

W. A. HILL.

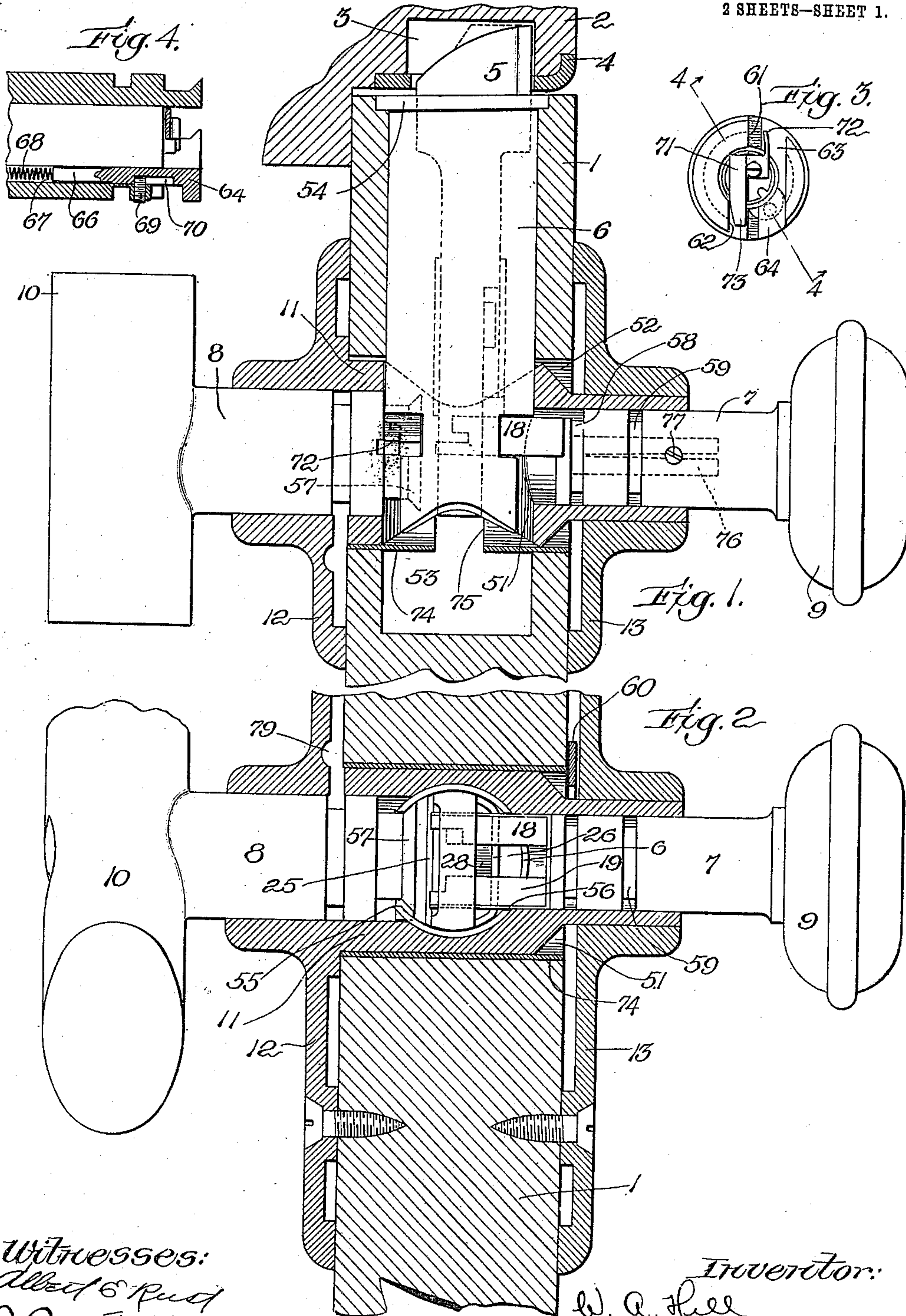
KNOB LOCK.

