Aug. 26, 1958 A. VARRIN ET AL 2,848,886

DOOR LATCH ASSEMBLY

Filed April 4, 1956 3 Sheets-Sheet 1

Fig 1

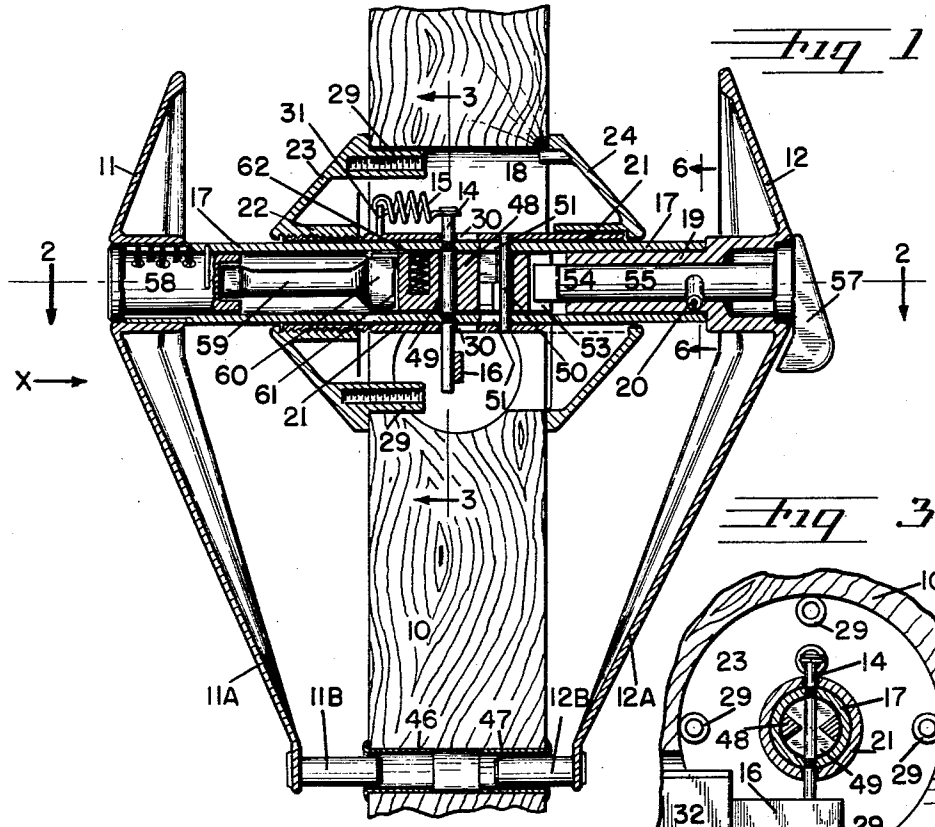
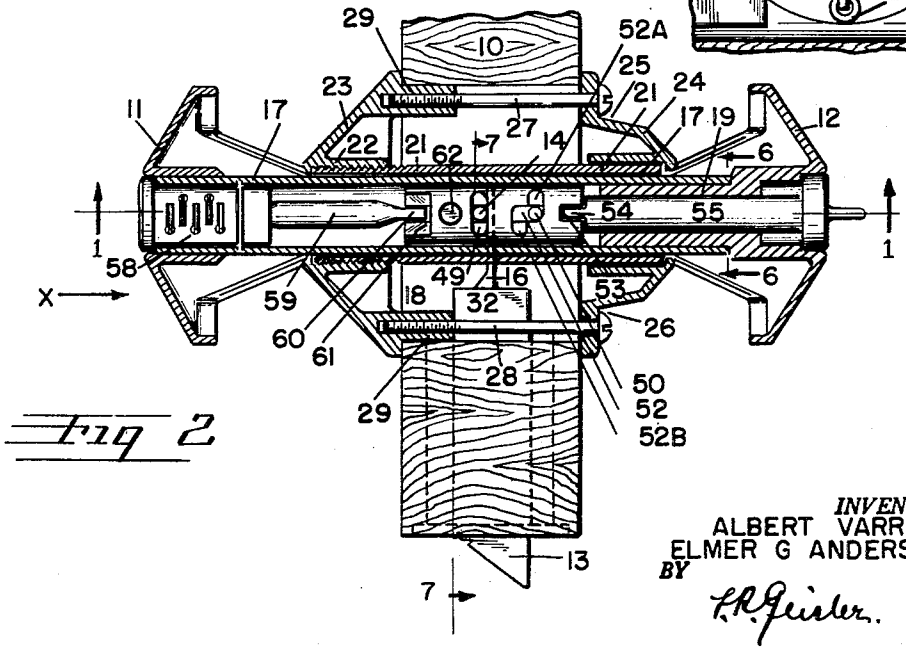


