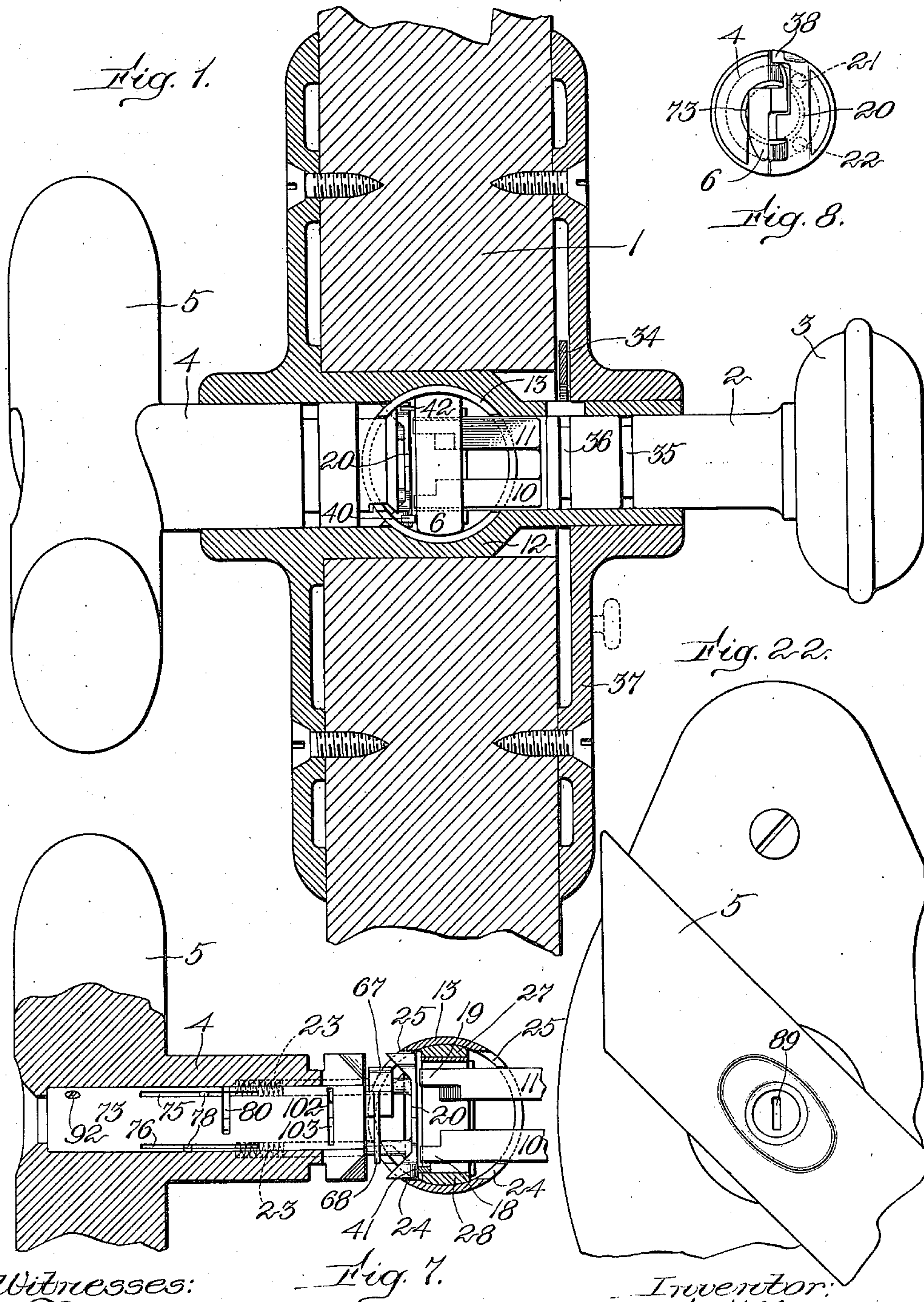


965,519.

W. A. HILL.
KNOB LOCK.
APPLICATION FILED MAY 28, 1908.

Patented July 26, 1910.

5 SHEETS—SHEET 1.



Witnesses:
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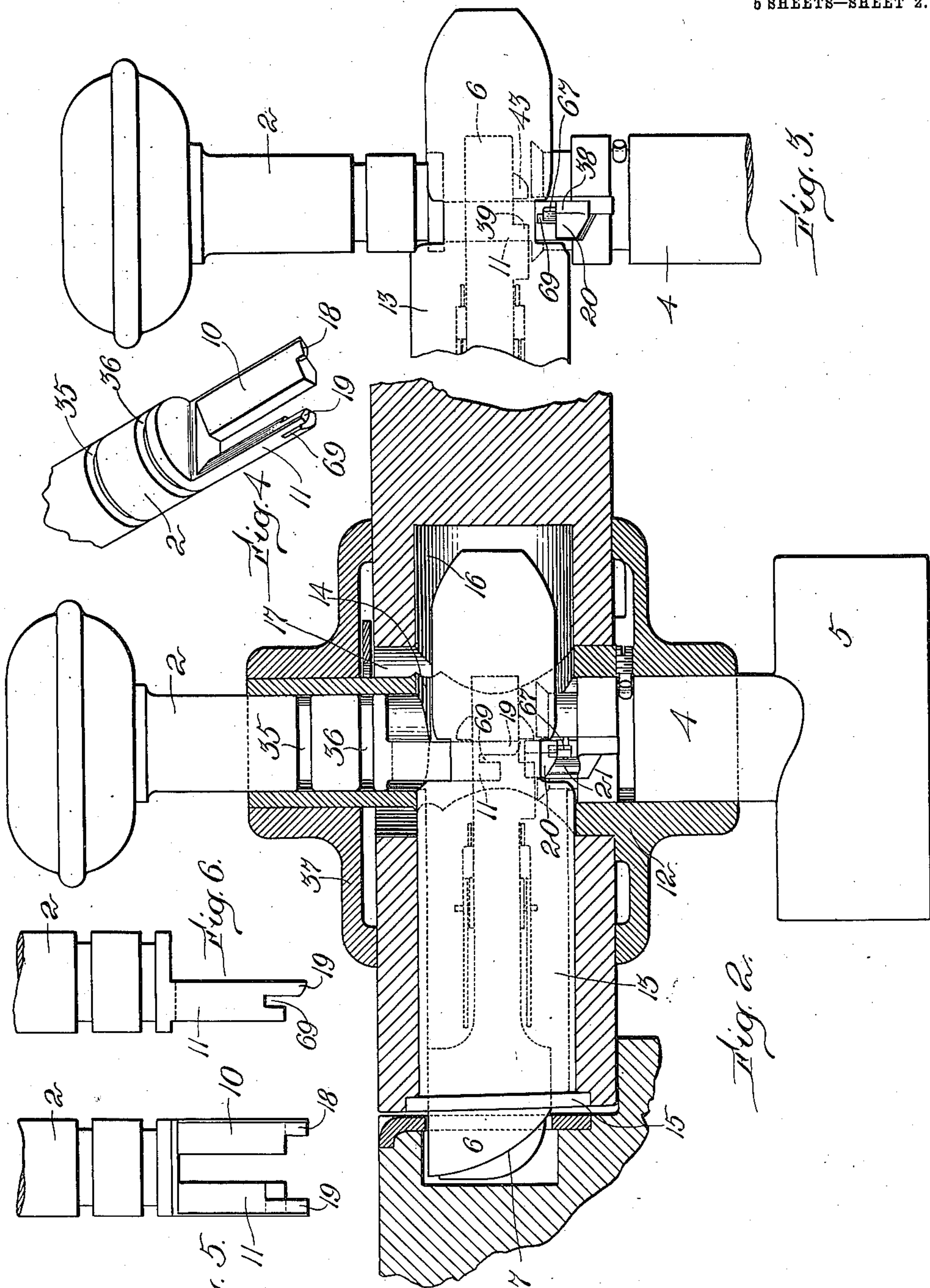
W. A. HILL.
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APPLICATION FILED MAY 28, 1908.