APPLICATION FILED AUG. 20, 1909.

965,520.

Patented July 26, 1910.

2 SHEETS—SHEET 1.



Witnesses:  
Albert E. Reed  
E. Bartholden

Inventor:  
W. A. Hill  
by Wright Brown Smith, May  
Attys.

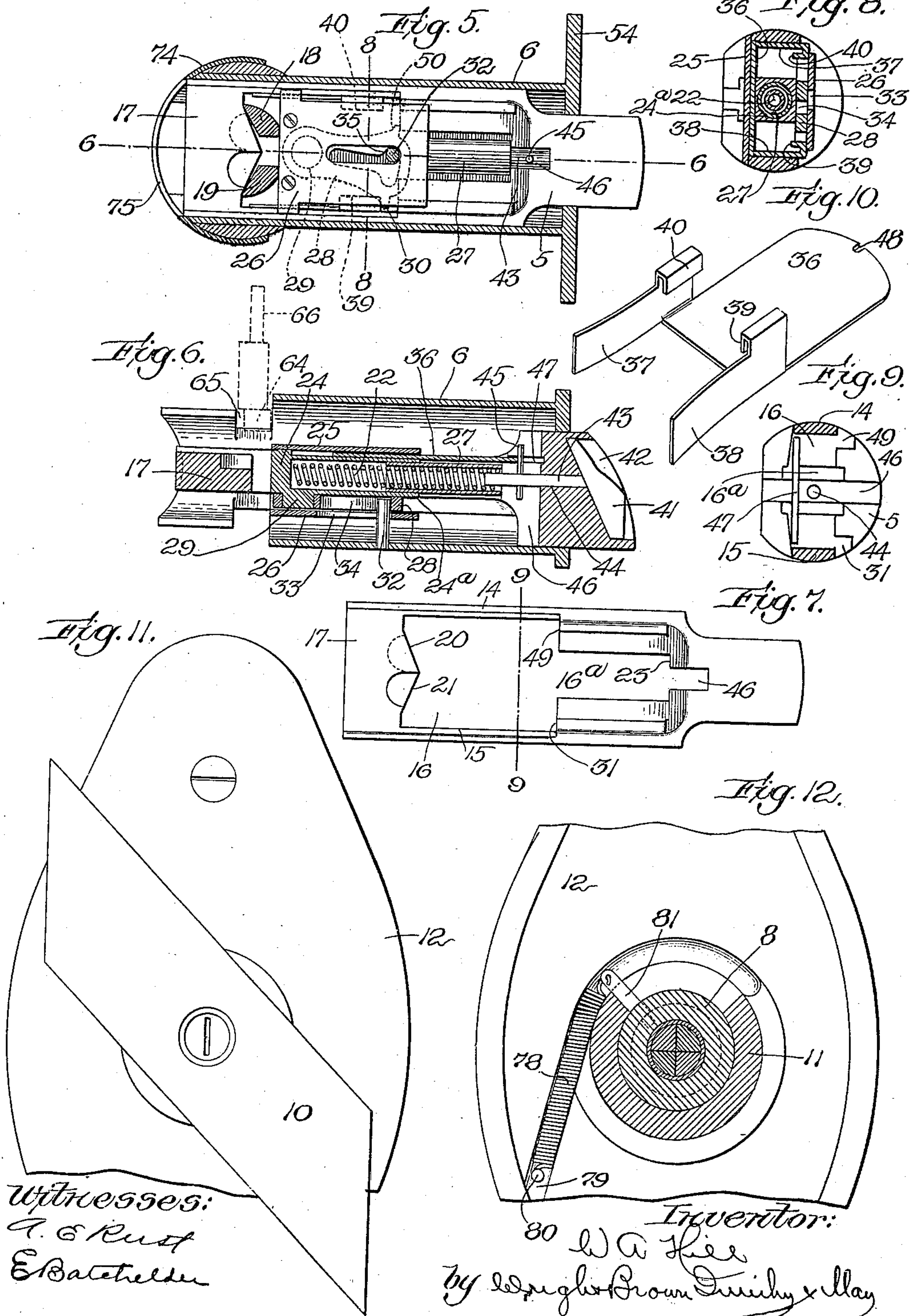


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Witnesses:  
A. E. Rust  
E. Bateman

Inventor:  
W. A. Hill  
by Edgar Brown Smith & May  
Atty's.