Fig 3

Fig 2



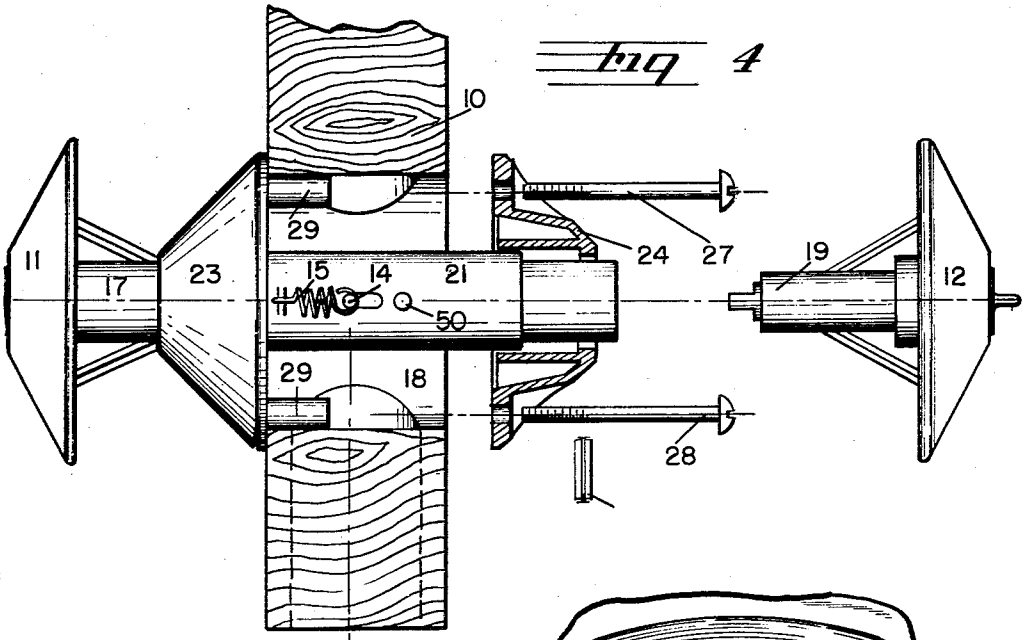
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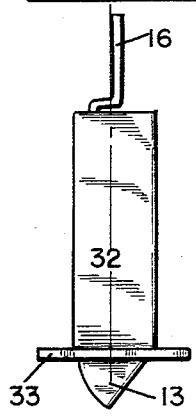
Aug. 26, 1958 A. VARRIN ET AL 2,848,886

