

July 28, 1942.

R. A. MILLER

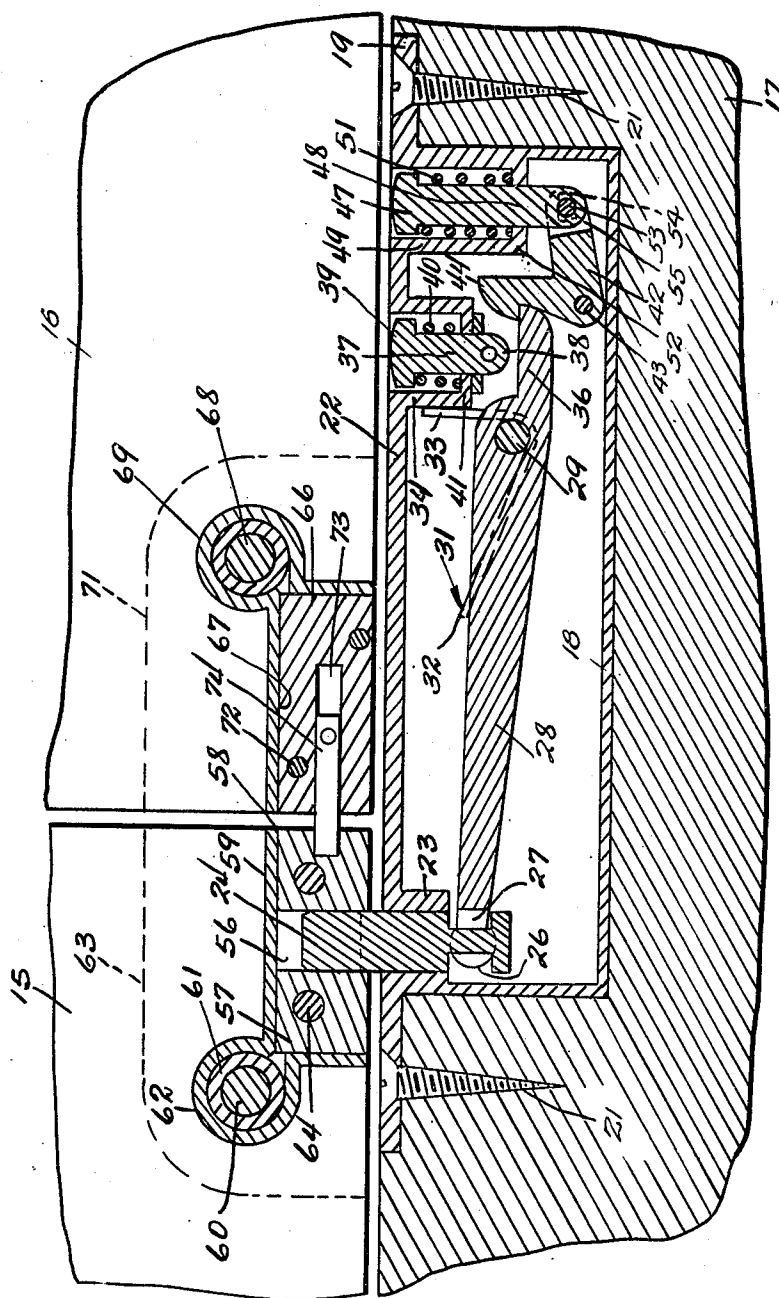
2,291,402

LATCH CONSTRUCTION

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5 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