# UNITED STATES PATENT OFFICE.

WILFORD A. HILL, OF WALTHAM, MASSACHUSETTS, ASSIGNOR TO THE HILL LOCK COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## KNOB-LOCK.

965,520.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed August 20, 1909. Serial No. 513,761.

*To all whom it may concern:*

Be it known that I, WILFORD A. HILL, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Knob-Locks, of which the following is a specification.

This invention relates to door locks of the character illustrated in my pending application for knob lock filed May 28, 1908, Serial No. 435,539, and has for its object to provide an improved lock which is simpler and less expensive in its construction, while at the same time being stronger than that illustrated in the application referred to.

The novel features of the present lock are pointed out in the following specification and claims and are illustrated in the drawings.

Figure 1 represents a horizontal section through a part of a door, to which a lock constructed in accordance with the present invention has been applied, showing the lock partly in section. Fig. 2 is a vertical section through the door and lock. Fig. 3 is an end view of the outer knob shank. Fig. 4 is a longitudinal sectional view on line 4—4 of Fig. 3. Fig. 5 is an elevation of the bolt and the lock with the associated parts. Fig. 6 is a sectional view of the same on line 6—6 of Fig. 5. Fig. 7 is an elevation of the bolt alone with the associated parts removed therefrom. Fig. 8 is a cross-section of the bolt and associated parts taken on line 8—8 of Fig. 5. Fig. 9 is a cross section of the bolt on line 9—9 of Fig. 7. Fig. 10 is a perspective view of the shield by which the bolt locking detent is controlled. Fig. 11 is an elevation of the outer knob or handle with the lock escutcheon. Fig. 12 is a cross sectional view of the outer knob shank, showing in elevation the inner surface of a part of the outer escutcheon.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings the character 1 represents a part of a door near the edge thereof and 2 represents the door jamb, having a socket 3 to receive the latch or bolt in a guard or striker plate 4, against which the latch strikes when the door is being closed.

5 represents a latch bolt with which the outer end is beveled on one side so that it may be retracted by striking the plate 4 in closing the door. This latch bolt is con-

tained in the casing 6, which is set into the edge of the door.

7 and 8 represent knob shanks, of which the shank 7 on the inner side of the door carries a knob 9, and the outer shank 8 carries a knob or handle 10. These shanks are mounted in line with one another in a casing 11, which is passed through the door from one side to the other, which casing carries on the end projecting from the outer side of the door an escutcheon plate 12, formed integrally with it, the inner end of said casing being passed through a plate 13 secured to the inner surface of the door.

The bolt is shown in detail in Figs. 5, 6 and 7 and consists of a frame having parallel side members 14 and 15, which together with the ends of the bolt inclose an interior space 16. The outer end of the bolt forms the projecting head and the inner end 17 forms an abutment against which a portion of one of the knob shanks engages, and against which the latter bears in retracting the bolt.

As in the construction illustrated in the application above referred to, the inner knob shank 7 carries on its end which projects into the lock casing a fork consisting of the arms 18 and 19, which are shown in cross section in Fig. 5. These arms are beveled adjacent to the end 17 of the bolt and their outer edges bear against the inclined surface 20, 21, respectively of the abutting surface of such end. Thus, when the shank is turned the outer edge of one of the arms bears against the adjacent abutting surface of the bolt and in being carried rotatively about the axis of the shank withdraws the bolt. At the same time this edge rides along the contacting inclined surface and increases the movement of the bolt by the cam action of this surface.