DOOR LATCH ASSEMBLY

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Fig 4





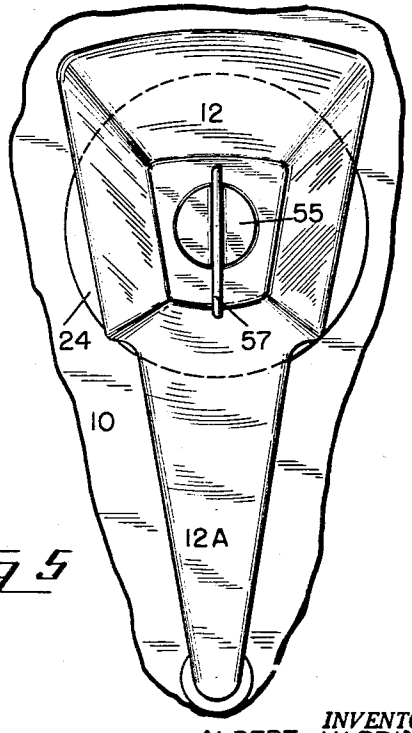


Fig 5

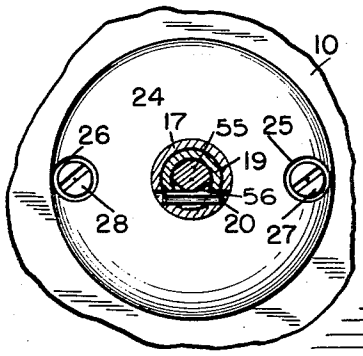


Fig 6

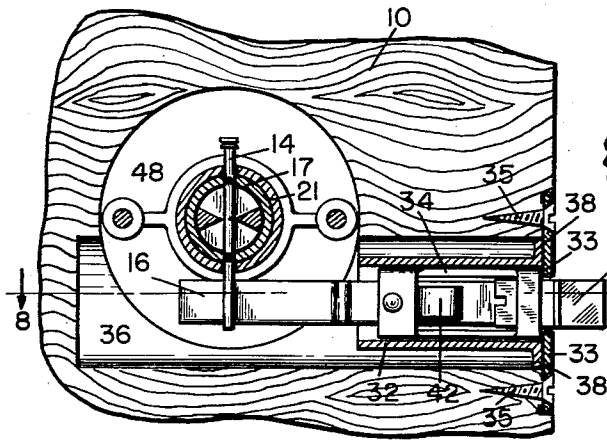
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DOOR LATCH ASSEMBLY

Filed April 4, 1956 3 Sheets-Sheet 3

Fig 1



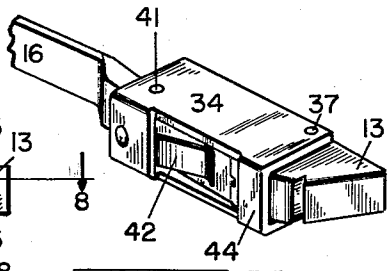


Fig 11

Fig 8

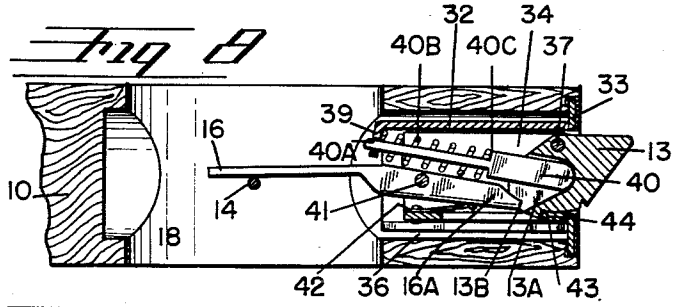
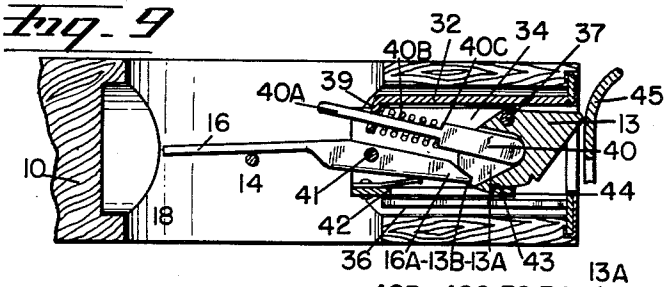


Fig 9



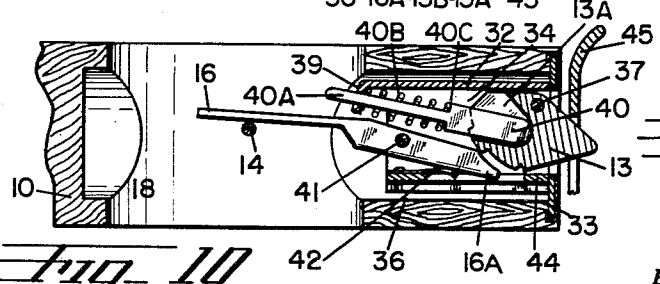


Fig 10

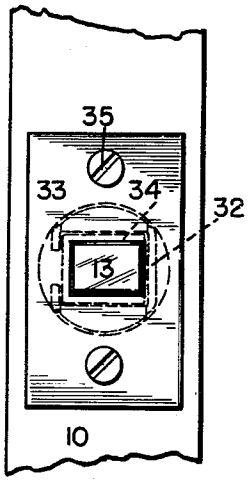


Fig 12

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United States Patent Office

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DOOR LATCH ASSEMBLY

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Application April 4, 1956, Serial No. 576,039

5 Claims. (Cl. 70—146)

This invention relates in general to latches and locks for hinged doors, and relates particularly to door latches adapted to be operated from either side of the closed door.

