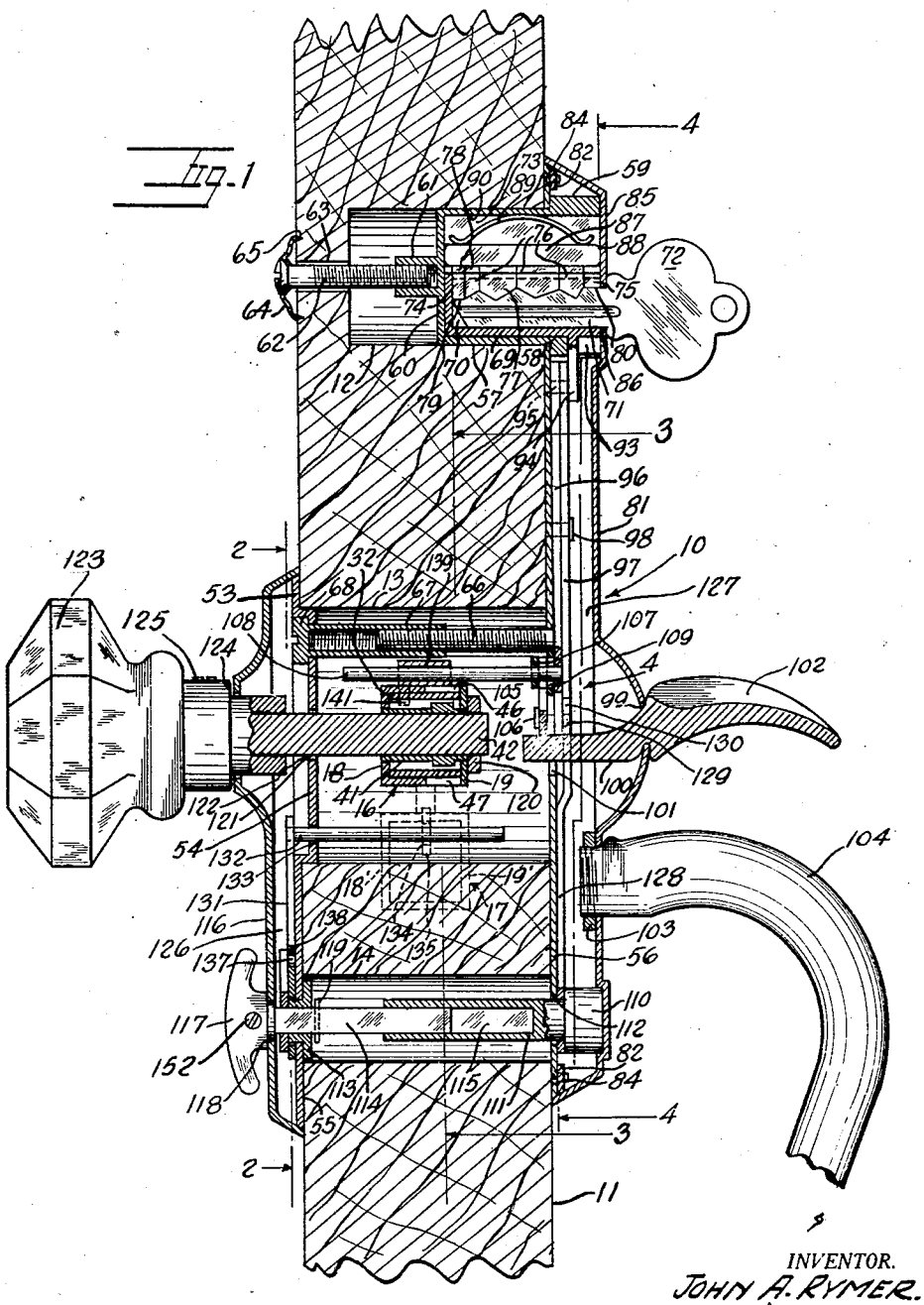
April 9, 1929. J. A. RYMER 1,708,593

LOCK

Filed Aug. 22, 1927 3 Sheets-Sheet 1

Fig. 1



INVENTOR.
JOHN A. RYMER.
BY Harry C. Schroeder
ATTORNEY

April 9, 1929. J. A. RYMER 1,708,593

LOCK

Filed Aug. 22, 1927 3 Sheets-Sheet 2

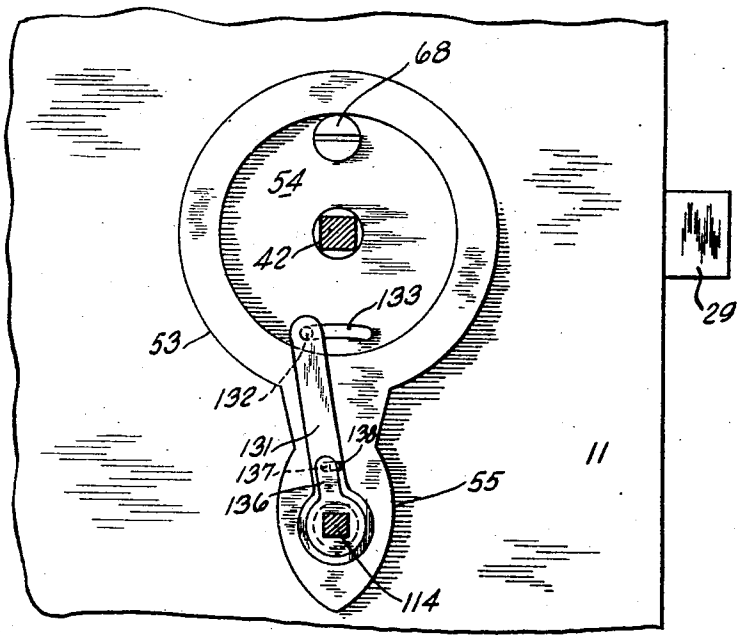


Fig. 2

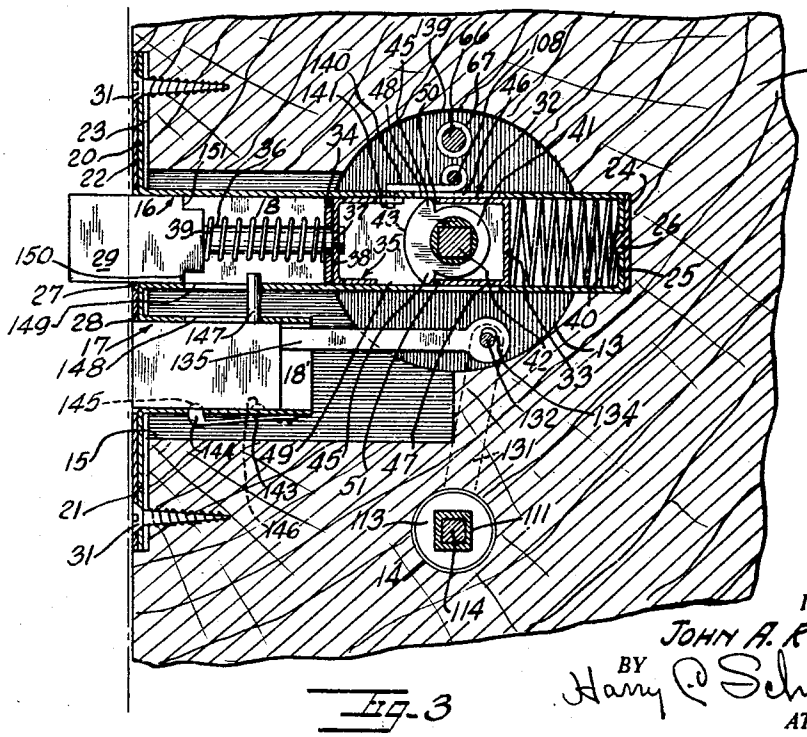


Fig. 3

INVENTOR.
JOHN A. RYMER.
BY Harry C. Schroeder
ATTORNEY

April 9, 1929. J. A. RYMER 1,708,593

LOCK

Filed Aug. 22, 1927 3 Sheets-Sheet 3

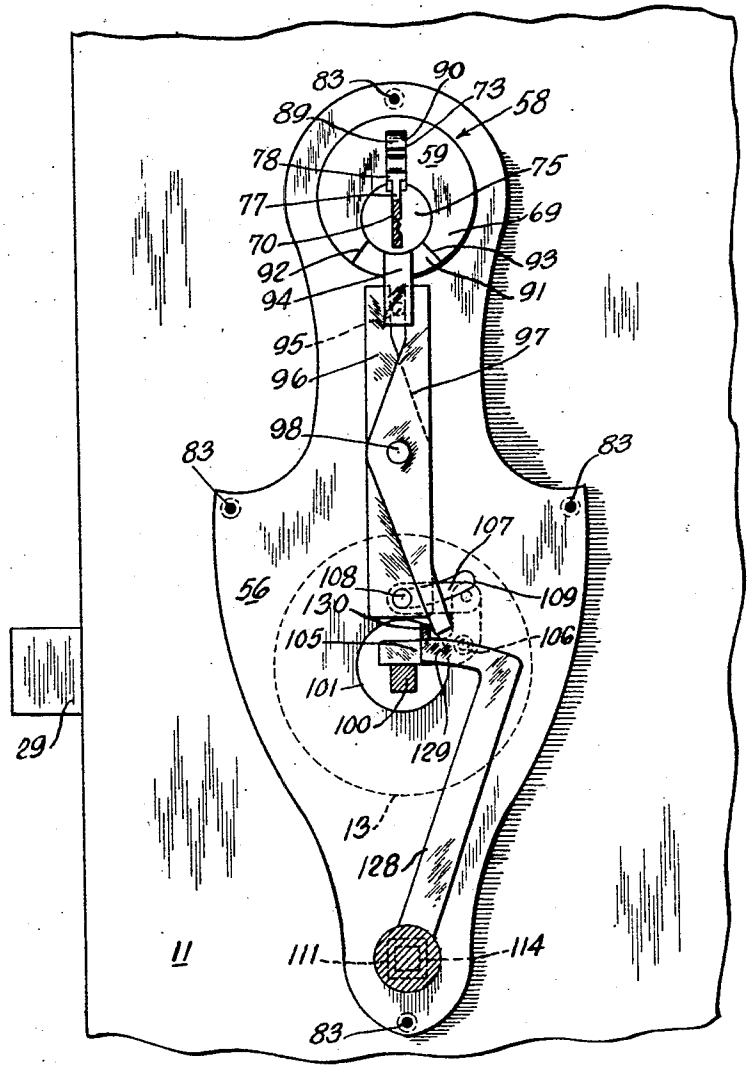


Fig. 4

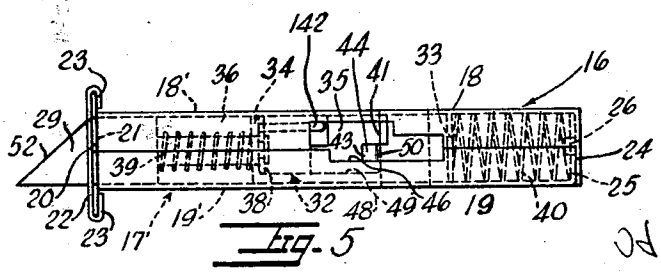


Fig. 5

INVENTOR.
JOHN A. RYMER.

BY Harry P. Schroeder
ATTORNEY

Patented Apr. 9, 1929. 1,708,593

UNITED STATES PATENT OFFICE.

JOHN A. RYMER, OF BERKELEY, CALIFORNIA, ASSIGNOR TO PRATT-RYMER COMPANY, OF SAN LEANDRO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

LOCK.

Application filed August 22, 1927. Serial No. 214,642.

My invention relates to locks of the cylinder type, and it refers particularly to a lock in which the cylinder or key-receiving element is adapted to actuate the mechanism for operating the latch bolt and the dead-bolt of the lock.

One object of my invention is to arrange the mechanism in a lock of this character so that only a minimum rotary movement of the cylinder or key-receiving element is required for causing the dead-bolt to be extended to its locking position, or for causing the withdrawing of the latch bolt alone or a simultaneous withdrawing of the latch bolt and the dead-bolt, and that thus the lock may be quickly locked or unlocked by the proper key therefor.

A second object of the invention is to construct a lock of this character so that, when the dead-bolt is extended to its locking position, it also locks the latch bolt and thereby virtually converts the latter into a dead-bolt, which can not be forced to an unlocked position from the outside of a door, having the lock applied thereto, except by a proper key for the lock.

A third object of the invention is to construct a lock of this character so that, when the lock is applied to a door, the lock mechanism, even if the door is closed, may be set either for allowing or for preventing the opening of the door from the outside without a proper key for the lock, and that the lock therefore in comparison with any lock, which for these purposes is provided with elements, operable only from the inside edge of a door, saves much time for a person and relieves him of a great deal of annoyance in thus setting the lock mechanism.

A fourth object of the invention is to provide a lock of this character with a unitary element, which has actuating means in connection therewith so as to be normally adapted to hold all of the tumblers depressed within the cylinder and to co-operate with the tumblers for preventing the rotation of the cylinder except by the proper key, the unitary element and its actuating means thus taking the place of a plurality of auxiliary tumblers and the individual springs therefor and thereby simplifying the lock construction and causing the locking action to be more dependable than in locks of this character heretofore known.

