

[54] DOOR LOCK

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[51] Int. Cl. ....E05b 5/00, E05b 65/02

[58] Field of Search.....70/146, 147, 152, 208, 448, 70/451, 452; 292/143, 173, DIG. 31

[56] References Cited

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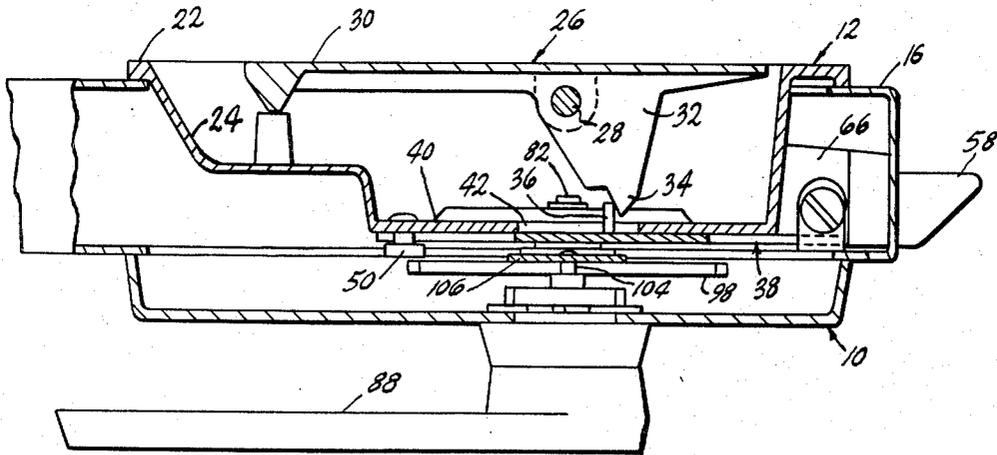
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[57] ABSTRACT

A door lock having a recessed door handle at the outer side thereof, the thickness of the lock being maintained at a minimum so that it can be used on relatively thin doors (for example, the exterior door of a mobile home) by forming numerous components of the lock, including the bolt, as relatively thin flat metal stampings. The bolt is adapted to be retracted by actuating an exterior handle mounted within a recessed outside escutcheon plate or by an inside handle mounted on an inner escutcheon plate. The door lock includes a lock cylinder key operated from the exterior and, if desired, by a push button from the inside for enabling or preventing retraction of the lock bolt.