Patented July 26, 1910.

5 SHEETS—SHEET 2.

965,519.



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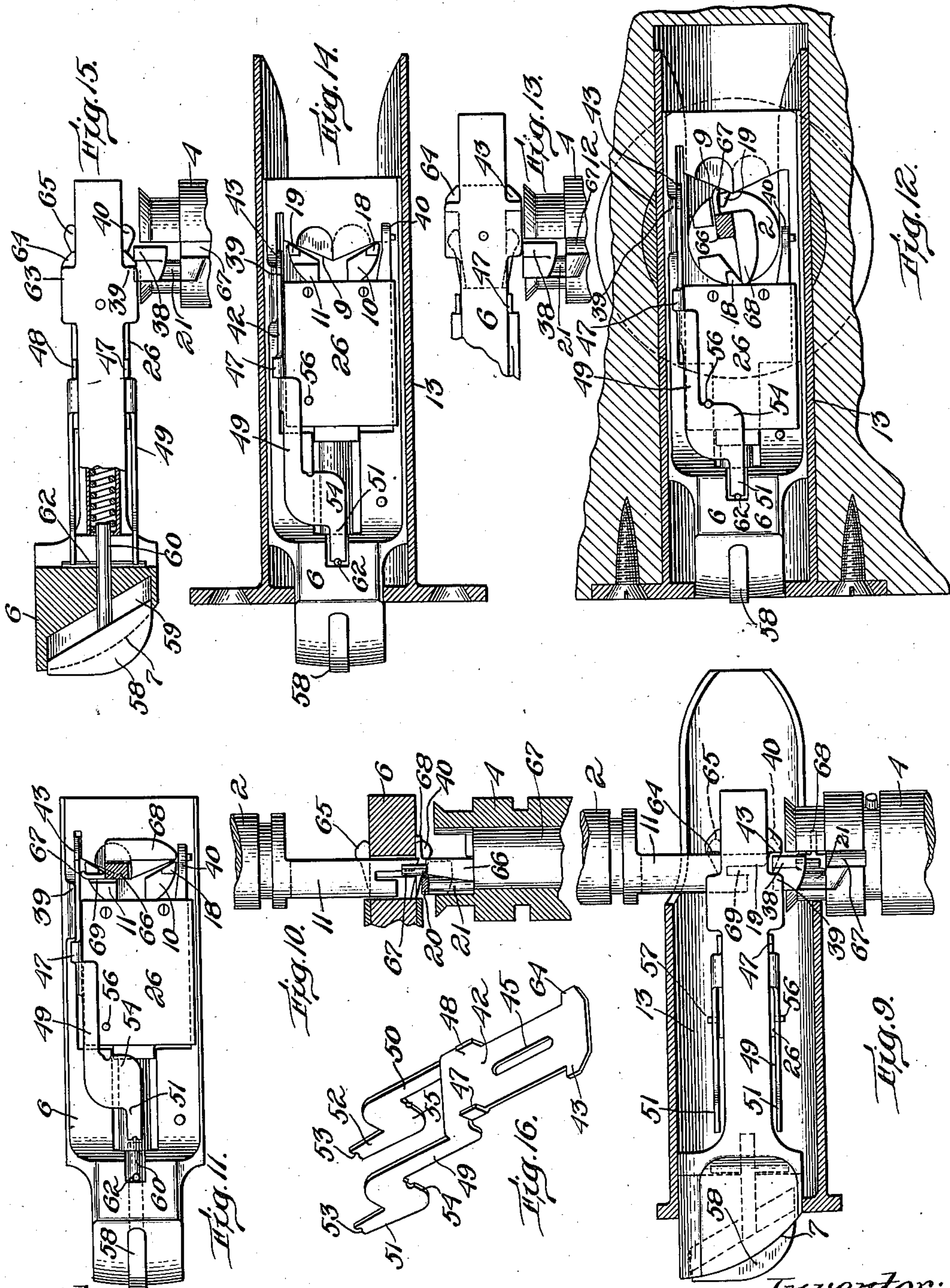
W. A. HILL.
KNOB LOCK.

APPLICATION FILED MAY 28, 1908.

Patented July 26, 1910.

5 SHEETS—SHEET 3.

965,519.



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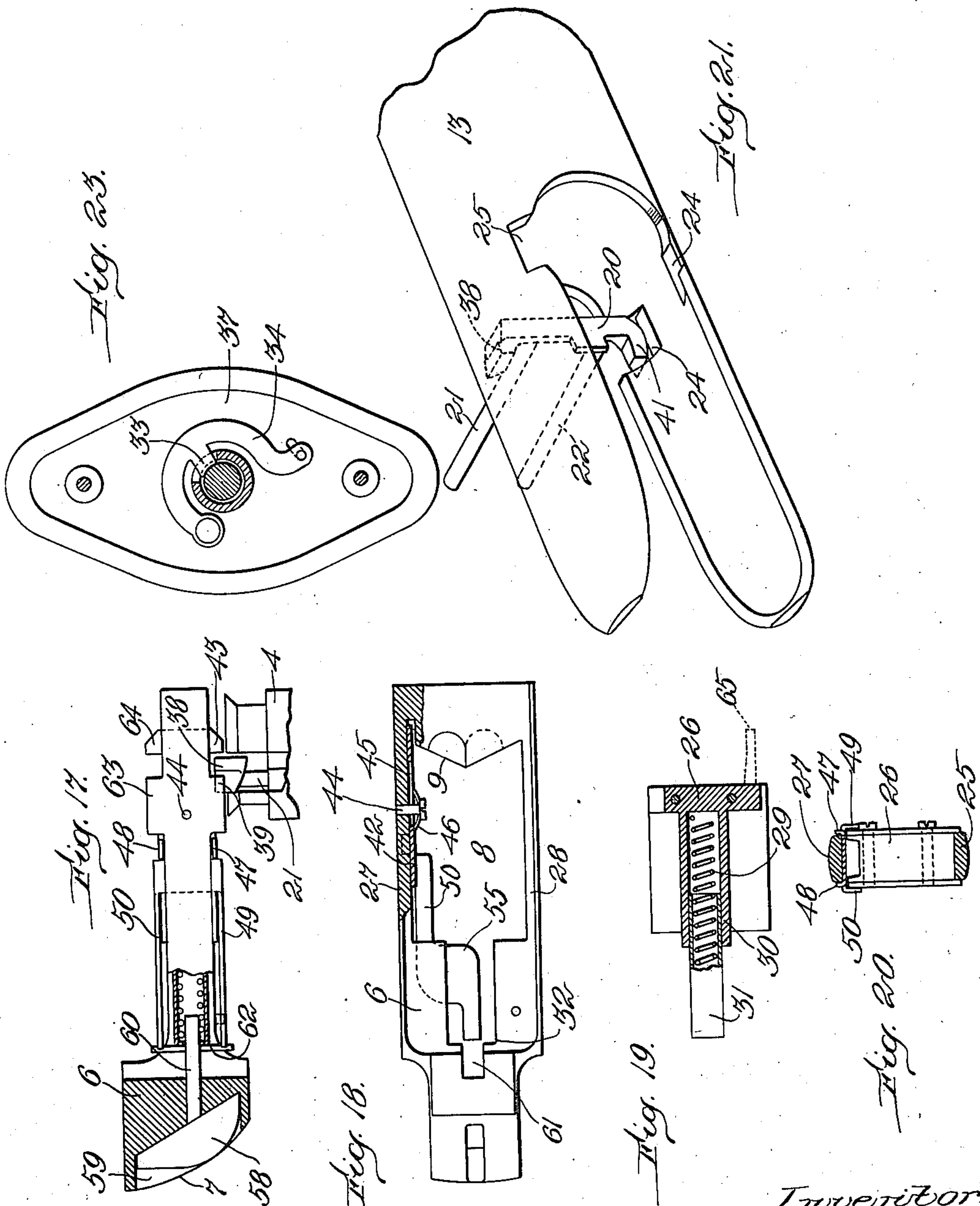
KNOB LOCK.

