DOOR LATCH MECHANISM HOUSING

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This invention relates to latches and locks for doors. It is well known to provide a door lock in which a key must be used to open the latch, the keyhole being formed at the center of a knob, and the locking function being effected by a locking button located at the center of the other knob. Such door sets are adapted to lock outside doors.

In addition to such door sets, other types of door-latching devices are in common use. A simple door latch, for closets or for interior doors, is often used, in which the mere turning of either knob serves to retract the latching bolt. In such instances, both door knobs are plain, and no locking button or lock is provided.

Doors leading to a patio or porch are often provided with another form of lock. In such patio door latches, provisions are made, as by a push button on the inside knob, for locking the door. However, no key-operated opening device is provided on the outside knob, so that, when the push button is operated to lock the door, the door can be unlocked only from the inside.

In bathroom or bedroom locking devices, another form of door latch is used. In this form, a locking push button is provided, available from inside the room; and an emergency key slot is provided in the knob on the outside of the room. The opening implement, in such instances, need not be a key, but, instead, may be a knife blade, screw driver blade, or the like; or else, any key may be used for this purpose.

For use on outside doors, the latch is provided with a lock, such as a cylinder lock, which is accessible for operation by a key from the outside of the door. A push button locking device is manipulable on the other side of the door to lock it.

It is one of the objects of this invention to make it possible to utilize identical or standard parts for many of the elements in all of these four forms of door latches, thereby reducing the number of separate elements that must be made for supplying any of these locks.

Thus, for example, the bolt and its retractor, or latch grip, may be identical for all of the door sets, as well as the escutcheon plates and the casing. Accordingly, to convert the simplest form of door latch, having no locking provisions, to one with a push button lock, only a few substitutions and additions are necessary.

When packaging the door sets, the manufacturer merely selects the elements from stock to correspond to the particular type of door set required.

It is another object of this invention to simplify the manufacture of door sets, and particularly by making it possible to produce many of the elements by relatively simple stamping operations.

It is still another object of this invention to make it unnecessary to perform precision work for the operating parts.

It is still another object of this invention to provide a door set capable of being used with doors of different thicknesses without requiring special parts.

It is still another object of this invention to facilitate installation of the door set, making it unnecessary to use any tool except a screwdriver.

When an outside latch is used, it is common to provide a locking mechanism that prevents withdrawal of the bolt from latching position by prying. It is another object of this invention to improve and simplify such mechanism.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a plan view of the latch mechanism shown as installed in a door, the door being shown in section; Fig. 2 is an enlarged horizontal sectional view of the door latch mechanism with the associated parts of the door; Fig. 3 is a vertical sectional view, taken along a plane corresponding to line 3—3 of Fig. 2; Fig. 4 is an enlarged vertical sectional view, taken along a plane corresponding to line 4—4 of Fig. 1; Fig. 5 is a view similar to Fig. 4, but showing the latch in retracted position; Fig. 6 is a fragmentary horizontal sectional view similar to Fig. 2, and illustrating the manner in which the unlocking bar may be held in locked position; Fig. 7 is a view, similar to Fig. 6, illustrating the retracted position of the locking bar; Fig. 8 is a sectional view, taken along a plane corresponding to line 8—8 of Fig. 6, but with the figure placed so that the locking bar appears in horizontal position; Fig. 9 is a perspective view of that knob and its associated mechanism, which includes the key-operated cam spindle for opening the latch; Fig. 10 is a sectional view, taken along a plane corresponding to line 10—10 of Fig. 3; Fig. 11 is a view, similar to Fig. 10, illustrating the manner in which the parts shown in Fig. 10 may be assembled and taken apart; Figs. 12 and 13 are sectional views, taken along planes corresponding to lines 12—12 and 13—13 of Fig. 3; Figs. 14 and 15 are fragmentary views illustrating the manner in which the door latch mechanism may be accommodated to doors of different thicknesses; Fig. 16 is a view, similar to Fig. 6, of a modified form of push button operated lock mechanism, and shown in the locked position; Fig. 17 is a view of the mechanism shown in Fig. 16, illustrating the locking bar in released position; Fig. 18 is a perspective view of the spring hook member for holding the lock bar in Figs. 16 and 17 in locking position; Fig. 19 is a fragmentary view, taken along a plane corresponding to line 19—19 of Fig. 16; Fig. 20 is an exploded perspective view of the lock mechanism in which a key-operated lock is utilized; Fig. 21 is an exploded perspective view of the retractable latch and the latch grip associated therewith; Fig. 22 is a view, similar to Fig. 2, partly in section, showing the substitution of parts to convert the door latch mechanism to a bathroom or emergency type of latch; Fig. 23 is a perspective view of the key-operated parts utilized in connection with Fig. 22;
Fig. 24 is a fragmentary view, partly in section, of a door knob that may be substituted for any of the door knobs in the door latch mechanism; and Fig. 25 is a horizontal sectional view of the latch bar and associated mechanism, taken along a plane corresponding to line 25—25 of Fig. 4; Fig. 26 is a sectional view, taken along a plane corresponding to line 26—26 of Fig. 25; Fig. 27 is an exploded perspective view of the latch mechanism shown in Fig. 25; Fig. 28 is a perspective view of a striker plate utilized with this invention; Fig. 29 is a perspective view of the cap utilized in connection with the push button lock bar; Fig. 30 is a perspective view of one of the spindles and its associated parts; Fig. 31 is an end view of the spindle shown in Fig. 30; Fig. 32 is a side view thereof; Fig. 33 is an opposite, side view thereof; Fig. 34 is a sectional view, similar to Fig. 25, of a modified form of latch bolt; Fig. 35 is a sectional view, taken along a plane corresponding to line 35—35 of Fig. 34; and Fig. 36 is an exploded view of some of the parts of the structure shown in Fig. 34.

