Jan. 11, 1966 W. B. WILSON 3,228,218

LOCK SET ASSEMBLY

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Fig. 2.

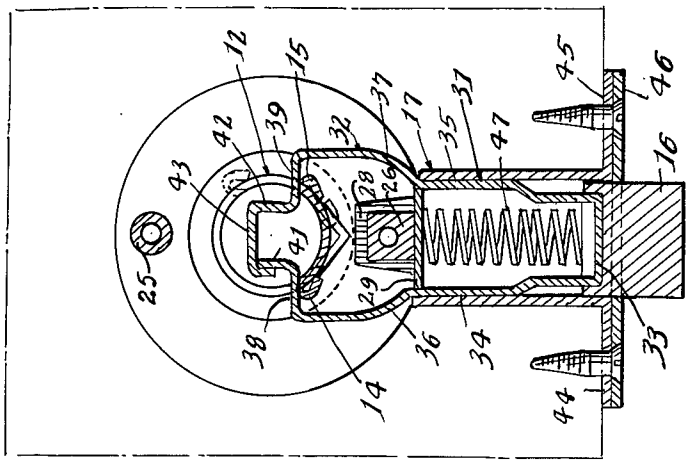
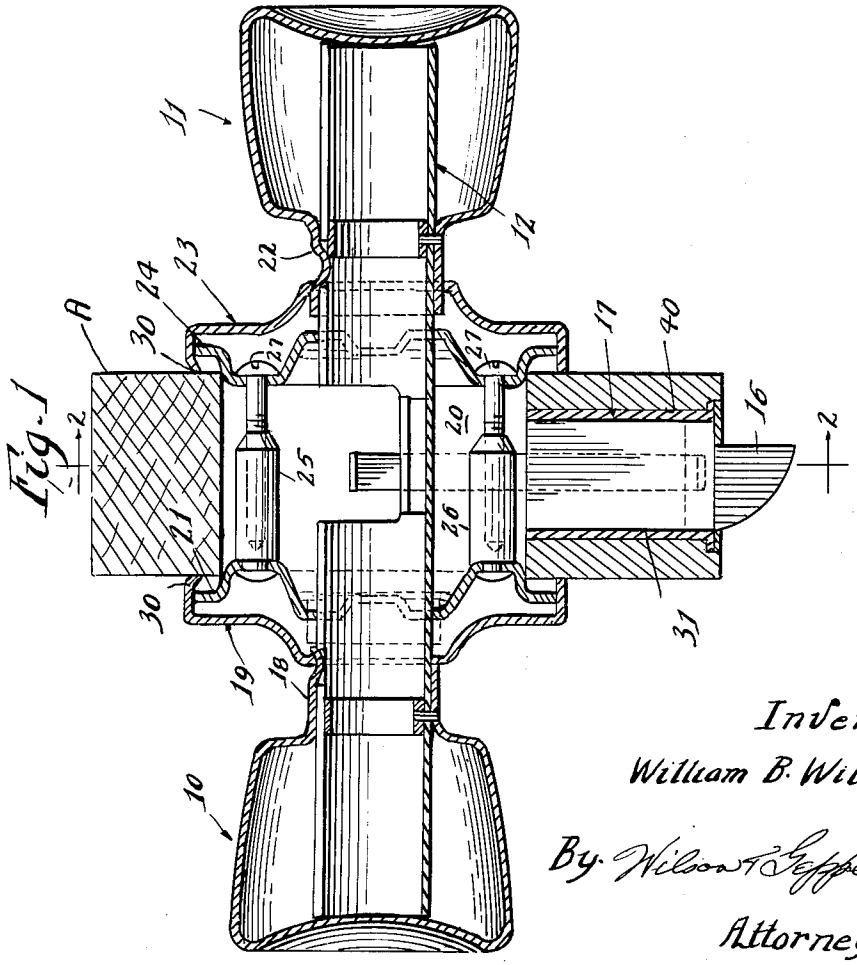


