Dec. 4, 1956 L. L. SCHACHT 2,772,554

LOCKING MEANS FOR A DOOR CONSTRUCTION

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Fig. 1.

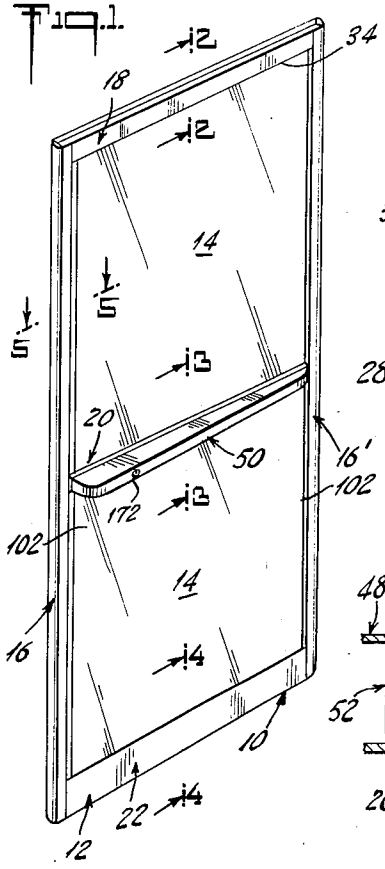


Fig. 2.

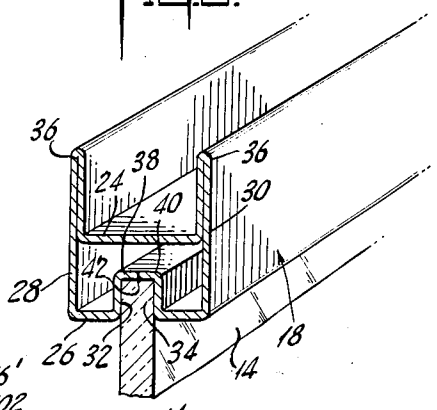


Fig. 3.

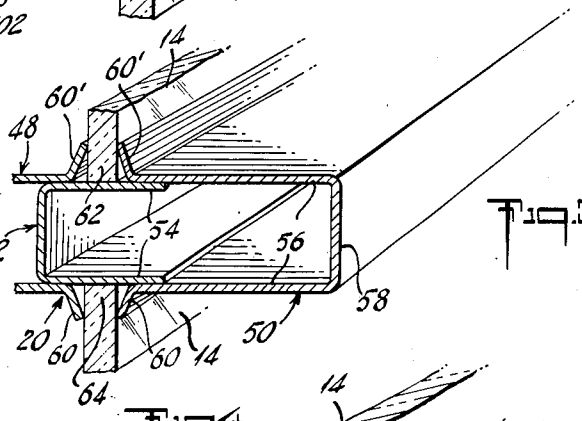


Fig. 5.

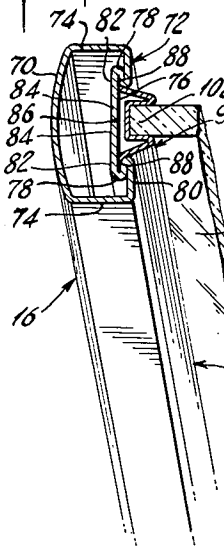


Fig. 6.

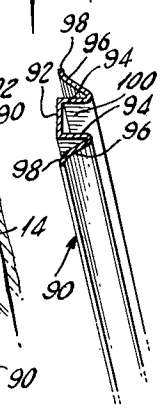
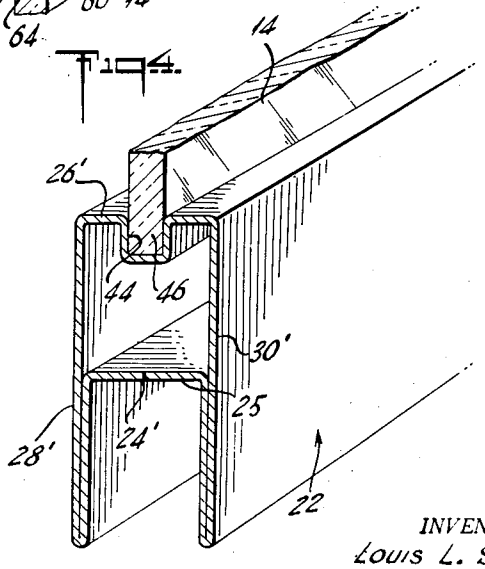


Fig. 4.