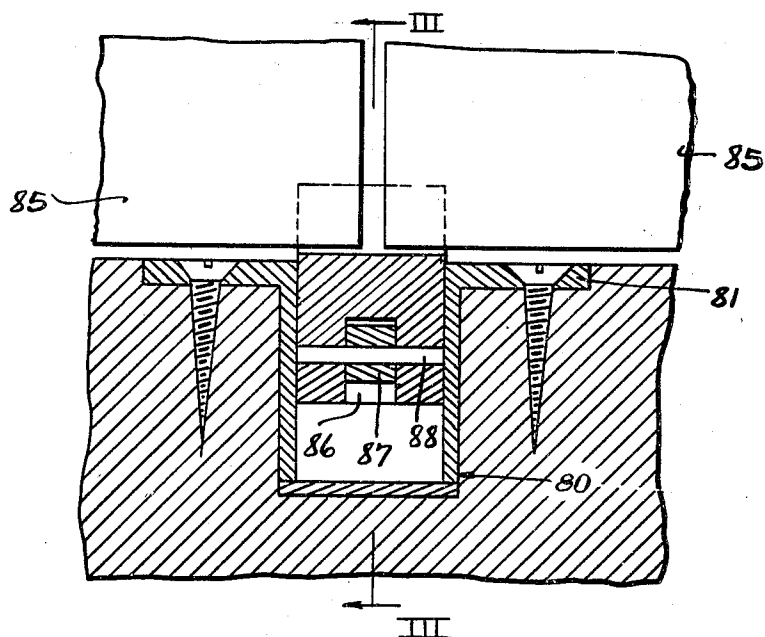
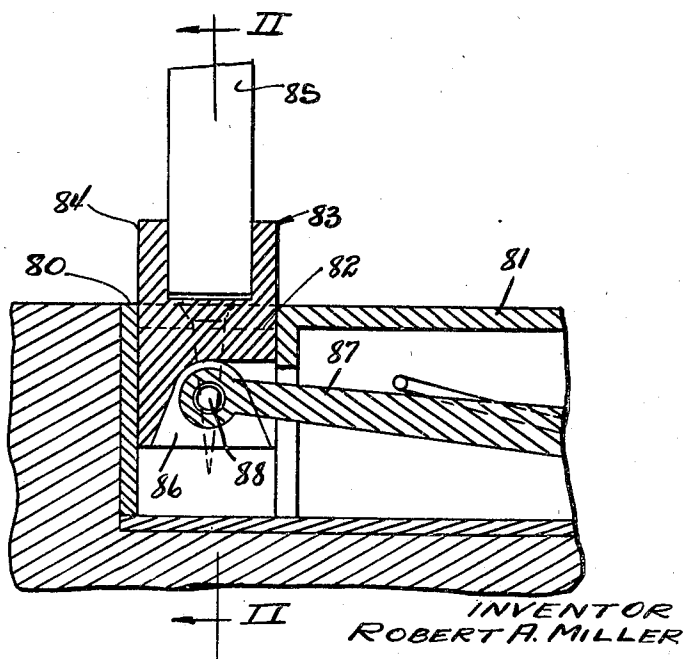


Fig. 3.



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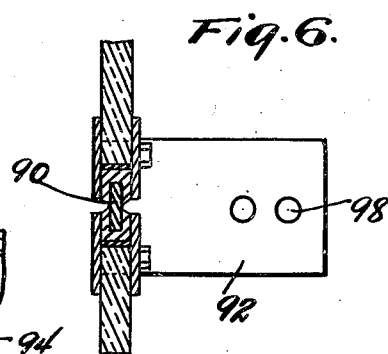
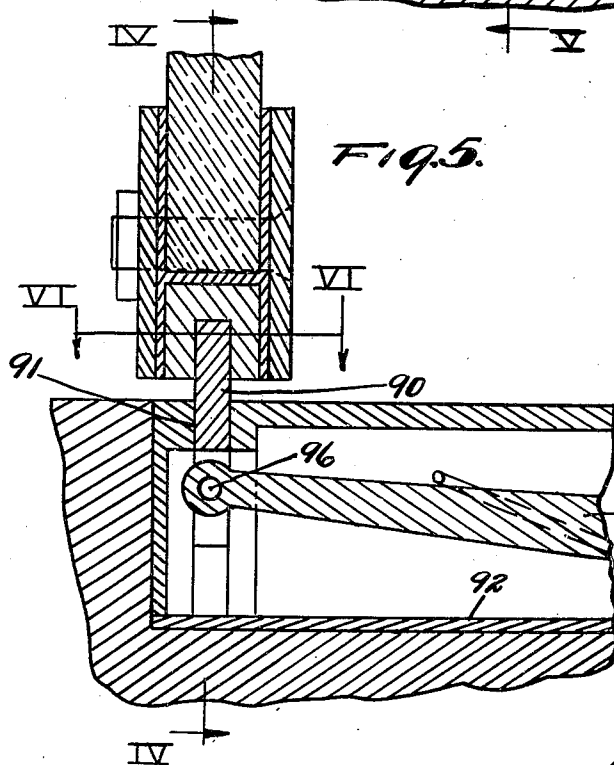
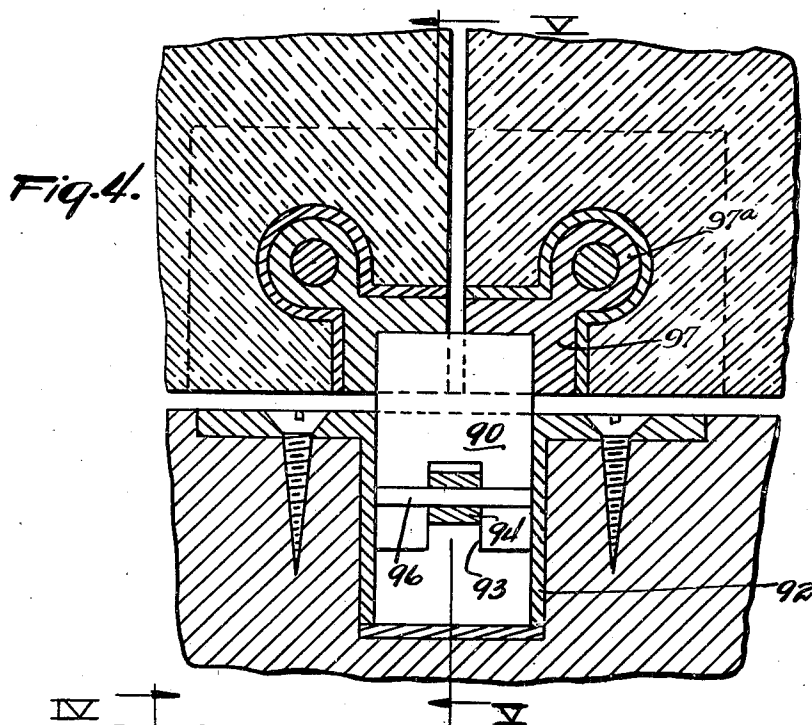
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Fig. 7.