Fig. 1



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LOCK SET ASSEMBLY

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Fig. 3

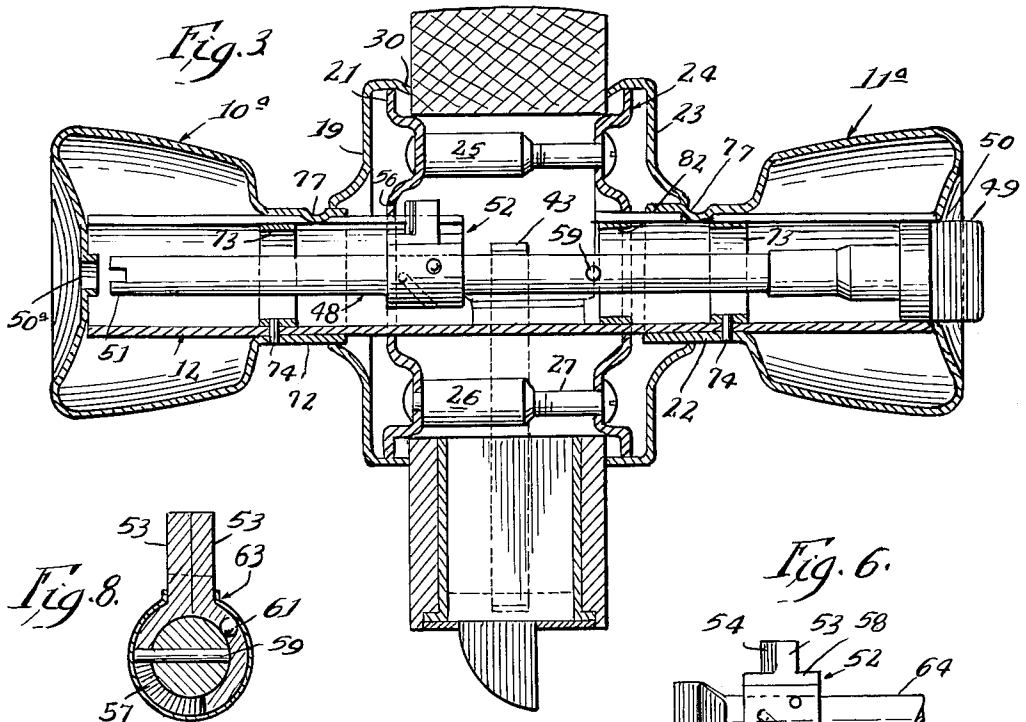


Fig. 8.

Fig. 6.

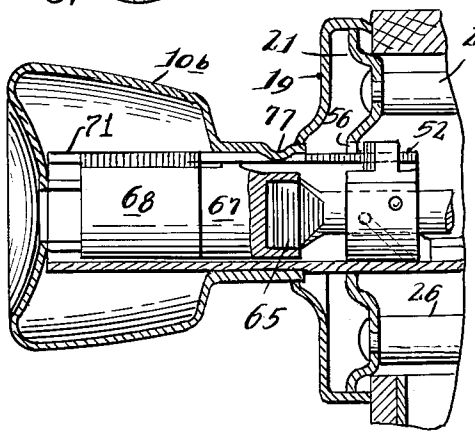
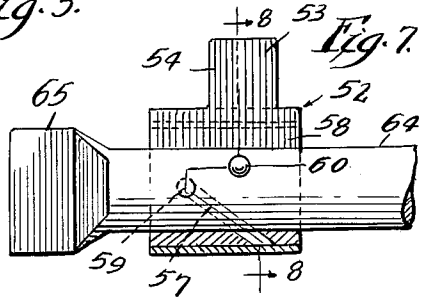


Fig. 5.

Fig. 7.



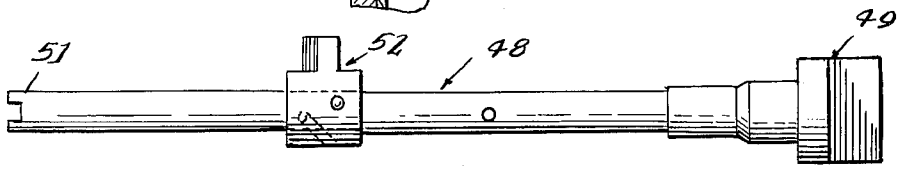


Fig. 4.

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LOCK SET ASSEMBLY

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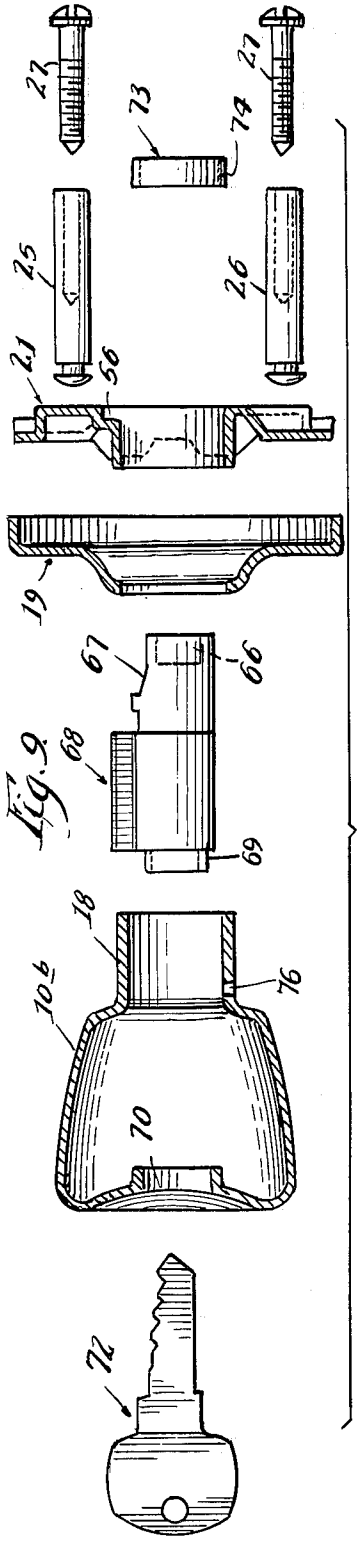