APPLICATION FILED MAY 28, 1908.

Patented July 26, 1910.

5 SHEETS—SHEET 4.

965,519.



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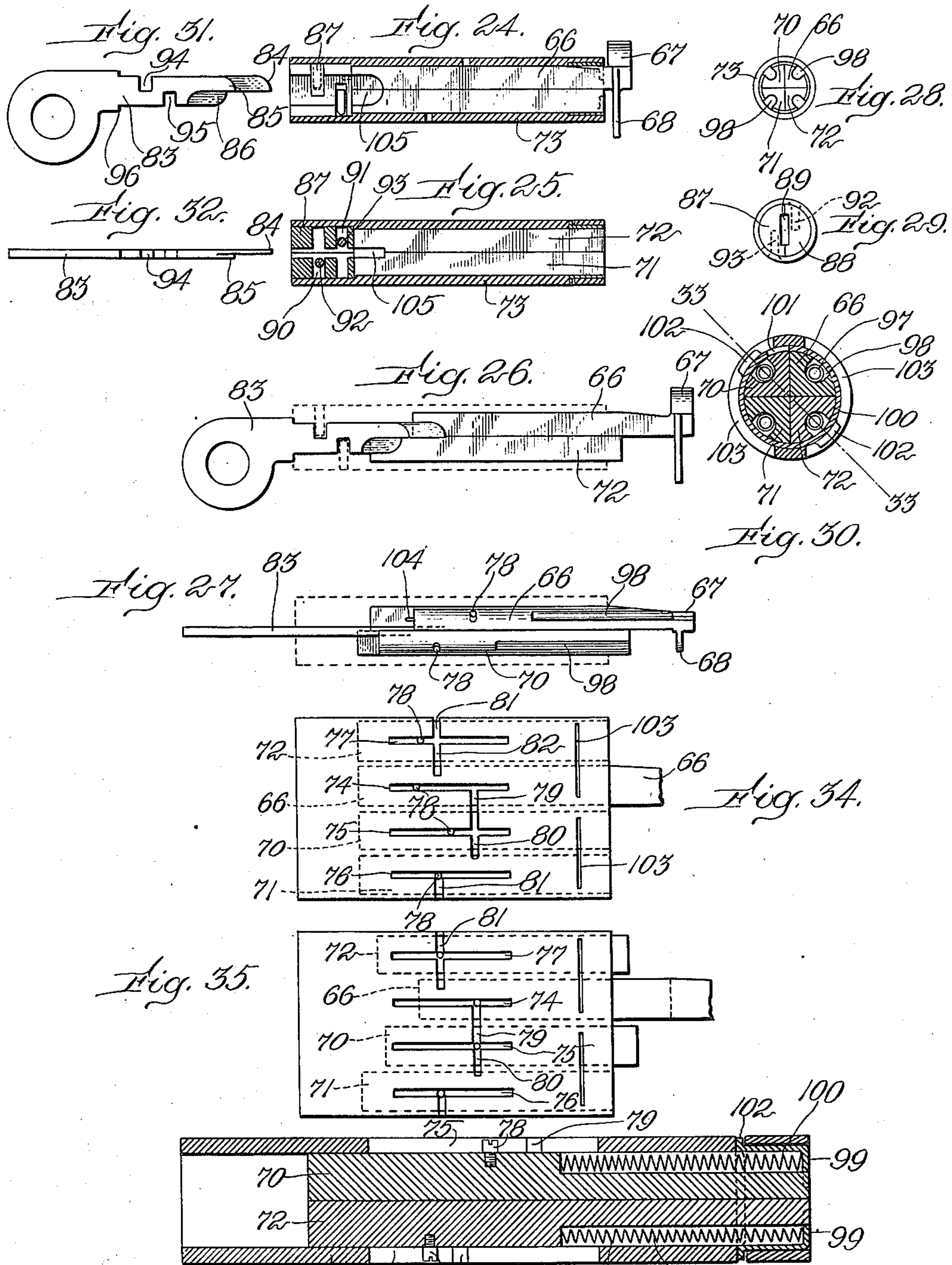
KNOB LOCK.

APPLICATION FILED MAY 28, 1908.

Patented July 26, 1910.

5 SHEETS—SHEET 5.

965,519.



Witnesses:
J. F. Richardson
A. C. Ratigan

Fig. 33.

In witness whereof
W. A. Hill
by Knight Brown Smith & May
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UNITED STATES PATENT OFFICE.

WILFORD A. HILL, OF WALTHAM, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE HILL LOCK COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

KNOB-LOCK.

965,519.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed May 28, 1908. Serial No. 435,539.

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 general character of that illustrated in patent granted to me May 18, 1897, and numbered 582,917, in which a single member acts both as a latch and a locking bolt, and is operated by two knob shanks, one of which may be made inoperative so that the lock cannot be operated thereby.

The present invention has for its most important object to enable the bolt to be positively locked when it is projected, so that it not only cannot be retracted by manipulation of the outer knob or handle, but also cannot be retracted by any force applied to its projecting outer end.

Another object is to enable the locking bolt to act as a latch, that is, to be retracted by engagement with the door jamb when the door is being closed, and then to be automatically locked as soon as it has been re-projected into the socket in the jamb so that no means except the inner knob or a key inserted from the outside of the door will serve to withdraw it from the socket.

Still another object is to provide a lock which cannot be picked.

In accomplishing the objects above defined, I have made use of the elements and devised the novel combination illustrated in the drawings and hereinafter more particularly recited in the following specification and claims.