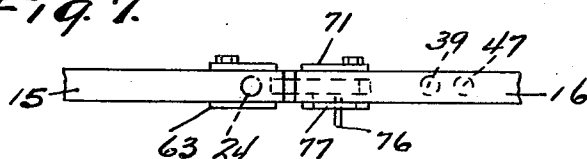


Fig. 8.

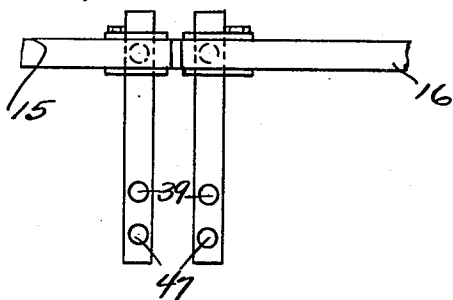


Fig. 9.

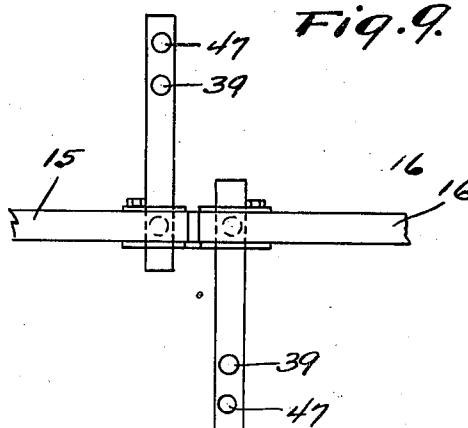
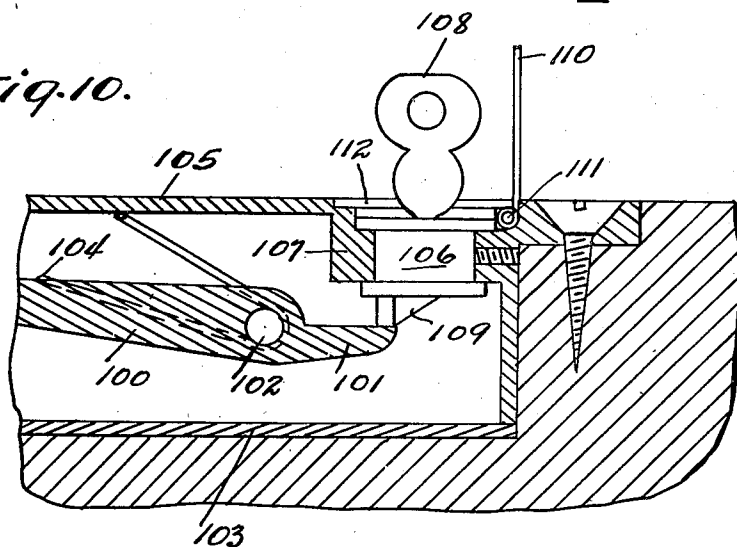


Fig. 10.