12 Claims, 11 Drawing Figures



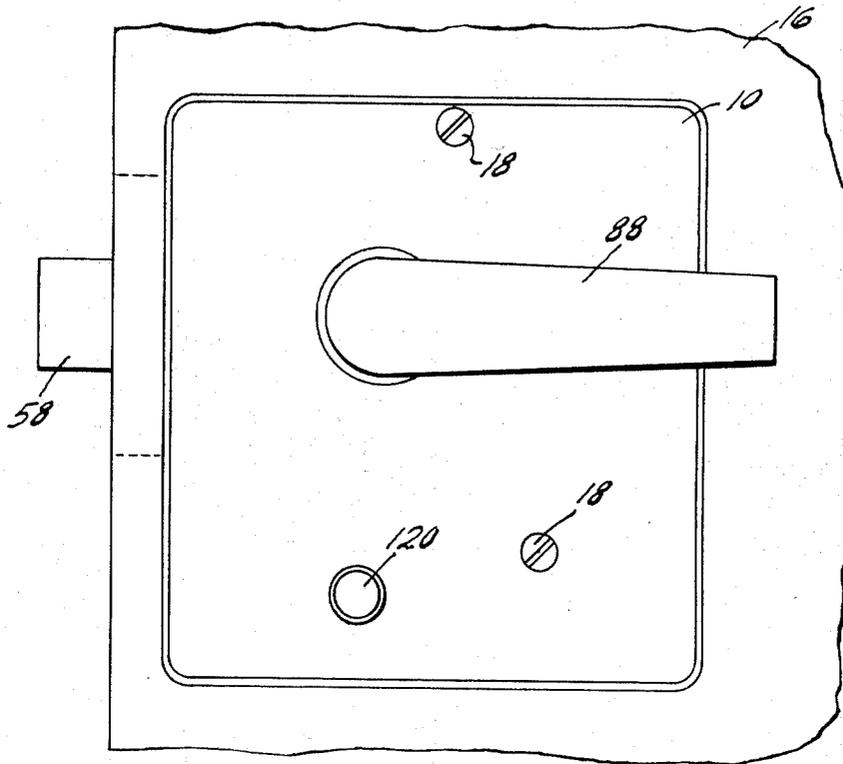


FIG. 1

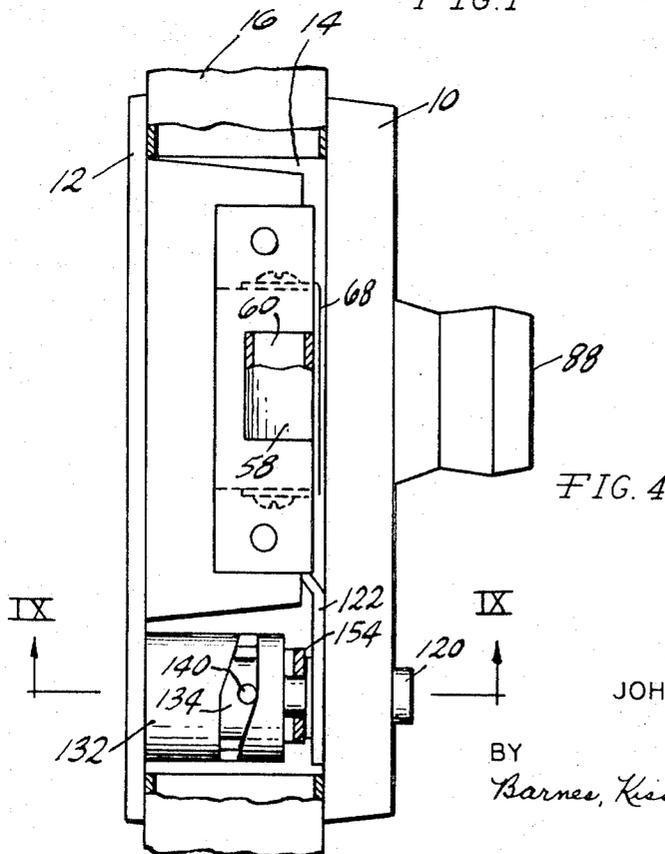


FIG. 4

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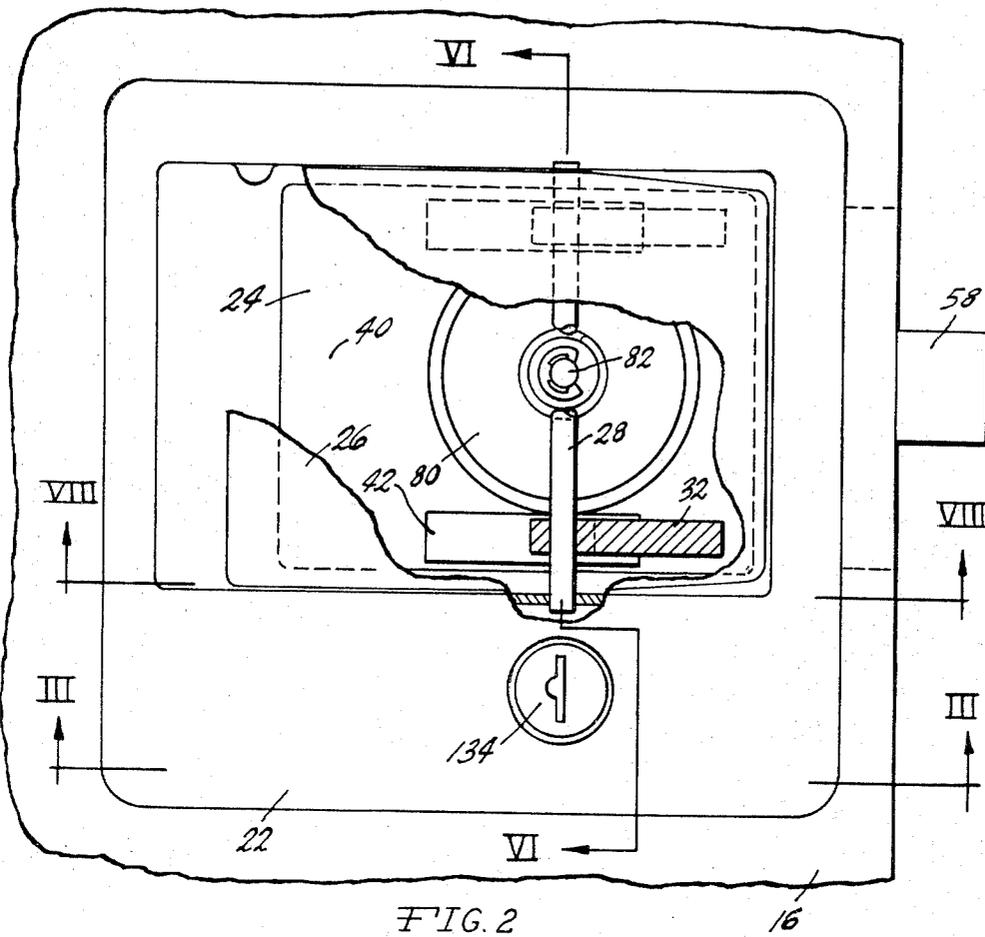