The bolt is automatically projected by a spring 22, which presses against a shoulder 23 near the front or head end of the bolt and reacts against a block 24, which is carried by the bolt and is mounted to slide thereon. This block is contained in the space 16 and has secured to it plates 25, 26, which overlap the side members 14, 15 of the bolt and so guide the block. The spring is guided and kept in place by a tube 27, which telescopes within the interior of the block, the latter being formed with a tubular portion 24<sup>a</sup> shaped so as to fit within a reduced part 16<sup>a</sup> of the interior space 16 in the bolt. The block 24 bears against the



arms 18 and 19 of the fork which is carried by the inner shank and thus enables the spring to exert its force to project the bolt. Thus the spring causes the fork to be gripped between the end 17 of the bolt and the block 24. The fork bars are flattened or otherwise made eccentric where they engage the sliding block so that, when being turned, they will move the latter outward at the same time that they draw the bolt as a whole inward.

I provide means for locking the bolt when it is projected so that it cannot be fraudulently retracted by an instrument inserted between the end of the bolt and the jamb. Such locking means consists of a dog or detent 28, pivoted to a stud 29 formed upon the sliding block. This dog has a shoulder or toe 30 which is adapted to bear against a shoulder 31 in the bolt. It should be observed that the bolt is intended to be used in the position shown in Fig. 5, in which position gravity tends to swing the dog into the position shown in that figure, in which its toe lies behind the shoulder 31. This shoulder projects outwardly somewhat beyond the side member 15 of the block. It will be observed that when the detent engages the shoulder, movement of the sliding block 24 along the bolt is positively prevented and therefore the bolt cannot be pushed inward by any force applied directly to it.

The only means by which the bolt can be retracted is the fork itself, which causes the detent to be lifted out of engagement with the shoulder 31 whenever it is turned for the purpose of retracting the bolt. This lifting of the detent is accomplished by a pin or stud 32 secured to the bolt casing, 6, and projecting inwardly. This stud constitutes a stationary abutment which passes through a slot 33 in the bolt guide plate 26 and into a slot 34 in the detent. The latter slot is widened near the end of the detent and is formed with a shoulder or cam portion 35. When the sliding block is in its rearmost position, the widened part of the slot 34 receives the pin 32 and allows the toe 30 of the detent to drop back to the shoulder 31. As soon as the knob shank is turned to retract the bolt the sliding block is pushed outwardly a sufficient distance to cause the cam shoulder to ride up on the stud and thereby lift out of engagement with the latter. Further rotation of the knob shank withdraws the bolt in the manner described, the detent being held up by the pin or stud 32. I provide also means for preventing the detent from becoming operative when the door is open and for causing the detent to become operative as soon as the door is closed and the bolt has been projected into the socket. This allows the bolt to slip back by contact with the door jamb when

the door is closed, but prevents a second retraction of the bolt by external means. The device which I provide for this purpose is a plate 36, having resilient wings 37, 38, which are contained between the side members 14, 15 of the bolt and between the covered plates 25, 26, of the sliding block. These wings are preferably resilient and bear with some friction against the sides of the bolt. They have detent-disabling members 39, 40, of which the former lies in line beside the shoulder 31 and is of the same height as the shoulder. This detent-disabling device or shield is normally separated from the shoulder 31 by a space wide enough to admit the toe 30 of the detent, but when moved forward, it closes this space and forms a platform along which the toe of the detent may ride. Whenever the knob shank is turned the sliding block in being moved forward strikes the parts 39, 40 and moves them forward until the forward end of the part 39 is close to the shoulder 31. This member 39 thereby forms a shield which holds the detent above the shoulder and enables the bolt to be moved in and out without having locking connection made with the detent.