A fifth object of the invention is to construct a lock of this character, in which the latch bolt and the dead-bolt and the operating elements directly connected therewith, as well as their housings, are contained in one part attachable to the side edge of the door, and certain elements of the operating mechanism for the latch bolt and the dead-bolt are contained in a part attachable to one side of the door, while certain other elements of the operating mechanism are contained in a third part attachable to the opposite side of the door, so that the parts may be quickly arranged in lock-operating positions and, when the door is provided with suitable cut-out portions, the parts may be quickly and easily applied in their respective places for effecting the operation of the lock from either side of the door, and that thus the lock may be attached to a door even by an unskilled person.

A sixth object of the invention is to construct a lock of this character so that the lock may be quickly and easily applied to doors of a different thickness, and so that the lock, if required, may be removed from one door and fitted to another without necessitating the change of any part or parts of the lock.

A seventh object of the invention is to construct a lock of this character so that it is necessary to cut out only a minimum portion of a door in order to enable a person to attach the lock to the door, and that the door is not weakened thereby to any appreciable extent.

An eighth object of the invention is to construct a lock of this character so that a large number of the parts thereof may be made of pressed metal and that thus the lock can be cheaply manufactured and, consequently, can be sold at a very low price.

With the foregoing and other objects in view, my invention resides in the combination and the arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention hereinafter disclosed may be made within the scope of the appended claims without departing from the spirit of the invention.

In the drawings:

Figure 1 is a mid-sectional elevation of a

preferred embodiment of the lock of my invention and a sectional elevation of a portion of a door to which the lock is attached, the lock being shown as unlocked and having a key inserted in the cylinder, and the tumblers moved thereby so as to allow the cylinder to be partially rotated for locking the lock;

Figure 2 is an elevation of a portion of a door to which a lock of my invention is applied, the view being taken from the inside of the door, cross-sectionally of the shafts for the door knobs, in planes indicated by the line 2—2 in Figure 1, and the escutcheon between the knobs and the door being removed in order to show the operating levers for the dead-bolt swung so as to hold the dead-bolt in its unlocked position;

Figure 3 is a sectional elevation, taken in planes indicated by the lines 3—3 in Figure 1, and shows a portion of the door and that part of the lock, which is attached thereto and carries the latch bolt and the dead-bolt and the directly connected operating mechanism therefor, the latch bolt being in its extended position, but the dead-bolt being in its unlocked position;

Figure 4 is an elevation of a portion of a door to which a lock of my invention is applied, the view being taken from the outside of the door, cross-sectionally of the thumb-latch lever and the door-knob shaft for the dead-bolt, in planes indicated by the line 4—4 in Figure 1, and the key as well as the front escutcheon being removed in order to show the position of certain parts of the lock-operating mechanism when the dead-bolt is unlocked, but when the latch bolt is in its extended position; and

Figure 5 is a plan of a preferred form of the latch-bolt housing and shows the latch bolt and certain operating parts therefor assembled in the housing.

An embodiment of the lock of my invention is in the drawings indicated as a whole by the numeral 10. This lock may be applied to a door 11, of which only a portion is shown in Figures 1, 2, 3, and 4, by providing the door with suitable cut-out portions for receiving respective parts of the lock therein. Of these cut-out portions, three portions 12, 13 and 14 are preferably cylindrical in form and arranged in alignment with one another at a suitable distance from the side edge of the door, the latter two cut-out portions extending through the door from the front to the back thereof, while the portion 12 is preferably counterbored only partly through the door from the front side thereof. A fourth cut-out portion 15 extends from the edge of the door between the sides thereof to the intermediate cylindrical portion 13 and is of a sufficient width for accommodating the respective latch-bolt and dead-bolt housings 16 and 17 of the lock 10.

These housings are preferably made of sheet metal and are respectively formed by two side sections 18, 18′, and 19, 19′, which at their outer ends are respectively provided with aligned flanges 20 and 21, and a plate 22, provided at each of its side edges with a return bend 23, is adapted to be slipped over the flanges, while one section, for instance, the section 18, has an inner end portion 24, which overlaps the inner end portion 25 of the section 19 and is formed with a lug 26 fitting into a corresponding opening in the section 19, so that, when the lug is snapped into the opening, and, when the plate 22 is slipped over the flanges 20 and 21, each of the housings 16 and 17 constitutes a unitary element and that the housings are in a fixed relation to each other. The plate 22 is further provided with respective openings 27 and 28 in order to allow the latch-bolt 29 and the dead-bolt 30 to slide freely therein, and both the plate and the flanges have suitable registering openings for receiving the fastening means, such as screws 31, which are screwed into the side edge of the door 11 and thus securely hold the housings within the cut-out portion 15, the door being recessed so as to fit the plate 22 and to cause the outside of the plate to be flush with the edge surface of the door, as shown in Figure 3.

In the latch-bolt housing 16 is slidably fitted a plunger 32, which is provided with an inner end wall 33 and an outer end wall 34, and another plunger 35 is also slidably fitted in the housing and is arranged in a slidable relation to the plunger 32 between the end walls 33 and 34 thereof. At its inner end the latch bolt 29 is provided with a stem 36, which extends slidably through an opening in the end wall 34 of the plunger 32 and is near its free end provided with a recessed portion 37. This recessed portion is adapted to be received in a slot formed in an end wall 38 of the plunger 35 so that, in fact, the stem may be considered as unitary with the wall 38 and thus, when the plunger 35 is reciprocated in the housing 16, a proportional reciprocating movement is at the same time imparted to the latch bolt 29. A coil spring 39 is placed around the stem 36 and between the wall 34 and the inner end of the latch bolt so as to hold the latch bolt normally extended outward from the plunger 32 and at the same time to cause the wall 34 of the plunger 32 to contact the wall 38 of the plunger 35. By this arrangement the latch bolt is adapted to follow the reciprocating movements of the plunger 32 in the housing 16. Another coil spring 40, somewhat stronger than the spring 39, is placed in the housing 16 between the inner end wall 33 of the plunger 32 and the inner end portion 25 of the hous-

ing for the purpose of normally forcing the plunger 32, and therewith also the plunger 35 and the latch bolt, outward.

For operating the latch bolt from the inside of the door 11, the housing 16 is laterally provided with aligned openings, in which are rotatably mounted the respective ends of an operating element 41 having longitudinally therethrough an opening, so that the operating element may be fitted upon a door-knob shaft 42, the shaft for the convenience of illustration being shown as square in cross section, and the opening in the operating element being correspondingly shaped, although it is understood that any other practical way of arranging the operating element in a slidable but nonrotatable relation to the shaft may be adopted. The operating element is provided with an arcuate portion 43, which is concentric with the shaft 42 and has at its ends shoulders or lugs 44 and 45, and cut-out portions 46 and 47 are respectively formed in the top and the bottom of the housing 16 in order to allow a free movement for the arcuate portion, while in the top and the bottom of the plunger 32 are formed respective cut-out portions 48 and 49, the respective end edges 50 and 51 of which are adapted to contact the lugs 44 and 45 and, together with the lugs, serve as means for limiting the outward movement of the latch bolt so that only the portion that has the inclined face 52 thereon will extend beyond the plate 22 when the plunger 32 is forced outward by the spring 40, and also as means, whereby a partial rotary movement of the door-knob shaft 42 will cause an inward movement of the plunger 32, as well as the plunger 35 and the latch bolt against the tension of the spring 40.