Fig. 9

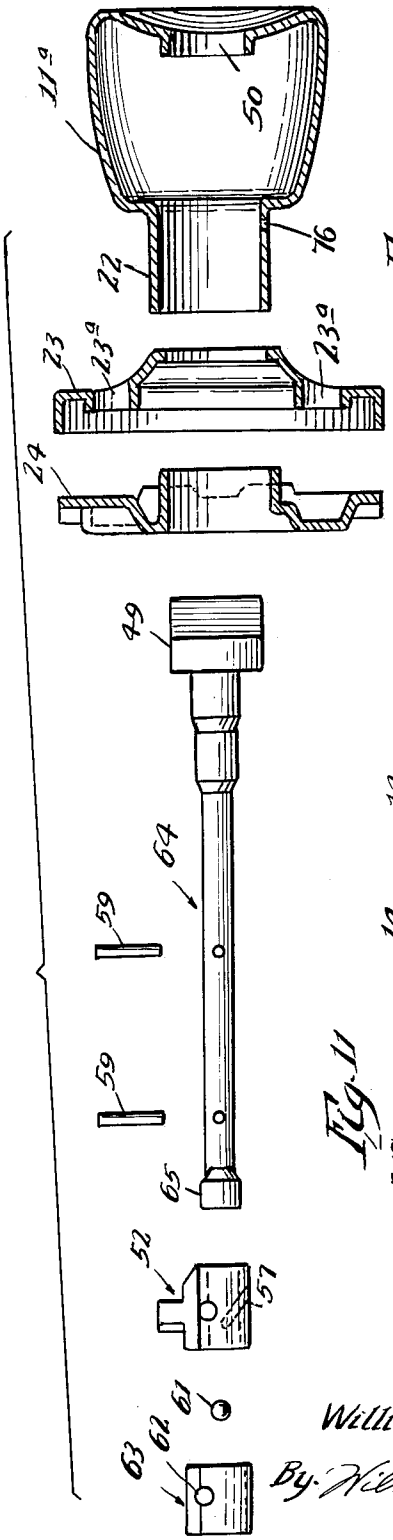


Fig. 10

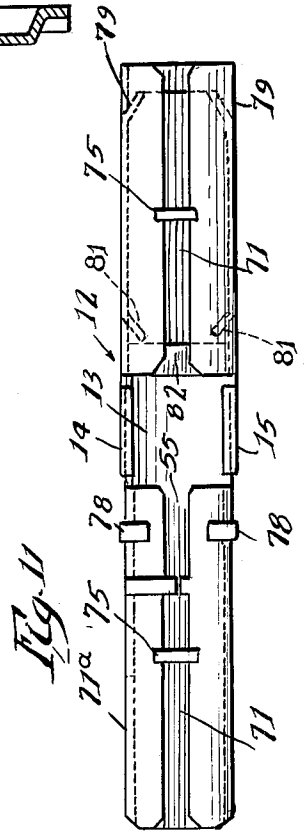


Fig. 11

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3,228,218

LOCK SET ASSEMBLY

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Filed June 7, 1963, Ser. No. 286,305
6 Claims. (Cl. 70—146)

The present invention relates to a novel lock set embodying a simplified basic assembly consisting of an outer and an inner knob, a slotted cam tube on the opposite ends of which are mounted the knobs, spaced clamp plates adjustably clamped to the opposite sides of the door and connected by spaced studs and screws, an inner and an outer escutcheon mounted on and enclosing the clamp plates, and a retractable latch bolt actuated by camming surfaces on the cam tube.