The door 1, in which the latch mechanism is to be installed, has a bore 3 (Figs. 1, 2, 3, 4, 5, and 22). A horizontal bore 4, transverse to the bore 3, accommodates the latch bolt mechanism and intersects the bore 3. A striker plate 5 (Figs. 1, 2, and 28) is attached to the door in such a manner that a horizontal movement of this striker plate may be obtained. This striker plate has an arcuate edge 180 where it is exposed. Corners are eliminated, ensuring against accidental hooking or tearing of garments. As is common in this type of lock mechanism, the major parts of the latch bolt operating mechanism are supported by a housing structure 2 (Fig. 1). This structure is inserted into the bore 3 after the retractable latch bolt structure 8 is inserted into the bore 4. This mode of assembly serves to couple the mechanism 2 to the latch bolt structure 8, as will be explained hereinafter. After the structures 2 and 8 are thus placed in operative relation, the knob or handle structures may be applied to cam spindles projecting in opposite directions from structure 2.

The latch bolt 7, in the mechanism illustrated in Figs. 1, 2, 3, and 4, extends to the right of the knob; but the same structure may be so assembled as to place the latch bolt to the left. Furthermore, the latch bolt 7, as indicated in Fig. 1, is located to engage the striker plate 5 by movement toward the right. Nevertheless, the bolt may be readily positioned, when installing the latch, to face the latch bolt in the opposite direction to that shown. The latch bolt structure 8 may be held in place by a retaining plate 9 (Figs. 1, 2, 4, 5, 25 and 27). This plate is flush with the edge of the door, and is held in place as by the wood screws 10 (Fig. 4).

By the aid of this invention, various types of door sets may be provided. In the simplest form of door set, no key lock of any kind is provided. The knobs or handles on each side of the door may simply be turned to retract the latch bolt 7.

This fundamental simple door set (used for closets or intercommunicating interior doors, or the like) may be altered to provide a patio or porch set, a bathroom set, or an outside door set.

The housing 2 includes sheet metal parts that may readily be assembled and manufactured by simple stamping and bending operations. Fundamentally, the housing 2 includes a stamped sheet metal housing member 11 (see, particularly, Figs. 3, 4, and 20). This is of generally U-shaped configuration. The free ends 12 of the legs forming the U-shaped configuration are inwardly directed for engaging a part of the bolt mechanism 8 when structure 2 is inserted in bore 3. For this purpose, the bolt mechanism 8 is provided with an end plate, or cap 13 (Figs. 21, 25, and 27). This cap 13 is held in the cylindrical housing 14 in which the retractable latch bolt 7 is slidable. This housing or barrel 14 may be welded, or otherwise permanently attached, to an arcuate extension 15 of the plate 9.

The cap 13 is assembled with the barrel 14, as by the aid of diametrically opposite projections 16 formed on cap 13. These projections interengage with corresponding slots 17 at opposite sides of the barrel 14 (Fig. 27). These projections are turned down on the exterior of barrel 14. The projections, such as 18, formed by the slots 17 are turned inwardly against the outer face of the cap 13, as indicated most clearly in Fig. 21. Projections 19 of barrel 14, are of substantial width, and extend over the flanges 20 of the plate 13. These flanges have outwardly turned ends 21 which interlock with the inwardly turned ends 12 of the housing member 11. The plate 13 is also provided with a rectangular aperture 22 (Fig. 27) to receive the passage of a pull bar or rod 23 that is connected with the latch bolt 7 (see Figs. 25 and 26).

To form the sides of the housing 2, a pair of generally circular plates 24 and 25 is provided (see, particularly, Figs. 2, 3, 4, 14, 15, and 20). Each of these plates is provided with four rectangular apertures 26. Through the passages 26 the projections 27, formed on the edges of the legs of casing member 11, are accommodated. By turning these projections 27 after they have been inserted in the apertures 26, the plates 24 and 25 are firmly held against the edges of the member 11 to form the complete housing. The projections 27 are undercut (Fig. 20) with a sloping cut 28, the slopes serving, when these projections are turned, to urge the plates 24 and 25 into close contact with the edges of the housing member 11.

