Sept. 5, 1967 W. M. KRANTZ 3,339,959

PUSH PULL DOOR LATCH MECHANISM

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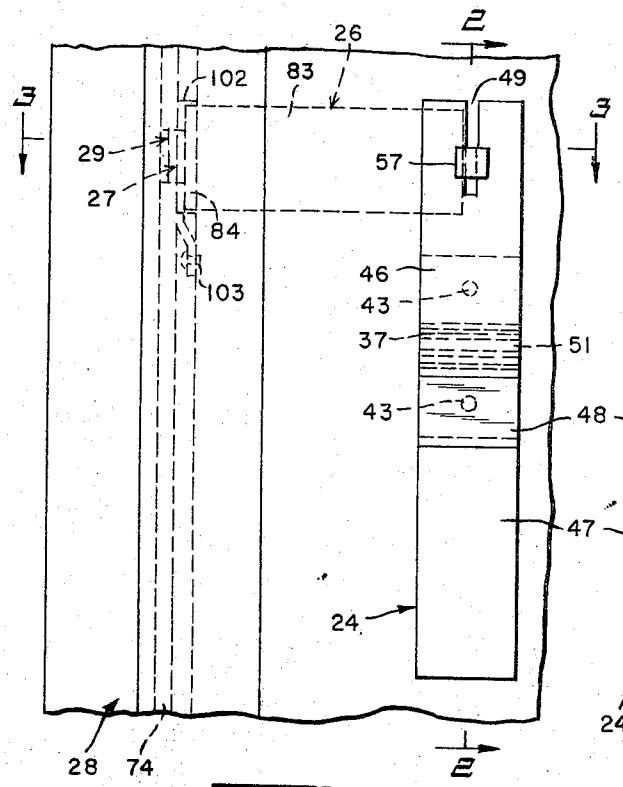


Fig. 1

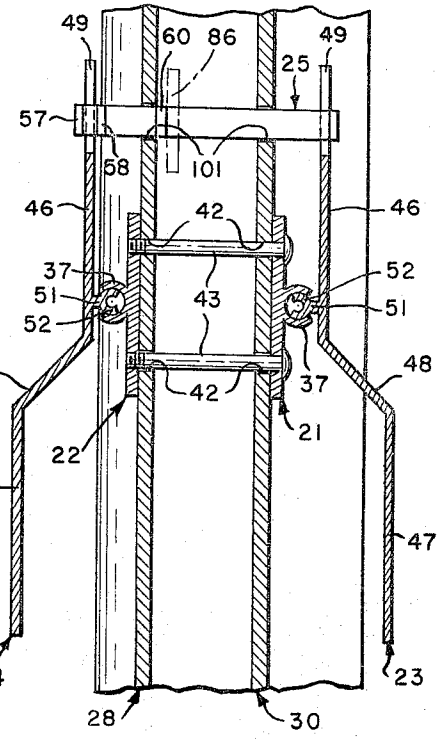


Fig. 2

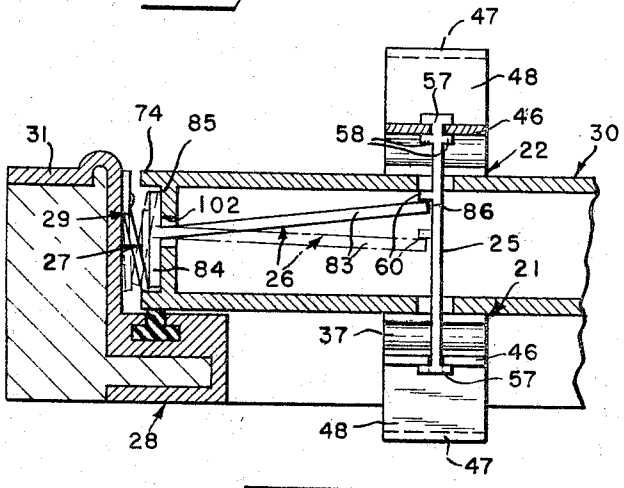


Fig. 3

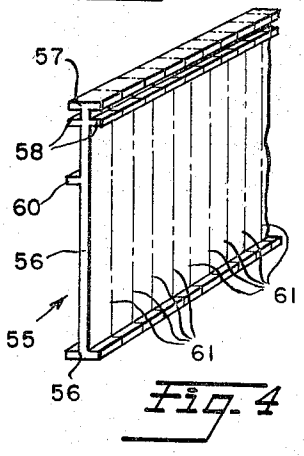


Fig. 4

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Sept. 5, 1967 W. M. KRANTZ 3,339,959

PUSH PULL DOOR LATCH MECHANISM

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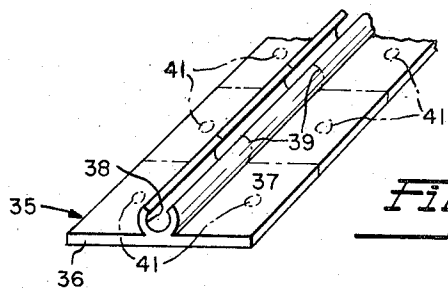