Of the drawings,—Figure 1 represents a vertical section of part of a door and the lock constituting the subject of this invention, taken through the axial line of the knob shanks. Fig. 2 represents a sectional plan of the lock, a part of the door, and the lock case being shown in section. Fig. 3 represents a plan view of part of the lock, showing the inner knob shank in a different position. Fig. 4 represents a perspective view of an end of the inner knob shank. Fig. 5 represents an elevation, and Fig. 6 represents a plan view of the same. Fig. 7 represents a sectional view of the outer knob or handle shank, showing a part of a lock and the device by which picking of the lock is pre-

vented. Fig. 8 represents an end view of the outer knob shank. Fig. 9 represents a plan view of a part of the lock, showing the bolt thereof projected. Fig. 10 represents a sectional plan view of the knob shanks and the inner end of the bolt. Fig. 11 represents an elevation of the bolt and the associated devices, removed from the lock, showing the relation of the key-operated actuator to the inner knob shank. Fig. 12 represents a sectional elevation illustrating the position of the parts when the bolt is retracted by a key. Fig. 13 represents a partial plan view of the outer knob shank and bolt when in this position. Fig. 14 represents a vertical section of the bolt casing and an elevation of the bolt. Fig. 15 represents a plan view of the bolt and outer knob shank, showing the position of the bolt detent and the controlling shield therefor after the bolt has been withdrawn by a key and re-projected. Fig. 16 represents a perspective view of the sliding plate which serves as a detent arrester. Fig. 17 represents a sectional plan view of the bolt and detent in the position they occupy after the door has been closed. Fig. 18 represents an elevation, partly in section, of the bolt alone. Fig. 19 represents a sectional view of the spring-actuated slide carried by the bolt by which the same is projected. Fig. 20 represents a cross-sectional view of the bolt. Fig. 21 represents a perspective view of the inner end of the bolt casing, showing the relation thereto of the detent which prevents rotation of the outer shank and retraction of the bolt. Fig. 22 represents a partial elevation of the outer face plate and knob or handle. Fig. 23 represents an elevation of the retainer by which the inner knob shank is held in either of its two positions. Fig. 24 represents a longitudinal sectional view of a selective key-operated device for the lock. Fig. 25 represents a sectional view of the same on a plane at right angles to that of Fig. 24. Fig. 26 represents an elevation of members of this lock in connection with the key by which they are operated. Fig. 27 represents a plan view of the same parts. Fig. 28 represents a right-hand elevation of Fig. 24. Fig. 29 represents a left-hand elevation of the same. Fig. 30 represents a sectional view of the inner end of the device on an enlarged scale. Fig. 31 represents a side elevation of a key used in connection with this form of lock.

Fig. 32 represents an edge view of the key. Fig. 33 represents a longitudinal section on line 33—33 of Fig. 30. Figs. 34 and 35 represent developments of the device in which the casing thereof is represented as being in one plane, these figures showing the parts respectively in their inoperative and lock-operating positions.

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

In the drawings, 1 represents a door, 2 represents a shank projecting from the lock at the inner side of the door and carrying a knob 3, and 4 represents a shank projecting from the lock on the outer side of the door and carrying a handle 5.

6 represents the bolt which projects beyond the edge of the door and has a beveled surface 7 at one side which strikes against the edge of the door jamb and serves automatically to retract the bolt when the door is closed. This surface enables the bolt to act as a latch. The form of the bolt can best be seen in Figs. 17 and 18. It has a frame-like structure with an opening 8 in its interior, which receives the end of the inner knob shank 2 and has a surface 9 at the rear end against which the knob shank abuts, and by engagement with which it serves when turned, to draw the bolt inward. That part of the inner knob shank which projects through the opening 8 of the bolt consists of two bars or prongs 10 11 which are eccentric of the shank, and which are beveled so that only their outermost edges bear against the surface 9. By reference to Figs. 12 and 14 it will be understood that rotation of the knob shank in right-handed rotation, as viewed in these figures, serves to move the edge of projection 11 along the surface 8, while being at the same time carried on the arc of a circle toward the right, so that the bolt is thereby retracted.

The knob shanks are contained in a cylindrical casing 12 which passes transversely through the door from front to rear, while the bolt is contained in another cylindrical casing 13 which is inserted from the edge of the door and passes through a hole 14 in the casing 12. A shoulder 15 on the outer end of the casing 13 limits the movement of the latter into the door and causes the two casings when assembled to occupy a position in which the inner shank correctly engages with the bolt. It will be noted that this construction, of containing all the parts in two cylinders intersecting each other, makes mounting the lock in a door as simple as possible, and eliminates to a great extent the possibility of making mistakes, for all that the workman needs to do is to bore one hole 16 in from the edge of the door, and another hole 17 at right angles thereto from one side to the other of the door.

The outer knob shank is separate from the

inner shank, and may be connected thereto and disconnected therefrom at will, the inner shank being mounted for this purpose with capability of longitudinal movement. When the inner shank is drawn out into the position shown in Fig. 2, it is disconnected from the outer shank, but when moved into the position shown in Fig. 3, it is connected therewith. This connection is made by means of studs 18 and 19 on the ends of the bars 10 and 11, which studs, when the inner shank is in the position of Fig. 3, engage the rear side of a yoke 20 which is carried by the outer shank. This yoke consists of a cross bar which is joined to the outer ends of rods 21 21 contained in longitudinal sockets in the outer shank. Springs 23 (Fig. 7) bear on the ends of the rods and tend to press the yoke outward from the end of the shank. When thus pressed outward, the ends of the yoke enter notches 24 25 (Figs. 7 and 21) in the adjacent side of the bolt casing 13, the walls of which notches constitute abutments that prevent the shank 4 and handle 5 from being turned. When the inner shank 2 is placed in its outer position, it leaves the yoke free to be pressed into these slots, but when it is moved into its inner position, the ends of the bars 10 and 11 engage the yoke and push it back out of the notches. Then the outer handle is free to be turned, and in turning, it turns the inner shank, by abutment of the yoke against the projection 19, and so serves to retract the bolt. On the latter there is a sliding block 26 which is contained in the opening 8 between the sides 27-28 of the latter, and is retained by plates which form the sides of this block, and the edges of which embrace the members 27 28. A spring 29 is contained in a sleeve 30 of the block 26 and also in a sleeve 31 which telescopes into the sleeve 30 and bears against a shoulder 32 near the outer end of the bolt. The spring presses sleeve 31 against this shoulder and reacts through the block 26 against the inner shank arms 10 11, thus serving to project the bolt. It will be seen that the outward movement of the bolt is effected by a spring automatically, that the inner knob shank serves as a bolt actuator which is operative at all times to retract the bolt whenever it is turned, and that the outer shank is operative to retract the bolt only when the inner shank is in its inmost position and engaged therewith, as shown in Fig. 3, being inoperative and locked against rotation at all other times. The inner shank is held in either of its positions by the finger 33 (Fig. 23) which is mounted on a lever 34 and is adapted to enter either of the grooves 35 or 36 formed around the periphery of the shank 2. This lever is pivoted to the plate 37 of the lock which is fastened to the inner surface of the door.

One of the important features of the invention is the provision of means, such as a detent, which prevents the retraction of the bolt by pressure applied to its projecting end when the same is contained in the socket of the door jamb, but which is disabled so as to permit the bolt to be retracted in the manner of a latch when the door is being closed, and is caused to become operative to lock the bolt when the same has been re-projected into its socket. The locking device for the bolt consists of a rib 38 on the yoke 20 which is adapted to lie behind a shoulder 39 on the bolt when the yoke is projected into the notches 24 and 25. In this position, the yoke serves as a detent which is itself prevented from turning by the sides of the notches, and a part of which lies in the path of the shoulder 39 to obstruct the same and prevent inward movement of the bolt. The walls of the notches then serve as stationary abutments which enable the yoke to serve as a positive rigid detent. Whenever the bolt is retracted by turning the inner knob shank, the detent is displaced from its operative position by a cam projection 40 carried by the sliding block 26. This projection extends from the lower side of the block and has an inclined surface, as shown in Figs. 13 and 15, which engages a surface 41 on the lower end of the yoke 20 (Figs. 7 and 21). This block, as previously stated, is held against the projections 10 and 11 of the shank 2, and when the latter is turned so as to draw the bolt inward, the lower projection bears against the block and moves it at the same time in the opposite direction, as shown in Fig. 12. This movement causes the cam 40 to ride on the surface 41 of the detent yoke and push the same back into the outer shank and out of the way of the shoulder 39 so that it does not interfere with the movement of the latter. Thus the detent opposes no resistance to the retraction of the bolt when the knob shank is turned, although it will positively prevent any inward movement of the bolt independently of the shank. After the bolt has once been withdrawn by the shank, the detent is held out of the way of the shoulder by a sliding plate 42 (Fig. 16) which has a laterally projecting wing 43. This plate is mounted in the bolt in the manner best shown in Fig. 18, being laid along the under side of the member 27 of the bolt, and held against the same by a stud 44 passing through a slot 45 of the plate and a spring 46 bearing against the under side of the plate. The slot allows the plate to move endwise so that its wing 43 may alternately overlap the shoulder 39, as shown in Figs. 13 and 15, and be separated therefrom by a distance sufficiently great to admit the detent rib 38, as shown in Figs. 2, 3, 9 and 17. It should be noted that the shoulder 39 is