An object of the invention is to provide an improved door latch assembly in which the latch will be released by slight manual movement of the door knob in a direction perpendicular to the plane of the face of the door, and in which any rotating of the knob will be impossible as well as unnecessary.

Another object of the invention is to provide a latch assembly, including a pair of door knobs on the respective faces of the door, which will be operable by a slight thrust against one knob in the direction in which the door opens, or by a corresponding slight pull in the same direction on the opposite knob, but which cannot be operated by a thrust in the same direction exerted against the door itself instead of being exerted against the thrust knob.

A further object of the invention is to provide an improved door latch assembly, operating in the manner previously mentioned, which can be locked from either side to prevent unlatching and subsequently similarly unlocked from either the same side or from the opposite side when it is desired to open the door.

An additional object of the invention is to provide a novel and improved door latching assembly which will be practical to manufacture, which will be easy to install on any door, which can readily be adjusted for doors of various thicknesses, and which will be ornamental and attractive in appearance while capable of being produced and sold within a popular price range.

The manner in which these objects and other incidental advantages are achieved with the device of the present invention, the manner in which the latch assembly is constructed, and the manner in which it operates, will be readily understood from the following brief description with reference to the accompanying drawings.

In the drawings:

Figure 1 is a sectional elevation taken through the door and through the center line of the door knobs and main control mechanism for the latch assembly, this section being taken on the line indicated at 1—1 in Figure 2;

Figure 2 is a corresponding horizontal section on line 2—2 in Figure 1;

Figure 3 is a fragmentary transverse sectional elevation taken on line 3—3 of Figure 1 and looking in the direction indicated by the arrows;

Figure 4 is an exploded plan view of the entire assembly with the members and parts arranged in relative position with respect to each other and with respect to the door, a portion of the door being shown in horizontal section, and one of the outside door plates being shown in section for the sake of clarity;

Figure 5 is a side elevation of the assembly, the view being taken from the right of Figures 1 and 2;

Figure 6 is a section on line 6—6 of Figures 1 and 2;

Figure 7 is a section on line 7—7 of Figure 2;

Figure 8 is a fragmentary section on line 8—8 of Figure 7 illustrating the latch in normal position;

Figure 9 is a similar section showing the position of the latch when the latch is brought into contact with the striker plate in the normal closing of the door;

Figure 10 is a similar section showing the position of the latch after it has been released by the operation of the assembly for the opening of the door and has been brought into contact with the striker plate as the door is being swung to open position;

Figure 11 is a perspective view showing the latch housing and the latch-holding member entirely removed from the door; and

Figure 12 is an elevation of the outer end of the latch taken from the right of Figures 7 and 8.

In all the figures (with the exception of Figure 11) the door on which the latch assembly is illustrated as being mounted is indicated by the reference character 10. For the purpose of illustration the door 10, or at least that portion of the door in which the latch assembly is shown as mounted, is assumed to be a solid wooden member, but it is to be understood that the latch assembly can be mounted in any door, including hollow panel doors of either wood or metal construction, and, as will be later mentioned, in doors of various thicknesses.

The two opposite door knobs are indicated by the reference characters 11 and 12 and the door latch itself by the reference character 13. In general, the arrangement of the entire assembly is such that pressure against one of the door knobs (thus pressure against the knob 11 in the arrangement of the assembly as illustrated), in the direction in which the door is mounted to open, will release the latch so that a continuance of this slight thrust or pressure against the knob will cause the door to open, and that similarly a slight pull in the same direction on the opposite knob 12 will produce the same result. The direction in which such thrust (or pull) is exerted, and thus the direction in which the door opens, is indicated by the arrow X in Figures 1 and 2. However, a thrust against the door itself in this direction will not release the latch 13 nor enable the door to open, for the thrust must be exerted against the knob 11 itself (or a corresponding pull exerted on the knob 12 itself) as will presently be explained. Also, locking means (later described) is mounted in each of the knobs 11 and 12 to hold the knobs against such movement with respect to the door and thus prevent releasing of the latch.

Referring first to Figure 1, the thrust against the door knob 11, in the direction indicated by the arrow X, or the corresponding pull on the knob 12, as required for releasing the door latch, results in moving a main vertical latch control pin 14 slightly to the right (as viewed in Figure 1) against the force of the spring 15. This main control pin 14 is in constant engagement with the end of a latch-holding member 16 (see also Figures 2, 3, 4 and 8), which is so arranged that such movement of the main control pin 14 results in temporarily releasing the latch sufficiently to enable the door to be pushed (or pulled) open.