The latch pull rod 23 (Figs. 25 and 26) is formed in this instance as a substantially U-shaped, stamped, or punched member having a T-head 29 (Figs. 4 and 5). This T-head is adapted to be pulled inwardly to the position shown in Fig. 5 by the aid of a sliding latch grip structure 30 (Figs. 4, 5, 20, and 21). This latch grip structure is formed of a generally U-shaped member of stamped sheet metal having inwardly turned legs engaging beneath the head 29. When this latch grip structure 30 is moved to the left from the position shown in Fig. 4, the pull bar 23 is pulled inwardly to release the latch bolt 7 from the striker plate 5.

The legs of the member 30 are spaced apart to fit in a slidable manner between the legs of the housing member 11. A cross brace or plate 32, also formed of a stamping, extends centrally across from one leg to the other of the member 30. In order to hold this cross plate 32 in place, the legs of the member 30 are provided with the edge slots 33. Each of the slots 33 has a deep portion 34 accommodating the projections 35 located on opposite sides of the plate 32. The plate 32 is accordingly held in place within the deep portions 34 of slots 33. The member 30 is resilient enough to permit the assembly of the parts 30 and 32.

Furthermore, the legs of the member 30, in the free position, converge toward the free ends of these legs. Accordingly, there is a resilient force holding the plate 32 in place after the assembly is completed.

In order to lubricate the sliding latch grip member 30 in the housing member 11, a small quantity of lubricant, such as beeswax, is placed in the plates 24, 25, and 30 (Figs. 4, 5, and 20) formed in the opposed legs of member 31.

The right-hand surface of the plate 32 (as seen in Fig. 4) acts as a cam surface which may be operated by cam spindles, to be hereinafter described, for moving the latch grip member 30 to the left for retracting the latch bolt 7.

A spring 36 (Figs. 4, 5, and 20) is provided for urging the plate 32 and, consequently, the latch grip 30, to the right when the cam spindles are not operated. This spring is adapted to pass through an aperture 37 in the end wall of the latch grip member 30, and rests on top of the cam.
plate 32. This cam plate 32 is provided with struck-up projections 38 to serve as a restraint for the inner end of the spring 36. The plate 32 also has a ridge 39 extending transversely across the plate 32 for permitting passage of a locking bar to be hereinafter described.

The upper end of the spring 36, as viewed in Figs. 2 and 22, engages the inner surface of the end of the housing member 11.

For operating the latch grip 30, a pair of cam spindles is provided. One cam spindle 40 projects to the left of the door 1, as shown in Figs. 2 and 3. It is rotatably accommodated within the hub 41 integral with the side plate 25 of housing 2. As shown most clearly in Figs. 20, 30, and 31, this spindle is rolled from flat sheet metal.

Cam spindle 40, being formed of sheet metal, has a narrow slot 45. The outside diameter of this spindle 40, when it is in free position, is slightly greater than the inside diameter of the sleeve portion 46 of the door handle or knob 47 (Figs. 1, 2, 3 and 20). This door knob and its sleeve are appropriately shaped of thin sheet metal.

Accordingly, when the door knob 47 is assembled with the cam spindle 40, the cam spindle is frictionally held within the sleeve 46. Close tolerance, accordingly, need not be maintained in this operation. The inner end of the cam spindle 40 is cut away to form the arcuate portion 48 extending from the latch grip 30. This arcuate portion has outwardly extending cam projections 49 which overlie the plate 32. Accordingly, rotation of the spindle 40 in either direction will cause retraction of the latch grip 30, and the latch bolt 7 is withdrawn.

The cam projections 49 closely overlie the inner surface of a washer 43 held in a recess on the inner side of end plate 25. Accordingly, movement of spindle 40 outwardly of the housing 2 is prevented.

Spindle 40 is attached to the sleeve 46 of knob 47 in a manner most clearly illustrated in Figs. 2, 3, 6, 20, 30, 31, and 32.

As shown in Fig. 2, a sleeve or extension 50 is held within the knob 47. The left-hand end telescopically over the inwardly turned flange 51 of the door knob 47. This extension has a diameter corresponding to that of spindle 40.

The extension 50 is formed of rolled metal, providing a relatively wide slot 51a (see, also, Fig. 30). At diametrically opposite places of the sleeve 50 are the slots 52 and 53. Slot 53 is a wider extension of slot 51a. Both of these slots have the same dimensions; and they are adapted to accommodate the two of the latches 54 and 55 of spindle 40. Either projection may be accommodated in either slot, thus making it possible to assemble the spindle to actuate a bolt that extends either to the left or right of the knob 47. Thus, as shown in Fig. 20, the latch bolt 7 is intended to be at the left of knob 47, since the cam extensions 49 of spindle 40 face to the right, as viewed from knob 47. However, in Figs. 2 and 4, the cam spindle 40 is placed so that the cam extensions face to the left of the knob; and, accordingly, the latch bolt 7 extends to the right of the knob.

Projection 55 is slightly undercut to provide transverse slots 193 (Figs. 30 and 31). The projection 54 is provided with a through aperture 56 (Fig. 12). This through aperture is in alignment with a corresponding rectangular aperture 57 in the sleeve portions 46. When assembling the parts, an arcuate spring lock member 58 is first disposed within the spindle 40 (Figs. 30). Its radial projection 59 passing through aperture 56. This projection is carried at one extremity of the arcuate member 58. This member 58 has an angular extent greater than 180°. At the other end of the arcuate member 58, there is a wider projection 60 that is accommodated in the undercut slot 195 (see Fig. 12). As shown most clearly in Fig. 33, one edge 185 of projection 54 is deeper than the opposite-edge in order to place the deep side on the same plane as the bottom of the slots 195.