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LOCKING MEANS FOR A DOOR CONSTRUCTION

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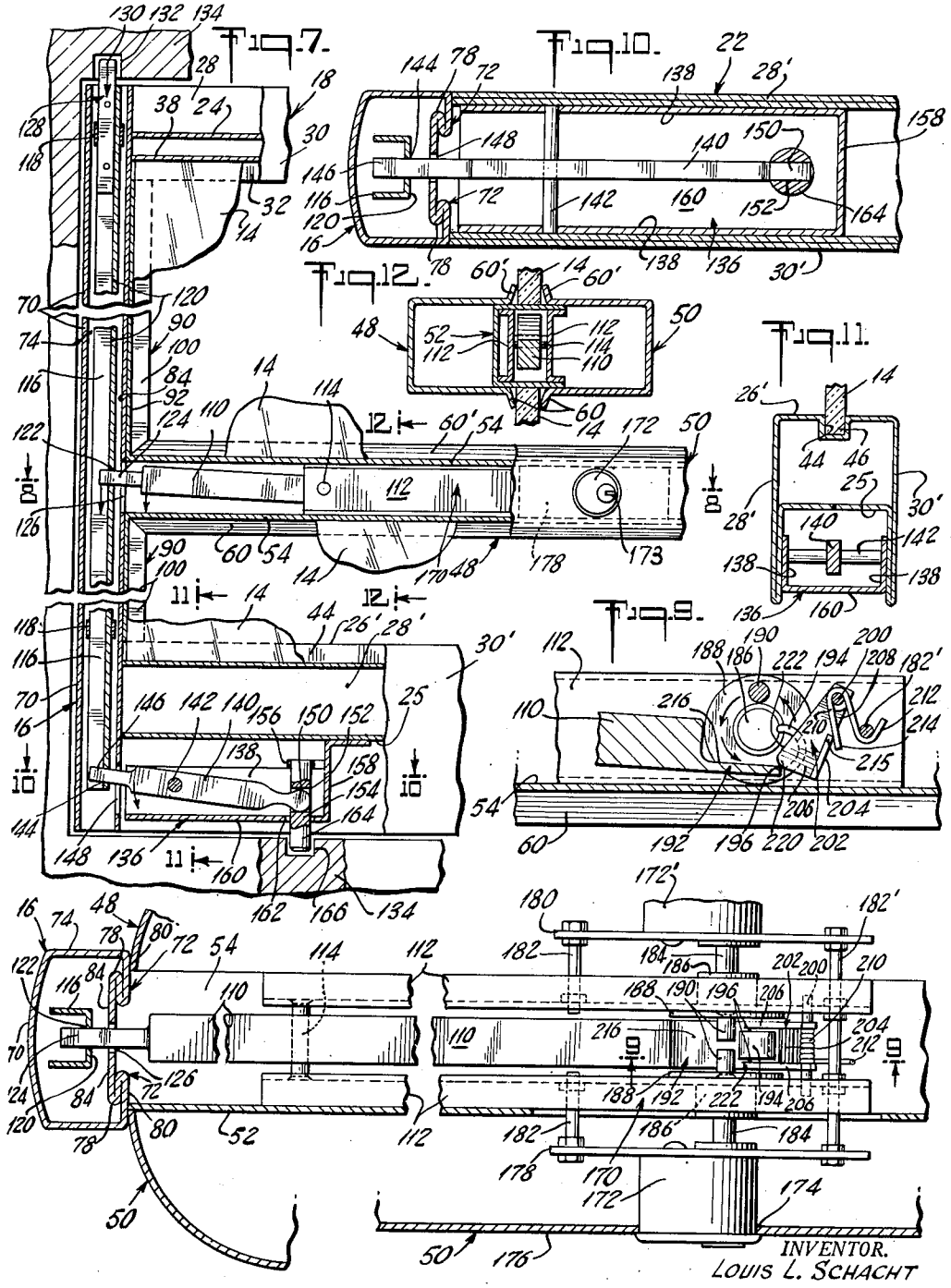


Fig. 7.