A mounting plate 53 for certain parts of the lock 10 is adapted to be applied to the inside of the door 11. Preferably, the plate is for this purpose provided with a depressed portion 54, which at its periphery fits the inner end of the cut-out door portion 13, while the plate otherwise is suitably formed so as to extend with an end portion 55 over the cut-out door-portion 14.

Another mounting plate 56 for certain parts of the lock is adapted to be applied to the outside of the door. This plate, in addition to extending over the cut-out door portions 13 and 14, also extends over the cut-out door portion 12 and has therein an opening in which is fitted the reduced portion 57 of a cylinder housing 58, while a shouldered portion 59 of the housing bears against the outside of the plate. The door portion 12 is preferably made to fit the reduced portion 57, and the latter is closed at the rear end of the housing by a wall 60, which has integral therewith centrally on its outside an internally threaded boss 61. A screw 62, for which a clearance hole 63 in axial alignment with the boss is drilled through the door, is adapted to be screwed into the boss and has thereon a washer 64, which is preferably provided with prongs 65 for non-rotatably engaging the inside of the door, so that, when the screw is screwed home into the boss, the plate 56 is securely held at one end to the outside of the door. To the plate 56 is also preferably secured a threaded stem 66, which extends from the inner side of the plate and at right angles thereto so as to be in alignment with an opening in the depressed portion 54 of the plate 53, and an elongated female screw 67, provided with a slotted head 68, is adapted to extend through the opening and to be screwed upon the stem 66 in order to cooperate with the screw 62 in holding the plate 56 securely in its required position on the outside of the door 11.

In the housing 58 is a longitudinal bore eccentric to the housing and extending from the front end to the rear wall 60 thereof, and in this bore is rotatably mounted a cylinder 69, which is provided with a suitably formed slot 70 for receiving the correspondingly shaped shank 71 of a key 72 therein. Towards the periphery of the cylinder 69 the slot 70 is widened and is adapted to register with a correspondingly wide slot 73 formed radially in the cylinder housing 58, as shown in Figure 4. In the slot 70 and at the ends thereof are respectively mounted master tumblers 74 and 75, and between these tumblers are mounted other tumblers 76. Each of the tumblers 74, 75 and 76 comprises a key-contacting portion 77, which slidably engages the narrow part of the slot 70, and a shouldered portion 78, which is slidable in the slot 73 and the wide part of the slot 70, so that all of the tumblers are limited in their inward movement into the cylinder by the contact of the shoulders 78 with the bottom of the wide part of the slot 70. The key-contacting portions 77 are preferably beveled at their ends wherever necessary, and the key shank 71 is also beveled in corresponding places in its tumbler-contacting edge, except at the respective master portions 79 and 80 thereof, in order to allow the shank to slide freely into and out of the slot 70.

An escutcheon 81, conforming to the contour of the plate 56, is fixed to the plate by any suitable means. For instance, lugs 82 may be formed in appropriate places on the inside of the escutcheon, and openings 83 may be correspondingly formed in the plate for the reception of screws 84 which are screwed into the lugs. Preferably, the screws 84 are provided with flat heads, and the openings 83 are countersunk accordingly so that the screw heads will not protrude beyond the door-contacting surface of the

plate 56. A portion 85 of the escutcheon fits snugly over the front surface of the shouldered portion 59 of the cylinder housing 58 and has therein an opening 86, which registers with the key-receiving part of the slot 70 in the cylinder 69 and is sufficiently large for allowing a free rotation of the key shank 71 but also sufficiently small so that the cylinder and the tumblers can not move therethru out of the housing 58.

In the slot 73 of the cylinder housing is an elongated block or element 87, the ends 88 of which are preferably rounded. This block is mounted so that it is adapted to slide freely into or out of the wide part of the slot 70 and laterally to engage the shouldered portions 78 of the tumblers 74, 75 and 76, and it extends so that it has a sufficient end play between the rear wall 60 of the cylinder housing and the portion 85 of the plate 81 for allowing the block to be rocked and thereby adapted to enter the wide part of the slot 70 with either of its ends 88. Means for urging the block 87 towards the tumblers is provided in the form of a curved leaf spring 89, which is mounted in the slot 73 and with its ends bears against the block near to the ends of the latter, while the intermediate curved portion of the spring bears against the wall 90, by which the slot is bounded longitudinally opposite to its opening toward the cylinder 69. By this arrangement the tumblers are forced inward into the cylinder, so that, when the key 72 is withdrawn from the cylinder, the shouldered portions 78 of the tumblers bear against the bottom of the wide part of the slot 70, and the block 87 thus extends longitudinally both in the wide part of the slot 70 and in the slot 73 and thereby normally prevents rotation of the cylinder. It is also evident that, by this arrangement, if an improper key is inserted into the cylinder, the key either will cause the tumblers to depress the block more at one end than at the other, or will cause the tumblers to force the block entirely out of the wide part of the slot while the tumblers themselves with their shouldered portions 78 enter the slot 73, so that the tumblers and the block always cooperate in preventing the cylinder from being rotated by a wrong key. Again, by the insertion of the proper key into the cylinder, the tumblers are caused to depress the block so that it is in its entire length out of the wide part of the slot 70, while the shouldered portions of all the tumblers at the same time are retained therein, and thus the cylinder readily can be rotated in either direction by the key.

Diametrically opposite to the slot 73, the shouldered portion 59 of the cylinder housing 58 has therein a cut-out portion 91, which preferably extends from the front of the housing rearward nearly to the plate 56 and is laterally bounded by walls 92 and 93, and an arm 94, integral with the cylinder 69, projects radially from the latter through and beyond this cut-out portion in order to allow the arm a certain lateral swinging movement and at the same time, by the contact of the arm with the side walls 92 and 93 to allow only a partial rotary movement of the cylinder. The arm 94 has integral therewith a pin 95, projecting rearward therefrom between the respective upper ends of an operating lever 96 and another lever 97, these levers being mounted on a common pivot 98 secured to the plate 56.