This basic assembly in which the clamp plates provide a housing for the retractor and camming means is readily converted to a privacy lock set by the simple insertion of a locking rod or bar into the slotted cam tube, the rod having a turn button at its inner end projecting through an opening in the inner knob and adapted to be rotated to lock the door from the interior by means of a locking member movable longitudinally along the rod. When the turn button and locking rod are rotated to locking position, the locking member prevents turning of the outer knob and tube until released from the interior by returning the push button and rod to inoperative position. Similarly, the basic assembly is adapted to include a locking rod with its locking member and a cylinder lock mounted in the outer knob and adjacent end of the cam tube, to convert the basic assembly into a key lock set. In both these converted lock sets to provide a privacy or a key-operated lock set assembly the inner knob is provided with an opening through which projects the turn button on the locking rod, and the outer knob of the key lock set is also provided with an opening to receive a cylinder lock for rotating the locking rod and releasing the locking member to permit the outer knob to rotate the cam tube and retract the latch bolt.

The present invention thus comprehends a novel basic lock set assembly comprising an outer and an inner knob each affixed to an end of a single slotted cam tube, a preassembled latch bolt assembly including a retractor actuated by camming means on said cam tube, a clamp plate for each side of the door and studs bridging and mounting said clamp plates in spaced relation in accordance with the thickness of the door, and an escutcheon mounted on the exterior of each clamp plate.

Another important object of the present invention is to provide a novel basic lock set assembly with the components including a single cam tube for retracting the latch bolt, and novel locking means for said cam tube actuated by a turn button to provide either a privacy lock set in which the door is locked and unlocked from the interior or a key-operated lock set in which the door is locked or unlocked from the interior but also capable of being unlocked from the exterior.

A further object of the present invention is the provision of a novel privacy lock set embodying a single slotted cam tube so constructed and arranged as to receive a rotatable locking rod carrying a locking member longitudinally movable along said rod upon rotation of the latter, whereby rotating a turn button on the end of the rod at the interior of the door causes said locking member to lock the outer knob against turning and retraction of the latch bolt until released by returning the turn button and its rod and locking member to release or inoperative position.

The present invention further comprehends providing the outer knob with a cylinder lock capable of being

operated from the exterior of the door, and in which insertion and rotation of the proper key in the cylinder lock causes the locking rod to be rotated to its inoperative position with the locking member retracted from its locking position, whereupon the outer knob is free to be rotated and in turn rotate the cam tube to retract the latch bolt.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

FIGURE 1 is a view in horizontal cross section of a lock set for a passage door where the inner and outer knobs are free to turn and retract the latch bolt for opening the door.

FIG. 2 is a view in vertical cross section taken on the line 2—2 of FIG. 1, except that in FIG. 2 the face plate of the latch bolt housing is shown of the non-mortise type while that of FIG. 1 is of the mortise type.

FIG. 3 is a view similar to FIG. 1 but of a privacy lock in which the cam tube is provided with a longitudinally extending locking rod or bar having a turn button projecting through the inner knob and a locking member on the rod for locking the outer knob against turning.

FIG. 4 is a top plan view of the locking rod and its locking member of FIG. 3.

FIG. 5 is a fragmentary view in horizontal cross section of the outer knob, cam tube and locking rod assembly shown in FIG. 3 except that in the outer knob is provided a cylinder lock and the outer end of the locking rod is formed to be received in a slot in the adjacent end of the plug ring of the cylinder lock to permit the door when locked from the inside to be opened from the outside by use of the proper key.

FIG. 6 is a fragmentary top plan view of the outer end of the locking rod and its locking member in the embodiment of FIG. 5.

FIG. 7 is an enlarged view similar to FIG. 6 but with the locking member encompassing the locking rod being shown in horizontal cross section.

FIG. 8 is a view in vertical cross section of the locking member, the view being taken in the irregular plane represented by the line 8—8 of FIG. 7.

FIG. 9 is a disassembled view of the outer knob and key lock assembly of FIG. 5 including a key, outer knob, cylinder lock, outer escutcheon, outer clamp plate, studs, screws and a locking collar, the knob, escutcheon and clamp plate being shown in horizontal cross section.

FIG. 10 is a disassembled view of the details of the locking rod or bar assembly, the inner clamp plate, the inner escutcheon and the inner knob of the key lock assembly, the locking member of the locking rod, clamp plate, escutcheon and knob being shown in horizontal cross section.

FIG. 11 is a view in rear elevation of the cam tube employed in the door lock sets of FIGS. 1, 3 and 5.

