 98 to register with the transverse slots 97, this member may be rotated independently of the cup member 94 so as to cause the pin 98 to move out of registration with the slots 96, and thus prevent the spring 99 from moving the pushbutton outwardly. Thus the dogging slide 70 will be held in dogging position against the tension of the spring 76, and the rollback of the outside knob will be dogged against movement. However, when the pushbutton mechanism is rotated by the member 93 until the longitudinal slots 96 register with the pin 98, the spring 99 will immediately return the pushbutton mechanism to its outer position, thus raising the tailpiece 101 from the free end of the lever 81 and permitting the dogging slide to be moved to non-dogging position by the spring 73.

It will be apparent that the knob mechanism just described may be completely assembled, together with the pindle 90 and operating lever 81, and applied to the door in assembled relation, the spindle 90 being of polygonal shape and entering a similarly shaped opening in the rollback 54. Also the opening 80 in the lever 81 will slide over the outer end 79 of the head of the pin 77 so as to be in the proper relation to this pin to actuate it when the pushbutton mechanism is depressed.

At the outside of the door is provided the outside knob mechanism, which may, as shown, comprise a key-operated lock within the knob.

Whether or not such a lock is provided will, of course, depend upon the use to which the door is put. In the case of a front door lock, for example, as is the type of lock herein shown, a key-operated lock is usually desired.

As illustrated, this outside mechanism comprises a rose 105 in which is rotatably mounted a knob shank 106 of the outside knob 107. Mounted within the knob is a key-operated lock 108 having a key barrel 109. To the knob shank is secured the outside spindle 110 of polygonal shape, which is adapted to enter a similarly shaped opening in the outer rollback hub 55. This spindle is hollow, and mounted therewithin is a shaft 111 secured to the key barrel 109, this shaft 111 having a flat reduced end portion 112 disposed in a slot 113 in the inner spindle 90.

Thus it will be seen that when the outer knob 107 is turned, the spindle 110 is operated to actuate the outer rollback 53 and retract the bolt. However, when this outer rollback is dogged against movement by the dogging slide 70, the key cylinder or key plug 109 may be rotated by the key, this serving to rotate the shaft 111 independently of the spindle 110, which, through the extended end 112, will rotate the inner knob spindle 90 and thus retract the bolt so that it may always be retracted by a key from the outside of the door.

It will also be understood that the shaft 111, which must always turn with the inner spindle 90, is connected to the key barrel by a lost-motion connection. I have not deemed it necessary to illustrate this connection as it is old in the art.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A lock comprising a main case open at its forward end and having bolt-retracting mechanism therein, a bolt case slidably received in the open end of the main case and having a bolt therein, means connecting said bolt with the bolt-retracting mechanism, said means comprising a stem on the bolt and a member on the retracting mechanism having an opening to rotatably receive said stem and means for securing said bolt case against removal from the main case.

2. A lock comprising a main case open at its forward end and having bolt-retracting mechanism therein, a bolt case slidably received in the open end of the main case and having a bolt therein, means connecting said bolt with the bolt-retracting mechanism, said means comprising a stem on the bolt and a member on the retracting mechanism having an opening to rotatably receive said stem and means for removably securing said bolt case in the main case in either of two positions reversed with respect to the longitudinal dimension of the bolt.

3. A lock comprising a main case open at its forward end and having bolt-retracting mechanism therein, a bolt case slidably received in the open end of the main case and having a bolt therein, means connecting said bolt with the bolt-retracting mechanism, and a face plate secured to the main case and retaining the bolt case therein.

4. A lock comprising a main case open at its forward end and having bolt-retracting mechanism therein, a bolt case slidably received in the

open end of the main case and having a bolt therein, means connecting said bolt with the bolt-retracting mechanism, said means comprising a stem on the bolt and a member on the retracting mechanism having an opening to rotatably receive said stem, said bolt case being rotatably mounted in the main case, and means for holding said bolt case against rotation.