Fig. 10.

Fig. 12.

Fig. 11.

Fig. 9.

Fig. 8.

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LOCKING MEANS FOR A DOOR CONSTRUCTION

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Application July 22, 1952, Serial No. 300,217

4 Claims. (Cl. 70—120)

This invention relates to improvements in door construction generally and, more particularly, to improvements in construction of a swinging type of glass door.

One object of the present invention is the provision in a swinging dor, of an improved locking means for locking the swinging end thereof securely and facilely.

Yet another object of the present invention is the provision in, a swinging door, of an improved locking means of the above character which is of simple design and construction utilizing a minimum number of moving parts, and which is actuated at an intermediate position for simultaneously securely locking both ends of the door to a complementary fixed structure.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings.

In the drawings:

Fig. 1 is a perspective view of a door constructed according to the present invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a sectional perspective view of the molding strip shown in Fig. 5 in assembled relation;

Fig. 7 is a fragmentary front elevational view of the door shown in Fig. 1 with parts broken away to reveal structural details of the door locking arrangement;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 7;

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 7; and

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 7.

Referring to the drawings, and more particularly to Fig. 1 thereof, the door 10 which is of the swinging type, comprises a frame 12 having panels 14 secured therein in a manner which will be described in detail hereinafter. The frame 12 comprises a pair of vertically extending laterally spaced stiles 16 and 16', a horizontal top rail or member 18, an intermediate horizontal rail or member 20, and a bottom horizontal rail or member 22, said rails and said stiles being secured together in assembled relation in the manner shown in Fig. 1 in any conventional manner, as by means of welding. The frame 12 constitutes the main structural member of door 10 and the panels 14 are supported in said frame. The panels 14 may be of any conventional construction and in the preferred embodiment, said panels are formed of glass whereby door 10 constitutes a swinging glass door. The frame 12 of the door is adapted to be shipped or transported to its place of erection without the panels 14 secured thereto, said panels being adapted to be secured relative to frame 12 at the place of erection of the door.

The top horizontal rail 18 (see Fig. 2) is preferably of a one-piece integral construction and comprises a top wall 24, a bottom wall 26, and spaced side walls 28 and 30, said bottom wall being formed with a longitudinally extending channel 32 for the reception of the top marginal edge portion 34 of the upper panel 14. The top wall 24 is recessed downwardly from the upper edges 36 of the side walls 28 and 30, and the initially free longitudinally extending marginal edge portions 38 and 40 of channel 32 are preferably butt welded together as indicated at 42. Thus, the rail 18 is formed from flat stock into the cross-sectional shape shown in Fig. 2, and the securement of the free marginal edges 38 and 40 to each other at 42 results in a rail 18 of a one-piece integral construction. The bottom horizontal rail 22 is formed structurally similar to the top rail 18 except that the side walls 28' and 30' of rail 22 are wider than the side walls 28 and 30 of rail 18 as indicated by a comparison of Figs. 2 and 4. The top wall 26' of rail 22 is provided with a longitudinally extending channel 44 for the reception of lower marginal edge portions 46 of the lower panel 14. It will be understood that channels 32 and 44 of the top and bottom rails 18 and 22, respectively, are structurally similar and that said rails have their end portions assembled to end portions of stiles 16, 16' so that the channels 32 and 44 are in confronting disposition at opposite ends of the door. Thus, the top and bottom rails 18 and 22, respectively, are structurally similar and are formed in a structurally similar manner.