formed as a projection extending laterally from the side of the upper member 27 of the bolt, and that the wing 43 lies under this shoulder. The plate 42 has upwardly turned lugs 47 and 48 which embrace the part 27 of the bolt to guide the plate, and arms 49 and 50 which are carried downwardly from the plate and embrace the sliding block 26. These arms have offset extensions 51, 52 which terminate near the center line of the bolt and have notches 53 in their ends. At the rear of the offset portions are shoulders 54 55 which lie in front of pins 56 57 carried by the sliding block 26, and are engaged by these pins when the block is moved forward. When the block is thus moved, the pins engage the shoulders of the plate 42 and move the same forwardly, as shown in Fig. 12, until the wing 43 overlaps the shoulder 39. The bolt is then operative as a latch so that it can be retracted upon striking the edge of the door jamb until the detent-restraining wing 43 is again separated from the shoulder 39. This separation is effected at the same time that the bolt is retracted in closing the door, by a trigger or trip device 58 which is mounted so as to project from the edge of the door, being preferably contained in a recess 59 in the head of the bolt. When so mounted, it projects beyond the beveled surface 7. This trigger is connected with a rod 60 which slides through the bolt head into a slot 61 which forms a continuation of the opening 8 in the bolt. This rod carries a pin 62 of which the ends project transversely from the rod so as to engage the ends 51 52 of the arms which extend from the plate 42. Whenever the trigger is pushed into the recess 59, the ends of this pin enter the notches 53 and bear against the arm extensions 51 52, moving the plate back to move the wing 43 clear of the shoulder 39.

From the foregoing it will be understood that whenever the bolt has been retracted, by turning the inner knob, or by a key inserted from the outside, as will be presently described, the bolt detent is rendered inoperative, so that the bolt becomes a spring latch, which can be retracted by pressure on its outer end, and is thereby enabled to move back and slip into a socket automatically when the door is closed, and without requiring the bolt to be drawn back by turning the knob. At the same time that the bolt is retracted, by striking the edge of the socket, however, the trigger 58 is retracted to a greater extent, for it has not only as great a movement as that of the bolt, but also an additional movement sufficient to bring the most protuberant part of its outer edge flush with the surface 7 of the latch, as shown in Fig. 17. Thereby at the same time that the shoulder 39 is being carried rearwardly past the rib 38 of the

detent, the wing 43 is being moved more rapidly to open the detent-receiving space in rear of the shoulder 39. The parts are proportioned and the shape of the cam surfaces on the latch and trigger so designed that the space between the wing and shoulder is not opened widely enough to admit the rib 38 until the shoulder 39 has passed beyond the forward edge of the rib. However, before the latch is wholly past the edge of the jamb socket, the space between the wing and shoulder is sufficiently opened so that as soon as the bolt has projected into the socket, the detent will slip into its locking position, and will prevent anyone from opening the door by inserting a tool between the door and jamb and working the latch out of the socket.

It is to be noted that there is a second shoulder 63 on the opposite side of the bolt from the shoulder 39, a wing 64 on the opposite side of plate 42, and a cam 65 opposite to the cam 40 on the sliding block 26. These shoulders, wings and cams are duplicates of each other and are arranged in pairs, as shown, but only one set is operative at the same time. Duplicate members are provided in order that the latch may be placed with its beveled surface turned toward either side of the door desired, and thus the same lock may be applied without change, to a door swinging in either direction from the wall. In case the lock were to be applied to a door swinging in the opposite direction about its hinges from that in which it is adapted to swing with the arrangement here illustrated, the bolt casing 13 would be turned through a semi-rotation so that the beveled surface is toward the opposite side of the door from that shown in Fig. 2. The shoulder 63, wing 64 and cam 65 will then be operative instead of the shoulder 39, wing 43 and cam 40, but otherwise the action of the lock will be precisely the same as previously described.

It has been previously stated that when the knob shanks are disconnected, the outer shank is locked so that the handle cannot be turned, and in this condition the door can only be opened by means of a key. I have provided as a part of this invention, a device by which a key may be enabled to operate the lock, which will at the same time respond only to the proper key, and will make picking of the lock absolutely impossible. The key-operated member which alone is operative to actuate the lock is a bar 66 which is mounted so as to be longitudinally movable in the outer shank 4. This bar carries on its inner end fingers or blades 67 68, the former of which is mounted edgewise so that it can enter a slot 69 in the arm 11 of the knob shank 2 in front of the projection 19, while the finger 68 is arranged flatwise to give it suffi-

cient stiffness, and is arranged to lie behind the projection 18. Ordinarily the bar 66 is retracted so that the fingers do not engage the knob shank 2 when the latter is in its outer position, shown in Fig. 2, but when a key is inserted, the bar 66 is pushed inward to engage the fingers with the projections 18 and 19 of the inner shank. Then when the key is rotated, these fingers cause the shank 2 to turn and operate the lock in the manner already described. In order to make the lock selective, and prevent it being turned by any but the proper key, I provide in addition to the bar 66, a number of other bars, denoted by 70 71 and 72, respectively, which lie in contact with the bar 66 so that the latter cannot be turned without moving the others. These bars have flat abutting surfaces, but are externally cylindrical, and together form a complete cylinder which is contained in a tubular casing 73 mounted in the shank 4. This casing is secured in the shank by means, not shown, so that it cannot be itself turned, and it has longitudinal slots or grooves into which project studs on the bars so that they cannot be turned within the casing until they are longitudinally moved into certain positions. The longitudinal slots are represented by 74 75 76 and 77 on Figs. 34 and 35, which represent a development of the casing, and the projections on the bars which enter these slots are designated by 78, there being one on each bar contained in one of the longitudinal slots. These projections are preferably the heads of screws which are threaded into the outer sides of the bars. Intersecting the longitudinal slots are transverse slots 79 80 81 and 82, respectively, which permit the bars to be rotated within the casing when they have been moved longitudinally far enough to bring their studs opposite the respective transverse slots. For so moving the bars, I provide a key 83 of the general character illustrated in Figs. 26, 31 and 32, and having shoulders 84, 85 and 86, one of these shoulders being the end of the key, to engage the several bars. As will be seen from Fig. 34, which represents the position of the bars when they are retracted, the one designated by 72 is normally held so that its stud is opposite to the transverse slot 81, but the studs on the other bars are at varying distances from the transverse slots which respectively receive them, that on the bar 66 being at the greatest distance from its slot 79. It is this bar which is engaged by the end shoulder 84 of the key, while the other shoulders 85 and 86 are at distances from the end corresponding to the spacing between the slots and the several studs. In the casing at the outer end is a cylindrical block formed of two parts 87 88 which are fitted together and have a slot 89 through which the key may

be passed. The members of this block have grooves 90 91 which receive screws 92 93 set inwardly from the casing. The screws prevent removal of the block and rotation of the key until the latter has been moved far enough to bring the notches 94 95 in its opposite edges opposite these screws. Any greater insertion of the key is prevented by a shoulder 96 which abuts against the ends of the block. When the key is thus fully inserted, its shoulders engage the bars 66 70 and 72 and move them until their lateral projections are beside the respective transverse slots. When they have been thus far moved, the fingers 67 68 on the bar 66 are engaged with the inner knob shank and can then be turned by the key to operate the bolt.