5. A lock comprising a main case of tubular shape open at one end, bolt-retracting mechanism therein, a bolt case slidably received in said main case, a bolt slidably mounted in the bolt case and engaged with said retracting mechanism, and means for holding said bolt case against movement in the main case, said means comprising a face plate secured to the main case.

6. A lock comprising a main case of tubular shape open at one end, bolt-retracting mechanism therein, a bolt case rotatably received in said main case, a bolt slidably mounted in the bolt case and engaged with said retracting mechanism, and means for holding said bolt case against movement in the main case, said engagement permitting relative rotation of the bolt and retracting mechanism whereby when said holding means is removed the bolt may be reversed about the longitudinal axis of the main case without disconnecting the bolt from the retracting mechanism.

7. A lock comprising a unitary main case of tubular shape open at the end, bolt-retracting mechanism therein, a tubular bolt case slidably received in the main case through the open end thereof, a bolt slidably mounted in the bolt case and secured against removal therefrom, means connecting said bolt with said retracting mechanism for operation thereby, said bolt case and bolt therein being reversible as a unit about the longitudinal axis of the main case, and means for retaining said bolt case against movement in the main case in either of two positions reversed with respect to such axis.

8. A lock comprising a unitary main case of tubular shape open at the end, bolt-retracting mechanism therein, a tubular bolt case slidably received in the main case through the open end thereof, a bolt slidably mounted in the bolt case, means connecting said bolt with said retracting mechanism for operation thereby, said bolt case and bolt therein being reversible as a unit about the longitudinal axis of the main case, and means for retaining said bolt case against movement in the main case in either of two positions reversed with respect to such axis, said means comprising a face plate removably connected to the main case and non-rotatably engaging the bolt.

9. A lock comprising a unitary main case of tubular shape open at the end, bolt-retracting mechanism therein, a tubular bolt case slidably received in the main case through the open end thereof, a bolt slidably mounted in the bolt case, means connecting said bolt with said retracting mechanism for operation thereby, and means for retaining said bolt case against movement in the main case, said retracting mechanism comprising a retractor element, rotatable rollbacks engaged therewith, and supporting mechanism for holding said parts in assembled relation independently of said main case.

10. A lock comprising a unitary main case of tubular shape open at the end, bolt-retracting mechanism therein, a tubular bolt case slidably received in the main case through the open end thereof, a bolt slidably mounted in the bolt case, means connecting said bolt with said retracting

mechanism for operation thereby, and means for retaining said bolt case against movement in the main case, said retracting mechanism comprising a retractor element, rotatable rollbacks engaged therewith, and supporting mechanism for holding said parts in assembled relation independently of said main case, said retracting mechanism being slidably received in the main case in assembled relation, and means for securing said mechanism in the case.

11. A door lock comprising a tubular case open at both ends, a bolt mechanism slidably received in one end of said case, said mechanism comprising a supporting element and a bolt slidably carried thereby, means for retaining said bolt mechanism in the case, retracting mechanism also slidably received in said case through an end thereof, said retracting mechanism comprising supporting means, rollbacks rotatably carried thereby, and a retracting member operatively engaged by said rollbacks, said retracting mechanism being received in said case in assembled relation, means for detachably connecting said bolt to said retracting mechanism after the latter has been assembled in the case, and means for retaining said retracting mechanism in the case with said retractor operatively connected to the bolt.

12. A lock comprising a unitary main case of tubular shape open at the end, bolt-retracting mechanism therein, a tubular bolt case slidably received in the main case through the open end

thereof, a bolt slidably mounted in the bolt case, means connecting said bolt with said retracting mechanism for operation thereby, means for retaining said bolt case against movement in the main case, said retracting mechanism comprising a retractor element, rotatable rollbacks engaged therewith, and supporting mechanism for holding said parts in assembled relation independently of said main case, said retracting mechanism being slidably received in the main case in assembled relation, and means for securing said mechanism in the case, said retaining means for the bolt mechanism being disconnectible, and said bolt mechanism being rotatable in the main case when said retaining means is disconnected to reverse the position of the bolt with respect to the longitudinal axis of the case.

JOHN B. FREYSINGER.

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