In the escutcheon 81 is an opening 99 adapted to have fulcrumed therein a latch lever 10, which extends inward through a sufficiently large opening 101 in the plate 56 for allowing the necessary swinging movement of the lever and is outside of the escutcheon provided with a thumb-hold 102. Slightly below the thumb latch lever the escutcheon has secured thereto by means of a nut 103 the upper end of a conventional door handle 104. A bell-crank lever 105 is suitably pivoted to the plate 56, as shown at 106, one arm of the bell-crank lever being adapted to rest upon the latch lever 100, while the other arm thereof extends upward and is at its end pivotally connected with one end of a link 107. The other end of this link is pivotally mounted upon a pin 108, which is fixed to the lower end of the lever 96 and extends inward from the lever through a slot 109 in the plate 56. This slot is preferably arcuate and allows a free travel of the pin therein, and the arrangement of the lever 96, the link 107 and the bell-crank lever 105 is such that the pin 108 is normally held at the left end of the slot in substantially vertical alignment with the pivot 98 and the pin 95 on the arm 94 when the cylinder 69 is in its normal or locked position, as shown in Figure 4, and such that, when the lever 96 is swung in a contra-clockwise direction, the swinging movement is limited by the contact of the pin 108 with the plate 56 at the right end of the slot 109. This contra-clockwise swinging of the lever 96 is effected in either of two ways; viz: by the rotation of the cylinder 69 in a clockwise direction, or by the depression of the thumb-hold 102 so as to raise the inner end of the latch lever 100 upward. When the cylinder is rotated in the aforementioned direction, the pin 95 on the arm 94, by its contact with the upper end of the lever 96, forces the lever to swing in the contra-clockwise direction until the movement of the cylinder is stopped by the contact of the arm 94 with the wall 92 simultaneously with the stopping of the lever's movement by the contact of the pin 108 with the plate 56 at the right end of the slot 109. Again, by the elevation of the inner

end of the latch lever 100, the bell-crank lever 105 is swung in a clockwise direction and communicates its motion to the lower end of the lever 96 so that the lever is thereby swung in a contra-clockwise direction and to the same degree, as before described.

Near its lower end, and preferably in axial alignment with the cylindrical, cut-out door-portion 14, the escutcheon 81 has on its inside a bearing 110. In this bearing is rotatably mounted the cylindrical end of a shaft 111, which extends inward through a clearance opening 112, formed in the plate 56 and adapted to register with an opening in the end portion 55 of the plate 53, and a shouldered bushing 113 is rotatably mounted in the latter opening so as to bear with its shoulder against the inside of the plate 53. A shaft 114, preferably square in cross section, as shown in Figures 3 and 4, is fitted in the bushing and is adapted to extend inward therefrom in the cut-out door-portion 14, and the shaft 111 has formed longitudinally therein a correspondingly square-walled opening 115, so that the shafts 111 and 114 may be slidably joined and may be considered as virtually splined to, and cooperating with, each other in the cut-out portion 14 when the plates 53 and 56 are secured to the door 11, as shown in Figure 1.

Fitting the contour of the plate 53 is an escutcheon 116, which has an opening therein adapted to register with the opening in the end portion 55 and with the opening 112 in the plate 56, and in this escutcheon opening is rotatably mounted the inner end of a knob 117, which is suitably fixed to the outer end of the shaft 114. The knob is preferably of the wing type and has a shoulder 118 adapted to bear against the outside of the escutcheon, while a pin 119 is driven through the shaft 114 adjacent to the shouldered bushing 113 so as to permit rotation of the shaft and at the same time to prevent the bushing from sliding inward into the cut-out door-portion 14 and to hold the lower part of the escutcheon in engagement with the end portion 55 of the plate 53.

Preferably, the inner end of the shaft 42 is threaded and has a nut 120 tightly fitted thereon, and the shaft is adapted to extend through a clearance opening 121 in the depressed portion 54 of the plate 53 and through an opening 122 formed in the escutchen 116 in axial alignment with the opening 121 and adapted to have rotatably mounted therein the inner end of a door knob 123, which is provided with a shoulder 124 adapted to bear against the outside of the escutcheon. The shaft is preferably threaded for some distance at its outer end, and the knob is correspondingly threaded and screwed upon the shaft, so that, by means of the nut 120 and the knob 123, a sufficient end play of the shaft for allowing a free rotation thereof may be effected, while at the same time the nut and the knob cooperate in holding the upper part of the escutcheon in engagement with the upper part of the plate 53. A set-screw 125, threaded into the knob so as to be adapted to engage one of the flat side faces of the shaft, further serves to hold the knob in its adjusted position upon the shaft.

It should be noted that the escutcheons 116 and 81, when attached to the respective plates 53 and 56, form therewith respective housings 126 and 127, adapted to hold certain operative parts of the lock 10 therein and to allow these parts freedom of movement in the housings. Thus, the shaft 111 has secured thereon in the housing 127 and between the plate 56 and the bearing 110 a locking lever 128, which extends upward from the shaft and to one side of the latch lever 100. At its free end the locking lever 128 has integral therewith an arm 129, preferably arcuate and concentric with the shafts 111 and 114 and adapted to extend under the lower end of the lever 97 and over the latch lever so as to prevent the latter from operating the lever 96 when the lever 128 is swung towards the latch lever. An upward extending lip 130, adapted to be in the path of the lower end of the lever 97, is formed at the end of the arm 129. By this construction, when the lever 97 is swung in a clockwise direction, it will engage the lip and thereby swing the lever 128 so that the arm 129 comes in the path of the latch lever and that thus the latch bolt 29 can not be operated from the outside of the door 11 by the latch lever.

In the housing 126 and on the bushing 113 is rotatably mounted a lever 131, adjacent to the end portion 55 of the plate 53. This lever has fixed at its free end a pin 132, which extends inward from the lever through an arcuate opening 133, formed in the depressed portion 54 of the plate so as to allow the pin to travel freely therein and at the same time to limit the swinging movement of the lever. The pin 132 is of such a length that, when the plates 53 and 56, the latch-bolt housing 16 and the dead-bolt housing 17 are secured to the door 11, as described, the pin extends through an opening 134 formed in the inner end of a bar 135, which is fixed to the dead-bolt 30 and extends inward therefrom into the cut-out door-portion 13, the opening 134 preferably being elongated so as to allow the pin 132 to move transversely of the bar and to cause a reciprocating movement of the dead-bolt by the swinging movement of the lever 131. In the housing 126 is also mounted alongside of the lever 131 another comparatively short lever 136 upon the shaft 114 and in a non-rotatable relation thereto. A pin 137 is fixed

to the end of the lever 136 and extends inward therefrom with freedom of movement into a slot 138, formed in the lever 131 and adapted, when the pin is at one end of the slot, to allow the shaft 114 a slight initial turning movement, so that a swinging movement of the lever 131 is not effected until the pin reaches the other end of the slot and the initial turning movement of the shaft is continued.