The intermediate rail 20 comprises a pair of opposed push and pull bars 48 and 50 which are demountedly secured to the U-shaped channel member 52 which is the main structural member of rail 20. Push and pull bars 48 and 50 are structurally identical and are secured at opposite sides of the door 10 to the spaced legs 54 of the channel member 52. The push and pull bars 48 and 50 are tapered in plan as best shown in Fig. 1 and comprise a pair of spaced legs 56 integral with the base or outer edge portion 58. Formed integral with the legs 56 of the push and pull bars 48 and 50 are longitudinally extending retainer strips 60 and 60', said strips diverging outwardly from the ends of legs 56 remote from base 58. The retainer strips 60' of the push and pull bars 48 and 50 are adaptd to cooperate with the lower marginal edge 62 of the upper panel 14 for retaining the latter in position relative to frame 12. Similarly, the retainer strips 60 of the push and pull bars are adapted to cooperate with the upper marginal edge 64 of the lower panel 14 for retaining the latter in position relative to the frame 12. As aforenoted the push and pull bars 48 and 50 are detachably mounted to the channel member 52, said detachable mounting being effected in any conventional manner as by means of fastener elements extending through the legs 54 of channel member 52 and adjacent portions of the push and pull bars 48 and 50. It will be apparent that the extremities of the channel member 52 and the upper and lower rails 18 and 22, respectively, are secured to portions of the stiles 16, 16' in any conventional manner to form the frame 12 which constitutes the main structural member of door 10.

Each of the stiles 16, 16' is structurally similar and is formed of a one-piece integral construction, said stiles comprising an arcuate front wall 70, an opposed rear wall 72 and spaced side walls 74, said rear wall having an intermediate portion thereof longitudinally recessed, as indicated at 76, towards the front wall 70. The rear wall 72 is provided with portions 78 which are bent back

upon the rear wall portions **80**, with the portions **82** being bent back upon the portions **78** so that the rear wall portions **82**, **78** and **80** are in reversed curve overlapping relation. The longitudinally extending marginal edge portions **84** of recess **76** are preferably butt welded together as indicated at **86**. The overlapping portions **78** and **82** define therebetween the longitudinally extending pocket formations **88**, the latter being adapted for the reception of complementary structure which will be described in detail hereinafter. It will be apparent from the above that outer side edges of recess **76** in conjunction with portions of rear wall **72** adjacent said recess define the pocket formations **88** which cooperate with the molding strip **90** for retaining the latter in place. Thus, the stiles **16**, **16'** are each of one-piece integral construction and have a recess **76** defined in the rear wall **72** thereof, outer side edge portions of said recess constituting the pocket formations **88** thereof. The molding strip **90** adapted to be used in conjunction with stiles **16**. **16'** comprise a generally U-shaped member comprising a base portion **92** having integrally formed therewith the laterally spaced legs **94**. Integrally formed with legs **94** are strip portions or legs **96** which diverge outwardly from the ends of the legs **94** remote from the base portion **92**. The longitudinally extending marginal portions **98** of the free ends of the strip portions or legs **96** are curved or turned outwardly a relatively small amount, said outwardly curved portions **98** being adapted to be received in the pocket formations **88** of recess **76** in the assembled condition of the stiles **16** and snap molding **90**. It will be noted that the longitudinally extending snap molding **90** is of one-piece construction and is preferably formed from flat sheet metal stock. The legs **94** and **96** of the snap molding **90** are flexibly resilient and the latter legs are adapted to be snapped into position in the recess **76** and more particularly, the socket formations **88** thereof. Prior to the positioning of the side marginal edge **102** of panel **14** in the recess **100** defined by the base portion **92** and legs **94**, the latter converge a relatively small amount towards each other from the base portion **92**, and when the side marginal edge portions **102** of panel **14** is positioned in recess **100**, said legs **94** are spread to a substantially parallel condition whereby said legs **94** will be urged towards each other to securely clamp the associated panel **14** in position relative to molding **90**. It will be noted that the legs **94** and strip portions **96** define an acute angle therebetween and that said strip portions are resilient whereby the outwardly turned edge portions **98** may be snapped into position in the recess pocket formations **88**.