A trigger 41 or shield displacer is located in a recess 42 in the forward end of the bolt head and has a shank 43 passing through an aperture 44 in the bolt head into the space 68. This shank carries a pin or stud 45 contained in a transverse slot 46 in the bolt head and lying in front of the end of plate 36. This plate, it should be noted, has its forward end contained in a groove 47 in the way of the bolt head and has a notch 48 into which the pin 45 may extend. When the plate 36 is moved forward as last described, it pushes the trigger outward so that it projects beyond the beveled face of the bolt head. As long as it remains in this position the bolt may be moved inward any number of times without being locked. When, however, the door is closed and the bolt strikes the door jamb the trigger also strikes the jamb and is moved inward until it lies wholly within the recess 42 as shown in Fig. 6. Then the shield 39 is moved away from the shoulder 31 and when the bolt is next projected to enter the socket, the detent engages the shoulder 31 and locks the bolt against retraction.

The casing 6 in which the bolt is contained is cylindrical so that the bolt may be turned in either direction. That is the same device can be used for doors which open in either direction, it being merely necessary to turn the bolt casing through 180 degrees. Both edges of the bolt are alike and a shoulder 49 corresponding to the shoulder 31 is formed on what in Figs. 5 and 7 is the upper side of the frame. The



detent 28 is also symmetrical and has a toe 50 opposite to the toe 30. When the bolt is reversed the toe 50 and shoulder 49 are at the lower side of the bolt and cooperate to lock the bolt as previously described. The shield or detent arrester 40 is the duplicate of 39 and cooperates with the shoulder 49 and detent toe 50 when the bolt is reversed.

10 The knob shank casing 11 has a transverse aperture 51, which is circular and of sufficient diameter to receive the bolt casing 6. When the parts are being assembled the knob shank casing is first passed through  
15 a hole 52 bored through the door, and the bolt casing is then inserted into an intersecting hole 53 bored in from the edge of the door. When the holes are properly bored so that the casings may intersect as  
20 described, the parts of the lock are properly assembled together.

On the outer end of the lock casing is a face plate 54, which is set flush with the edge of the door. This plate is preferably  
25 beveled so as to correspond with the beveled edge of a closely fitting door. The reversible character of the bolt enables one style to fit any kind of door so that hardware dealers need not carry locks of which the end  
30 faces are beveled in both directions.

The opposite sides of the lock casing near the inner end thereof are slotted at 55 and 56 to receive the ends of the knob shanks. The outer knob shank has a head 57 which  
35 is wider than the slot 55, so that when the casing 6 is in place, the shank is locked and cannot be pulled out; thereby removal of the outer handle is prevented as long as the door is shut, because the casing 6 locks  
40 the handle and this casing cannot be removed without opening the door. The shank may be either connected together or disconnected at will and for this purpose the inner shank is longitudinally movable  
45 in the casing, having grooves 58, 59, with which a latch 60 engages to hold it in either position as fully described in my pending application before referred to. When the  
50 shank 7 is pushed inward, the ends of the fork 18, 19 engage shoulders 61, 62 at the side of a transverse slot 63, cutting the end of the outer knob shank. Thereby, when the outer shank is turned, the inner shank is also turned and the bolt may be retracted.

55 Turning of the outer knob or handle is however prevented when the shanks are separated, by a lock 64, which is carried by the inner end of the outer shank and normally enters a notch 65 in the bolt casing  
60 shown in Fig. 6. This lock or detent 64 is movable longitudinally of the outer shank having a stem 66 contained in a socket 67 in the shank and acted upon by a spring 68. The spring normally pushes the detent 64  
65 into the notch 65 and so holds the outer

handle against turning, but when the inner shank is pushed in so as to engage the outer shank, the detent 64 is displaced from the notch. A stud 69 enters a groove 70 in the shank of the detent 64 to prevent the latter  
70 from being pushed out too far. This detent is shaped as shown in Fig. 3, having but a single arm and being thus more powerful than the corresponding detent or yoke of the prior application referred to. Cooper-  
75 ating device 71 having projections 72, 73 to engage the fork bars 18, 19 is provided in this mechanism and is constructed and operated as fully described in the prior appli-  
80 cation.