The bars are contained in their innermost position abutting against the block 87 87, by means of springs 97 which are set into longitudinal grooves 98 in the outer surfaces of the bars. At their inner ends these springs abut against the ends of the groove, while their outer ends abut against ears 99 which are turned inwardly from a ring 100 contained in the end of the tubular casing 73. As shown in Fig. 30, this ring is incomplete, and has an opening 101 at one side which enables it to be contracted in diameter so that lugs 102 which project outwardly from one edge can be slipped into the end of the sleeve or casing 73. The resiliency of the sleeve 100 causes it to expand when the lugs arrive at slot 103 in the casing 73, thereby moving these lugs into the slots. The sleeve 100 is thus prevented from being forced out of the casing, while it is enabled to turn as far as necessary for operating the lock. When the bars are fully retracted by the springs 97, a pin 104 on the bar 66 enters a socket in the block 87 and maintains the bars and block in such a position that the slot 89 in the latter will guide the key into correct engagement with the bars. Preferably the bars are four in number and are formed as quadrants of a cylinder, their dividing surfaces being in rectangular axial planes, and there is a recess 105 formed partially in each of the segmental bars. The shoulders on the key are formed so that each will engage only its appointed bar, by cutting away the under part and side of the key. Thus, at the end of the key the portion below its center line is cut away, and also half the width of the key is removed, leaving the end shoulder 84 of such a width that it will be wholly contained in that portion of the recess 105 which is formed in the bar 66, while the metal below the shoulder 85 is cut away at the side of the key so that this shoulder will engage only the bar 70, and will move past the bar 71. By reason also of the fact that the key is half cut away below the shoulder 85, the shoulder 86 is

enabled to move past the bar 71 and operate only the bar 72. It is only the bar 66 which is actually operative to control the lock, the others being inserted to prevent operation by any but the proper key, and to prevent picking of the lock. A great number of locks may be provided for by differences in the positions of the transverse slots and studs 78, each such difference requiring a corresponding change in location in one or more of the shoulders on the key. Even a slight difference will prevent one key from operating another lock. Although in the arrangement illustrated the bar 71 is not moved longitudinally, it is obvious that the necessity for making this bar move also might be provided for, in which case a fourth shoulder on the key for operating the same would need to be provided. Picking of the lock is rendered impossible, because of the fact that several bars are provided, and that each must be moved longitudinally to a certain definite position before any can be turned. It is not essential that the bars should be segmental or that a recess 105 should be formed in their ends, but the essence of the invention is found in any structure where a number of bars are fitted together in a casing wherein they can only turn in unison, and in which they must be moved various longitudinal distances before they can turn at all.

Attention has already been called to the fact that the bar 71 need not be longitudinally moved as a preliminary to operating the lock. It should be noted, however, that the bar is capable of longitudinal movement exactly as are the others, and that this capability of movement gives an additional safeguard against picking the lock, for, if it should be moved at all, the lock actuator could not be turned, even though all the other bars were in their proper longitudinal positions with respect to the transverse slots of the casing 73. That is, before the lock can be key operated, three of the bars must be moved longitudinally by various amounts, and one of the bars must not be moved at all, and therefore a pick-lock not knowing the combination, would find it practically impossible to determine which of the bars must not be moved, in addition to finding out how far each of the other bars must be severally advanced. There is no way of trying each bar separately, for any one of the bars in locking position locks them all, so that none can be turned until all are simultaneously in the proper position and turned together.

I claim:—

1. A door-lock comprising a retractable bolt, inner and outer knob shanks, of which the inner is engaged at all times with said bolt so that it may retract the same and is detachably engageable with the outer, and

means associated with said outer shank and operative when the shanks are disengaged for preventing retraction of the bolt.

2. A door-lock comprising inner and outer knob shanks, a spring-projected bolt connected with said inner knob so that it may be retracted by the latter under all conditions, and a bolt-locking member carried by said outer knob shank for positively preventing retraction of the bolt.

3. A door-lock comprising inner and outer knob shanks, having means by which they may be engaged together, and disengaged, a spring-projected bolt connected with said inner knob so that it may be retracted by the latter under all conditions, and a bolt-locking member arranged to prevent said bolt from being retracted by pressure applied to its projecting end, when said knob shanks are disengaged from one another.

4. A combined door-lock comprising a sliding latch-bolt having a face shaped to cause its withdrawal upon striking a door jamb, a detent within the lock adapted to engage said bolt and prevent its withdrawal, means for holding said detent out of locking position, and a trigger carried by said bolt adapted to disable said detent-holding means, said trigger being itself independent of said detent.

5. A combined door-lock comprising a sliding latch-bolt, having a face shaped to cause its withdrawal upon striking a door jamb, a detent within the lock arranged to engage a shoulder of said bolt to prevent retraction thereof by pressure externally applied, and a shield member mounted upon said bolt and movable thereon, said shield having portions arranged to hold said detent out of engagement with said shoulder when in one position, and to permit such engagement when in another position, said shield being held so as to remain in either of its positions.

6. A combined door-lock comprising a sliding latch-bolt, having a face shaped to cause its withdrawal upon striking a door jamb, a detent within the lock arranged to engage a shoulder of said bolt to prevent retraction thereof by pressure externally applied, a shield mounted on and being movable relatively to said bolt, and being constructed and arranged to remain in any of its positions for retaining said detent out of engagement with said shoulder, a trigger arranged to be actuated upon striking the door-jamb for displacing said shield and permitting operation of the detent, a bolt retractor, and means operated by said retractor for placing the shield in detent-disabling position.

7. A combined door-lock, comprising a latch-bolt, having a face shaped to cause its withdrawal upon striking a door jamb, a detent within the lock arranged to engage

and obstruct the inward movement of said bolt, a bolt retractor, and a slide mounted to travel on said bolt, operated by said retractor simultaneously with and oppositely to the movement of the bolt, and constructed to disable said detent when thus operated.

8. A combined door-lock and latch, including a sliding bolt having a beveled face whereby it may be retracted by striking the edge of a latch socket, a shoulder on said bolt, a detent beside said shoulder located so as to engage the same and prevent retraction of the bolt, a shield carried by said bolt and adapted to be so placed as to hold said detent in a position where it will not interfere with said shoulder upon retraction of the bolt, and a trip for displacing said shield.

9. A combined door-lock and latch, including a sliding bolt having a beveled face whereby it may be retracted by striking the edge of a latch socket, a shoulder on said bolt, a detent beside said shoulder located so as to engage the same and prevent retraction of the bolt, a shield carried by the bolt and adapted to be so placed as to hold said detent in a position where it will not interfere with said shoulder upon retraction of the bolt, and a trip connected with said shield and projecting from the exposed end of the bolt, adapted to be pressed inward by contact with the socket edge for displacing said shield.