FIG. 2

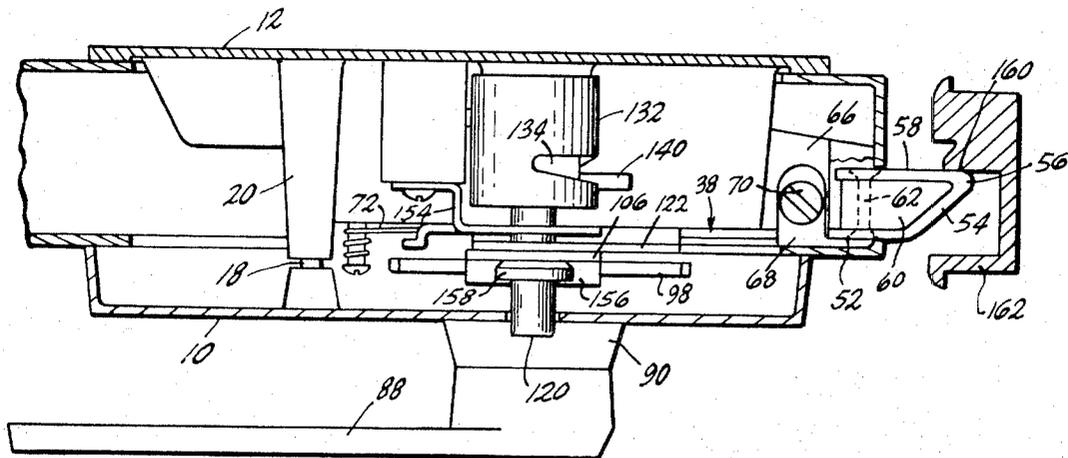


FIG. 3

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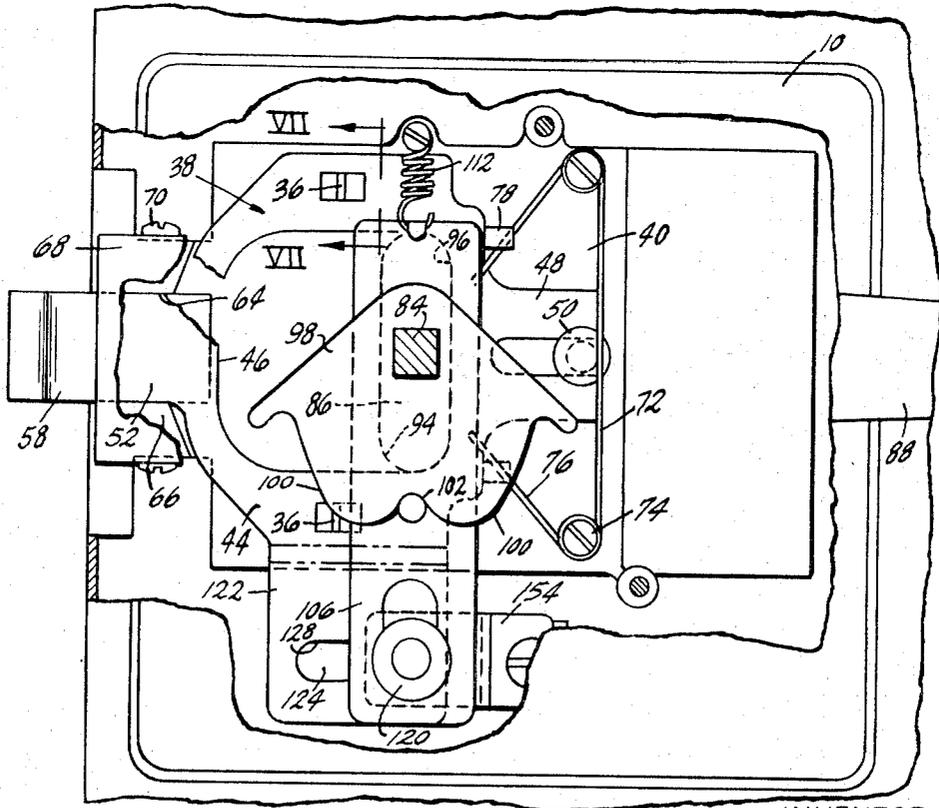
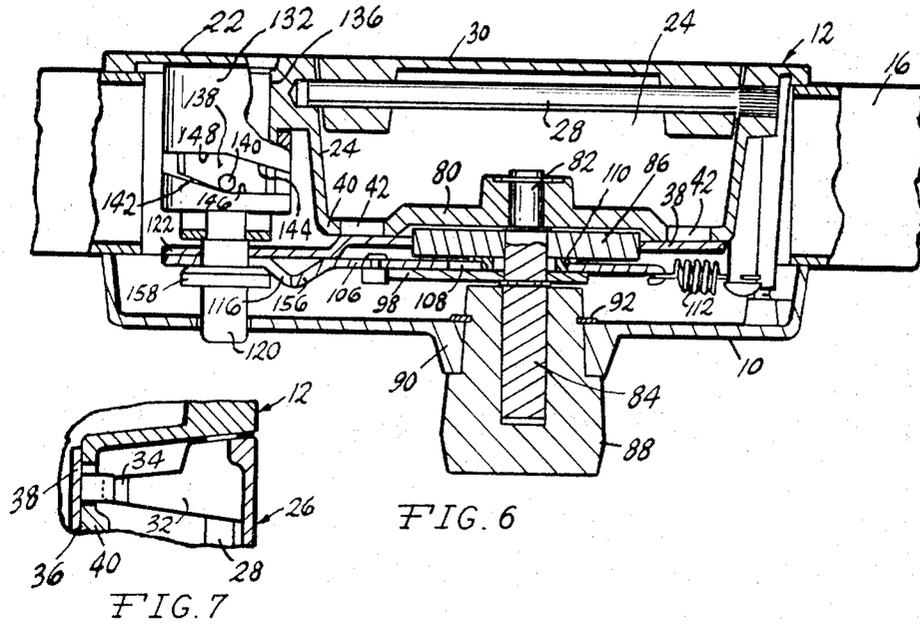