I believe a lock constructed as hereinbefore described is secure against being picked. As a further precaution, however, and for the purpose of preventing the insertion of an instrument through the door beyond or  
85 back of the escutcheon plate to trip the detent 28, I provide a cover or shield 74 which embraces the central part of the shank casing 11 and extends over the open end of the lock casing 6. This shield has a slot 75 to  
90 permit the rear end of the bolt to pass through when the bolt is retracted.

One of the important features of the invention is an adjustment which permits the knob shanks to fit a door of any width  
95 without the looseness and end shake which is such an objectionable feature of many of the locks now in use. For this purpose I make the fork, 18, 19 of one piece separate from the knob shank 7 and provide it with a  
100 stem 76 which is inserted in a socket in the knob shank. This stem is divided longitudinally, and between the divided parts is set a pointed end of a set screw 77, which is screwed in the shank. This set screw sepa-  
105 rates the parts of the stem 76 and clamps the latter within the knob shank. This adjustment enables the form to be set in any position so that it may engage properly with the bolt in the outer shank without displac-  
110 ing the inner shank.

In order to return the shank to normal position after it has been turned for retracting the bolt, and thus relieve the spring 27 of the bolt from extra duty, I provide a spring 78,  
115 which is contained in a groove 79 of the escutcheon plate 12, one end of the spring being secured to a pin 80 attached to the plate, and the other to a pin 81 projecting from the knob shank 8. The arrangement  
120 of the spring and the direction in which it exerts its force are such as to tend to hold the outer handle in the position shown in the drawings.

I claim—

1. A door lock comprising a normally and automatically projected bolt having an abutment, manually-operated means for retracting said bolt, and a detent carried by said bolt, arranged to engage said abutment of  
125 130



the latter, and being further arranged to react against, or be held from inward movement by, said bolt-retracting means, for locking the bolt in its projected position.

5 2. A door lock, including a sliding latch-bolt constructed so that it may be retracted upon striking a door-jamb, said bolt having an abutment, a detent mounted upon said latch-bolt and arranged to coact with said  
10 abutment for preventing retraction of the latch-bolt, a shield arranged to engage said detent and hold the same out of engagement with the said abutment, and a shield displacer carried by said latch-bolt in position  
15 to strike the door-jamb when said shield is in detent-disabling relation.

3. A combined door-lock and latch, including a bolt having a beveled face, by which it may be retracted by engagement  
20 with a door jamb, said bolt having an abutment, a detent carried by said bolt so as to be movable relatively thereto, arranged to engage said abutment on said bolt to prevent retraction thereof by direct pressure  
25 thereon when the bolt is projected into the socket of a door jamb, and means for keeping said detent out of engagement with said shoulder when the bolt is projected in the open position of the door.

30 4. A combined lock and latch, comprising a bolt, a manually actuated retractor therefor, a spring-actuated projector therefor, reacting against said retractor, said bolt having an abutment and a detent carried by said  
35 projector and arranged to engage said abutment of the bolt for preventing retraction of the latter by any other means than said retractor.

40 5. A combined lock and latch, comprising a bolt, a manually actuated retractor therefor, a spring-actuated projector therefor reacting against said retractor, said bolt having an abutment, a detent carried by said projector and arranged to engage said abut-  
45 ment of the bolt for preventing retraction of the latter, and means controlled by said retractor for disengaging said detent from said abutment.

50 6. A combined lock and latch, comprising a bolt, a manually-actuated retractor therefor, a spring-actuated projector therefor reacting against said retractor, said projector and bolt being moved in opposite directions by the retractor, a detent carried by said  
55 projector for preventing inward movement of said bolt, and means by which outward movement of the projector disables said detent.