A hollow shaft 17 is welded or otherwise rigidly secured at one end to the door knob 11 and extends through the center of a circular opening 18 (Figure 1) which is cut in the door 10 for the assembly. The other door knob 12 has an integral tubular neck 19, the outside diameter of which corresponds to the inside diameter of the shaft 17, and this tubular neck fits into the corresponding other end of the hollow shaft 17, as shown in Figures 1, 2 and 4, and a pin 20, extending transversely through pairs of registering holes in the shaft

17 and the inserted tubular neck 19, holds the knob 12 secured to the other end of the shaft 17.

A supporting sleeve 21 extends around the central portion of the hollow shaft 17. The length of this sleeve 21 is greater than the width of the door 10, as shown in Figures 1 and 2, but shorter than the length of the hollow shaft 17. One end of this sleeve 21, thus the left hand end as viewed in Figures 1 and 2, is threaded and engages threads on the inside of a central cylindrical channel 22 formed in a frusto-conical door plate 23. The major outer diameter of this outer door plate 23 is greater than the diameter of the opening 18 which is cut in the door 10. A corresponding frusto-conical door plate 24 is mounted on the opposite side of the door and supports the other end of the sleeve 21. The door plate 24 is provided with a pair of diametrically opposite apertured recesses 25 and 26 (Figures 2 and 6) and a pair of screws 27 and 28 extend from these apertured recesses across the opening 18 and engage the opposite door plate 23. The door plate 23 is formed with four inwardly-extending lugs 29, spaced 90° apart, each lug having a threaded recess adapted to engage the end of one of the screws 27 or 28 (see Figures 2, 3 and 4.) In this way the two door plates 23 and 24 are clamped together at opposite sides of the door cavity 18 and secure the supporting sleeve 21 firmly in place. Since one end of the sleeve 21 has threaded engagement with the channel 22 of the door plate 23, the door plate 23 and sleeve 21 can be adjusted so that the sleeve will be centrally positioned with respect to the two door plates on a door of any thickness within a reasonable range, and the two door plates can thus be clamped tightly in place against the respective opposite faces of the door. This adjustability of the spacing between the two door plates to correspond to the particular door thickness is facilitated by providing the door plate 23 with the four recessed lugs 29 for the two clamping screws 27 and 28, instead of providing only a single pair of such lugs.

When the door plates 23 and 24 are mounted in place and the sleeve 21 is thus secured in proper position, the sleeve 21 provides the support mounting for the hollow shaft 17 and the hollow shaft 17 then is longitudinally or axially slidable in the sleeve 21 to a limited extent. A pair of diametrically opposite, vertically aligned holes are provided in the hollow shaft 17 for the main latch control pin 14 (Figure 1) previously mentioned, and this control pin 14 also passes through a pair of identical vertically aligned slots 30 in the sleeve 21. Thus, these slots 30 limit the extent to which the hollow shaft 17, and therewith the control pin 14, as well as the two door knobs 11 and 12, can move with respect to the stationary sleeve 21. The spring 15 has one end attached to the pin 14 and the other attached to a lug 31 welded on, or formed integral with, the sleeve 21. Accordingly, the spring 15 normally holds the hollow shaft 17, and therewith the latch control pin 14 and the knobs 11 and 12, in the position indicated in Figure 1, but permits them to be moved to the right (as view in Figure 1) against the force of this spring 15 for a distance limited to the length of the slots 30. Such movement, when imparted to the control pin 14 against the force of spring 15, releases the latch 13 by moving the latch-holding member 16, as will be presently described.

The door latch 13 (see Figures 7 to 12, inclusive), which preferably is shaped as shown in the drawings, is pivotally mounted at 37 in a slide 34 (Figure 11) which, in turn, is slidably mounted in a housing 32 (Figures 7–10). The housing 32 is positioned in an opening 36 in the door edge which connects with the opening 18. The housing 32 and slide 34 are open in front to permit the latch faces to extend beyond the slide and housing. The front end of the housing 32 has a flange 38 (Figure 7) which is welded to a front plate 33 in the door edge. The front end of the slide 34 also engages this front plate 33 which is countersunk

in the edge of the door and is secured in place by a pair of screws 35. Thus, the housing 32 is held against any movement in the door by the front plate 33, while the slide 34 is slidable within the housing 32 but its forward movement is limited by the front plate 33.