Fig. 5

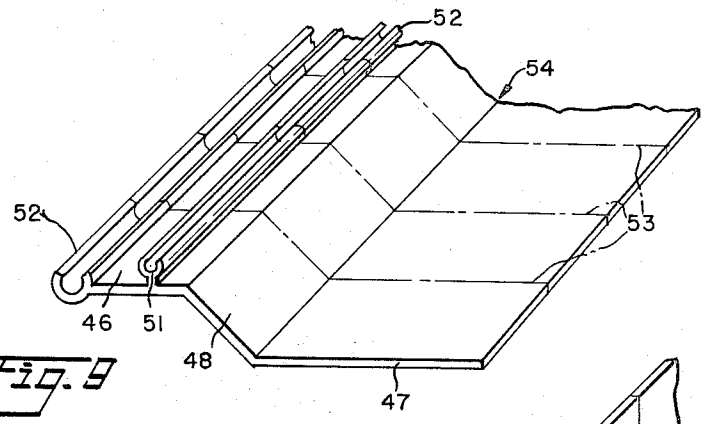


Fig. 9

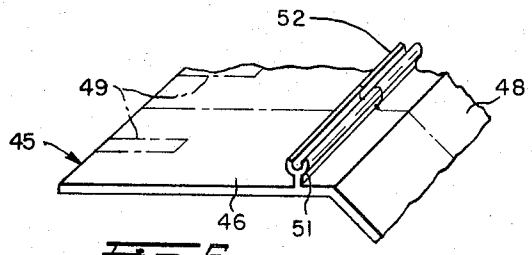


Fig. 6

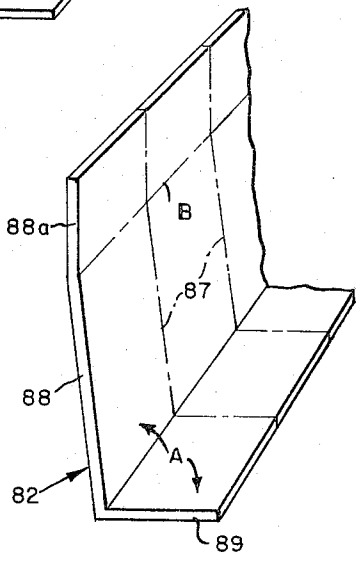


Fig. 10

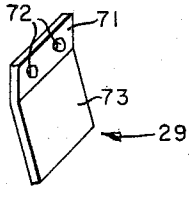
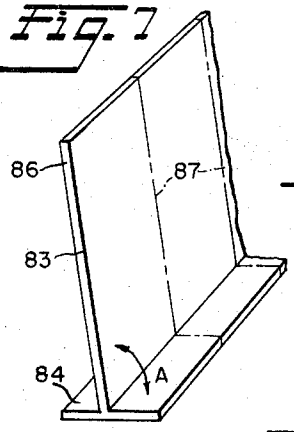


Fig. 8

Fig. 7



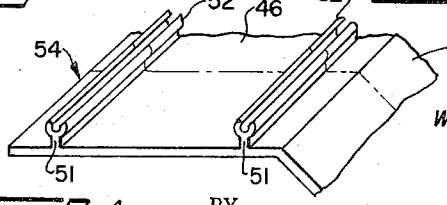


Fig. 9A

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Sept. 5, 1967 W. M. KRANTZ 3,339,959

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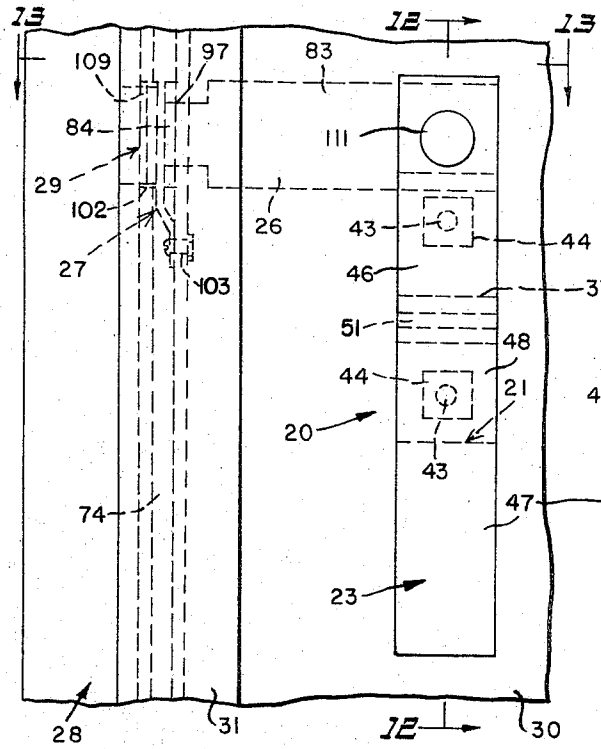


Fig. 11

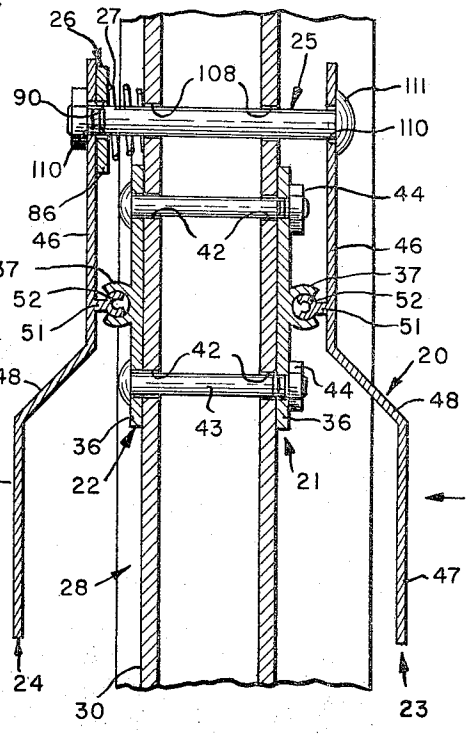


Fig. 12

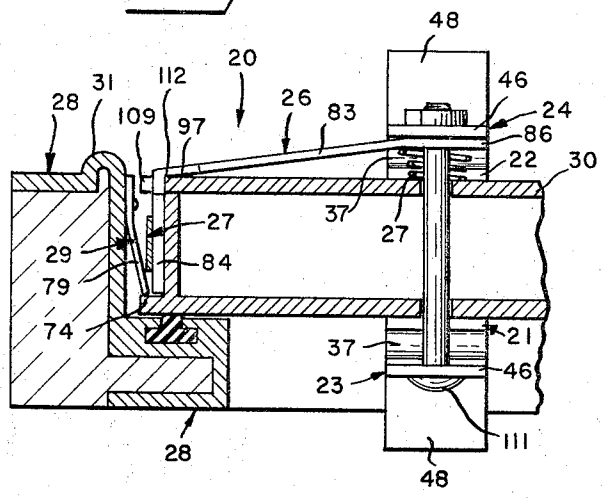


Fig. 13

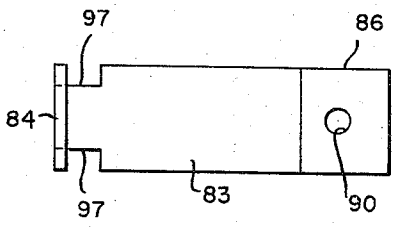


Fig. 14

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PUSH PULL DOOR LATCH MECHANISM