The sleeve 46 of knob 47 is first placed over sleeve 50; the inwardly directed lip 61 at the edge of the sleeve 46 passes through slot 51a until this lip 61 clears the right-hand edge of the sleeve 50; then the sleeve 50 and knob 47 are relatively turned until this lip is in alignment with one of the slots 196 or 197 disposed at opposite sides of spindle 40. The angular movement between sleeves 50 and 46 causes the lip 61 to lock the sleeve 50 in place within the knob 47. Then locking projection 59 is depressed to permit entry of the spindle 40 into knob sleeve 46 and through opening 57. As soon as opening 57 aligns with the aperture 56, the projection 59 snaps into locking position. Removal of the knob 47, with the spindle extension 50, can be effected by urging the projection 59 inwardly.

When a simple door set is to be utilized, the knob 47 may be removed, and a knob 198 (Fig. 24) may be substituted therefor.

The spindle 40 is adapted to be located on the inside of the door 1. On the outside of the door 1, a corresponding spindle 44 is utilized, having substantially the same structure as spindle 40 (Figs. 2, 3, 9, 20, 23, and 33). Thus, the spindle 44, as shown most clearly in Fig. 9, is provided with diametrically opposite cam extensions 77, adapted on the inner side of the lock 195. This arcuate washer 63 located in a depression in the side plate 24. Thus, these extensions prevent movement of spindle 44 outwardly of the housing 2. Also, since the inner ends of the spindles 40 and 44 approach close to each other, these spindles are restrained against substantial inner movement. End plate 24, as shown most clearly in Figs. 2, 14, 15, and 20, has the hub extension 64 within which the cam spindle 44 is rotatable. The end edges of hub extensions 41 and 64 of end plates 25 and 24 cooperate with the knob sleeves to prevent inward movement of the spindles.

Cam spindle 44 is joined to the outside knob 65 in a manner similar to that described in connection with the knob 47. Thus, this knob 65 has a sleeve extension 66 adapted to be slipped over the spindle 44. This spindle 44 is also made of rolled metal, and has a diameter slightly larger than the inside diameter of the sleeve portion 66. This provides a frictional engagement, such as has been hereinabove described in connection with the spindle 40.

The spindle 44 is provided with a through aperture 67 (Figs. 5, 13, and 20) in alignment with the corresponding aperture 152 of the sleeve extension 66. A resilient spring arcuate member 68 (see, also, Fig. 13) is used to lock the spindle 44 in place in the sleeve 66. The wide projection 62 of this lock member fits into a slot 199 in the spindle 44, and the narrow projection 151 extends through the aligned openings 67 and 152. Knob sleeve 66 also has a lip 199a cooperating with either of the wide slots 153, 154 in spindle 44. The knob sleeves 46 and 66 are provided with a pair of diametrically opposite apertures 57, 152 to permit the use of the same knob whatever may be the position of the locking projections 59 and 151, corresponding to right- or left-hand position of latch bolt 7.

When a key lock set is used, the knob 65 is provided with a supplemental sleeve 69. This sleeve 69 is held against the right-hand end of the spindle 44, as by the aid of the projections 70 formed on the sleeve 69, which fit into slots 153, 154 in the right-hand edge of spindle 44. The right-hand end of the sleeve 69 telescopes over the inwardly directed flange 71 of the knob 65. A cylinder lock 72 is accommodated in the sleeve 69. Bosses 155 directed inwardly of the sleeve 69 serve to center the lock 72. Lock 72 has a radial projection 73 entering the wide slot 156 formed in the sleeve 69. In this way, the lock is held from turning. Its keyhole end is made available through the opening in the flange 71 for a key.
Lock 72 has a projection 74 (see, also, Fig. 13) cooperating with the right-hand end of an inner spindle 75 (see, also, Fig. 13). The inner end of this inner spindle 75 has oppositely directed U-shaped ends 76, the spaced ends of which form a slot for the accommodation of the projection 74 (see, also, Fig. 20).

Rotation of the knob 65 causes one or the other of the ends 76 to engage the plate 32 of the latch grip, and the latch bolt 7 is thereby retracted. Similarly, by operation of a key in the lock 72, one or the other of the edges 78 of inner spindle 75 operates the latch grip independently of the knob 65.

The lock mechanism enclosed in the housing 2 is clamped within the box 3 by the aid of a pair of clamping plates 157 and 79 (Figs. 2, 3, 10, 11, 14 and 15). These clamping plates may be placed over the hub portions 41 and 64 of the housing plates 24 and 25. Each of the clamping plates 157 and 79 is provided with an annular rib 80 or 81 (Figs. 2 and 3) adapted to fit snugly within the bore 3. Each of these clamping plates may also be provided with sharp points 82 for engaging the outer surface of the door 1.