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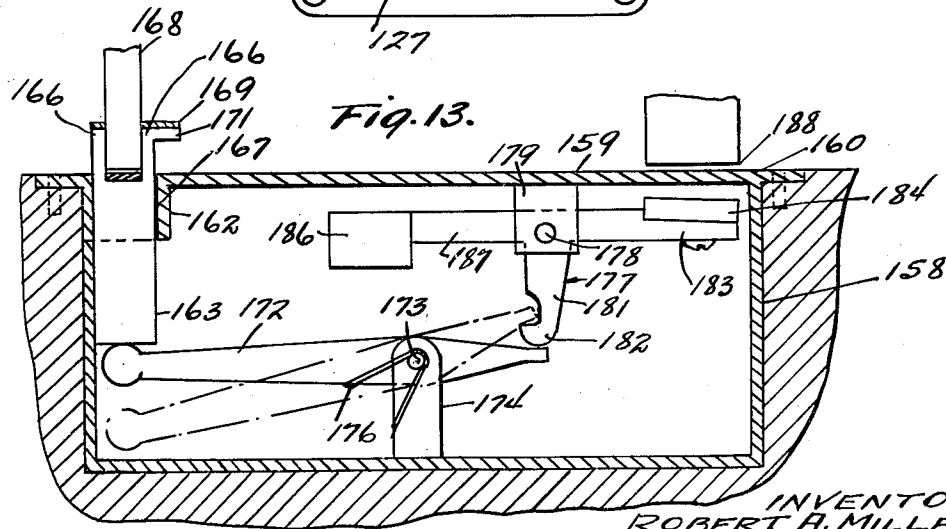
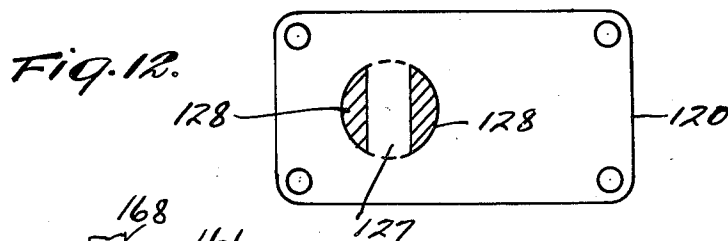
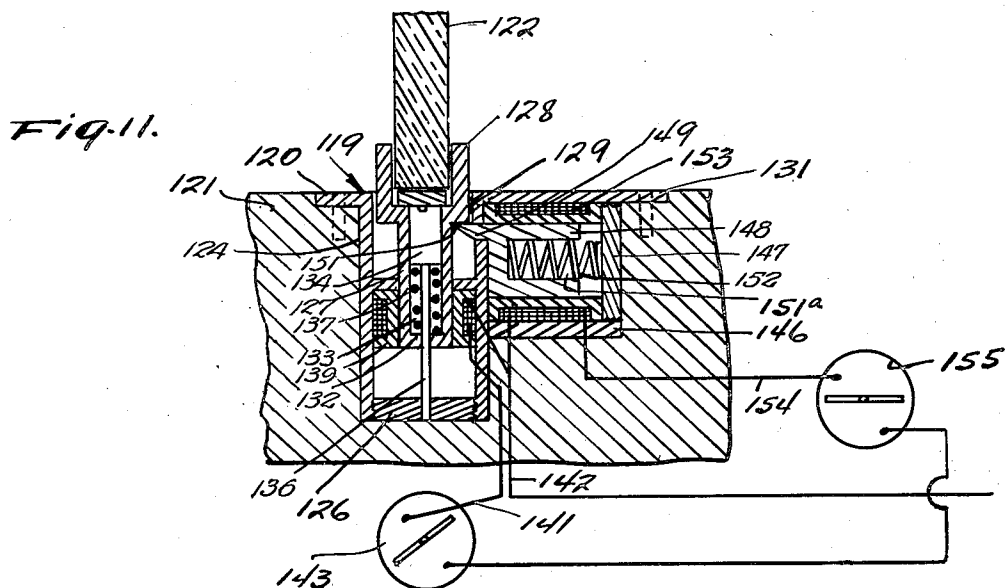
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## UNITED STATES PATENT OFFICE

2,291,402

## LATCH CONSTRUCTION

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Original application November 1, 1938, Serial No. 238,198. Divided and this application May 24, 1941, Serial No. 395,034

2 Claims. (Cl. 292—166)

The present invention relates to latch mechanisms for closures and it has particular relation to mechanisms for latching or locking doors or other closures comprising panels of glass.

One object of the invention is to provide mechanism of the foregoing type the main elements of which are mounted in a floor or ceiling of a building rather than in the movable closure panels.

This and other objects of the invention will be apparent from consideration of the following specification and the appended claims.