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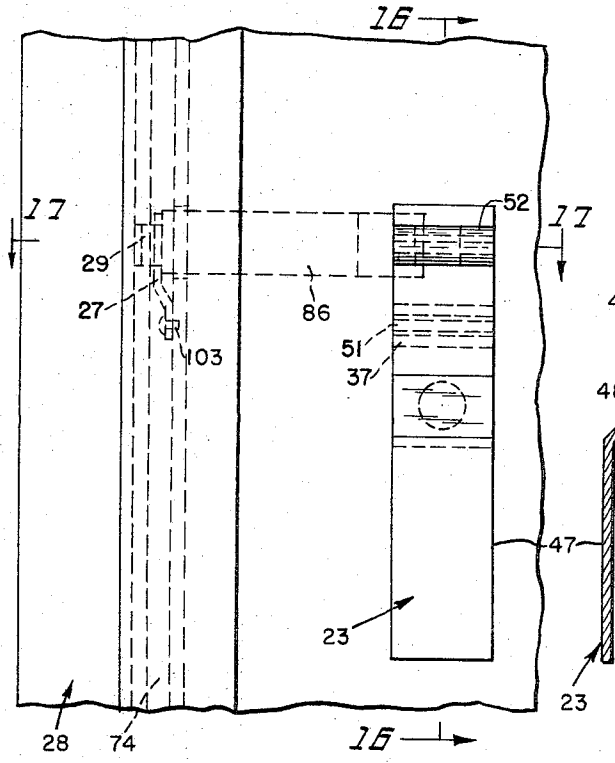


Fig. 15

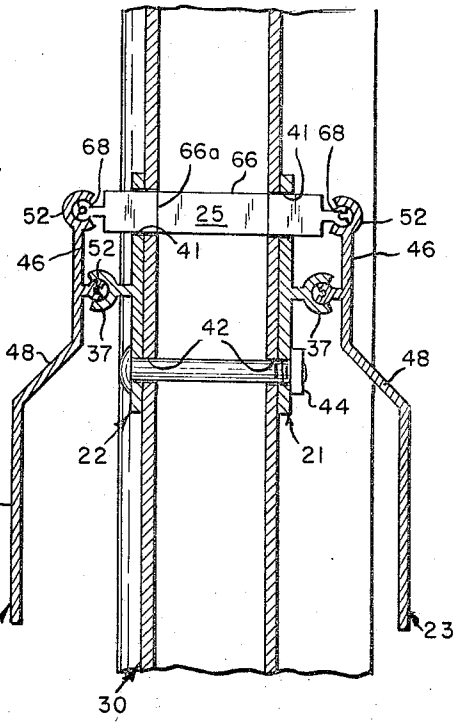


Fig. 16

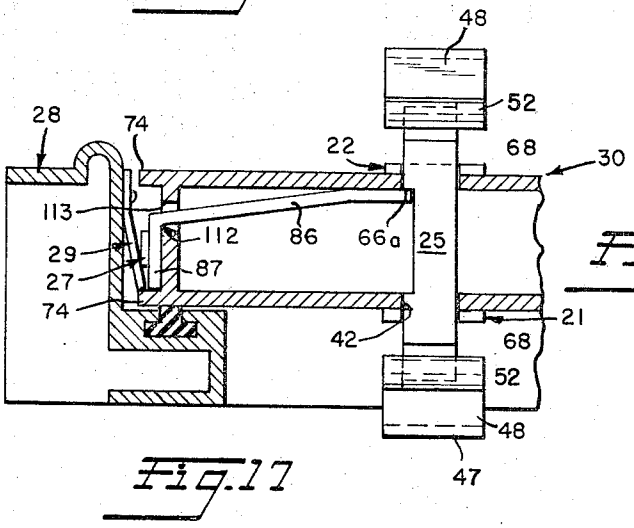


Fig. 17

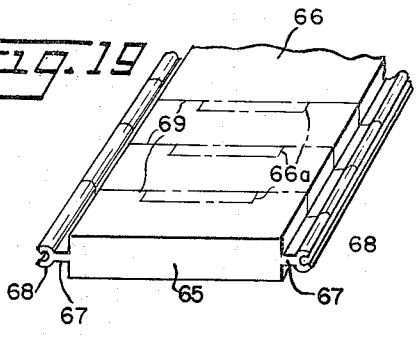


Fig. 19

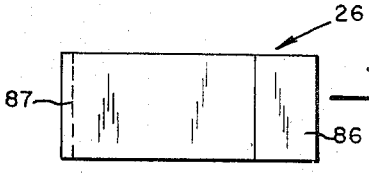


Fig. 18

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PUSH PULL DOOR LATCH MECHANISM

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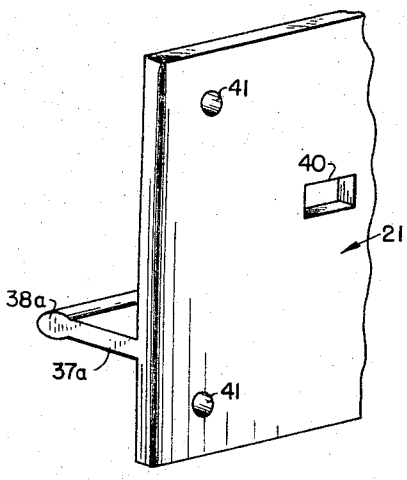