These clamping plates 157 and 79 are clamped together against the outside surfaces of the door by the aid of a pair of hook members 83 and 84 (see, also, Fig. 1). These hook members are of identical construction, and their mode of operation may be best described in connection with Figs. 14 and 15. These hook members are disposed at diametrically opposite sides of the housing plates 24 and 25.

These hook member 83 is of generally U-shaped configuration. The ends of the legs extend through pairs of parallel slots 85 and 86 on plate 79 (Fig. 20). These ends are formed into hooks 87, engaging the outer surface of the plate 79. The connecting member 88 for the legs of the member 83 is provided with a threaded aperture for engagement by a machine screw 89 that passes through plate 157. Accordingly, by tightening the screw 89, the clamping plates 78 and 79 are drawn together tightly upon opposite sides of the door 1.

The U-shaped members 83 and 84 are made long enough so that the clamping effect may be provided for doors of different thicknesses. Further, in order to facilitate the adjustment of these members 83 and 84 to different door thicknesses, the lower edges of the legs of these members are each provided with a series of spaced slots 90. The edges of any set of corresponding slots may be brought into coincidence with the edges of the end plate 24. Thus, the hook member 83 may be arranged so that any one of the slots 90 of each leg may engage the edges adjoining the bottom of the corresponding slot 91.

Adjustment, therefore, is available for the spacing of the clamping plates 157 and 79. The spacing between the clamping plates may vary from the dimension a of Fig. 14 to the dimension b of Fig. 15. Slots 90 may be made to correspond with the standard door thickness.

Provisions are made to simplify assembly of the clamping plates in relation to the door 1. Thus, as shown most clearly in Figs. 10 and 11, the clamping plate 157 is provided with keyhole slots 92 through which the heads 93 of the screws 89 may project. In the process of assembly, the screws 89 are first threaded only part way into the members 83 and 84 before the clamping plates are clamped together.

The clamping plate 157 is moved axially and angularly to align the heads 93 of the screws 89 with the large end of the keyhole slot 92 (Fig. 11). Then, the clamping plate 157 may be rotated in a counterclockwise direction, as viewed in Fig. 11, to assume the position of Fig. 10. In this position, the screws 89 have reached the end of the narrow portion of the keyhole slot 92, and the screw may then be tightened.

A rosette plate 94 is provided to cover the clamping plate 157. This rosette plate 94 is made of relatively thin metal. At one point 95 of its periphery (Figs. 2 and 20) the thin metal edge may be turned inwardly to engage a corresponding outwardly directed point 96 of the clamping plate 157.

Diametrically opposite the point 95, the rosette plate 94 is provided with a rectangular aperture 97 (see, also, Fig. 10). Cooperating with this aperture 97 is a latch bar 98. This latch bar 98 is slideable in a radial direction with respect to the clamping plate 157. Thus, for example, the clamping plate 157 may have a guiding strap 99 (Figs. 2, 10, 11, and 20). The bar 98 has an inwardly turned operating portion guided by the strap 99. The inner side of this latch bar 98 engages the outer surface of the clamping plate 157. A compression spring 100 is confused between the strap 99 and the inner end of the slot 101a formed in the clamping plate 157.

Accordingly, to remove the rosette plate 94, the end surface of the latch 98 is depressed and the plate rotated about its axis.

A rosette plate 101 also is provided for the opposite clamping plate 79. While the same attaching means as for plate 94 may be provided, a modified form is shown. Rosette plate 101 has an outer flange turned inwardly, as indicated at 102 (Fig. 2) for holding the rosette plate in place while also (Fig. 1). When the latch mechanism is to be used merely as a closet door set, or the like, the knobs 47 and 65 may be replaced with the simple knob, such as shown by knob 198 of Fig. 24, and the lock 72 and inner spindle 75 are omitted.

In a patio or porch type of lock, the key operated cylinder lock 72 is omitted, and a locking mechanism is provided in conjunction with the knob 47. A knob 198 is then substituted for the knob 65, so that the door may be locked and unlocked only from the inside.

This locking mechanism, in the form of Figs. 2, 3, 7, and 20, includes a locking bar 103. This locking bar 103, when held in the locking position of Figs. 2 and 6, engages between the ears 104 of the spindle 44 (see Figs. 2, 6, and 9). These inwardly turned ears are punched from the body of the spindle 44.

Accordingly, when the locking bar 103 is in this locking position, it is not possible to turn the knob 65. Of course, the inner spindle 75 may be operated by a key independently of the knob 65.

The locking bar may, however, be released from the locked position of Figs. 2, 3, and 6 to the unlocking position of Fig. 7. In this position of Fig. 7, the door knob may be rotated to open the door.

When the locking bar 103 is used, the lock gar guide 105 is supported in the housing 2. This guide 105 is shown in the present instance made of a pair of relatively thin metal members which may readily be punched to provide the inwardly directed slot 106. Within this slot 106 the bar 103 is slideable. The plate 32, as shown most clearly in Fig. 20, has a slot 158 to clear the bar 103.