FIG. 5

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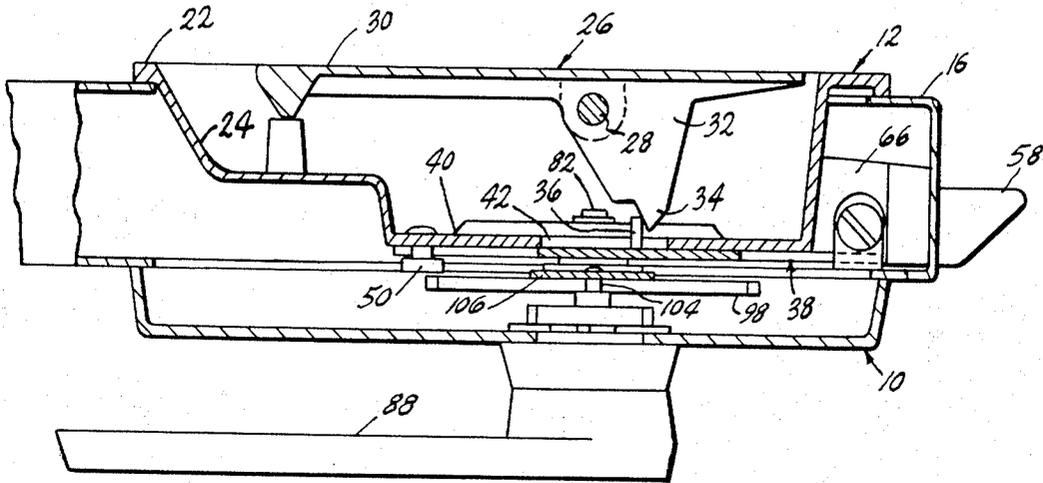