It has heretofore been proposed to form doors or other closures for buildings of single massive panels of glass, which panels usually are tempered in order to increase the strength thereof. Difficulty has been encountered in the provision of adequate and attractive securing devices for such closures. Obviously the provision of conventional mortise locks is impracticable. Other types of conventional locking mechanism are objectionable because they tend to detract from the general appearance of a single massive panel of glass. Furthermore, in most instances they require mounting holes or openings of one form or another which holes are difficult to form in such hard, brittle material as glass. These difficulties are accentuated where the doors comprise twin panels, the swinging edges of which are juxtaposed when the doors are closed.

In accordance with the provisions of the present invention the foregoing difficulties are substantially obviated by the provision of a latching or locking mechanism the body of which is mounted in a floor or ceiling and is adapted to be projected lockingly to engage a corner portion of the doors or closure panels to be secured.

For a better understanding of the invention reference may now be had to the accompanying drawings in which Figure 1 is a cross-sectional view through a convenient embodiment of a locking mechanism and the adjacent corner portions of a pair of swinging doors.

Figure 2 is a fragmentary view substantially upon the line II—II of Figure 3, showing an additional form of the invention.

Figure 3 is a cross-sectional view taken substantially upon line III—III of Figure 2.

Figure 4 is a fragmentary cross-sectional view taken substantially upon the line IV—IV of Figure 5, and showing a further example of the invention.

Figure 5 is a fragmentary cross-sectional view of slightly modified form of the structure shown in Figure 1.

Figure 6 is a fragmentary view taken substantially upon the line VI—VI of Figure 5.

Figures 7, 8 and 9 are fragmentary plan views illustrating schematically the relative arrangement of the locking mechanisms with respect to swinging door panels.

Figure 10 is a fragmentary cross-sectional view illustrating a convenient form of key-controlled locking mechanism for use in connection with the latching devices.

Figure 11 is a fragmentary cross-sectional view disclosing electrically-controlled locking mechanism.

Figure 12 is a plan view of the device shown in Figure 11.

Figure 13 is a fragmentary cross-sectional view of a latching mechanism embodying a magnetically-controlled securing device for the bolt thereof.

In the drawings like numerals refer to like parts throughout.

In the form of the invention shown in Figures 1 and 7 a pair of door panels 15 and 16, preferably of tempered glass, of a thickness varying within the approximate range of  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches, are perpendicularly mounted to swing in any convenient manner in an opening, one horizontal edge of which is defined by a deck such as a floor or ceiling 17. When the doors are closed two of their edges are so juxtaposed as to practically completely close the opening.

Mechanism to latch or lock the panels in closed position includes a housing 18, disposed as shown in Fig. 1 in the plane of the doors and having flanges 19 countersunk in the floor or ceiling to receive securing screws or bolts 21 extending therethrough. The housing is closed by a plate 22 which is provided with a tubular boss 23 that contains a vertically sliding bolt 24. The bolt when retracted is concealed in the housing, thus leaving a plane surface. It is also formed with a peripherally-extending groove 26 for a yoke 27 at the forward extremity of a horizontal operating bar 28. The bar swings vertically upon transversely-extending pivot 29, and is urged to normally retracted position by means of a spring 31 of mouse-trap type. One extremity 32, of the spring, bears upon the upper face of bar 28 and the rear portion 33 bears against a tubular abutment 34 extending downwardly from plate 22. At its mid portion the spring is bent about pivot 29 to produce tension upon the extremities.

The bar 28 is also provided with a rearwardly-extending portion 36, which may be depressed in

order to actuate the bolt 24 upwardly, by means of a normally, flushly disposed push-button 37 disposed in tubular abutment or boss 34. The button includes a stem 38 extending downwardly to engage the portion 36 when the latter is in elevated position, and a head 39, the lower face of which is engaged by helical spring 40 extending about the stem to maintain the button in normally elevated position. The lower end of the spring rests upon flange 41 about the inner periphery of the boss 34.

The bar 28 is latched in elevated position by means of mechanism including a small bell-crank lever 42, pivoted at its apex upon transverse pin 43. The lever includes at one extremity a hooked portion 44, adapted to engage extension 36, to maintain the latter in depressed position. It will be observed that the extremity of the portion 36 and the hook 44 are so rounded or sloped that upon depression of button 37 to move the projection 36 downwardly the hook is moved rearwardly by cam action until it can clear the rear edge of the projection.