Upon the pin 108 is adjustably fitted, preferably so as to be frictionally slidable thereon, a sleeve 139. This sleeve has integrally formed thereon a lateral arm 140, the end 141 of which is adapted to extend downward through the cut-out portion 46 in the latch-bolt housing 16 and into an opening 142 formed in the top of the plunger 35. Thus, if it is assumed that the lock 10 is viewed from the outside of the door 11, upon a rotary movement of the cylinder 69 in a clockwise direction and upon the consequent swinging movement of the lever 96 in the contra-clockwise direction, as before described, the lever will pull the plunger 35 and therewith also the latch bolt 29 inward into the housing 16 against the tension of the spring 39. At the same time, the spring 40 will counteract an inward movement of the plunger 32, so that, upon the return movement of the cylinder towards its normal or locked position, the spring 39 will cause the lever 96 to swing back in a clockwise direction and thereby will force the plunger 35 outward and therewith also the latch bolt to its fully extended position, until the movements of the latch bolt and the plunger 35 are stopped by the contact of the latter's wall 38 with the wall 34 of the plunger 32.

The dead-bolt housing 17 has secured thereto, preferably to the bottom thereof, a spring 143, provided at its end with a tongue 144, which extends through an opening in the bottom of the housing and is adapted to engage, and to snap into and out of, cavities 145 and 146 formed in the dead-bolt 30, the tongue engaging the cavity 145 for holding the dead-bolt in its receded or unlocked position, as shown in Figure 3, and engaging the cavity 146 for holding the dead-bolt in its extended or locking position. Near its inner end and at its top the dead-bolt has fixed thereto a pin 147, which extends through registering longitudinal slots 148 and 149 formed respectively in the top of the dead-bolt housing and in the bottom of the latch-bolt housing, the pin being adapted to contact the inner ends of the slots when the dead-bolt is fully withdrawn into its housing and to contact the outer ends of the slots when the dead-bolt is in its fully extended or locking position, and the latch bolt being formed with end portions 150 and 151 so that it may be reversed in its housing and in either of its positions may be adapted to contact the pin and thereby to move the dead-bolt, and that, when the latch bolt is fully withdrawn into its housing, the dead-bolt is also moved to its fully receded or unlocked position in the housing 17.

The relation of the levers 128 and 136 to each other is such that—when the lever 136 is swung so that the pin 137 is at the extreme left of the slot 138 in the lever 131, and that the latter lever is also thereby swung until the pin 132 is at the extreme left of the arcuate opening 133, if it is assumed that the lock 10 is viewed from the inside of the door 11, as shown in Figure 2—the lever 128 is swung to its normal position or its extreme position away from the latch lever 100; that is, to the right of the latter, if it is assumed that the lock is viewed from the outside of the door, as shown in Figure 4.

From the foregoing description, it is clear that the lock 10 may be quickly and easily applied to doors of greatly varying thickness. After the latch and dead-bolt housings have been secured in the cut-out portion 15, the shaft 42, with the nut 120 at its inner end, is inserted into the operating element 41; the housing 127, with its respective lock-operating parts assembled therein, is placed in the proper position on the outside of the door, and the end 141 of the arm 140 on the sleeve 139 is inserted into the opening 142 in the plunger 35. The mounting plate 53, with its respective lock-operating parts assembled thereon, is thereafter placed in the proper position on the inside of the door, so that the shaft 114 engages the shaft 111, and the pin 132 engages the slot 134 in the dead-bolt bar 135. The screws 62 and 67 are then screwed home, so that the housing 127 is fixed to the outside of the door, while the mounting plate 53 is fixed to the inside thereof. After this, the escutcheon 116 is slipped over the shafts 42 and 114, and the door knob 123 is secured in the proper position on the shaft 42 by the set-screw 125, while the wing knob 117 may be secured in the proper position upon the shaft 114 by a set-screw 152, so that the escutcheon 116 is retained by the knobs 117 and 123 upon the mounting plate 53 and thereby completes the housing 126 in which the levers 131 and 136 operate.

When a door 11, having a lock 10 of my invention secured thereto, as described, is closed, it is normally held in a latch engagement with a door-frame member, which is indicated by a dot-and-dash line in Figure 3, by the normally extended latch bolt 29. A person is enabled, by simply turning the knob 123 in either direction, to withdraw the latch bolt and thus easily to open the door from the inside thereof. The dead-bolt, if it is in its extended or locking position, may also be withdrawn in the same manner together with the latch bolt by the turning of

the knob 123, since the latch bolt by its contact with the pin 147 forces the dead-bolt inward into its housing 17, or the dead-bolt alone may be withdrawn by the turning of the wing knob 117.

In order to hold the door merely in a latch engagement with the door-frame member and at the same time to prevent the opening of the door from the outside except by a proper key 72 for the lock, a person turns the wing knob only until the pin 137 on the lever 136 reaches the right end of the slot 138 in the lever 131, as viewed from the inside of the door. The tongue 144 on the spring 143, by its engagement with the cavity 145, will then sufficiently resist an outward movement of the dead-bolt so as to cause the person to stop the turning movement of the wing knob, unless it is desired to move the dead-bolt to its extended position and thereby to lock the door. When the lever 136 is swung in this manner, the lever 128 is at the same time swung sufficiently far toward the latch lever 100 for causing the arm 129 to come into the path of the latch lever and thus effectively to prevent any movement of the latch bolt by the manipulation of the latch lever from the outside of the door.

It is understood from the description regarding the operation of the cylinder 69 that a person may open the door from the outside by first inserting a proper key into the cylinder and then turning the cylinder in a clockwise direction, thus effecting the swinging of the lever 96 in a contra-clockwise direction, as viewed from the outside of the door, but it should also be observed that, while by this movement of the cylinder the latch bolt is withdrawn and the door is opened, the arm 129 still remains in the path of the latch lever 100, since the movement of the cylinder in the aforementioned direction, when the lever 136 has been swung, as described, does not effect a movement of the shaft 111 to which the lever 128 is fixed. The door may thus be slammed shut repeatedly without changing the position of the arm 129, so that, as long as the lever 136 remains in the position referred to, a key must be used, as described, in order to withdraw the latch bolt and thereby to enable a person to open the door from the outside.

When a person desires, not only to latch the door but to lock it from the inside, he simply continues to turn the wing knob 117 in the aforementioned direction and thereby swings the levers 136 and 131 until the pin 132 reaches the right end of the arcuate opening 133 and thus stops the movement, while at the same time the tongue 144 on the spring 143 snaps into the cavity 146 in the dead-bolt and thereby retains the latter in its extended or locking position. The lever 128, of course, is also by this continued movement swung farther toward the latch lever 100. Then, in order to open the door from the outside, a person, after having inserted a proper key into the cylinder, turns the latter in the same manner as before described in regard to the operation of the latch bolt from the outside of the door, thus swinging the lever 131 back to its normal position, with the pin 132 at the left end of the slot 133, as shown in Figure 2, and thereby simultaneously withdrawing the latch bolt and the dead-bolt from their extended positions, while at the same time the lever 136, on account of the play of the pin 137 in the slot 138, is swung back only to the position it is caused to assume for preventing the operation of the latch bolt from the outside of the door, as before observed.