FIG. 8

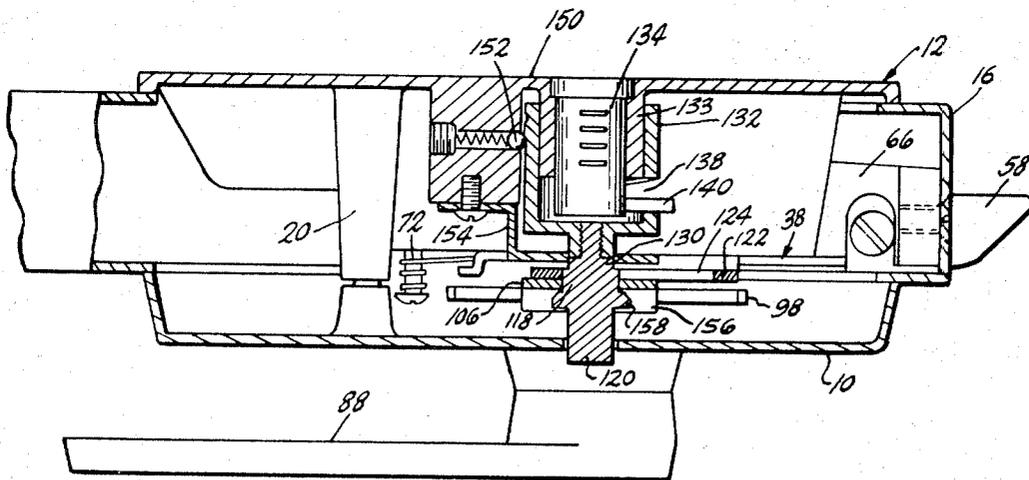


FIG. 9

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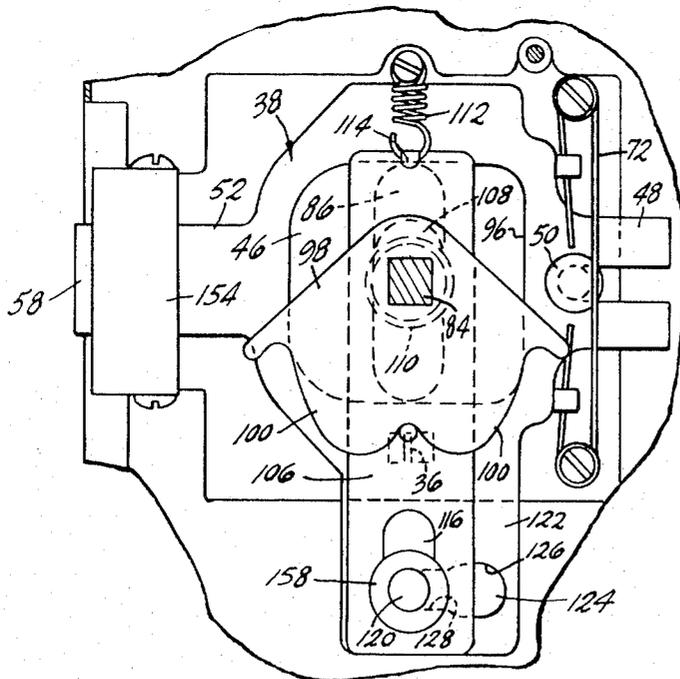
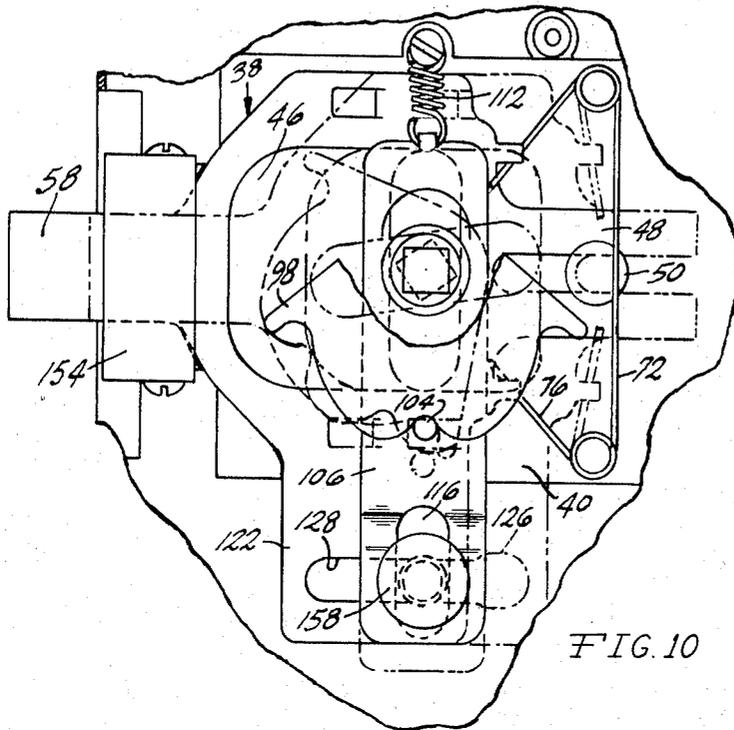


FIG. 11

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## DOOR LOCK

This invention relates to a door lock particularly adapted for use on the exterior door of a mobile home.