In order to assemble panels **14** to frame **12** each of said panels has positioned thereon at both side marginal edge portions **102**, a molding strip **90**, it being understood that each of said molding strips will be of a length substantially equal to the vertical distance between the intermediate rail **20** and the outer rails **18** and **22**. If desired, each of the marginal edges of the panels **14** may have secured thereto suitable taping or gasket strips whereby said taping or gasket strips will be interposed between the marginal edge portions of panels **14** and the channels **32** and **44** and recesses **100**. After the molding strips **90** are positioned on the side marginal edges **102** of panels **14** the latter are ready for assembly to frame **12**. It will be understood that two structurally similar molding strips **90** will be utilized for each panel **14**, one such strip being positioned on each of the side marginal edge portions **102** of the panels **14**. The assembly of upper panel **14** to the frame **12** is effected by inserting the upper horizontal marginal edge **34** of said upper panel in the channel **32** of the rail **18** while at the same time working the molding strips **90** into the recesses **76** of stiles **16**, **16'**. It will be understood that the legs or strip portions **96** of the molding strips **90** are sufficiently resilient whereby they will

readily interengage with their complementary structure in stiles **16**, **16'**. More particularly, the outwardly curved end portions **98** of legs **96** will snap engage in the pocket formations **88** of recess **76** in the assembled condition of the snap molding **90** and stiles **16**. From the above, it will be readily apparent that in the assembly of upper panel **14** to the frame **12** the marginal edge portions of said panel are worked into their associated structure of frame **12** until the assembly is completed. In the assembled relation of snap molding **90** and stiles **16**, **16'** the outwardly curved end portions **98** of said snap molding will be firmly interengaged in the recesses **76** and more particularly, in the pocket formations **88** of said recesses to thereby firmly retain the upper panel **14** in position relative to the frame **12**. The lower panel **14** is assembled to frame **12** in the same manner as described above relative to the assembly of upper panel **14** to said frame. The assembly of the push and pull bars **48** and **50** to the channel member **52** completes the assembly and securement of the panels **14** to frame **12**. Thus, when the push and pull bars **48** and **50** are assembled to frame **12** in the manner aforenoted the retainer strips **60** and **60'** of said push and pull bars will cooperate with the marginal edge portions **62** and **64** of the upper and lower panels **14**, respectively, to complete the securement of said panels to frame **12**. From the above it will be apparent that the snap molding **90** and complementary structure defined in the stiles **16**, **16'** provide an efficient and ready means for the securement of panels **14** to frame **12**. As noted above, the frame **12** is adapted for shipment to the place of erection without the panels **14**, the latter being conventional and readily procurable through the usual sales outlets. Thus, the snap moldings or molding strips **90** in conjunction with the recesses **76** defined in stiles **16**, **16'** provide for a very simple and secure means for the assembly of glass panels **14** to frame **12** at the place of erection of door **10**. In practice, the panels **14** may be snapped into position very quickly and facilely and similarly, said panels may be readily replaced by reversing the procedure aforedescribed. Thus, to replace a panel **14** it is merely necessary to remove its associated push and pull bar and unsnap the moldings **90** from their complementary structure in the stiles **16**, **16'** whereby said panel may be readily removed from the frame **12**. Thereafter a substitute panel **14** may be readily installed in frame **12** in conformity with the procedure described in detail above.

The glass or panelled door **10** is adapted to be mounted for swinging movement and one side thereof, for example the side adjacent the stile **16'** is adapted to be pivotally mounted relative to a fixed structural support. The free or swinging side of door **10**, for example the side of stile **16**, is adapted to be releasably locked to a complementary fixed structure **134** by the locking arrangement now to be described.