The guide member 105 is detachably held by the end wall of the housing member 11. Thus, this housing member 11 (Fig. 20) is mounted to provide the guiding straps 107, and it is also provided with the rectangular opening 108 for the entry of the guide bar 105. Inwardly directed straps 109 cooperate with the outwardly directed straps 107 for accommodating a cotter pin, or other locking element, 109a for holding the guide member 105 in place. For this purpose, the guide member 105 is provided with the aperture 111.

Of course, when assembling the door sets, the guide bar 105 and its cotter pin 110 may be omitted from those sets in which no locking bar is to be used.

The locking bar 103 is manipulable by aid of a hollow push button 112, made of thin metal (Figs. 6 and 7). Thus, the locking bar 103 passes through a washer 113 urged against the arcuate spring lock member 58 by compression spring 114. The left-hand end of the spring
114 abuts a restraining cap 115 (see, also, Fig. 29). Push button 112 is attached to this cap 115, as by the inwardly directed edges engaging within slot 116, and is in the edge of cap 115 (Fig. 8). The cap 115 loosely encompasses the reduced end of the locking bar 103. A washer 117, passing over the left-hand end of the bar 103, is held in place by upsetting this end of the bar.

The cap 115 is provided with a slot projection 118 (see, particularly, Fig. 3), adapted to engage in the slot 51a of the spindle extension 50. Near the left-hand end of this slot 51a is a transverse slot 119. This transverse slot 119 has a sloping side 120 and a re-entrant portion 121 providing an abutment 122.

When the push button 112, in the releasing position of Fig. 7, is urged inwardly, the projection 118 moves along the slot 51a until the sloping surface 120 is reached. Then the push button may be turned to bring the projection 118 to the bottom of the transverse slot 119, and then the push button 112 is released. In this position, illustrated in Fig. 6, the projection 118 is restrained against removal from the bottom of the slot 119 unless the push button 112 is first urged inwardly and then rotated to free projection 118 from the abutment 122. The push button 112 is limited in its movement to the left by engagement of the flange 160 (Fig. 29) of cap 115, with the inwardly turned flange 51 of knob 47.

Another type of push button operator for the lock bar 103 is illustrated in Figs. 16, 17, 18, and 19. In this form, the bar 103 carries, at its left-hand end, a spring hook structure 124. This structure 124 is made of a flat spring, having a bent end in which a slot 125 (Fig. 18) is provided. The left-hand end of bar 103 extends through this slot. The cap 126 is substantially the same as the cap 115 except for the omission of the projection 118 (Figs. 8 and 29).

The spring 124 extends through a slot 127 of the member 126. The spring 124 has a hook end 134a adapted to enter an aperture 129 formed in the body of the spindle extension 50.

The push button 130, made of thin sheet metal, is joined to cap 126 by upsetting the edge of the button to enter slots 116 (Fig. 29) of the cap.

Caps 115 and 126 are also alike except for the fact that projection 118 is omitted for cap 126. Accordingly, the same punched part may be used for both types of caps, and projection 118 is sheared off when the cap 126 is to be formed for the type of push button lock shown in Figs. 16 and 17.

When the push button 130 is pushed inwardly, the hook end 134a engages the edge of aperture 129, as shown in Fig. 16. This is the locked position. Now, when the knob 47 is turned, the edge of aperture 129, as illustrated in Fig. 19, depresses the hook end 134a, which is purposely made with sloping sides; and the compression spring 114 urges lock bar 103 toward the left for releasing the lock, as illustrated in Fig. 17.

The latch bolt structure is illustrated most clearly in Figs. 25, 26, and 27. In this structure, the latch bolt 7 is shown as made of hollow tubing with a cut-away corner 33 for the accommodation of a hook 132. This hook 132 engages the back of the striker plate 5, as shown in Figs. 1 and 2, so that unauthorized wedging or prying of the latch bolt 7 is prevented when the door is locked.

This hook member 132 is formed on the end of a bar 133. At the inner end 134, a pin 135 serves to pivot the hook member in ears 136. These ears are formed integrally with a sleeve 137 that is fastened to the inside of bolt 7. The pull bar 23 is pivotally joined to the inner end 134, as by the aid of the pin 138 passing through apertures 139 in the legs of the bar 23 and through the aperture 140 in the member 133. A compression spring 141, enclosed in the housing 14, urges the pull bar 23 toward the right to closing position, as well as the hook member 132 to active position. Spring 142 operates against a washer 143 disposed over the pull bar 23 and is provided with a rectangular opening 143. Washer 142 is slidable in sleeve 137; and one edge of the opening 143 is bent outwardly to engage the rear surface of bar 133. Normally, spring 141 cocks the washer 142 to the position shown in Fig. 25 to urge the hook 132 to engaging position. Thus, the spring serves to operate hook 132, as well as to urge the bolt 7 to projected position.

When the pull rod 23 is pulled to the left, as indicated by arrow 148 of Fig. 25, the bar 133 is first rotated in a clockwise direction until the shoulder 144 on hook 132 engages the edge 145 of opening 131. This frees the hook 132 from the striker plate 15. Continued movement of the pull bar 23 then retracts the latch bolt 7 from the striker plate. Latch bolt 7 is provided with holes 200 to permit assembly of pin 135 with ears 136.