The housing 32 is open at the rear to permit the slide 34 to move rearwardly from the position of Figure 8 to that of Figure 9. The rear end of the housing 32 has an inwardly-extending tongue 39 which is provided with an aperture in which the shank 40A of a spring-controlled plunger rod 40 is slidable. The forward end of the plunger rod 40 engages a recess 13A in the latch 13, and a spring 40B on the shank 40A is held under compression between the tongue 39 and the shoulder 40C on the plunger rod and thus holds the plunger rod in engagement with the latch recess and also exerts a force to hold the latch 13 as well as the latch-carrying slide 34 in the normal forward positions shown in Figure 8.

The latch-holding member 16 is pivotally mounted in the slide 34 at 41 (Figures 8–10). This member 16 is shaped as shown in these figures and its forward end 16A is tapered so as to engage a shoulder 13B on the adjacent periphery of the latch 13. A leaf spring 42, mounted on the slide 34 bears against the member 16 and normally holds the forward end 16A of this member in holding engagement with the latch shoulder 13B.

A second shoulder 43 is provided on the latch periphery ahead of the shoulder 13B and normally engages a wall portion 44 of the slide 34.

The operation of the latch will now be described with reference to Figures 8, 9 and 10. In Figure 8, the latch is shown in normal position which will be its position when the door is open or when the door has been entirely closed and the latch has been received into the customary recess in the striker plate. In the closing of the door, the latch 13 will first come into contact with the striker plate, indicated at 45 in Figure 9, which striker plate will be mounted around the usual recess in the door casing for receiving the latch. As the latch contacts the striker plate 45, the spring 40B permits the slide 34 and the latch 13 to move into the respective positions shown in Figure 9, and the latch thus is in the position to pass across the striker plate until it reaches the striker plate recess and returns to the normal position of Figure 8. During this movement the latch is held against pivoting by the engagement of the shoulder 43 with the slide wall portion 44. As the slide 34 is temporarily pushed inwardly, against the force of spring 40B, the member 16 also moves inwardly over the control pin 14.

When the door has been closed, the latch again being in the normal position of Figure 8, any attempt to open the door would require the latch to swing (in clockwise direction as viewed in Figure 8), on its pivotal mounting 37. This is impossible as long as the end 16A of member 16 engages the shoulder 13B of the latch 13. However, when the member 16 is moved sufficiently by the control pin 14 to cause the end 16A to become disengaged from the shoulder 13B, as illustrated in Figure 10, the latch 13 can then pivot in clockwise direction, as shown in Figure 10, and in so doing will move over the striker plate 45 in the opening of the door.

Thus, a slight movement of the control pin 14 acts to release the latch-holding member 16 and thus release the latch sufficiently to enable the door to be opened, and this slight but necessary movement of the control pin 14 is obtained by either a thrust on the knob 11 or a pull on the knob 12 (Figure 1), as previously described, resulting in temporarily moving the knobs, hollow shaft 17, and control pin 14 against the force of spring 15.

The preferred shape of the door knobs 11 and 12 is shown in Figures 1 and 5. To facilitate the proper moving of the knobs for the opening of the door, and to prevent any inadvertent attempt to turn or twist either knob, these knobs in their preferred form are made with identical, downwardly and inwardly extending tapered por-

tions 11A and 12A, respectively. These portions carry horizontal, inwardly-extending guide pins 11B and 12B, respectively (Figure 1) at their lower ends. Recesses for these guide pins are provided in the door and preferably are furnished with tubular inserts or shields 46 and 47 in which the guide pins 11B and 12B can then slide easily. The door knobs, when so formed, in addition to being practical and serviceable, are very attractive in appearance and are relatively inexpensive and simple to fabricate; but, of course, various other shapes and types of knobs may also be employed with this assembly.

The description thus far has made no mention of any special means for locking the door in closed position, and while the assembly can be used without any locking means when there is no intention of ever having to require locking of the door, nevertheless in most installations it will be desirable to make provision for possible locking of the door, and such locking means, which constitutes part of the assembly illustrated, will now be described.