With reference to Figs. 7 through 12, the locking means for door **10** comprises a pivotally mounted locking lever **110** which is positioned between the opposed U-shaped brackets **112**, the latter being secured to the channel member **52**, interiorly thereof, in any conventional manner. The locking lever **110** is mounted for pivotal movement on the pivot pin **114**, the latter having its end portions secured to the brackets **112**. It will be understood that the locking lever **110**, which is disposed between the brackets **112**, will be normally hidden from view by the push and pull bars **48** and **50** when the latter are assembled to the frame **12**. Disposed in the stile **16** at the swinging side of door **10** is a vertically disposed, longitudinally extending channel member **116**, the latter being mounted for axial movement in stile **16** and is guided in such axial movement by means of the guide brackets **118** which are also disposed in stile **16**. The axially reciprocable channel member **116** has its base

portion 120 apertured at an intermediate point as indicated at 122 for the reception therethrough of the reduced end portion 124 of the locking lever 110. The rear wall 72 of stile 16 is slotted as indicated at 126 for the reception of the reduced end portion 124 of lever 110, said slot 126 being of a length to provide sufficient clearance for the range of pivotal movement of the lever 110. From the above, it will be apparent that the pivotal movement of lever 110 will be effective to concommitantly axially reciprocate the channel member 116. Secured to the upper end of member 116, in any conventional manner, is a locking element 128, the end portion 130 thereof being adapted to be received in the socket 132 defined in the fixed structure 134 when said locking element is in the locked position. Suitably secured to the wall 24' of the bottom rail 22, at the exterior face 25 thereof, is a generally U-shaped bracket 136, the latter having pivotally mounted between the spaced legs 138 thereof, a lever 140 which is mounted for pivotal movement relative to the bracket 136 by means of the pivot pin 142, the latter having its end portions secured to the spaced legs 138 of said bracket. The lower end of the channel member 116 is apertured at 144 for the reception therein of the reduced end portion 146 of the lever 140. The rear wall 72 of stile 16 is slotted at 148 for the reception therethrough of the reduced end portion 146 of lever 140, said slot being of a sufficient length to provide clearance for the range of pivotal movement of said lever. The opposite end of the lever 140 is provided with an integral ball or spherical fitting 150 which is adapted for reception in the transverse aperture 152 of the locking element 154. The locking element 154 is guided for axial movement in any conventional manner as by means of the guide bracket 156 which is secured to the upright wall 158 of bracket 136. The base wall 160 of the bracket 136 is apertured at 162 for the axial extension therethrough of the end portion 164 of the locking element 154. The end portion 164 of the locking element 154 is adapted to be received in the socket 166 of fixed support 134 in the locked position of said locking element.

It will be readily apparent from the above that the pivotal movement of lever 110 will be effective to simultaneously axially extend and retract the locking elements 128 and 154 corresponding to the direction of said pivotal movement of said lever. In Figs. 7 through 12 the locking elements 128 and 154 are shown in an axially extended locked position, being received in sockets 132 and 166 of the fixed support 134. To unlock the locking elements 128 and 154 the lever 110 will be pivoted in a counterclockwise direction, as viewed in Fig. 7, to thereby axially reciprocate channel member 116 in a downward position to thereby retract locking element 128 from socket 132 and to pivot lever 140 in a counterclockwise direction, said pivotal movement of lever 140 being effective to retract locking element 154 from socket 166 due to the cooperative association between fitting 150 of lever 140 and the transverse aperture 152 of locking element 154. Thus it will be seen that the locking elements 128 and 154 are simultaneously extendible and retractible under the control of the locking lever 110, the latter being in turn under the control of the locking provision 170, now to be described.