On mobile homes or similar vehicles safety requirements frequently demand that the door handles of exterior doors be recessed so that the handle does not project outwardly substantially beyond the outer face of the door. It thus becomes necessary to form the outer escutcheon plate of the lock with a recess for accommodating the handle. Since such doors are frequently relatively thin, it becomes necessary to design the lock itself so that the overall thickness thereof is at a minimum in order to prevent the lock from projecting substantially from the inner face of the door.

Accordingly it is an object of this invention to provide a door lock of the recessed handle type which is of minimum thickness so that it can be mounted on a relatively thin door.

A further object of the invention resides in the provision of a door lock of the type described which is formed with relatively thin, light weight components but which is, nevertheless, of very durable and strong construction.

Other objects and features of the present invention will become apparent from the accompanying description and drawings, in which:

FIG. 1 is an elevational view of a door lock according to the present invention mounted in a door and as viewed from the inner face of the door.

FIG. 2 is an elevational view of the lock as viewed from the outer face of the door and with parts broken away.

FIG. 3 is a sectional view along line III—III in FIG. 2.

FIG. 4 is an end view of the lock from the bolt side thereof with portions of the door edge removed.

FIG. 5 is a view similar to FIG. 1 but with the inside cover plate and handle of the lock broken away to show the lock interior.

FIG. 6 is a sectional view along line VI—VI in FIG. 2.

FIG. 7 is a fragmentary sectional view along line VII—VII in FIG. 5.

FIG. 8 is a sectional view along line VIII—VIII in FIG. 2.

FIG. 9 is a sectional view along line IX—IX in FIG. 4.

FIG. 10 is a fragmentary elevational view of the lock interior illustrating in broken lines retraction of the lock bolt by means of the inside handle.

FIG. 11 is a fragmentary elevational view of the lock interior showing the bolt retracted by operation of the outside handle.

The lock of the present invention includes an inside escutcheon plate 10 and an outside escutcheon plate 12 which are adapted to be positioned over an opening 14 formed through a door 16 adjacent the free edge thereof. The two plates 10 and 12 are adapted to be secured together against opposite faces of the door by means of screws 18 (FIG. 1) extending through inside plate 10 and threaded into bosses 20 (FIG. 3) formed on the inner face of outside plate 12. Plates 10 and 12 are preferably formed as metal die castings.

Outside plate 12 (as shown in FIGS. 2 and 8) is fashioned with a flat outer peripheral flange portion 22 and a central recessed portion 24. An outside operating handle 26 is pivotally supported on outer plate 12 by means of a pin 28 which extends vertically across

recess 24 as shown in FIGS. 2 and 6. Handle 26 comprises a flat plate portion 30 having inwardly projecting lugs 32 adjacent the upper and lower edges thereof, the inner free ends of the lugs being fashioned as abutments 34 adapted to engage with ears 36 on a lock bolt 38. The bottom wall 40 of recess 24 is formed with spaced slots 42 through which the ears 36 of bolt 38 project. As shown in FIGS. 6 and 8, the flat plate portion 30 of handle 26 is substantially flush with the flat outer peripheral portion 22 of outside plate 12.

Bolt 38 is formed as a sheet metal stamping having a generally flat body portion 44. The central portion of body portion 44 is formed with a generally rectangularly shaped opening 46. At one end thereof body 44 of bolt 38 is formed with a slotted flat extension 48 engaged by a headed pin 50 projecting inwardly from the bottom wall 40 of recess 24 to slideably retain the bolt against the inner face of bottom wall 40. At the opposite end body portion 44 of bolt 38 is formed with a rectangularly shaped extension 52 which is curved upwardly as at 54 (FIG. 3) and return bent as at 56 to form a bolt nose 58. A solid die cast metal bolt block 60 is secured within bolt nose 58 by a rivet 62. Bolt nose 58 is slideably guided within a guideway 64 formed within a lug 66. Lug 66 is cast integrally with outer plate 12. Bolt nose 58 is slideably retained in lug 66 by means of a retainer plate 68 which extends across extension 52 and secured at opposite sides of lug 66 by screws 70 (FIGS. 3 and 5). It follows that bolt 38 is slideably guided and retained against the flat inner face of bottom wall 40 of recess 24 by headed pin 50 and retainer plate 68. Ears 36 are formed on bolt 38 by bending tabs outwardly perpendicularly to the plane of the bolt. Bolt 38 is biased to the projected position by means of a spring 72 which has spaced portions wound around pins 74 threaded into bottom wall 40 and free end portions 76 which engage offset ears 78 on the body portion 44 of bolt 38.