A metal locking cylinder 48 (Figures 1 and 2), having a diameter slightly less than the inside diameter of the hollow shaft 17, is located centrally within the hollow shaft 17. This cylinder 48 is provided with an aperture 49 (Figures 2 and 3) through which the control pin 14 extends, and this aperture is widened sufficiently to permit partial rotation of the cylinder in either direction with respect to the control pin 14 and hollow shaft 17. Thus, the cylinder 48 will be moved longitudinally when the hollow shaft 17 and control pin 14 are moved, and, in addition, can be independently rotated to a limited extent in either direction.

A locking pin 50 (Figures 1 and 2) extends diametrically through the sleeve 21 and has its ends secured in the sleeve. The hollow shaft 17 has a pair of diametrically opposite, longitudinally-extending slots 51 (Figure 1), corresponding in length to the slots 30 in the sleeve 21, through which the locking pin 50 extends. The locking cylinder 48 is provided with a substantially Z-shaped slot 52, the central main portion of which extends longitudinally or axially a distance equal to the length of the slots 51 in the hollow shaft 17, and at the respective ends of which oppositely arranged, transversely-offset locking notches 52A and 52B, are located (see Figure 2). Thus, when the locking cylinder 48 is in the normal or neutral position illustrated in Figure 2, the locking cylinder will be movable longitudinally a short distance (to the right) although the locking pin 50 is stationary; but a slight rotation of the cylinder 48 (counterclockwise as viewed from the right in Figure 2) will then cause the pin 50 to be engaged by the notch 52A and hold the cylinder 48 against any longitudinal movement and consequently hold the hollow shaft 17 and the control pin 14 against movement. Similarly, when the hollow shaft 17, control pin 14 and cylinder 48 have been moved to the right, a slight rotation of the cylinder 48 (clockwise) will then cause the locking pin 50 to be engaged by the other notch 52B and prevent the cylinder 48 (and therewith the hollow shaft 17 and control pin 14) from returning to normal position until the cylinder 48 is given sufficient partial rotation to return it to the unlocked or neutral position. In this manner partial rotation of the locking cylinder 48 in one direction will prevent the knobs, hollow shaft 17 and main latch control pin 14 from being moved into unlocking position and prevent any releasing of the latch until the cylinder is first returned to neutral position; and the cylinder 48 also makes it possible for the knobs, hollow shaft 17, and latch control pin 14 to be locked in the latch releasing position, should this be desired.

The right hand end of the locking cylinder 48 (as viewed in Figures 1 and 2) has a diametrically extending groove 53 which is arranged to be engaged by a tongue 54 on the inner end of a lock operating shaft 55 located in the knob 12 and its tubular neck 19. This lock-operating shaft 55 has a notch 56 which engages the pin 20 so that the pin 20 prevents removal of the shaft 55 while permitting slight rotation of the shaft 55 with respect to the pin, and the shaft 55 terminates in a finger grip 57 (see also Figure 5) which enables the lock-operating shaft 55 (and therewith the cylinder 48) to be manually turned easily at the knob 12.

The other knob 11 is provided with a key-operated lock 58 of standard construction which is secured in the end of the hollow shaft 17 at the knob 11. This lock 58 is connected to a stub shaft 59, the inner end of which is flattened into a tongue 60. The adjacent end of the locking cylinder 48 is provided with a notch 61, corresponding in shape to the aperture 49 as shown in Figure 3, which notch 61 is engaged by the tongue 60 of the stub shaft 59. Accordingly, by inserting the key in the lock 58 and turning the key so as to produce required rotation of the stub shaft 59, the locking cylinder 48 can be operated from the knob 11. In this manner the cylinder 48 can be operated from either side of the door, and, when locked from one side, can be unlocked from the other side and vice versa.

In order to prevent the locking cylinder 48 from rotating too easily, or being rotated inadvertently, a spring 62 is placed in a recess in the cylinder 48 and bears against the hollow shaft 17.

Various minor modifications would, of course, be possible in the construction of the individual members of the assembly without departing from the principle of the invention, and it is not intended to limit the invention otherwise than as set forth in the claims.

We claim:

1. In a door latch assembly of the character described including a pair of door knobs located on opposite sides of a door respectively, a shaft connecting said knobs, a support mounting for said shaft, said shaft longitudinally movable in said support mounting, and means limiting said movement of said shaft, a downwardly extending portion on each of said door knobs, an inwardly-extending guide pin carried by each of said portions, and a recess in the door for each guide pin, said guide pins slidable in said recesses respectively.