The locking provision 170 is housed in the push and pull bars 48 and 50 and is supported by the opposed U-shaped brackets 112. The locking provision 170 comprises a pair of locks 172 and 172', said locks being disposed and accessible for actuation at opposite sides of the door 10. Lock 172 extends through complementary aperture 174 of wall 176 of push and pull bar 50 whereas lock 172' is structurally associated with push and pull bar 48 in a similar manner as lock 172 is associated with push and pull bar 50. Locks 172 and 172' are adapted to independently control and actuate the lever 110 whereby it will be apparent that the locking and unlocking of door 10 may be effected from either side thereof. The locks 172 and 172' are mounted on plates 178 and 180, respectively, the latter plates being secured to the brackets 112 by means of the studs 182 and 182', the stud 182' extending between plates 178 and 180 through the brackets 112, whereas the studs 182 extend between the brackets 112 and plates 178 and 180 but do not extend between the brackets 112. The actuation of the locks 172 and 172' is under the control of a suitable key which is adapted to be received in said locks for actuating the latter. Projecting from each of the locks 172 and 172' is an actuating shaft 184, the latter being secured to a rotatable drum 186 which has a face portion 188 positioned in abutting relation with its associated bracket 112. Eccentrically mounted on each of the face portions 188 of drums 186 is a pin member 190, the latter being adapted to actuate the lever 110 aforedescribed. Thus, the train of mechanism aforedescribed associated with the locks 172 and 172' is structurally identical, with each of said locks being adapted to independently control the actuation of locking lever 110.

The lever 110 has a plate-like projecting end portion 192 remote from its reduced end portion 124, said projecting end portion terminating in a hooked portion 194, the latter being substantially narrower than the portion 192 to define the shoulders 196 at the juncture of the portions 192 and 194. Mounted on pivot pin 200, transversely extending between the brackets 112, is a lock element 202 which is adapted to coact with the pin members 190 and the lever 110 in a manner now to be described. The pivotally mounted lock element 202 is generally U-shaped having a base portion 204 and laterally spaced legs 206, said base portion 204 being cut away at 208 for the reception of the biasing spring 210, the latter being positioned on pivot pin 200 between the laterally spaced legs 206 of said lock element. The hooked end 212 of the spring 210 is adapted to engage an intermediate portion of stud 182' and the opposite end 214 of said spring is adapted to engage the edge 215 of the base portion 204 of the lock element 202. From the above it will be apparent that the lock element 202 will be biased in a clockwise direction as viewed in Fig. 9. In order to project the locking elements 128 and 154 to the locked position, one of the locks 172 and 172' will be rotated by means of a complementary key inserted therein to thereby rotate one of the pin members 190, the rotation of the latter cooperating with the upper face 216 of the portion 192 to thereby pivot lever 110 in a clockwise direction about its pivot pin 114, said movement of one of the pin members 190 being continued until the shoulders 196 of lever 110 interengage with the spaced locking portions 220 of the lock element 202. It will be apparent that the rotation of said one of the pin members 190 will cause the end portion 192 of lever 110 to pivot said lever in a clockwise direction as viewed in Fig. 7, said portion 192 coacting with the spaced cam edges 222 of the spaced legs 206 to retract said legs to a position whereby the shoulders 196 of portion 192 will move past the end of said cam edges to thereby cause the interengagement of said shoulders with the locking portions 220 of element 202. The movement of lever 110 in a locking direction may be effected by the rotation of pin members 190 in either a clockwise or counter-clockwise direction, as will be readily apparent, since the rotation of said pin members in either such direction will be effective to pivot the lever 110 in a clockwise direction as viewed in Fig. 7.

To pivot the lever 110 in an unlocking direction the lock 172 will be rotated in a counter-clockwise direction as viewed in Fig. 9 whereby the pin member 190 associated with said lock will be effective to rock the end portion 192 of lever 110 a small amount in a clockwise direction, the further movement of said pin member in said counter-clockwise direction being effective to re-

tract the lock element **202** from interengagement with the shoulders **196** of lever **110** whereby the further movement of said pin member in said direction will result in the interengagement of the latter with the hooked portion **194**, said interengagement being effective to pivot the lever **110** to the unlocked position. Thus the rotation of one of the pin members **190** in an unlocking direction will be effective to slightly pivot the lever **110** in a locking direction and said pin member will coact with the cam edges **222** of the element **202** to retract said element from interengagement with the shoulders **196** of said lever whereby the further rotation of said pin member will result in the interengagement of the latter with the hooked portion **194**, said pin member being further rotated in an unlocking direction until said lever is snapped into the unlocked position by means of the biasing of the element **202** by the spring **210**.