Release of hook 44 from the projection 36 is effected by push-button mechanism including a second flushly disposed button 47 having a stem 48 mounted to reciprocate in a tubular housing 49 extending downwardly from cover plate 22. The button is maintained in elevated position by helical spring 51 engaging the lower face of the button at one extremity and at its lower extremity engaging suitable flange 52 about the inner periphery of the housing. At its lower extremity stem 48 of the button 47 is pivoted by means of pin 53 disposed in slots 54 within bifurcated portion 55 at the rear extremity of the bell-crank lever in such manner that depression of the button swings the hook portion 44 to release extension 36 of arm 28.

Bolt 24, when elevated to operative position, is received within an opening 56 in a block 57 of brass or other material disposed in a notch in the corner of door panel 15, and is insulated from direct contact with the glass by means of a resilient packing 59 of rubber or other suitable material. It is secured in position by means of a bolt 60 in bushing 61 in opening 62 that communicates with the notch 58 in such manner that the bushing is held within the opening. The bolt at its extremities extends through cover plates 63, which may be secured to the block 57 by means of transverse bolts 64.

A block 66 is also disposed in a notch 67 in panel 16 and is secured from displacement by means of bolt 68 in circular opening 69, cover plates 71 and bolts 72, all substantially corresponding to bolts 60, plates 63 and bolt 64. Block 66 is formed with horizontally-extending bore 73 in which is slidably disposed a bolt 74, projecting into a corresponding opening in the edge of block 57. Bolt 74 may be operated in any convenient manner, for example, by means of a laterally-extending arm 76 (shown in Fig. 7) which projects through an opening 77 in one of the plates 71.

The operation of the mechanism herein shown is substantially self-evident. Assuming that the bolt 24 is in depressed or retracted position and that it is desired to lock the door panels 15 and 16 the panel 16 is first opened to expose the button 37. The latter is then depressed to swing the arm 28 upwardly and correspondingly to project the bolt 24 into the opening 56. Simultaneously the hook 44 is cammed rearwardly until it engages and locks the rear extremity of the

projection 36. The panel 16 may then be closed and the bolt 74 projected into the opening in the block 57, thus securing the two door panels in locked position. The push-buttons 37 and 47 controlling the latch bolt are then directly below the panel 16 and can not be operated so long as the latter is closed. Upon retraction of the bolt 74, the panel 16 may be opened to expose button 47. Depression of the latter disengages hook 44 from projection 36 and permits the bolt 24 to be withdrawn from opening 56.

In the form of the invention shown in Figures 1 and 7, the latch bar 28 is disposed substantially within the plane of the closed positions of panels 15 and 16. However, as shown in Figure 8 the bar may be turned transversely of the door panels. In this event it is preferable to employ two latching mechanisms, one for each door panel. Either panel may then be released independently of the other. Assuming that the latching mechanisms are disposed with the push-buttons 39 and 47 to the interior of a room or building, the doors may be locked or latched against entrance from the exterior, but can be opened by a person within the interior.

In the forms of the invention disclosed in Figures 2 and 3 the employment of blocks in the corners of the door panels is obviated. In this form of the invention the housing 80 corresponding to the housing 18 is disposed in a floor or ceiling and is provided with a cover plate 81 within which is formed an opening 82. A bolt 83 having a bifurcated upper portion 84 is slidably disposed in the opening in such manner that the bifurcated portion may engage and disengage the lower corners of a pair of door panels 85. The lower portion of the bolt is recessed as indicated at 86 to receive the forward extremity of latch bar 87 corresponding to latch bar 28. The extremity is pivoted upon a transverse pin 88 within the recess. Aside from the modification of the bolt 83 this embodiment of the invention substantially corresponds in construction to that disclosed in Figure 1. It will be noted that the latch bar 87 extends transversely of the door panels and since the bolt 83 simultaneously engages both panels of the door a single latch is sufficient for both panels.

In the form of the invention disclosed in Figures 4, 5 and 6, a plate-like bolt 90 of substantial width is disposed to reciprocate in opening 91 in housing 92. The plate is slotted as indicated at 93 to receive the forward extremity of latch bar 94, corresponding to bars 28 and 87, which is pivoted within the slot by means of transverse pin 96. The upper extremity of the bolt is received within suitable slots formed in the adjacent corners of blocks 97 which in construction and mounting essentially correspond to the blocks 57 and 66, shown in Figure 1.

The operation of this embodiment of the invention substantially corresponds to that described in connection with Figures 2 and 3. Both panels of the door are locked by the single bolt 90 and may be released by depression of a button 98, corresponding to button 47.

In Figure 10 is illustrated a convenient embodiment of apparatus including a lock adapted to actuate the latching mechanism and also positively to secure the latter in locked position. In this embodiment of the invention a latch bar 100 corresponding to the bar 28 and provided with a rearwardly-projecting portion 101, is pivoted upon transverse pin 102 in housing 103. The bar is actuated to retracted position by means of hair-

pin spring 104 bearing upon the top of bar 100 and at the other extremity engaging the under face of cover plate 105 of housing 103.