When it is desired to provide a bathroom lock, or the like, the cylinder key lock 72 is omitted. In its place, a resilient forked bar 153 (Figs. 22 and 23) is substituted therefor. The bent end 161 is placed within the arcuate parts 76 of the lock spindle 75. The shoulders 146, formed on the bar 150, limit inward movement of this bar. The free ends of the bar are restrained by a plate or cap 162 disposed within the flange 71 of knob 65 and held against removal by the outwardly turned flange 163. This cap 162 has a relatively wide transverse slot 164 for the accommodation of a screw driver blade, or the like, for turning the cap 162, and thereby the member 150, for operating the lock from the outside of the door. The edges of slot 164 are reinforced by the inwardly turned ribs 170.

For the simplest form of door set, the operating parts, including the spring 114 and the push button 112, or 130, is omitted. The cylinder lock 72 and the guide bar 105 are also omitted. In such a simple set, turning of either of the knobs serves to move the latch grip 30 horizontally.

To provide a patio or back porch lock, either of the two forms of push buttons shown in Figs. 6 or 16 may be utilized. In this connection, the guide bar 105 is retained, but a simple knob, such as 198, without a cylinder lock 72, is used on the outside of the door.

In the next form of lock, knob 65 is substituted for the knob 198, with the bent bar 150, as illustrated in Fig. 22. This provides a bathroom lock.

In the most complex form, a substitution is made for the bar 150; and, instead, the cylinder lock 72 is used, as illustrated in Fig. 21.

The manufacturer of these door sets may then appropriately choose the parts required for supplying the selected kind of door set.

In the simplest type of door sets, the hook restraint 132 (Fig. 25) is unnecessary. Instead, a type of latch bar may be used such as is shown in Figs. 34, 35, and 36.

In this form, the hollow latch bolt 201 is slidable in housing 14. Attached to the interior of this latch bolt is a flanged collar 202. This collar has an opening 203 for the accommodation of the legs 204 of the pull bar 23. In order to couple these legs to the collar 203 (and thus to the latch bolt 202), the edges of these legs are provided with slot 205. The center portion of opening 203 is made wider, as shown most clearly in Fig. 36, so as to pass the legs 204 which may be urged together for this purpose. When, when slots 205 are in alignment with the edges of the aperture 203, the legs 204 are retracted to assume the position of Fig. 35. In this position, the upper and lower edges of the opening 203 are engaged with slots 205.

The compression spring 141 is received in the collar 202 to urge the latch to engaging position.

In order to prevent the legs 204 of bar 23 from being accidentally moved into the wider portion of opening 203 (thus uncoupling the parts), the washer 142 is placed over the bar 23 so that the edge 143 extends between the
legs. In assembling the parts, therefore, the spring 141, together with washer 142, must be retracted away from the free ends of legs 204, and until the legs assume the coupling position.

The inventors claim:
1. In a door latch mechanism: a housing; said housing having a pair of end walls; one end wall having slots at opposite edges of the wall; door-engaging plates; one of said plates having openings aligned with the slots in said end wall; hook members extending through the aligned openings and slots; and screws passing through the other plate and threaded into said hook members.
2. In a door latch mechanism: a housing; said housing having a pair of end walls; one end wall having slots at opposite edges of the wall; door-engaging plates; one of said plates having openings aligned with the slots in said end wall; hook members extending through the aligned openings and slots; said hook members having spaced slots the edges of which interengage the edges of the slots in the said one end wall for adjusting the position of the hook members; and screws passing through the other plate and threaded into said hook members.
3. In a door latch mechanism: a housing; said housing having a pair of end walls; one end wall having two pairs of slots respectively at opposite edges of the wall, the slots in each pair being parallel; a pair of door-engaging plates; one of said plates having openings aligned with the slots; a pair of hook members, each having two legs terminating in hooks engaging the outer side of said one plate, said legs passing through the openings and slots; and screws passing through the other plate and respectively threaded into the hook members.
4. In a door latch mechanism: a housing; said housing having a pair of end walls; one end wall having two pairs of slots respectively at opposite edges of the wall, the slots in each pair being parallel; a pair of door-engaging plates; one of said plates having openings aligned with the slots; a pair of hook members, each having two legs terminating in hooks engaging the outer side of said one plate, said legs passing through the openings and slots; said legs having spaced slots the edges of which interengage the edges of the slots in the said one end wall for adjusting the position of the hook members; and screws passing through the other plate and respectively threaded into the hook members.
5. In a door latch mechanism: a housing for slidably accommodating a movable latch grip; a guide member having a slot for guidingly receiving a dogging bar, said guide member extending into the housing to position said slot therein, said guide member having a through aperture; and a removable pin carried by said housing; said housing having means defining a space guidingly receiving said pin, said aperture being aligned with said space, said pin also extending through said aperture.
6. In a door latch mechanism: a housing for slidably accommodating a movable latch grip; a guide member having a slot for guidingly receiving a dogging bar, said guide member extending into the housing to position said slot therein, said guide member having a through aperture; said housing having an aperture through which said guide member extends, said housing also having a pair of straps on opposite sides of said housing aperture; and a removable pin extending through said straps and said aperture of said guide member.