From the outside of the door, a person may turn the cylinder with a proper key therein in a contra-clockwise direction, thus causing the lever 97 to swing the lever 128 towards the latch lever 100 until the movement is stopped by the contact of the arm 94 with the wall 93, as before described, and thereby locking the door, or a person may turn the cylinder only partially in the same direction in order not to extend the dead-bolt but merely to hold the door in a latch engagement with the door-frame member in the manner explained in regard to the operation of the levers 136, 131 and 128 by the wing knob 117. In either case, the door is opened from the outside in the same manner as it is opened after having been secured from the inside by the operation of the wing knob.

When it is desired to leave the door unlocked so that it may be opened from the outside by the depression of the thumb-hold 102 on the latch lever, the wing knob is simply turned in a contra-clockwise direction until the lever 131 is swung back to its normal position by the lever 136, so that the pin 132 is moved to the left end of the arcuate opening 133, as shown in Figure 2, and that the lever 128 also is swung back to its normal position, with the arm 129 out of the path of the latch lever, as shown in Figure 4.

As before observed, the latch bolt is shown as provided at its inner end with portions 150 and 151 adapted to contact the pin 147. This, of course, is merely illustrative, since the latch bolt obviously can be constructed in various ways so as to allow the full extension of the dead-bolt and to be instrumental in forcing the withdrawing of the dead-bolt into its housing and also to allow a reversal of the latch bolt, according to the positioning of the door to which the lock is applied. It should also be noted that, if the latch bolt is reversed from the position shown in the drawings, the positioning of the housings 126 and 127 will be changed

accordingly, with a consequent reversal of the operation of the lock mechanism. However, since the operation of the lock mechanism in such a case is analogous to, and is easily understood from, the operation set forth in the foregoing, a further description appears superfluous and is therefore omitted.

I claim:

1. A lock adapted to be secured to a door or other closing member and comprising a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; and means operatively connected with the key-receiving element and with the dead-bolt, so that, by a partial rotation of the element in one direction, the dead-bolt is extended to a locking position, or that, by a partial rotation of the element in the opposite direction, the dead-bolt is withdrawn to an unlocked position.

2. A lock adapted to be secured to a door or other closing member and comprising a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; means operatively connected with the key-receiving element and with the dead-bolt, so that, by a partial rotation of the element in one direction, the dead-bolt is extended to a locking position, or that, by a partial rotation of the element in the opposite direction, the dead-bolt is withdrawn to an unlocked position; and means for limiting the partial rotation of the element in both directions.

3. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; and means operatively connected with the key-receiving element, the latch bolt and the dead-bolt, so that, by a partial rotation of the element in one direction, the latch bolt and the dead-bolt may be withdrawn, or that, by a slight partial rotation of the element in the other direction, the operation of the latch bolt from the aforementioned side of the door is prevented, except by the turning of the element when a proper key has been inserted therein, and that, by an additional partial rotation of the element in the last-mentioned direction, the dead-bolt is extended to a locking position.

4. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; means operatively connected with the key-receiving element, the latch bolt and the dead-bolt, so that, by a partial rotation of the element in one direction, the latch bolt or both the latch bolt and the dead-bolt may be withdrawn, or that, by a slight partial rotation of the element in the other direction, the operation of the latch bolt from the aforementioned side of the door is prevented, except by the turning of the element when a proper key has been inserted therein, and that, by an additional partial rotation of the element in the last-mentioned direction, the dead-bolt is extended to a locking position; and means for limiting the partial rotation of the element in both directions.

5. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either of its ends into the cylinder and thus to co-operate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; and means associated with the cylinder for withdrawing the latch bolt by a rotative movement of the cylinder.

6. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either

of its ends into the cylinder and thus to cooperate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; means for urging the element towards the tumblers; and means associated with the cylinder for withdrawing the latch bolt by a rotative movement of the cylinder.

7. A lock adapted to be secured to a door or other closing member and comprising a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either of its ends into the cylinder and thus to cooperate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; and means associated with the cylinder for moving the dead-bolt either to a locking or an unlocked position.

8. A lock adapted to be secured to a door or other closing member and comprising a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either of its ends into the cylinder and thus to cooperate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; means for urging the element towards the tumblers; and means associated with the cylinder for moving the dead-bolt either to a locking or an unlocked position.

9. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either of its ends into the cylinder and thus to cooperate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; and means associated with the cylinder for withdrawing the latch bolt or the latch bolt and the dead-bolt, or for extending the dead-bolt, by a rotative movement of the cylinder.

10. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a housing adapted to be mounted in the door; a key-receiving element or cylinder rotatably mounted in the housing; tumblers mounted so as to be slidable in the cylinder and the housing; means for limiting the movement of the tumblers into the cylinder; a unitary element mounted so as to be adapted to slide and to rock in the housing and the cylinder and to bear against the tumblers for forcing them into the cylinder, the unitary element being adapted to depress all the tumblers into the cylinder or to extend with either of its ends into the cylinder and thus to cooperate with the tumblers in allowing a rotative movement of the cylinder, when a proper key is inserted therein, or in preventing a rotative movement of the cylinder by a wrong key; means for urging the element towards the tumblers; and means associated with the cylinder for withdrawing the latch bolt or the latch bolt and the dead-bolt, or for extending the dead-bolt, by a rotative movement of the cylinder.

11. A lock comprising a latch bolt slidably mounted in a suitable housing and normally held in an extended position therein, the housing being adapted to be secured in, and at a side edge of, a door; a mounting plate adapted to be secured to one side of the door; a key-receiving element rotatably mounted in the plate and having an arm thereon; an operating lever pivotally mounted on the plate and adapted to be operatively connected with the latch bolt, the arm on the key-receiving element being

adapted to swing the operating lever so as to withdraw the latch bolt when the element is partially rotated in one direction; a latch lever mounted on the plate so as to be adapted to swing the operating lever and thereby to withdraw the latch bolt; a locking lever pivotally mounted so as to be adapted to swing to a locking position for preventing the latch lever from causing movement of the operating lever; a lever pivotally mounted on the plate and adapted to be swung by the arm, when the key-receiving element is partially rotated in the direction opposite to that first mentioned, so as to cause the locking lever to swing to its locking position; and means adapted to be operated from the side of the door opposite to that having the plate thereon and to be detachably connected with the locking lever for causing the latter to swing to or from its locking position.