2. In a door latch assembly of the character described including a pair of door plates mounted respectively on opposite faces of a door, a sleeve extending between and supported by said door plates, a pair of door knobs located on opposite sides of the door respectively, a shaft connecting said knobs, said shaft supported in said sleeve and movable longitudinally therein, and means limiting the movement of said shaft with respect to said sleeve, a downwardly-extending tapered portion on each of said door knobs, an inwardly-extending guide pin carried by each of said portions, a recess in the door for each guide pin, and a tubular insert in each recess, said guide pins slidable in said tubular inserts respectively.

3. In a door latch assembly of the character described, a latch housing, a slide in said housing, a latch pivotally mounted in said slide, spring means normally holding said slide and latch in forward position, a latch-holding member pivotally mounted in said slide and normally engaging said latch to prevent pivotal movement of said latch in said slide, spring means urging said member into engagement with said latch, the inner end of said member extending beyond said slide, a control pin contacting the inner end of said member for disengaging said member from said latch, a pair of door plates mounted respectively on opposite faces of a door, a sleeve extending between and supported by said door plates, a pair of door knobs located on opposite sides of the door respectively, a hollow shaft connecting said knobs, said shaft supported in said sleeve and movable longitudinally therein, means limiting the movement of said shaft with respect to said sleeve, said control pin carried by said shaft, a slot in said sleeve for

said pin, spring means normally holding said shaft and therewith said control pin against movement with respect to said sleeve but enabling said shaft and said control pin to be moved a limited distance against the force of said latter mentioned spring means and thereby move said member into disengaging position with respect to said sleeve but enabling said shaft and said control pin to be moved a limited distance against the force of said latter mentioned spring means and thereby move said member into disengaging position with respect to said housing, a locking cylinder in said hollow shaft, means holding said cylinder against relative axial movement with respect to said shaft but permitting partial rotation of said cylinder in said shaft, a stationary locking pin secured in said sleeve and extending transversely through slots in said hollow shaft and locking cylinder, locking notches in said cylinder engageable with said locking pin upon partial rotation of said cylinder, and means mounted in each of said door knobs extending to and engaging the respective end of said locking cylinder to enable said cylinder to be rotated through the medium of said latter mentioned means.

4. In a door latch assembly of the character described, a latch housing, a slide in said housing, a latch pivotally mounted in said slide, spring means normally holding said slide and latch in forward position, a latch-holding member pivotally mounted in said slide and normally engaging said latch to prevent pivotal movement of said latch in said slide, spring means urging said member into engagement with said latch, the inner end of said member extending beyond said slide, a control pin contacting the inner end of said member for disengaging said member from said latch, a pair of door plates mounted respectively on opposite faces of a door, a sleeve extending between and supported by said door plates, a pair of door knobs located on opposite sides of the door respectively, a hollow shaft connecting said knobs, said shaft supported in said sleeve and movable longitudinally therein, means limiting the movement of said shaft with respect to said sleeve, said

control pin carried by said shaft, a slot in said sleeve for said pin, a locking member within said hollow shaft spaced from the ends thereof, means holding said locking member against relative movement longitudinally with respect to the shaft but permitting partial rotation of said locking member in said shaft, a stationary locking pin extending transversely through slots in said shaft and locking member, a locking notch in said locking member engageable with said locking pin upon partial rotation of said locking member, and means mounted in one of said door knobs engaging said locking member to engage said locking member to be rotated through the medium of said latter mentioned means.

5. In a door latch assembly, a pair of door plates mounted on opposite faces of a door, a stationary sleeve extending between and supported by said door plates, a hollow shaft extending through said sleeve and movable longitudinally therein, a pair of door knobs secured to opposite ends of said shaft respectively, means limiting the movement of said shaft and therewith of said door knobs with respect to said sleeve, a latch control member carried by said shaft, a slot in said sleeve for said control member, a locking cylinder in said shaft, means holding said cylinder against relative axial movement with respect to said shaft but permitting partial rotation of said cylinder in said shaft, a stationary locking pin secured in said sleeve and extending transversely through slots in said shaft and in said cylinder, said cylinder having locking notches engageable with said stationary locking pin upon partial rotation of said cylinder, and means mounted in one of said door knobs extending to and engaging an end of said cylinder to enable said cylinder to be rotated into and out of locking position through the medium of said latter mentioned means.

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