Fig. 26

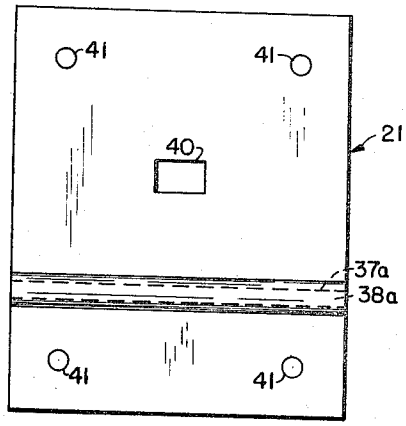


Fig. 27

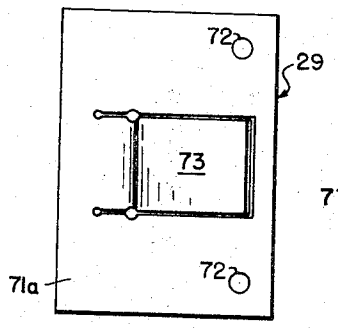


Fig. 28

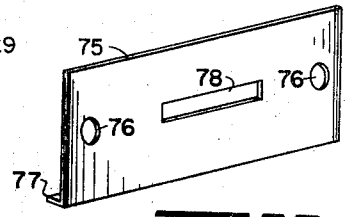


Fig. 20

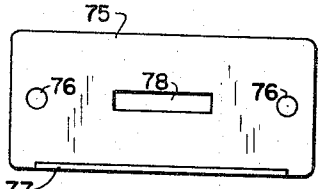


Fig. 21

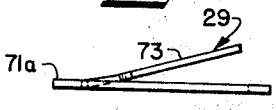


Fig. 29

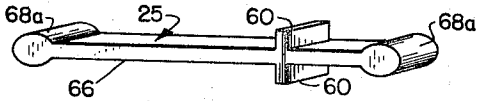


Fig. 30

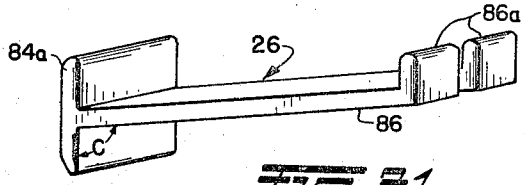


Fig. 31

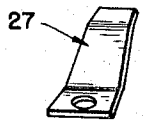


Fig. 14A

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PUSH PULL DOOR LATCH MECHANISM

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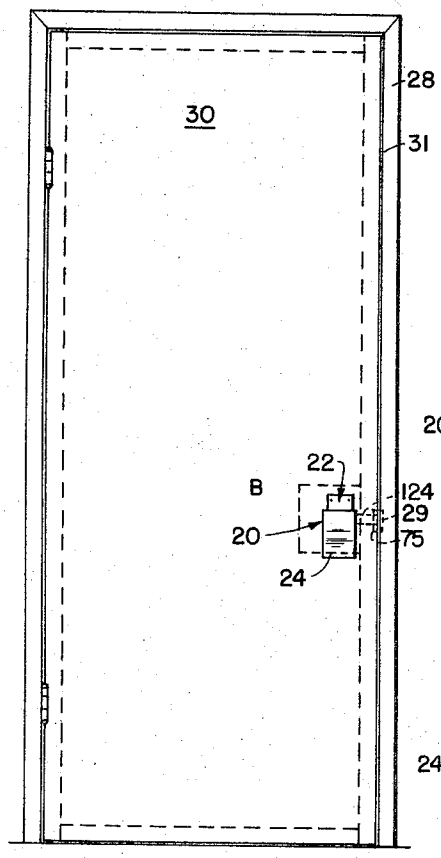