Referring more particularly to the disclosure in the drawings in which the basic assembly or components of the present invention in a lock construction is adapted for use in (1) a passage lock set, (2) a privacy lock set and (3) a key lock set, such basic assembly comprises an outer knob **10**, an inner knob **11**, a single slotted cam tube **12** with its opposite ends projecting into the knobs and having an intermediate portion cut away at **13** with the edges thereat bent or folded back to provide camming members **14** and **15** for retracting a latch bolt **16** in a latch bolt assembly **17**. These camming members **14** and **15** are shown in full lines in inoperative posi-

tion and in dotted lines in camming position to retract the latch bolt (FIG. 2).

Adjacent the neck 18 of the outer knob 10 is an escutcheon 19 and an outer clamp plate 21 longitudinally adjustable on the slotted tube 12, and adjacent the neck 22 of the inner knob 11 is an escutcheon 23 and an inner clamp plate 24. The clamp plates 21 and 24 each have a tubular neck portion conforming closely to the outer diameter of the cam tube 12 and are disposed in spaced relation and anchored in a transverse bore 20 in a door or closure A by means of a round stud 25 and a square stud 26 affixed to and projecting from the plate 21 and screws 27 inserted through the inner clamp plate 24 into the threaded studs. Openings 23^a (FIG. 10) in the inner escutcheon 23 permit access to these screws. Each escutcheon is retained on its clamp plate by snaps or detents 30. The square stud 26 also passes through a conforming opening in a projection 28 on the tail piece 29 of a latch bolt housing 31 for mounting the latch bolt assembly 17 and its bolt retractor 32, the latter being rigidly affixed or staked at one end 33 to the bolt 16. The clamp plates 21 and 24 are spaced apart a distance depending upon the thickness of the door A.

This bolt retractor 32 has spaced legs 34 and 35 projecting inwardly through the tubular housing 31 and retained in slots in the tail piece 29 clamped or affixed to and forming a closure for the inner end of the housing 31. The legs 34 and 35 beyond or rearwardly of the tail piece are bent outwardly and rearwardly at 36 and 37 and then each is bent inwardly to provide relatively wide shoulders 38 and 39 contacted by the camming members 14 and 15, the latter providing a rollback on the spaced edges of the cutout portion 13 of the slotted tube or tubular member 12. Each of the legs 34 and 35 is then bent rearwardly at the end at 41 and 42 with one end 43 bridging and connecting the other to retain these ends against disengagement.

With the legs 34 and 35 being of spring metal and flexible, the extended or expanded portions thereof may be compressed sufficiently to be projected through a bored hole 40 in the edge of the door, the hole being of a diameter or cross section to tightly and conformably receive therein the housing 31 of a mortise type latch assembly (FIG. 1), or affixed or staked to the outer end of the housing 31 by ears 44 and 45 is a face plate 46 (FIG. 2) of the non-mortise type securely held in the conforming opening in the door by screws or other attaching means. A coil or expansion spring 47 springbiases the latch bolt 16 into projected position and latching engagement.

All of the above elements are common in the passage door lock set, in a privacy lock set without a key-operating mechanism, and in a key lock set incorporating elements of the privacy set.

In the privacy lock set (FIGS. 3 and 4) there is provided a locking rod or bar 48 having a turn button 49 on its inner or forward end projecting through an opening 50 in the inner knob 11^a. The other end of the rod 51 is bifurcated and this bifurcated end projects into the outer knob 10^a which in this assembly is provided with a small opening 50^a through which may be projected a small blank key, screwdriver or other small instrument capable of being projected into the adjacent slotted or bifurcated end 51 of the locking rod 48 and turn the latter to release it from its locking engagement as will be hereinafter explained.

On the locking rod 48 is mounted a locking lever or member 52 (FIGS. 6, 7 and 8) in the form of a split collar provided with lateral projections 53 having a tapered leading edge 54 received and slidable in a slotted portion 55 of the outer end of the cam tube 12, and adapted to be projected and guided into a slot 56 in the outer fixed or stationary clamp plate 21. Said locking member 52 is provided with an inclined or spiral slot 57 (FIGS. 7 and 8) extending through an arc of approximately 90° in the collar 58 of the locking member and a hole receiving a pin 59 projecting into said slot.

This locking member 52 also has a recess 60 receiving a ball bearing 61 capable of being received in a recess 62 in a locking spring 63 in the form of a resilient sleeve encompassing the annular collar or body 58 of the locking member 52. Thus the rod may be turned relative to the locking member through an arc of approximately 90° and move the locking member 52 longitudinally of the rod 48 through a distance (approximately ¼ inch) sufficient to move the locking member 52 into and out of the slot 56 in the fixed outer clamp plate 21. The ball 61 and the recess 62 in which it is adapted to be received in the encompassing locking spring 63 provides a detent for frictionally retaining the locking member 52 in its extended locked position upon turning of the turn button 49.