60 7. A door-lock comprising a bolt having a shoulder, a housing in which the same is mounted to reciprocate, a block mounted to slide upon said bolt and a detent carried by said block and movable relatively thereto arranged to engage with said shoulder of  
65 the bolt to prevent retraction of the latter.

8. A lock comprising a bolt having a shoulder, an oscillative manually operative retractor for said bolt, a detent carrier mounted slidably upon said bolt and engaged with said retractor, means associated  
70 with said carrier for causing the same to project the bolt and a detent mounted upon said carrier arranged to engage said shoulder of the bolt to prevent endwise movement of the latter.

75 9. A door lock comprising a sliding bolt having an abutment, a detent carrier mounted to move relatively to said bolt, a detent mounted upon said carrier arranged to engage said abutment of the bolt to prevent  
80 retraction of the latter, a retractor for withdrawing said bolt having an engagement with said detent carrier, whereby to move the latter at the same time in a direction opposite to that of the bolt and a detent  
85 disabler caused by such movement of said carrier to disengage said detent from the shoulder of the bolt whereby withdrawal of the latter is permitted.

90 10. A door-lock comprising a bolt casing, a bolt mounted to slide in and out of said casing and having a shoulder, a detent carrier movable relatively to said bolt, a detent held by said carrier and gravity-operated to lie behind said shoulder and prevent inward  
95 movement of the bolt, and a stationary detent lifter engaging with a cam shoulder of said detent, whereby movement of said detent carrier is enabled to disengage the detent from the bolt shoulder and permit re-  
100 traction of the bolt.

11. A door-lock comprising a bolt having a shoulder, a manually-operated device for withdrawing said bolt, a detent normally located behind said shoulder of said bolt, a  
105 movable support for said detent abutting against said bolt retracting device, whereby inward movement of the bolt in response to force applied directly to it is prevented, and a detent disabler engaged with said detent  
110 and caused by movement of said detent support in opposition to the retractive movement of the bolt to disengage the detent from the latter and permit retraction thereof.

115 12. In a door-lock, a bolt having a shoulder, a slide movable relatively to said bolt, a bolt retractor engaged with said bolt and slide and adapted to move them simultaneously in opposite directions, a detent pivoted  
120 to said slide arranged to engage said shoulder of said bolt and prevent retraction thereof and a stationary detent disabler engaged with said detent, one of the last named members having a cam surface which causes dis-  
125 engagement of the detent from the bolt shoulder when said slide is moved.

13. In a door-lock a bolt casing, a bolt movable in and out of said casing, a slide movable in said casing relatively to said  
130



bolt, a retractor engaged with said bolt and slide and adapted to move them simultaneously in opposite directions, said bolt having a shoulder, a detent carried by said slide adapted to engage said shoulder of said bolt, and a detent disabler fixed in said casing and engaging said detent, the detent having a cam surface adapted to ride over said disabler when the slide is moved, whereby the detent is disengaged from the cooperating shoulder.

14. A lock comprising a bolt having a shoulder, a detent adapted to engage said shoulder, a slide movable longitudinally of said bolt by which said detent is carried, a bolt retractor arranged to move said bolt inwardly and at the same time move said slide in the opposite direction, a stationary device arranged to engage said detent and displace the same from engaging with said shoulder when the slide is so moved, a shield carried by said bolt and arranged to prevent engagement of the detent with the shoulder, and a trigger carried by the bolt for displacing said shield when the door is closed.

15. A door-lock comprising a reversible bolt having shoulders, a detent having abutments on its upper and lower side adapted to engage either of the said shoulders, and mounted so as to be gravity actuated to engage the lower of the shoulders, the said detent being of a width permitting it to pass between said shoulders, a holder for said detent with which the same is movable, means for withdrawing the bolt and simultaneously moving said detent holder, and a stationary detent lifter engaging with the cam portion of said detent and caused by such movement of the holder to disengage the detent from the adjacent shoulder, whereby retraction of the bolt is permitted.