FIG 22

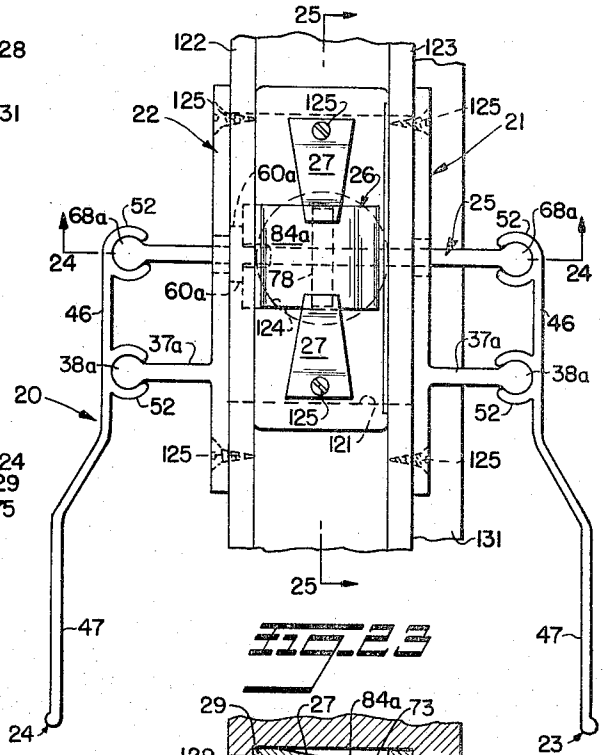


FIG 23

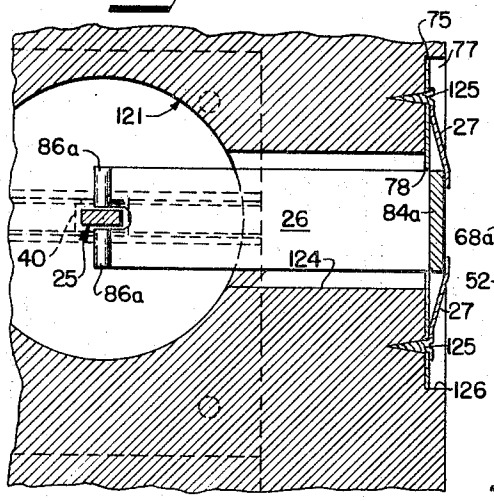


FIG 25

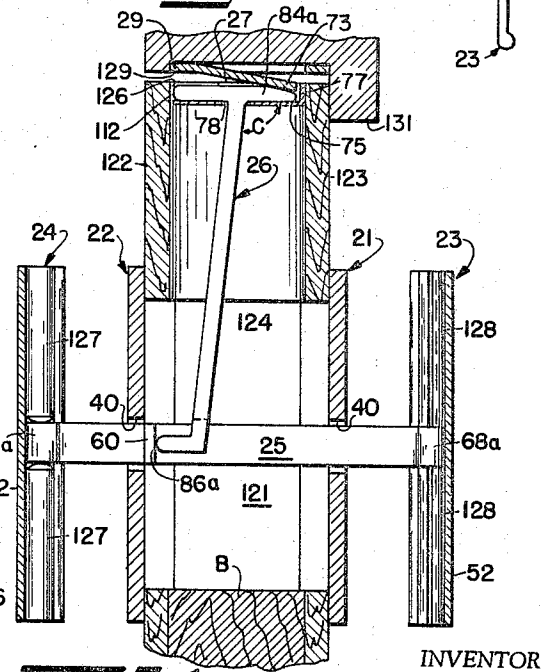


FIG 24

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PUSH PULL DOOR LATCH MECHANISM

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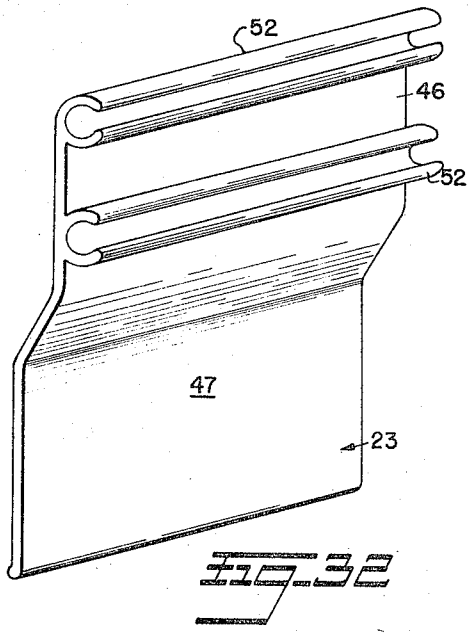


Fig. 32

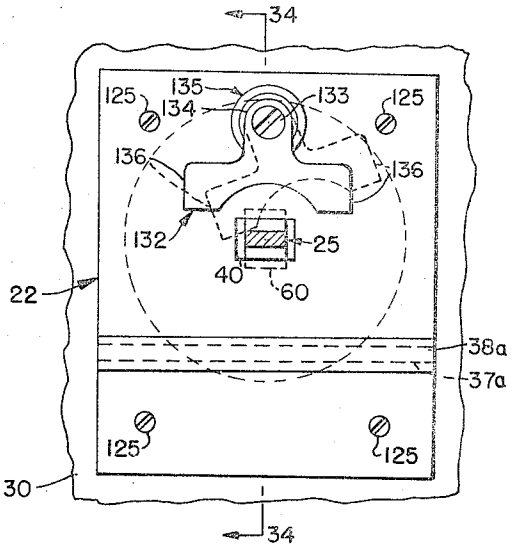


Fig. 33

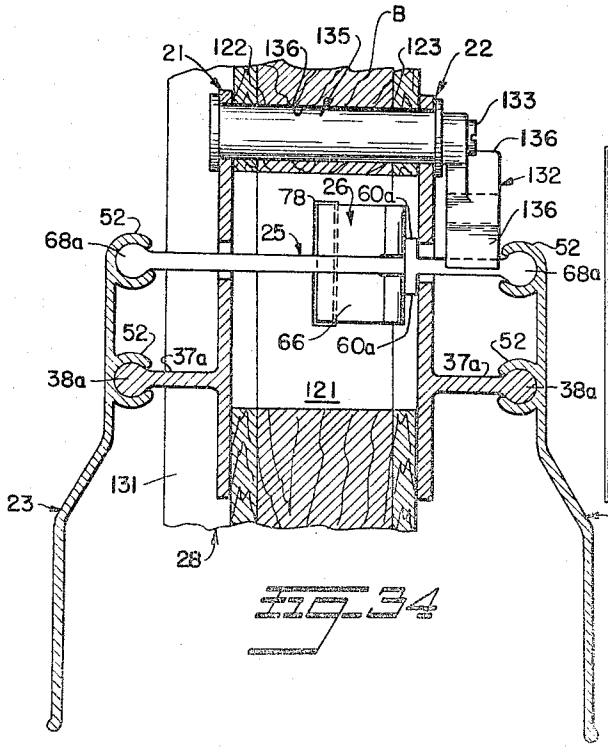


Fig. 34

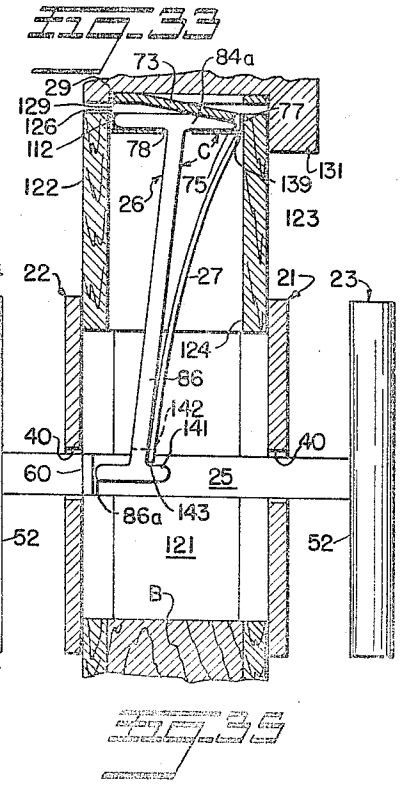


Fig. 35

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United States Patent Office 3,339,959
Patented Sept. 5, 1967

3,339,959

PUSH-PULL DOOR LATCH MECHANISM

Walter M. Krantz, 2355 Lake Shore Blvd., Apt. 304, Mimico, Toronto, Canada

Filed June 2, 1965, Ser. No. 460,752
15 Claims. (Cl. 292—254)

The present application is a continuation-in-part of copending application Ser. No. 418,627 filed Dec. 16, 1964, now abandoned and entitled Push-Pull Door Latch Mechanism.