12. A lock comprising a latch bolt and a dead-bolt slidably mounted in suitable housing means, adapted to be secured in, and at the side edge of, a door, the latch bolt being normally held in an extended position, and the dead-bolt being adapted to be extended to a locking position or to be withdrawn to an unlocked position; a mounting plate adapted to be secured to one side of the door; a key-receiving element rotatably mounted in the plate and having an arm thereon; an operating lever pivotally mounted on the plate and adapted to be operatively connected with the latch bolt, the arm on the key-receiving element being adapted to swing the operating lever so as to withdraw the latch bolt when the element is partially rotated in one direction; means on the dead-bolt adapted to engage the latch bolt so that a withdrawing of the latter will cause a withdrawing of the dead-bolt; a latch lever mounted on the plate so as to be adapted to swing the operating lever and thereby to withdraw the latch bolt; a locking lever pivotally mounted so as to be adapted to swing to a locking position for preventing the latch lever from causing a movement of the operating lever; a lever pivotally mounted on the plate and adapted to be swung by the arm, when the key-receiving element is partially rotated in the direction opposite to that first mentioned, so as to cause the locking lever to swing to its locking position; and means adapted to be operated from the side of the door opposite to that having the plate thereon and to be detachably connected with the locking lever and detachably and pivotally connected with the dead-bolt, so that, when the locking lever is swung to a locking position, the dead-bolt is also moved to its locking position, and, when the locking lever is swung from its locking position, the dead bolt is moved to an unlocked position.

13. A lock comprising a latch bolt and a dead-bolt slidably mounted in suitable housing means, adapted to be secured in and at the side edge of, a door, the latch bolt being normally held in an extended position, and the dead-bolt being adapted to be extended to a locking position or to be withdrawn to an unlocked position; a mounting plate adapted to be secured to one side of the door; a key-receiving element rotatably mounted in the plate and having an arm thereon; an operating lever pivotally mounted on the plate and adapted to be operatively connected with the latch bolt, the arm on the key-receiving element being adapted to swing the operating lever so as to withdraw the latch bolt when the element is partially rotated in one direction; means on the dead-bolt adapted to engage the latch bolt so that a withdrawing of the latter will cause a withdrawing of the dead-bolt; a latch lever mounted on the plate so as to be adapted to swing the operating lever and thereby to withdraw the latch bolt; a shaft mounted so as to be adapted to extend rotatably through the plate and into an opening in the door; a locking lever secured upon the shaft so as to be adapted to swing to a locking position for preventing the latch lever from causing a movement of the operating lever; a second mounting plate adapted to be placed on the side of the door opposite to the side having the first-mentioned mounting plate thereon; a shaft rotatably mounted in the second plate so as to be operatable from the outside thereof and adapted to extend into the door and to detachably engage the first-mentioned shaft so that the shafts are rotatable in unison; a lever pivotally mounted on the first-mentioned plate and adapted to be swung by the arm, when the key-receiving element is partially rotated in the direction opposite to that first mentioned, so as to cause the locking lever to swing to its locking position; a lever mounted in a rotatable relation to the shafts and operatively connected with the dead bolt; and a second lever mounted so as to rotate in unison with the shafts and to engage the rotatable lever, so that there is a slight rotary play between the rotatable lever and the second lever, and that thus the locking lever may be swung to a position for preventing the withdrawing of the latch bolt by the latch lever without causing the dead-bolt to be extended to a locking position, or that the locking lever may be swung to a position for preventing the withdrawing of the latch bolt by the latch lever and also for causing the dead-bolt to be extended to a locking position.

14. A lock adapted to be secured to a door or other closing member and comprising a dead-bolt adapted to be extended to a locking position or to be withdrawn to an un-

locked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; means, operatable from the other side of the door, for extending or withdrawing the dead-bolt; and means operatively connected with the key-receiving element and with the dead-bolt, so that, by a partial rotation of the element in one direction, the dead-bolt is extended to a locking position, or that, by a partial rotation of the element in the opposite direction, the dead-bolt is withdrawn to an unlocked position.

15. A lock adapted to be secured to a door or other closing member and comprising a latch bolt adapted to be normally held in an extended position; a dead-bolt adapted to be extended to a locking position or to be withdrawn to an unlocked position; a key-receiving element adapted to be rotatably mounted in the door so as to be operatable from one side thereof; means on the dead-bolt adapted to engage the latch bolt so that a withdrawing of the latter will cause a withdrawing of the dead-bolt; means operatable from the other side of the door, for withdrawing the latch bolt; and rotatable means, operatable from the last-mentioned side of the door and operatively connected with the dead-bolt, the key-receiving element and the latch bolt, so that, by a partial rotation of the element in one direction, the latch bolt or both the latch bolt and the dead-bolt may be withdrawn, or that, by a slight partial rotation of the element in the other direction, the operation of the latch bolt from the first-mentioned side of the door is prevented, except by the turning of the element when a proper key has been inserted therein, and that, by an additional partial rotation of the element in the last-mentioned direction, the dead-bolt is extended to a locking position, or that the rotatable means may be operated from the other side of the door either for allowing the operation of the latch bolt from the first-mentioned side of the door or for preventing it, except by the aforementioned turning of the element, and also for causing the dead-bolt to be extended to its locking position.

16. A lock comprising a latch bolt and a dead-bolt slidably mounted in suitable housing means, adapted to be secured in, and at the side edge of, a door, the latch bolt being normally held in an extended position, and the dead-bolt being adapted to be extended to a locking position and to be withdrawn to an unlocked position; a housing adapted to be secured to one side of the door; a key-receiving element rotatably mounted in the housing and adapted to extend into an opening in the door so as to be operatable from the outside of the housing; means on the dead-bolt adapted to engage the latch bolt so that a withdrawing of the latter will cause a withdrawing of the dead-bolt; means mounted in the housing and operatively connected with the latch bolt for operating the latter from the outside of the housing; means rotatably mounted in the housing and operatively connected with the key-receiving element and adapted to be connected with the latch bolt; a housing adapted to be secured to the side of the door opposite to the first-mentioned side; means mounted in the last-mentioned housing so as to be operatable from the outside thereof, said means being adapted to engage the latch bolt for causing a withdrawing of the latter; and means rotatably mounted in the last-mentioned housing and adapted to engage the dead-bolt and to cooperate with the rotatable means in the housing having the key-receiving element therein, so that, by a partial rotation of the element in one direction, the latch bolt or both the latch bolt and the dead-bolt may be withdrawn, or that, by a slight partial rotation of the element in the other direction, the operation of the latch bolt from the first-mentioned side of the door is prevented, except by the turning of the element when a proper key has been inserted therein, and that, by an additional partial rotation of the element in the last-mentioned direction, the dead-bolt is extended to a locking position, or that the cooperative rotatable means may be operated from the other side of the door, either for allowing the operation of the latch bolt from the first-mentioned side of the door or for preventing it, except by the aforementioned turning of the element, and also for causing the dead-bolt to be extended to its locking position.

In testimony whereof I affix my signature.

JOHN A. RYMER.