The projection 101 is actuated to and maintained in depressed position by means of a lock including a conventional lock cylinder 106, which is disposed in a socket 107 in cover plate 105 and may be rotated by key 108. The lower extremity of the cylinder 106 is provided with a downwardly-projecting cam 109 adapted upon rotation of the cylinder to gradually depress portion 101. When the key 108 is withdrawn from the lock cylinder the key opening is closed against the admission of dirt by means of a small lid 110, hinged upon pin 111, and adapted to fit flush with the surface of the floor or ceiling in a countersink 112.

After the lever 100 has been elevated by rotation of cylinder 106, it is maintained in position until the cylinder is again rotated to release cam 109 from projection 101.

The locking mechanism disclosed in Fig. 10 may be employed to actuate any of the levers 28, 87, or 94. Where it is employed, bell-crank 42 and its attendant push-buttons are not required.

In the form of the invention illustrated in Figures 11 and 12, the latching mechanism is controlled by means of electrical solenoids which are in circuit with suitable switches disposed at any convenient point. The construction embodies a casing 119 approximately of inverted L shape, and having a flange 120 by means of which it is secured in a floor or ceiling 121, in vertical alignment with door or doors 122. The vertical branch 124 of the casing is of tubular cross-sectional outline and at its lower extremity is threaded to receive a screw plug 126 providing a closure therefor.

Bolt 127 reciprocates within the branch and at its upper extremity is provided with a bifurcated portion, the branches 128 of which slide in slots 129 in the top portion 131 of the casing. The bolt also comprises a stem portion 132 which is bored as indicated at 133 to receive a slidable plug 134 which is provided with a stem 136 extending downwardly and threaded at its lower extremity into the plug 126. A coil spring 137 is disposed about the stem 136 and engages at opposite extremities with the lower face of plug 134 and the bottom of the bore 133, to urge the bolt to retracted position. In order to actuate it upwardly to locking position, a solenoid 139 is disposed in an intermediate portion of the branch 124 and is connected by conductors 141 and 142 to a source of electrical current. A conventional switch 143 connected in series with the conductor 141 provides means for controlling the energization of the solenoid.

Branch 146 of the casing 119, like branch 124 is of tubular cross-section and includes at its extremity a screw threaded closure plug 147 corresponding to plug 126. A horizontal bolt 148 reciprocates within the branch 146 and is provided at its forward extremity with a lip 149 adapted to engage a shoulder 151 at the upper extremity of stem 132. The bolt is bored as indicated at 151a to receive a helical spring 152 which engages at its extremities respectively with the bottom of the bore and the adjacent face of the plug 147. This spring actuates the bolt forwardly automatically to engage the aforementioned shoulder when the bolt is elevated and thus to prevent retraction of the bolt 127. In order to retract bolt 148 to release bolt 127,

a solenoid 153 is disposed in the branch 146 and is connected by conductor 142 and a conductor 154 with a suitable source of energizing current. A switch 155 disposed in series with the conductor 154 provides means for controlling the current.

It will be apparent that the switches 143 and 155 may be of substantially any convenient design and may include locking mechanism (not shown) if so desired in order to prevent unauthorized manipulation thereof. The switches may be disposed at any suitable place either adjacent to or remote from the door which is to be locked.

The operation of the mechanism disclosed is practically self evident. Assuming that the bolt 127 is in retracted position, door 122 is swung into alignment with the bifurcated upper portion thereof. Switch 143 is then closed to energize the solenoid 139. As a result, the bolt is actuated upwardly to engage the lower edge of the door panel or door panels 122. When the upper limit of travel is reached bolt 148 is projected forwardly by the spring 152 to engage the shoulder 151 and thus to maintain the bolt in elevated position after the switch 143 is closed. When it is desired to open the door, switch 155 is closed to energize the solenoid 153, thus causing the bolt 148 to be retracted against the urge of the spring 152. The bolt 127 then drops or is retracted by the urge of the spring 137 and the door is thus left free to swing open.