Turning of the turn button 49 through an arc of approximately 90°, locks the outer knob 10^a and the cam tube 12 against turning movement from the outside and retraction of the latch bolt retractor 32 and its latch bolt 16 until the turn button 49 in the inner knob 11 is returned to its unlocked position and the outer knob 10^a is released. As a precautionary measure to permit the latch bolt 16 to be retracted from the exterior in the event of an emergency such as where a small child in entering the room closes the door and turns the button 49 to locked position, an instrument may be inserted through the opening 50^a in the outer knob 10^a and the end thereof received in the bifurcated end 51 of the locking rod 48 and turn the latter to release position in which the locking member is withdrawn from the slot 56 in the clamp plate 21. Thereupon the outer knob 10^a is released and may be turned to retract the latch bolt 16 and open the door.

Where the outer knob 10^b is provided with a key lock as shown in FIGS. 5 and 9, a locking rod or bar 64 similar in construction to the rod 48 except for its being provided with a flattened and widened end 65 as in FIGS. 5, 6, 7 and 10 is employed. This end portion is adapted to be conformably received in a recess 66 on the inner end of a plug ring 67 of a cylinder lock 68 having a conventional cylinder 69 conformably received in a recess 70 in the outer knob 10^b and the slot 71^a in the cam tube 12, the lock 68 being actuated by a key 72. Except for the above changes, the details of the key lock set are similar to that of the privacy lock set of FIG. 3 and similar reference characters are applied to like parts.

The outer and inner knobs 10 and 11 of the passage lock set of FIG. 1, the outer and inner knobs 10^a and 11^a of the privacy lock set of FIG. 3, and the outer and inner knobs 10^b and 11^a of the key lock set of FIG. 3, are each staked to and retained on the cam tube 12 in assembled relation by an annular expansible spring 73 having a projection 74 adapted to project through an aligned slot 75 in the cam tube 12 opposite its longitudinal slots 71, 71, and into a transverse slot 76 in the neck 18 and 22 of these knobs. Each neck is also provided with a detent 77 adapted to be received and aligned in one of the slots 71 of the cam tube 12, whereby each knob is retained affixed to the cam tube.

The outer end of the cam tube 12 (FIG. 11) is also provided with one or more embossments 78 forming stops or abutments adjacent the interior of the outer clamp plate 21, and with indentations 79 for locating the turn button in the inner end of the cam tube 12, and similar indentations 81 for locating one side of a split washer or back bearing 82 (FIG. 3) in the cam tube 12. A pin 59 in the locking rod 64 locates the other side of this washer 82.

The basic assembly of the cam tube 12, latch bolt assembly 17, outer and inner escutcheons 19 and 23, outer and inner clamp plates 21 and 24 and the connecting studs 25 and 26 and screws 27, is common for use in a passage lock set (FIG. 1), in a privacy lock set (FIG. 3) or in a key lock set (FIG. 5). This simplifies the cost of manufacture, invoice of parts and of assembly. It requires no housing except for the clamp plates 21 and 24 enclosed

by the escutcheons 19 and 23 when assembled in the door A.

To readily and easily convert this comon basic assembly into a privacy or key-operated lock, there may be added the locking rod or bar assembly 48 for a privacy lock or the locking rod 64 for a key operated lock, each with its turn button 49 and its locking member 52, the latter being longitudinally movable in the slot 55 in the outer end of the cam tube 12 and into and out of the slot 56 in the outer stationary clamp plate 21 for locking the cam tube and outer knob against turning until the locking rod 64 is released, either by turning the turn button 49 in the inner knob 11a, or by rotating the locking rod 48 by the proper key 72 to release the locking member 52.

To accommodate the turn button for either the privacy or key lock, the inner knob 11a is provided with a central opening 50. To permit access to a room in which the door is locked from the inside by turning of the push button 49 and locking rod 48 as in FIG. 3, the outer knob 10a is preferably provided with an opening 50a such as a relatively narrow slot through which a key blank or small screwdriver may be inserted into the slotted or bifurcated end 51 of the extreme outer end of the rod 48 and turned. Such turning retracts the locking member 52 on the rod 48. When the member 52 is withdrawn and released from the slot 56, the outer knob 10a may be turned to rotate the cam tube 12 and retract the retractor 32 and the latch bolt 16.

In the key-operated lock of FIGS. 5 to 11, inclusive, the locking rod 64 with its elongated portion extending from the locking member 52 to the flattened end 65 thereof is employed along with the cylinder lock 68. The flattened end 65 extends into the recess 66 in the plug ring 67 (FIG. 5).