7. In a door latch mechanism: a housing for slidably accommodating a movable latch grip; a guide member having a non-circular slot for guidingly receiving a dogging bar and for confining the bar against angular movement, said guide member extending into said housing to position said slot therein, said guide member having a through aperture; said housing having an aperture into which said guide member extends, said housing also having a pair of straps on opposite sides of said housing aperture; and a removable pin extending through said straps and said aperture of said guide member.

8. In a door latch mechanism: a door-engaging plate carried by the mechanism; a rosette having a flange telescopically receiving said plate; said plate having a radially extending slot, and a strap extending transversely of said slot at one end thereof; a latch bar guided for radial movement by said strap, said latch bar having a reduced portion extending in juxtaposed relationship with respect to said slot; a compression spring surrounding said reduced portion and accommodated in said slot, one end of said spring engaging said plate at the other end of said slot, the other end of said spring engaging said latch bar; said flange having an aperture receiving said latch bar.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,726,891</td>
<td></td>
<td></td>
</tr>
<tr>
<td>612,730</td>
<td>Hughes</td>
<td>Oct. 18, 1898</td>
</tr>
<tr>
<td>767,378</td>
<td>Bower</td>
<td>Aug. 16, 1904</td>
</tr>
<tr>
<td>849,865</td>
<td>Spencer</td>
<td>Apr. 9, 1907</td>
</tr>
<tr>
<td>1,169,566</td>
<td>Priskorn</td>
<td>Jan. 25, 1916</td>
</tr>
<tr>
<td>1,194,636</td>
<td>Joy</td>
<td>Aug. 15, 1916</td>
</tr>
<tr>
<td>1,243,596</td>
<td>Elwell</td>
<td>Oct. 16, 1917</td>
</tr>
<tr>
<td>1,289,867</td>
<td>Moore</td>
<td>Dec. 31, 1918</td>
</tr>
<tr>
<td>1,312,199</td>
<td>Ottinger</td>
<td>Aug. 5, 1919</td>
</tr>
<tr>
<td>1,579,457</td>
<td>Schlage</td>
<td>Apr. 6, 1926</td>
</tr>
<tr>
<td>1,621,174</td>
<td>Schlage</td>
<td>Mar. 15, 1927</td>
</tr>
<tr>
<td>1,691,528</td>
<td>Schlage</td>
<td>Nov. 13, 1928</td>
</tr>
<tr>
<td>1,822,424</td>
<td>Scott</td>
<td>Sept. 8, 1931</td>
</tr>
<tr>
<td>1,829,815</td>
<td>Schlage</td>
<td>Nov. 3, 1931</td>
</tr>
<tr>
<td>1,876,079</td>
<td>Schlage</td>
<td>Sept. 6, 1932</td>
</tr>
<tr>
<td>1,876,885</td>
<td>Ellingon</td>
<td>Sept. 13, 1932</td>
</tr>
<tr>
<td>1,971,580</td>
<td>Schlage</td>
<td>Aug. 26, 1934</td>
</tr>
<tr>
<td>1,981,289</td>
<td>Schlage</td>
<td>Nov. 20, 1934</td>
</tr>
<tr>
<td>1,991,031</td>
<td>Schlage</td>
<td>Feb. 12, 1935</td>
</tr>
<tr>
<td>2,038,907</td>
<td>Schlage</td>
<td>Apr. 28, 1936</td>
</tr>
<tr>
<td>2,062,765</td>
<td>Schlage</td>
<td>Dec. 1, 1936</td>
</tr>
<tr>
<td>2,293,856</td>
<td>Schlage</td>
<td>Aug. 25, 1942</td>
</tr>
<tr>
<td>2,297,077</td>
<td>Schlage</td>
<td>Sept. 29, 1942</td>
</tr>
<tr>
<td>2,301,751</td>
<td>Schlage</td>
<td>Nov. 10, 1942</td>
</tr>
<tr>
<td>2,351,077</td>
<td>Segal</td>
<td>June 13, 1944</td>
</tr>
<tr>
<td>2,369,494</td>
<td>Schlage</td>
<td>Feb. 13, 1945</td>
</tr>
<tr>
<td>2,423,206</td>
<td>Schlage</td>
<td>July 1, 1947</td>
</tr>
<tr>
<td>2,491,783</td>
<td>Thomas</td>
<td>Dec. 20, 1949</td>
</tr>
<tr>
<td>2,547,256</td>
<td>Cerf, Jr.</td>
<td>Apr. 3, 1951</td>
</tr>
<tr>
<td>2,566,470</td>
<td>Thomas</td>
<td>Sept. 4, 1951</td>
</tr>
<tr>
<td>2,593,264</td>
<td>Cerf, Jr.</td>
<td>Apr. 15, 1952</td>
</tr>
<tr>
<td>2,669,474</td>
<td>Kanell</td>
<td>Feb. 16, 1954</td>
</tr>
</tbody>
</table>