The present invention relates to door latching mechanisms and more particularly to a push-pull latch actuating mechanism composed of a minimum number of parts of simplified construction capable of being produced at low cost by conventional extrusion processes.

While various door latching mechanisms have been heretofore proposed to simplify and reduce the number of parts so as to minimize manufacturing expense and installation operations, none of these prior art proposals have resulted in the simplification and reduction of manufacturing expense and installation operations achieved by the present invention. In this connection, the door latching mechanisms of the prior art are customarily made up of respective individually formed support plates providing journal recesses in their outer faces, respective individually formed handle members having shank portions shaped to provide journalled mating cooperation with the recesses of the mounting plates, a rod-like knob connector member removably mounting the door knob at its opposite ends and having a center portion operatively cooperating with a latch plunger of a mortised lock housing which requires a mortised slot opening through the door edge and a mounting plate apertured to be screw fastened to the door edge, and a keeper plate adapted to be fixed to the door jamb to cooperate with the latch plunger. Where push-pull latch actuators have been proposed these structures also require individually formed support plates, respective individually formed push-pull handle members secured to the support plates, either a rod-like handle connector member formed with cam surfaces to actuate a spring biased latch plunger carried in a lock housing housed in a hollow or mortised door edge or a pivoted spring biased latch member pivotally carried on the handle structure, and a keeper plate adapted to be fixed to the door jamb to cooperate with the latch plunger or pivoted latch member. (See United States Letters Patent 1,634,195 to B. W. Johnston, dated June 28, 1957; 2,617,287 to H. B. Tobias, dated Nov. 11, 1952, and 2,980,459 to D. E. Schwanz et al., dated Apr. 18, 1961.) All of these prior latch mechanisms require the use of complicated and expensive multiple parts requiring skill in production and assembly and skillful installation procedures and embody some parts, at least, which are relatively short lived, either breaking easily in use or being subject to malfunction due to wear. As a consequence, these prior art door latches are expensive to manufacture and install and fail to give satisfactory long life service in use.

It accordingly, is a primary object of the present invention to provide a door latch mechanism made up of a minimum number of sturdy parts capable of being produced rapidly and at slight expense by conventional quantity production processes and which require a minimal number of installation operations all of which may be accomplished rapidly by non-skilled labor.

A further important object of the present invention is to provide a door latching mechanism which is made up from three or four basic and simple extrusions, a handle connector and a spring metal latch element requiring a maximum of three through drilled holes in the door itself and screw holes in the door edge or opposing jamb for

attaching the spring metal latch element to the door edge or jamb.

Another object of the present invention resides in the provision of three or four basic extruded shapes for forming respectively the door handle mounting plates, the actuating door handles, and the latch release member required to be mounted on the door itself.

A still further object of the present invention is to provide a combination of extruded metal and extruded rigid, impact resistant plastic door latch parts which may be employed in conjunction to minimize galling and corrosion of mating door latch components and thereby assure free long life operation of the door latching mechanism.

Further objects will appear from the following description and appended claims when read in conjunction with the accompanying drawings wherein:

FIGURE 1 is a fragmental face view of a conventional metal storm door and its associated jamb fitted with a preferred embodiment of the latch mechanism of the present invention;

FIGURE 2 is a vertical sectional view through the door of FIGURE 1 and the latch mechanism associated therewith taken substantially on line **2—2** of FIGURE 1 looking in the direction of the arrows;

FIGURE 3 is a horizontal sectional view through the door of FIGURE 1 and the latch mechanism associated therewith taken substantially on line **3—3** of FIGURE 1 looking in the direction of the arrows;

FIGURE 4 is a fragmental perspective view of the extrusion from which the door handle connector bar elements of FIGURES 1 to 3 are cut;

FIGURE 5 is a fragmental perspective view of the extrusion from which the door handle mounting plates of FIGURES 1 to 3 are cut;

FIGURE 6 is a fragmental perspective view of the extrusion from which the door handles of FIGURES 1 to 3 are cut;

FIGURE 7 is a fragmental perspective view of the extrusion from which the latch release members of FIGURES 1 to 3 are cut;

FIGURE 8 is a perspective view of the spring metal latch member employed in FIGURES 1 to 3;

FIGURE 9 is a fragmental perspective view of a modified door handle extrusion from which the door handles of FIGURES 15 to 17 are cut;

FIGURE 9A is a fragmental perspective view of a variant of the FIGURE 9 extrusion which may be employed if desired;

FIGURE 10 is a fragmental perspective view of a modified extrusion from which the latch release members of FIGURES 11 to 13 and 15 to 17 are cut;

FIGURE 11 is a view like FIGURE 1 illustrating a further embodiment of the latch mechanism of the present invention;

FIGURE 12 is a vertical sectional view through the door of FIGURE 11 and the latch mechanism associated therewith taken substantially on line **12—12** of FIGURE 11 looking in the direction of the arrows;

FIGURE 13 is a horizontal sectional view through the door of FIGURE 11 and the latch member associated therewith taken substantially on line **13—13** of FIGURE 11 looking in the direction of the arrows;