Assuming the turn button 49 and its locking rod 48 (FIG. 3) or 64 (FIG. 5) are turned to advance the locking member 52 in the slot 71 of the cam tube 12 until it is received in the aligned slot 56 in the fixed or stationary outer clamp plate 21, the outer knob 10a or 10b and the cam tube 12 are prevented from being rotated to retract the retractor 32 and the latch bolt 16. However, by insertion and turning of the proper key 72 in the lock cylinder 68 (FIG. 5), the turning of the plug ring 67 rotates the locking rod 64 to release position in which the locking member is withdrawn or moved out of the slot 56 in the clamp plate 21 to thereby release the cam tube 12 and permit its rotation by turning of the outer knob 10b to retract the latch bolt 16.

Having thus disclosed the invention, I claim:

1. A lock set assembly adapted for mounting in a bore of a door, comprising a longitudinally slotted and rotatable cam tube insertable through the bore and having a central recess providing camming surfaces intermediate its length for retracting a latch bolt in the edge of the door, a knob mounted on and secured to each end of said cam tube and adapted to rotate the latter, an outer and an inner clamping plate mounted in spaced relation on said cam tube but held stationary at the opposite sides of the door, internally threaded studs mounted on the outer clamping plate and projecting through the bore toward the interior of the door, screws mounted in the inner clamping plate and having threaded engagement with said studs to retain the clamping plates in spaced assembled relation at the exterior and interior of the door, an escutcheon fitting over and secured to each of said clamping plates, and a preassembled retractor and latch bolt unit assembly comprising a retractor affixed at one end to a spring-biased latch bolt, said retractor having spaced legs of flexible metal with said legs spanning said camming members and each leg provided with a relatively wide shoulder with each shoulder in contact with a camming member to retract said retractor and latch bolt upon turning of the cam tube by either of said knobs, the ends of said legs bridging the cam tube and connected in overlapping relation.

2. A lock set assembly adapted for mounting in a bore of a door, comprising a longitudinally slotted and rotatable cam tube insertable through the bore and having a central recess providing camming surfaces intermediate its length for retracting a latch bolt in the edge of the door, a knob mounted on and secured to each end of said cam tube and adapted to rotate the latter, an outer and an inner clamping plate mounted in spaced relation on said cam tube but held stationary at the opposite sides of the door, internally threaded studs mounted on the outer clamping plate and projecting through the bore toward the interior of the door, screws mounted in the inner clamping plate and having threaded engagement with said studs to retain the clamping plates in spaced assembled relation at the exterior and interior of the door, an escutcheon fitting over and secured to each of said clamping plates, a locking rod rotatably mounted in said cam tube and having a turn button on one end projecting through the inner knob for turning from the interior of the door and a locking member mounted on and movable longitudinally of said rod as the latter is rotated, said locking member movable in the slot in said cam tube, and said outer clamping plate having a slot into which said locking member is movable upon rotation of said locking rod by turning of the turn button to prevent rotation of said cam tube and turning of said outer knob, said locking member encompassing the rod and having an external spiral slot, a pin in said rod having an end projecting into said spiral slot for moving said locking member longitudinally along said rod as the latter is rotated, a resilient sleeve encompassing said locking member, and detent means for frictionally retaining said locking member in its locked position on the locking rod.

3. A lock set assembly adapted for mounting in a bore of a door, comprising a longitudinally slotted and rotatable cam tube insertable through the bore and having a central recess providing camming surfaces intermediate its length for retracting a latch bolt in the edge of the door, a knob mounted on and secured to each end of said cam tube and adapted to rotate the latter, an outer and an inner clamping plate mounted in spaced relation on said cam tube but held stationary on opposite sides of the door, internally threaded studs mounted on the outer clamping plate and projecting through the bore toward the interior of the door, screws mounted in the inner clamping plate and having threaded engagement with said studs to retain the clamping plates in spaced assembled relation at the exterior and interior of the door, an escutcheon fitting over and secured to each of said clamping plates, a retractor and latch bolt unit mounted in a bore in the edge of the door and in which the retractor and latch bolt are retracted by said camming members upon rotation of said cam tube, a locking rod rotatably mounted in said cam tube having a turn button on one end projecting through the inner knob for turning from the interior of the door, and a locking member mounted on and movable longitudinally of said rod in the slot in said cam tube as the rod is rotated, said outer clamping plate having a slot adapted to receive and retain said locking member when the rod is rotated upon turning of the turn button to locking position to prevent rotation of said cam tube and turning of said outer knob, said locking member encompassing the rod and having an external spiral slot, a pin in said rod having an end projecting into said spiral slot for moving said locking member longitudinally along said rod as the latter is rotated, a resilient sleeve encompassing said locking member, and detent means for frictionally retaining said locking member in its locked position on the locking rod, and a cylinder lock mounted in the outer knob, said cylinder lock having a slot conformably receiving the other end of the locking rod whereby turning of the proper key in the cylinder lock rotates said locking rod and retracts and releases the locking member from the slot in the outer clamping plate and permits turning of the outer knob and the cam tube to retract the retractor and latch bolt.