16. A lock comprising a bolt mounted to slide longitudinally, a block carried by said bolt and adapted to slide thereon, a detent pivoted to said block having a locking toe or abutment on its lower side and having a slot which is widened at the end nearest to said abutment, a stationary stud extending into said slot and a shoulder on the bolt, said shoulder abutment and stud being arranged so that when the bolt is fully projected, the stud lies in the widest part of said slot and the detent abutment is in rear of the bolt shoulder, whereby retraction of the bolt is prevented.

17. In a lock a bolt having a shoulder, a pivotally mounted pawl carried by said bolt and automatically operated to lie in rear of said shoulder to prevent externally applied force from retracting the bolt, a stationary pawl disabler engaged with a cam surface of said pawl, and a bolt retractor arranged to move said bolt and pawl in opposite directions, the cam surface of said pawl being thereby moved over said dis-

abler, and the pawl being disengaged from said shoulder when the bolt is retracted.

18. In a lock a bolt having an interior space, a shoulder on one side of said space, a plate having wings bearing against the opposite walls of said space so as to slide therein and being provided with a shield portion adapted to be placed close to and separated slightly from said shoulder, a detent adapted to lie between the shoulder and shield when the same are separated and to rest upon the shield when the latter is close to the shoulder, and means operated by the closing of the door to which the lock is applied for thus separating the shield and shoulder, whereby to permit engagement with the latter of said detent.

19. In a lock a bolt contained within the lock and having a projecting head, a part of said bolt within the lock having upper and lower parallel guiding surfaces, a shoulder extending upward from the lower of said guiding surfaces, a slide guided between said surfaces and having a shield portion in line with the extremity of said shoulder, said shield portion being movable with the slide up to and away from the shoulder, and a detent carried by said bolt adapted to rest upon said shield when the latter is adjacent to the shoulder, and to extend between the shoulder and shield when the latter are separated so as to engage the shoulder.

20. In a lock a bolt having an interior space inclosed by parallel side members, shoulders extending inwardly toward one another from said side members, a plate lying close beside said bolt and provided with wing portions contained between said side members, and shields carried by said wing portions and projecting inward therefrom, being equal in extent to said shoulders.

21. A door lock comprising a bolt, knob shanks in alinement for operating said bolt, a casing passing transversely through the door containing said knob shanks, a casing extending inwardly from the edge of the door and containing said bolt, said bolt casing being passed through said knob casing, and a cover embracing the penetrated portion of the knob casing and extending across the end of the bolt casing.

22. A door-lock comprising a bolt, knob shanks in alinement for operating said bolt, a casing passing transversely through the door containing said knob shanks, a casing extending inwardly from the edge of the door and containing said bolt, said bolt casing being passed through said knob casing, and a cover consisting of a curved plate extending partially around the shank casing and across the inner end of the bolt casing, extending inwardly from the edge of the shank casing.

23. In a lock a bolt, a casing in which said bolt is contained, inner and outer knob



shanks extending into opposite sides of the door and into said bolt casing, and a spring projected lock on the inner end of said outer shank adapted to enter a notch in said bolt casing to prevent rotation of the outer shank, said spring projected lock having the sole function of thus preventing such rotation.

24. In a lock a bolt, a casing in which said bolt is contained, inner and outer knob shanks intersecting said casing and normally disconnected from one another, a detent carried by the inner end of said knob shank having a single stem contained in a socket of the shank, a spring tending to press said detent into the interior of the lock, whereby

said detent is caused to enter a notch in the bolt casing to prevent rotation of said outer shank and means for limiting the movement of the detent.

25. In a lock a bolt, a knob shank, a stud projecting from said knob shank and a spring engaged with said stud tending to hold the knob shank in the position occupied thereby when the bolt is projected.

In testimony whereof I have affixed my signature, in presence of two witnesses.

WILFORD A. HILL.

Witnesses:

JAS. H. CHURCHILL,  
ARTHUR H. BROWN.