FIGURE 14 is a face view of the latch release member of FIGURES 11 to 13;

FIGURE 14A is a perspective view of the biasing or retaining spring of FIGURES 11–13 and 23–25;

FIGURE 15 is a view like FIGURE 1 illustrating still another embodiment of the latch mechanism of the present invention;

FIGURE 16 is a vertical sectional view through the door of FIGURE 15 and the latch mechanism associated

therewith taken substantially on line **16—16** of FIGURE 15 looking in the direction of the arrows;

FIGURE 17 is a horizontal sectional view through the door of FIGURE 15 and the latch mechanism associated therewith taken substantially on line **17—17** looking in the direction of the arrows;

FIGURE 18 is a face view of the latch release member of FIGURES 15 to 17;

FIGURE 19 is a fragmental perspective view of a modified handle connector bar extrusion for making the connector bars for the embodiment of the invention illustrated in FIGURES 15 to 17;

FIGURE 20 is a perspective view of a keeper plate provided for use with doors having smooth edge faces or conventional wooden doors;

FIGURE 21 is a front elevational view of the keeper plate of FIGURE 20;

FIGURE 22 is a front elevational view of a conventional wooden door provided with still another embodiment of the latching mechanism of the present invention;

FIGURE 23 is a fragmental edge view of an enlarged scale showing the door latching mechanism installed on the wooden doors of FIGURE 22;

FIGURE 24 is a sectional view taken substantially on line **24—24** of FIGURE 23;

FIGURE 25 is a sectional view taken substantially on line **25—25** of FIGURE 23;

FIGURE 26 is a fragmental sectional view of the mounting plate employed in the latching mechanism of FIGURE 22;

FIGURE 27 is a front elevational view of the mounting plate of FIGURE 26;

FIGURES 28 and 29 are respectively front elevational and end views of the spring metal latch member employed in the embodiment of the invention shown in FIGURE 22;

FIGURE 30 is a perspective view of the door handle connector bar employed in the embodiment of the invention shown in FIGURE 22;

FIGURE 31 is a perspective view of the latch release member employed in the embodiment of the invention shown in FIGURE 22;

FIGURE 32 is a perspective view of the door handles employed in the embodiment of the invention shown in FIGURE 22;

FIGURE 33 is a front elevational view as seen from the left of FIGURE 2 illustrating a simple lock mechanism that may be provided in event the latch mechanism is employed as an outside inswinging door;

FIGURE 34 is a sectional view taken substantially on line **34—34** of FIGURE 33; and

FIGURE 35 is a view like FIGURE 24 illustrating a modified form of biasing spring for retaining the latch release member in its normal inoperative position.

With continued reference to the drawings wherein like reference numerals are employed throughout to indicate the same parts, the latch release mechanism **20** of this invention may be formed in any suitable manner from extrusions such as those illustrated in FIGURES 4 through 10, 19, 26, 30, 31 and 32. The latch release mechanism is made up of inner and outer handle mounting plates **21** and **22**, inner and outer actuating handles **23** and **24**, handle connector bar **25**, latch release member **26**, and a suitable biasing spring **27** to be hereinafter described. The latch release mechanism **20** is mounted on the door **30**, illustrated in FIGURES 1 through 19 of the drawings as a conventional hollow aluminum storm door hinged to a conventional Z-bar type door opening framing structure **28** of aluminum in any suitable manner, and is adapted to actuate a spring steel latch element **29** carried by the vertical run **31** of framing structure **28** which cooperates with the free edge of the door opposite the hinged door edge. In FIGURES 22 through 34 a conventional hollow type plywood or Masonite panel door is illustrated hinged in a wooden framing structure **28** carrying on vertical run **31** a latch element **29** in the form of a spring metal tongue struck out of a mounting plate as best seen in FIGURES 28 and 29.

For economy and speed of manufacture, the major components of the latch release mechanism are designed for production as extruded shapes utilizing conventional extrusion processes and equipment. To this end, the handle mounting plates **21** and **22** comprise identical cut-off sections of a continuous aluminum or rigid, impact resistant, plastic extrusion **35** depicted in FIGURE 5 or suitable modifications to provide the plates **21** and **22** of FIGURES 26 and 27. As shown in FIGURE 5 extrusion **35** comprises a continuous strip-like base portion **36** of uniform thickness and width provided along the longitudinal center line of one face with an upstanding, generally cylindrical, open sided, hollow rib **37** defining an internal, cylindrical journal socket **38** coextensive in length with base portion **36**. The respective mounting plates **21** and **22** are produced by cutting off segments of extrusion **35** of predetermined length along transverse lines of cut indicated at **39** in FIGURE 5 and drilling through bolt passages in base portion **36** at opposite sides of rib **37** as indicated at **41** in FIGURE 5. The bolt openings of alternate plates to be used as outer mounting plates **22** may be tapped to threadedly receive securing bolts **43** entered through the inner mounting plate bolt openings and drilled openings **42** provided in the opposite door walls as illustrated in FIGURES 1 to 3. Alternatively mounting plates **21** and **22** may be mounted through use of round headed screws **43** passed inwardly from the outer plate and threaded into nuts **44** on the inside of the door as shown in FIGURE 12, wood screws as shown in FIGURE 23, or may be secured by a single bolt **43** and employed to slidingly mount the handle connector bar **25** as illustrated in FIGURES 15 to 17. In the FIGURES 15 to 17 and FIGURE 23 embodiments, the mounting plates are preferably provided with a through passage **40**, preferably rectangular in configuration, to permit free passage of the ends of connector bar **25** employed therewith (see FIGURES 26 and 27). In all cases, lock washers (not shown) may be applied beneath the bolt heads, wood screws or uts **44** to assure against inadvertent dissociation of bolts **43**. Aluminum plates are illustrated in FIGURES 1 to 3, 11 to 13 and 26 and 27 while plastic plates are employed in the embodiment of FIGURES 15 to 17. In the FIGURES 26–27 embodiment the rib **37** is replaced by a right angular rib **37***a* terminating in a cylindrical journal beading **38***a*.