4. A lock set assembly adapted for mounting in a bore of a door, comprising a longitudinally slotted and rotatable cam tube insertable through the bore and having a central recess providing camming surfaces intermediate its length for retracting a latch bolt in the edge of the door, a knob mounted on and secured to each end of said cam tube and adapted to rotate the latter, an outer and an inner clamping plate mounted in spaced relation on said cam tube but held stationary at the opposite sides of the door, internally threaded studs mounted on the outer clamping plate and projecting through the bore toward the interior of the door, screws mounted in the inner clamping plate and having threaded engagement with said studs to retain the clamping plates in spaced assembled relation at the exterior and interior of the door, an escutcheon fitting over and secured to each of said clamping plates, a preassembled retractor and latch bolt unit assembly comprising a housing having a spring-biased latch bolt and a retractor staked at one end to the latch bolt, said retractor having spaced legs projecting through the inner end of said housing with the latter having a tail piece conformably receiving and anchored to one of said studs, the spaced legs of said retractor being of flexible metal and extending rearwardly and outwardly to encompass the camming members of said cam tube, each leg terminating in an inwardly extending shoulder contacting one of said camming members for retracting said retractor and latch bolt upon turning of said cam tube by either of said knobs, a locking rod rotatably mounted in said cam tube having a turn button on one end projecting through the inner knob for turning from the interior of the door and a locking member mounted on and movable longitudinally of said rod in the longitudinal slot in said cam tube as the rod is rotated, said outer clamping plate having a slot radially aligned with the longitudinal slot in the cam tube adapted to receive and retain said locking member when the rod is rotated to locking position upon turning of the turn button from the interior of the door to prevent rotation of said cam tube and turning of the outer knob until said locking member is withdrawn from the slot in the outer clamping plate, the spaced legs of the retractor having ends extending rearwardly from said shoulders and a bridging portion is formed on one leg connecting the ends together, said ends and bridging portion generally encompassing said locking rod.

5. A lock set assembly adapted for mounting in a bore of a door, comprising a longitudinally slotted and rotatable cam tube insertable through the bore and having a central recess providing camming surfaces intermediate its length for retracting a latch bolt in the edge of the door, a knob mounted on and secured to each end of said cam tube and adapted to rotate the latter, an outer and an inner clamping plate mounted in spaced relation on said cam tube but held stationary at the opposite sides of the door, internally threaded studs mounted on the outer clamping plate and projecting through the bore toward

the interior of the door, screws mounted in the inner clamping plate and having threaded engagement with said studs to retain the clamping plates in spaced assembled relation at the exterior and interior of the door, an escutcheon fitting over and secured to each of said clamping plates, a preassembled retractor and latch bolt unit assembly comprising a housing having a spring-biased latch bolt and a retractor staked at one end to the latch bolt, said retractor having spaced legs projecting through the inner end of said housing with the latter having a tail piece conformably receiving and anchored to one of said studs, the spaced legs of said retractor being of flexible metal and extending rearwardly and outwardly to encompass the camming members of said cam tube, each leg terminating in an inwardly extending shoulder contacting one of said camming members for retracting said retractor and latch bolt upon turning of said cam tube by either of said knobs, a locking rod rotatably mounted in said cam tube having a turn button on one end projecting through the inner knob for turning from the interior of the door and a locking member mounted on and movable longitudinally of said rod in the longitudinal slot in said cam tube as the rod is rotated, said outer clamping plate having a slot radially aligned with the longitudinal slot in the cam tube adapted to receive and retain said locking member when the rod is rotated to locking position upon turning of the turn button from the interior of the door to prevent rotation of said cam tube and turning of the outer knob until said locking member is withdrawn from the slot in the outer clamping plate, said locking member including a sleeve slidably mounted on the locking rod, a lateral projection on said sleeve extending outwardly through the longitudinal slot in the cam tube, said sleeve having a spiral slot, and a pin secured to the locking rod and projecting into the spiral slot to provide longitudinal movement of said sleeve upon rotation of said locking rod.

6. A lock set assembly as set forth in claim 5, including a locking spring encompassing said sleeve and detent means in said sleeve and cooperating with said locking spring for frictionally retaining the locking member in its locked position on the locking rod.

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