10. A combined lock and latch, comprising a bolt, a manually-actuated retractor therefor, a spring-actuated projector therefor reacting against said manual retractor, a detent arranged to cooperate with a shoulder on said bolt for preventing retraction thereof, and means rendered operative by said projector for displacing said detent.

11. A combined lock and latch, comprising a bolt, a manually-actuated retractor therefor, a spring-actuated projector therefor reacting against said manual retractor and movable thereby in a direction opposite to that in which the bolt moves, a detent arranged to cooperate with a shoulder on said bolt for preventing retraction thereof, and means arranged to engage and displace said detent from the path of the cooperating shoulder, when said projector is moved by the retractor as the latter retracts the bolt, to permit such retraction.

12. A combined lock and latch, comprising a bolt, a manually-actuated retractor therefor, a spring-actuated projector therefor reacting against said manual retractor and movable thereby in a direction opposite to that in which the bolt moves, a detent arranged to cooperate with a shoulder on said bolt for preventing retraction thereof, and a cam member carried by said projector located so as to engage and displace said de-

tent from the path of the cooperating shoulder, when the projector is moved by the retractor, to permit retraction of the bolt thereby.

5 13. A combined lock and latch for doors, comprising a bolt, an outer knob shank, an inner knob shank adapted to be located in a plurality of positions, in one of which it is connected with said outer shank, and being
10 operatively engaged with said bolt in all positions, and a detent carried by the outer shank arranged to prevent inward movement of the bolt when the shanks are disconnected and to be rendered inoperative when
15 they are connected together.

14. A combined lock and latch for doors, comprising a bolt, an outer knob shank, an inner knob shank adapted to be located in a plurality of positions, in one of which it is
20 connected with said outer shank, and being operatively engaged with said bolt in all positions, and a detent carried by the outer shank arranged to prevent turning of the same and inward movement of the bolt when
25 the shanks are disconnected, said detent being made inoperative by the connection of the shank.

15. A combined lock and latch for doors, comprising a bolt having a shoulder, an
30 outer knob shank, an inner knob shank adapted to be located in a plurality of positions, in one of which it is connected with said outer shank, and being operatively engaged with said bolt in all positions, a stationary abutment, and a detent carried by the outer shank
35 arranged to engage said abutment and shoulder and thereby prevent both turning of the outer shank and retraction of the bolt by direct pressure thereon, said detent being
40 arranged so as to be held out of the way of the abutment and shoulder when the shanks are connected together.

16. A door-lock and latch comprising an outer knob shank, a sliding bolt having a
45 shoulder, a detent carried by said shank, means tending to hold said detent in position to be engaged by said shoulder, preventing inward movement of the bolt, and an inner knob shank operatively engaged
50 with the bolt so as, in being turned, to retract the same, and adapted to be connected with the outer shank so that it may be operated by the latter, said inner shank having provisions whereby to displace the detent
55 from its operative position, when connected with the outer shank.

17. A door-lock and latch comprising an outer knob shank, a sliding bolt having a shoulder, a detent carried by said shank, a
60 stationary abutment beside the bolt, means tending to hold said detent in position to be engaged by said shoulder and to engage said abutment, preventing inward movement of the bolt and rotation of the shank,
65 and an inner knob shank operatively en-

gaged with the bolt so as, in being turned, to retract the same, and adapted to be connected with the outer shank so that it may be operated by the latter, said inner shank having provisions whereby to displace the
70 detent from its operative position, when connected with the outer shank.

18. A door-lock and latch comprising an outer knob shank a sliding bolt having a shoulder, a detent carried by said shank, a
75 stationary abutment beside the bolt, means tending to hold said detent in position to be engaged by said shoulder and to engage said abutment, preventing inward movement of the bolt and rotation of the shank,
80 and an inner knob shank operatively engaged with the bolt so as, in being turned, to retract the same, said inner shank being adapted to occupy a plurality of positions, in one of which it holds said detent clear of
85 the abutment and shoulder and is connected with the outer shank so that it may be turned by rotation of the latter, whereby retraction of the bolt by turning the outer shank is permitted.
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19. A door lock and latch comprising an outer knob shank, a sliding bolt having a shoulder, a detent carried by said shank, means tending to hold said detent in position to be engaged by said shoulder, pre-
95 venting inward movement of the bolt, an inner knob shank operatively engaged with the bolt so as, in being turned, to retract the same, and being capable of occupying a position in which it is free from connection
100 with the outer shank, and a key-operated device engageable with the inner shank when in this position, whereby the said shank may be turned and the bolt retracted by a key from the outside.
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20. A door-lock and latch comprising a bolt having a shoulder, an outer shank carrying a knob or handle, a detent carried by said shank and arranged to engage a fixed
110 abutment to prevent turning of the shank, and to engage said shoulder on the bolt to prevent retraction thereof, and a key-operated element for disengaging said detent from the bolt shoulder and retracting the bolt.
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21. A door-lock and latch comprising a bolt having a shoulder, an outer shank carrying a knob or handle, a detent carried by said shank and arranged to engage a fixed
120 abutment to prevent turning of the shank, and to engage said shoulder on the bolt to prevent retraction thereof, and a key-operated element contained in said shank and adapted to be moved inward by insertion of a key, and to disengage said detent from
125 the bolt shoulder and retract the bolt when rotated by turning of the key.

22. A door-lock and latch comprising a bolt having a shoulder, an outer shank carrying a knob or handle, a detent carried by
130

said shank and arranged to engage a fixed abutment to prevent turning of the shank, and to engage said shoulder on the bolt to prevent retraction thereof, a member having a movement different from that of the bolt and carrying a cam surface located so as to engage said detent and displace the same from the path of the bolt shoulder, and a key-operated element arranged to be projected inwardly and turned by a key to move said member and retract the bolt.

23. A door-lock and latch comprising a bolt having a shoulder, an outer shank carrying a knob or handle, a detent carried by said shank and arranged to engage a fixed abutment to prevent turning of the shank, and to engage said shoulder on the bolt to prevent retraction thereof, a slide having a movement relatively to the bolt oppositely thereto, carrying a cam surface located so as to engage said detent and remove it from the path of the bolt shoulder, an interior member distinct from said shank, engaged with said slide and bolt, a key-operated element adapted to be brought into connection with said member by a key and turned so as to actuate said member to move the bolt and slide oppositely, thereby releasing and retracting the bolt.

24. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt, a detent adapted to engage said member to prevent its retraction by force applied to its projecting end, means for rendering said detent inoperative, and a device projecting from the projecting end of the member being mounted therein and having movement relatively thereto, for disabling said means and permitting said detent to become operative.

25. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt, a detent adapted to engage said member to prevent its retraction by force applied to its projecting end, means for rendering said detent inoperative, and a trigger projecting from within the end of said member and movable inwardly to disable said means and permit said detent to become operative, said member being beveled to cause such inward movement upon striking a door-jamb.

26. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt and having a shoulder, a detent adapted to be located behind said shoulder so as to prevent retraction of said member by force applied to the outer end thereof, a shield carried by said bolt and arranged to slide thereon adapted to be placed so as to hold said detent out of the way of the shoulder, whereby the member may be retracted by external force, and a trigger for displacing said shield and permitting the detent to become operative, said trigger and

bolt being each movable independently of the other.

27. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt and having a stop shoulder, a manual actuator engaging said member within the lock and operable to retract the same, a detent positionable so as to obstruct said stop shoulder and prevent inward movement of the member, means operated by said actuator for disabling said detent, whereby retraction of the member as a latch by external application of force is permitted, and a trip arranged to be struck by the door jamb and moved thereby independently of the movement of the bolt in the closing of the door for displacing said means and allowing the detent to return to locking position after the next projection of the member.

28. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt and having a stop shoulder, a detent beside said member arranged to extend into the path of said shoulder and obstruct inward movement thereof, a shield mounted on said member so that it may slide longitudinally thereon, having a wing arranged to occupy a position in which it engages said detent, holding the same out of the way of said shoulder, and a position in which it is clear of the detent, and a trigger or trip device projecting from the lock and arranged to move said shield from the first to the second position.

29. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt and having a stop shoulder, a detent beside said member arranged to extend into the path of said shoulder and obstruct inward movement thereof, a shield having a wing arranged to occupy a position in which it engages said detent, holding the same out of the way of said shoulder, and a position in which it is clear of the detent, and a trigger or trip device projecting from the latch and bolt member and beyond the end of the same, so that it may strike a door jamb and be retracted as the door is closed, arranged to move said shield from the first to the second said position.

30. A door-lock and latch consisting of a single member adapted to serve both as a latch and as a bolt and having a stop shoulder, a detent beside said member arranged to extend into the path of said shoulder and obstruct inward movement thereof, a shield having a wing arranged to occupy a position in which it engages said detent, holding the same out of the way of said shoulder, and a position in which it is clear of the detent, a manually-operated actuator for retracting said member, a device mounted on said member so as to be moved by said actuator in the retraction of the member, for displacing

said detent and moving said shield into the first said position thereof, and a trigger or trip device projecting from the lock and arranged to move said shield from the first 5 to the second position.

31. A door lock and latch consisting of a single member adapted to serve both as a latch and as a bolt mounted slidingly and arranged to be retracted upon striking a 10 door jamb in closing of the door, a spring for projecting said member, a trigger or trip device carried by said member and projecting from the interior thereof, being arranged also to be retracted by similarly 15 striking the door jamb, a detent, and means controlled by retraction of said trigger for causing said detent to obstruct the inward movement of the member.

32. A door-lock, comprising a cylindrical 20 casing adapted to be set transversely in the door, knob shanks therein, a second cylindrical casing adapted to be set into the edge of the door intersecting the first casing, and having a slot of which the edges lock with 25 the inner end of one of said shanks to prevent removal of the latter, and a sliding bolt beveled on one side held in said second casing, with which one of said knob shanks is connected to operate the same, said cas- 30 ings being formed to fit together so that, when assembled, the knob shanks and bolt will be in correct relation, and the second casing being reversible to permit assemblage of the parts with the beveled surface of the 35 bolt toward either side of the door.

33. A door-lock, comprising a cylindrical casing adapted to be set transversely in the door, knob shanks therein, a second cylindrical casing adapted to be set into the edge 40 of the door intersecting the first casing, a sliding bolt contained in said second casing, having a beveled outer end, and constructed with provisions whereby it may be engaged and retracted by one of the shanks, a bolt- 45 locking detent, and stop shoulders, detent retractors and detent arresters made in pairs and carried symmetrically by said bolt, only one of each of said pairs being operative at one time, whereby the second casing and bolt 50 may be reversed to turn the beveled face of the bolt toward either side of the door.

34. A door-lock comprising a bolt, inner and outer knob shanks, a prong carried by said inner shank engaging said bolt at a 55 point eccentric to the axis of said shank, and a longitudinally movable bar contained in said outer shank adapted to be pushed inward by a key into engagement with said prong and to be turned, whereby said prong 60 is turned to retract the bolt.

35. A door-lock comprising a bolt, inner and outer knob shanks, a pair of prongs carried by said inner shank and engaging said bolt at points eccentric to the axis of said

shank, whereby turning of the prongs may 65 retract the bolt, said prongs being normally disengaged from said outer shank, and a key-operated bar having fingers on its inner end carried by said outer shank, adapted to be moved inward to put said fingers into 70 rotation-transmitting engagement with the prongs, and to be turned when so engaged, to retract the bolt.

36. A door-lock comprising a bolt, an inner knob shank engaged with said bolt so that, 75 in being turned, it may retract the bolt, an outer knob shank distinct from said inner shank, a bar longitudinally movable in said outer shank and adapted to be engaged at its inner end in rotation-transmitting con- 80 nection with said inner shank when pushed inward by insertion of a key in the outer shank, whereby such key may be enabled to rotate the inner shank and actuate the bolt, a sleeve in which said bar is contained, 85 having longitudinal and transverse grooves, and a pin on the side of the bar arranged to traverse said slots and prevent rotation of the bar until the pin comes opposite a trans- 90 verse slot, whereby the lock can be operated only by a key of the proper length.

37. A door-lock comprising a bolt, an inner knob shank engaged with said bolt so that, in being turned, it may retract the bolt, an 95 outer knob shank distinct from said inner shank, a bar longitudinally movable in said outer shank and adapted to be engaged at its inner end in rotation-transmitting connection with said inner shank when pushed inward by insertion of a key in the outer 100 shank, whereby such key may be enabled to rotate the inner shank and actuate the bolt, a sleeve in which said bar is located, a second bar in said sleeve associated with the first bar so that neither can be turned with- 105 out turning the other, said sleeve having longitudinal and transverse grooves, and pins on said bars contained in said grooves, the bars being engaged by the key and moved 110 different distances until the pins are opposite the proper respective transverse grooves.

38. A door-lock comprising a bolt, an inner knob shank engaged with said bolt so that, in being turned, it may retract the bolt, an 115 outer knob shank distinct from said inner shank, longitudinally and rotarily movable bars contained side by side in said outer shank and engaged together so as to be rotatable only in unison, one of said bars being 120 formed to make connection when moved inward, with said inner shank, pins carried by said bars arranged to traverse different longitudinal and transverse grooves in the element surrounding the bars, and a key 125 having shoulders to engage and move certain of said bars various distances inward until the pins are opposite the several proper transverse grooves.

39. In connection with a door-lock having a bolt, an outer shank, and an inner shank distinct from said outer shank and engaged with said bolt so as to be capable of re-
5 tracting the same, a sleeve set into said outer shank, longitudinally and rotarily movable bars contained in said sleeve fitting each other and the sleeve so that they can rotate only in unison and one of them having pro-
10 visions for making rotation-transmitting connection with said inner shank, longitudinal and transverse slots in the sleeve, pins projecting from the sides of said bars, one into each longitudinal slot to prevent
15 rotation of the bars, and a key having shoulders to engage certain of the bars and move them longitudinally until their pins are opposite the proper transverse slots, said slots and pins being variously positioned for
20 the several bars and the shoulders on the key correspondingly arranged, whereby opera-

tion of the lock by any but the proper key is prevented.

40. In a door-lock, a casing, a bolt sliding therein, an outer handle shank, a detent car- 25 ried at the end of said shank and spring-pressed outward so as to enter a notch in said casing, to prevent rotation of the shank, and an inner knob shank engaged eccentrically with said bolt so as to retract the 30 same, said shank being placeable in a plurality of positions, in one of which it holds said detent out of the casing notch and is engaged with said outer shank in such a man- 35 ner that it may be turned by the outer shank to operate the bolt.

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

WILFORD A. HILL.

Witnesses:

ARTHUR H. BROWN,
P. W. PEZZETTI.