In the form of the invention illustrated in Figure 13 a housing 158 is provided with a cover 159 having marginal projections 160. The cover, also, has a downwardly-projecting tubular boss 162 within which reciprocates a locking bolt 163. This bolt is bifurcated and the branches 166 of the bifurcated portion reciprocate within slots 167 in the top or cover 159 of the housing. In order to prevent possible chipping of the lower edge of a door 163, which is locked by the bolt, the upper portions of the branches 166 may be faced or covered with rubber, resin or soft metal such as lead, aluminum, copper, or other material in the form of a layer 169. One of the branches 166 may also include a laterally-extending lug 171 extending outwardly to provide a convenient thumb piece for manually pressing the bolt downwardly out of engagement with the lower edge of the door 163.

The bolt is actuated upwardly into engagement with the door by means of a lever 172 journaled intermediate of its length upon a pivot 173 disposed in upwardly-extending brackets 174 on the bottom of housing 158. Spring 176 is coiled about the pivot and at its opposite extremities engages respectively with the brackets 174 and the lower edge of the lever, thus providing means for maintaining the bolt in normally elevated position.

Securing means for positively preventing any unauthorized depression or retraction of the bolt 163 includes a small bell-crank lever 177, pivoted at its apex upon pin 178, which extends through downwardly-extending brackets 179 in cover 159. The downwardly-extending branch 181 of the lever is adapted to engage the rear extremity of lever 172 when the bolt 163 is in elevated position, thus preventing depression of the latter to release the door. The branch 181 also includes a hook-like portion 182 adapted to engage the rear extremity of the lever in order to maintain the bolt in depressed position when so desired. Branch 183 of the lever is provided at its rear extremity

with a piece 184 of iron or other magnetic material constituting an armature. If so desired, the armature may be partially counterbalanced by means of a small weight 186 at the extremity of an auxiliary arm 187 upon the bell-crank. The magnetic pull required to elevate the armature is thus reduced.

The mode of the operation of this embodiment of the invention is substantially as follows:

Assuming that the bolt 163 is in elevated position to engage the edge or edges of door or doors 168 and it is desired to release the latter, a magnet 188 of any suitable design is brought over cover 159 into proximity to the armature 184, thus causing the branch 181 of the lever 177 to swing rearwardly out of the path of the extremity of the lever 172. Manual pressure may then be exerted upon the lug 171 of the bolt, thus causing the latter to be depressed against the urge of spring 176 until the rear extremity of the lever is eventually above the hooked portion 182. If the magnet 188 is then removed while the bolt is held in depressed position, it will be apparent that the arm 181 will swing forward to engage the hook with the lever, thus positively locking the latter against the urge of the spring and maintaining the bolt 163 in depressed position. In event that it is desired to release the bolt, it is merely necessary again to bring the magnet 188 over the armature 184. This causes the arm 181 again to swing rearwardly, to release the lever 172 and permit the bolt 163 to be projected upwardly by spring 176. Manifestly if the friction between hook 182 and lever 172 is too great to be overcome by magnet 188, a slight pressure on thumb piece 171 will relieve it.

The main advantages of the forms of the invention disclosed in Figures 11, 12 and 13 reside in the fact that the use of buttons or other manipulating devices, which might be objectionable in a floor, are obviated. The only openings required in the floor are those formed to permit passage of the locking bolts.

The embodiments of the invention herein disclosed and described are relatively simple in construction. All of the main operating elements

thereof can be conveniently housed in a floor or ceiling as may be convenient in such manner as to obviate the necessity of inclusion of mechanism within the door panels themselves. The expense involved in the provision of such mechanism is obviated. Simultaneously, the door is substantially unmarred by any locking mechanism.

The devices are particularly well adapted for securing doors comprising massive swinging panels of glass. However, they may be employed in connection with doors of other material or for securing horizontally sliding panels and doors. The devices may also be employed for securing doors comprising single panels rather than a pair of panels.

The forms of the invention herein shown and described are to be considered merely as exemplary and numerous modifications may be made therein without departure from the spirit of the invention or the scope of the appended claims.

This is a division of my copending application Serial No. 238,198, filed November 1, 1938 for Latch constructions, which has matured into Patent No. 2,264,182, of November 25, 1941.

What I claim is:

1. A latching mechanism for a double door in a doorway of a building construction having a deck, the door comprising a pair of hinged panels having swinging edges which in closed position of the panels are directly juxtaposed and the deck defining a horizontal side of the doorway, said locking mechanism comprising a vertically reciprocable bolt disposed in the deck and engaging when in elevated position with the adjacent edge of one of the panels when the latter is in closed position, releasable means positively to hold the bolt in engagement with the edge, means to actuate said means to release the bolt, disposed to be covered by, but being out of engagement with, one edge of the second panel and being manually operable to effect release of the bolt only after the second panel has been opened.

2. A construction as defined in claim 1, which further includes locking means carried by one of the panels to secure the two panels together in closed position.

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