While a specific lock provision **170** has been illustrated and described in detail for controlling the lever **110** and its associated locking mechanism, it will be understood that any other suitable lock provision may be utilized for controlling the actuation and locking of the lever **110**. It will be understood that the door **10**, having the locking arrangement above described, may be locked and unlocked from either side of the door by the locks **172** and **172'** which have their keyholes **173** accessible at the push and pull bars **48** and **50**. The locking mechanism above described is entirely disposed in the frame **12** of the door and the locking elements **128** and **154** are adapted to be simultaneously extended in response to the movement of the locks **172** and **172'** in a locking direction. Thus, door **10** may be conveniently locked from an intermediate position, said locking being effective to simultaneously securely lock both ends of the door to the complementary fixed structure **134**.

While I have shown and described the preferred embodiment of my invention, it will be understood that various changes may be made in the present invention without departing from the underlying idea or principles of the invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A lock for a door construction having a vertically extending hollow stile and a horizontally disposed hollow frame member intermediate the ends theerof, comprising actuating means disposed in said frame member and having a lever mounted for pivotal movement about a horizontal pivot axis disposed in said frame member and laterally spaced from said stile, said lever having an end part extending to said stile, an axially reciprocable member disposed in said hollow stile and operatively connected to said lever end part, and locking elements operatively connected to end portions of said reciprocable member and adapted for simultaneous extension and retraction in response to the axial reciprocation of said reciprocable member, the extended position of said locking elements constituting the locked position thereof and the retracted position of said locking elements constituting the unlocked position thereof, the actuation of said actuating means being effective to pivot said lever about said axis to correspondingly actuate said reciprocable member and said locking elements, and locking means disposed in said frame member at the opposite side of said pivot axis to said stile and operatively associated with said actuating means for controlling the actuation thereof.

2. A lock for a door which has a frame which comprises hollow vertical channeled stiles, a horizontal channeled frame member extending between said stiles intermediate the opposite ends thereof, panels of translucent material mounted in the channels of said vertical stiles and said horizontal frame member, said lock comprising a locking device mounted for vertical movement in one of said vertical stiles to and from door-retaining and door-releasing positions, and movable means mounted within said hollow horizontal member and projecting from the latter into said one of the vertical stiles and operatively connected to said locking device for actuating the latter, and key-operable means mounted on said horizontal frame member at the inner and outer sides, respectively, of said frame and each operatively connected to said actuating means within said hollow horizontal frame member for operating said actuating means.

3. A lock for a door which has a frame which comprises hollow vertical channeled stiles, a horizontal channeled frame member extending between said stiles intermediate the opposite ends thereof, panels of translucent material mounted in the channels of said vertical stiles and said horizontal frame member, and a horizontally extending push-pull bar on said frame on the inner and outer sides, respectively, of the door, for opening said door, said lock comprising a locking device mounted for vertical movement in one of said vertical stiles to and from door-retaining and door-releasing positions, movable means mounted within said hollow horizontal member and projecting from the latter into said one of the vertical stiles and operatively connected to said locking device for actuating the latter, and key-operable means mounted on said horizontal frame member at the inner and outer sides, respectively, of said frame and each operatively connected to said actuating means within said hollow horizontal frame member for operating said actuating means, said key-operable means being accessible for operation at the front of said push-pull bars, respectively.

4. A lock for a door which has a frame which comprises hollow vertical channeled stiles, a horizontal channeled frame member extending between said stiles intermediate the opposite ends thereof, panels of translucent material mounted in the channels of said vertical stiles and said horizontal frame member, said lock comprising a locking device mounted for vertical movement in one of said vertical stiles to and from door-retaining and door-releasing positions, and movable means mounted within said hollow horizontal member and projecting from the latter into said one of the vertical stiles and operatively connected to said locking device for actuating the latter, said movable means comprising a lever pivotally mounted intermediate its opposite ends on said frame member for vertical movement about a horizontal pivot, a part of said lever at one side of said pivot being connected to said locking device in said stile, and a key-operable member carried by said horizontal frame member and operatively connected to a part of said lever at the opposite side of said pivot.

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