Referring to FIGS. 2 and 6 it will be seen that the bottom wall 40 of recess 24 has an outwardly raised central portion 80 in which a central stem 82 is rotatably supported. Stem 82 has a non-circular portion 84 on which a tumbler 86 and an inside handle 88 are fixedly secured. Handle 88 is journaled in a boss 90 on inside plate 10 and is retained thereon by a snap ring 92. Tumbler 86 is an elongate member (FIGS. 5, 10 and 11) which is disposed within the central opening 46 of the body portion 44 of bolt 38. The opposite ends of tumbler 86 are rounded as at 94. As shown in FIG. 5, spring 72 normally biases bolt 38 to the projected position wherein the edge 96 of bolt opening 46 abuts against one of the straight sides of tumbler 86. Thus, when handle 88 is rotated in either direction one of the rounded ends 94 of tumbler 86 engages edge 96 on bolt 38 to retract the bolt against the bias of spring 72.

There is also fixedly secured to the non-circular portion 84 of stem 82 a cam 98 (FIG. 5). Cam 98 has a pair of opposed cam lobes 100 which are interconnected by a recessed portion 102 adapted to be normally engaged by a pin 104. Pin 104 is mounted on a lock plate 106. Lock plate 106 is disposed between cam 98 and tumbler 86. Lock plate 106 is provided with an elongated opening 108 through which stem 82 extends. A spacer bushing 110 around stem 82 engages the side edges of the elongated opening 108 in lock plate 106 and forms a

guide for sliding movement of lock plate 106. Lock plate 106 is normally biased in one direction by a tension spring 112 connected to one end thereof as at 114. The opposite end of lock plate 106 is formed with an elongated slot 116 through which the cylindrical portion 118 of a latch stud 120 projects.

Bolt 38 has a second lateral extension 122 having an elongated slot 124 therein. The axis of slot 124 is perpendicular to the axis of slot 116 and parallel to the axis of reciprocation of the bolt. Slot 124 has an elongated, transversely enlarged end 126, the width of which is only slightly greater than the cylindrical portion 118 of latch stud 120. The opposite end of slot 124 is narrower as at 128 and corresponds in width to the smaller diameter of the cylindrical portion 130 of latch stud 120 which is adjacent the cylindrical portion 118. The outer end of latch stud 120 projects through the inner cover plate 10 as shown in FIG. 9 and the inner end thereof is threaded into a sleeve 132. Sleeve 132 is slideably arranged on a guide sleeve 133 on outer plate 12 in which the barrel 134 of a key-operated cylinder lock is arranged. Sleeve 132 is slideable axially on guide sleeve 133 and is prevented from rotating by means of a lug 136 (FIG. 6) on outside cover 12 which engages an axial slot in sleeve 132. Sleeve 132 is formed with a circumferentially extending slot 138 at one side thereof through which a radially extending pin 140 on barrel 134 projects. Slot 138 is formed with opposed axially inclined surfaces 142, 144 and with opposed flat radial surfaces 146, 148. At one side thereof sleeve 132 is formed on its outer surface with a pair of axially spaced notches 150 which are adapted to be engaged by a spring biased detent 152. Stud 120 and barrel 134 are radially stabilized by a retainer 154.

Lock plate 106 is formed with an offset cam 156 which projects from the plane of the plate in a direction toward inner cover plate 10. Slot 116 in lock plate 106 extends to the peak of cam 156. In the position to which it is normally retracted by spring 112 lock plate 106 assumes a position where cam 156 laterally clears an enlarged circular flange 158 on latch stud 120. With lock plate 106 in this position when handle 88 is rotated one of the cam lobes 100 engages pin 104 on lock plate 106 to shift the lock plate in a direction toward the left as viewed in FIG. 6, thus causing cam 156 to engage flange 158 and thus shift sleeve 132 from the position shown in FIGS. 6 and 9 toward the inner cover plate 10 to a position wherein the detent 152 engages the other notch 150 in sleeve 132. Shifting of sleeve 132 in this manner is permitted by reason of the fact that slot 138 is substantially wider than the diameter of pin 140. This causes stud 120 to be projected outwardly of inner plate 10 so that the enlarged diameter portion 118 thereof is shifted axially outwardly out of the plane of slot 124 and thus aligns the reduced diameter portion 130 of stud 120 with the narrower portion 128 of slot 124. Continued rotation of handle 88 causes bolt 38 to be completely retracted against the bias of spring 72. The bolt is thus retracted out of engagement with the locking face 160 of the striker plate 162 (FIG. 3) which would be mounted in the door frame.

As indicated previously, outside handle 26 is adapted to retract the bolt when it is pivoted by reason of the interengagement of the abutments 34 with ears 36 (FIG. 8). However, if latch stud 120 is in the depressed condi-

tion, the enlarged portion 118 of the pin is engaged with the wider portion 126 of slot 124 and thus prevents substantial retraction of the bolt. Thus with the bolt in the locked condition outer handle 26 is ineffective to retract the bolt. However the bolt can be released from the outside of the door by inserting a key in barrel 134 and then rotating the barrel to cause pin 140 to engage the inclined cam surface 142 (FIG. 6) of sleeve 132 and thus shift latch stud 120 outwardly. Likewise with the door lock in the unlocked position a key may be inserted in barrel 134 and rotated to cause pin 140 to engage the inclined surface 144 of slot 138 and thus shift latch stud 120 to the retracted locked position shown in FIG. 6.

I claim:

1. A door lock comprising inner and outer door lock plates adapted to be mounted in registering relation against the inner and outer faces of a door in a position overlying an opening through the door, said outside plate having a generally central recess therein adapted to project into said opening in the door and a peripheral flange surrounding said recess and adapted to overlie the outer face of the door around the opening therein, an outer door operating handle mounted in said recess and normally disposed substantially wholly within said recess, said recess having a generally flat bottom wall, a lock bolt slideably supported on the inner face of said bottom wall for reciprocation in a rectilinear path, said bolt having a generally flat thin body portion provided with a projection extending laterally from one side thereof in a direction parallel to the path of reciprocation of the bolt, said projection extending laterally beyond said recess and having a relatively thick bolt nose on the end thereof which is adapted to engage with a door frame mounted strike to retain the door in a closed position, said exterior handle being operatively connected with said bolt to retract the bolt from said strike engaging position to a strike releasing position when the handle is actuated and an inner handle mounted on said inner plate and operatively connected with the bolt to retract the same when the inner handle is actuated.

2. A door lock is called for in claim 1 wherein the bolt comprises a sheet metal stamping.

3. A door lock as called for in claim 2 wherein said lateral extension is bent out of the plane of the body portion of the bolt to form said bolt nose.

4. A door lock as called for in claim 1 wherein said bolt nose comprises a rigid metal block secured to said lateral extension.

5. A door lock as called for in claim 4 wherein said lateral extension is wrapped around said metal block.

6. A door lock as called for in claim 1 wherein said bolt body is formed with a non-circular opening therein, a stem connected with one of said handles for rotation thereby, a generally flat tumbler rotatable with said spindle and disposed adjacent the inner face of said bottom wall within the opening in said bolt, said tumbler being disposed in a plane parallel to the plane of the bolt body and engageable with the edge of the bolt opening to retract the bolt when the tumbler is rotated.

7. A door lock as called for in claim 1 wherein the bolt body has a second lateral projection thereon extending beyond said recess in the outer plate, said

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second projection having a slot therein, the longitudinal axis of said slot being parallel to the axis along which the bolt reciprocates, said slot having two axially spaced portions of different widths, a stud mounted on said inner plate for axial reciprocation in a direction perpendicular to the plane of the bolt, said stud extending through said slot and having two axially contiguous portions of different transverse size, said stud being axially shiftable to engage the stud portion of greater transverse size with the wider portion of the slot to lock the bolt against reciprocation.

8. A door lock as called for in claim 7 including a key operated rotatable lock cylinder mounted on said outer plate and means connected with said lock cylinder and stud for shifting the stud axially to and from said bolt locking position.

9. A door lock as called for in claim 8 wherein said last-mentioned means comprises a sleeve surrounding said lock cylinder and shiftable axially thereon in response to rotation of the lock cylinder, said sleeve being connected with said stud for axial reciprocation

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therewith.

10. A door lock as called for in claim 9 wherein said sleeve has a circumferentially extending slot therein having axially opposed portions inclined to the axis of the sleeve at an acute angle, a pin on the lock cylinder rotatable therewith and projecting through said slot and engageable with said inclined portions to shift the sleeve axially in opposite directions in response to rotation of the lock cylinder in opposite directions.

11. A door lock as called for in claim 9 including a stem connected with said inner handle and rotated thereby, a cam mounted on the stem for rotation therewith, a lock plate adapted to be reciprocated when said cam is rotated and means on said lock plate engaging said stud for shifting the stud to the unlocked position in response to reciprocation of said lock plate.

12. A door lock as called for in claim 11 wherein said bolt, said tumbler, said lock plate and said cam are disposed in stacked relation against the inner face of the bottom wall of said recess.

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