The respective handles **23** and **24** comprise identical cut-off sections of a continuous aluminum extrusion **45**, **54** respectively depicted in FIGURES 6, 9 or a modification of extrusion **54** to form handles **23**, **24** of FIGURE 32. As shown in FIGURE 6 extrusion **45** comprises a continuous base portion of uniform thickness and width from end to end having respective longitudinally continuous, offset body portions **46** and **47** of predetermined width joined along their adjacent inner edges by an inclined transition section **48**. The upper face of body portion **46**, as seen in FIGURE 6, at a point inwardly of its line of juncture with transition section **48** is provided with a narrow, longitudinally continuous, upstanding rib **51** the free edge of which is flared out to provide a longitudinally continuous, open sided, generally cylindrical, hollow beading **52** coextensive in length with body portions **46** and **47** and transition section **48**. The respective handles **23** and **24** are produced by cutting off segments of extrusion **45** of predetermined length along transverse lines of cut indicated at **53** in FIGURE 6. The outer end of body portion **46** is slotted as indicated at **49** (FIGURES 1 and 6) for a purpose to be hereinafter pointed out. Handles **23** and **24** are pivotally associated with their respective mounting plates **21** and **22** by inserting the hollow beading segments of each into the respective sockets **38** formed by the rib segments of the mounting plates. To assure a proper fit the external dimension of

beading **52** is related to the internal socket dimension of rib **37** to effect a close running clearance.

Extrusion **54** is identical to extrusion **45** except that the upper face of body portion **46** as shown in FIGURES 9 and 9A is provided adjacent its outer edge with a second upstanding rib **51** having its free upper edge flared to provide a longitudinally continuous, open sided, generally cylindrical, hollow beading **52** coextensive with body portions **46** and **47** and transition section **48**. The respective handles **23** and **24** formed from this extrusion are produced by cutting off segments along transverse lines of cut **53** as heretofore described in connection with extrusion **45**. The second hollow beading **52** is provided to pivotally associate the handles with the connector bar **25** as shown in FIGURES 15 to 17 making it unnecessary to notch or otherwise alter the cut off segments of this extrusion.

The handles **23–24** of FIGURE 32 differ from that of FIGURE 9 in that the open sided beadings **52** are formed directly on the face **46** of the extrusion.

While the fit between the aluminum beadings **52** and aluminum journal socket **38** or journal beadings **38***a* of plates **21** and **23** or connector bar **25** provides a reasonably long life pivotal connection between the respective handles and their mounting plates or connector bar **25**, corrosive action may take place at this connection when all metal parts are employed necessitating periodic lubrication or even disassembly and cleaning of the pivotal parts. To avoid such periodic maintenance, extrusion **35**, extrusions **45**, **54** or extrusion **65** hereinafter described may be made from any suitable impact resistant plastic material, for example, so-called rigid polyvinyl chloride containing a plasticizer exhibiting a lubricating characteristic in association with aluminum. Such a relationship is hereinafter described in connection with the embodiment of the invention depicted by FIGURES 15 to 17 and may be employed in either or all of the other embodiments. The dissimilarity in material employed for the handles and mounting plates or connector bar just mentioned also minimizes, if it does not entirely obviate, the corrosive action that takes place when similar metals are employed for the pivotally mating parts.

While the handle connector bars **25** may take any of the forms depicted in the four disclosed embodiments of the invention, i.e., an extruded aluminum shape such as depicted in FIGURES 1 to 3, a metal bolt and nut as depicted in FIGURES 11 to 13, an extruded rigid plastic shape as depicted in FIGURES 15 to 17, or an extrusion providing the handle connector bar of FIGURE 30, the extruded shapes are preferred to take advantage of the incident production economies and speed of production. To this end, the connector bars **25** of the FIGURE 1 to 3 embodiment comprise cut-off segments of a continuous aluminum extrusion **55** as depicted in FIGURE 4 while bars **25** of the FIGURES 15 to 17 embodiment comprise cut-off segments of a rigid, impact resistant, plastic extrusion **65** as depicted in FIGURE 19 and bars **25** of the FIGURES 22 to 34 embodiment comprise cut-off segments of an extrusion shaped to provide the solid journal beadings and oppositely directed flanges of FIGURE 30.

As shown in FIGURE 4, extrusion **55** employed for the FIGURES 1 to 3 embodiment comprises a continuous body portion **56** of uniform thickness and width provided along its opposite edges with right angularly disposed, longitudinally coextensive, flanges **57** protruding in opposite directions from the faces of body portion **56**. A second pair of oppositely directed longitudinally coextensive flanges **58** are formed inwardly from one set of end flanges **57** to form a pair of oppositely directed grooves **59** adjacent to one end for a purpose to be hereinafter pointed out and a final longitudinally coextensive flange **60** protruding from one face of body portion **56** is formed inwardly of the pair of flanges **58** at a point to assure its disposition slightly inwardly of the outside door wall when the latch mechanism is completely assembled. The purpose of the flange **60** will be hereinafter pointed out.

The bars **25** of the FIGURES 1 to 3 embodiment of the invention are produced simply by cutting off segments of extrusion **55** of predetermined length along transverse lines of cut indicated at **61** in FIGURE 4.

As shown in FIGURE 19, extrusion **65** for the FIGURES 15 to 17 embodiment comprises a body portion **66** of uniform thickness and width provided along its opposite edges with oppositely directed coextensive reduced sections **67**, the outer ends of which are flared out to provide longitudinally continuous, open sided, generally cylindrical, hollow journal beadings **68** coextensive in length with body portion **66** and reduced sections **67**. The respective connector bars **25** for the FIGURES 15 to 17 embodiment of the invention are produced merely by cutting off segments of extrusion **65** of predetermined length along transverse lines of cut indicated at **69** in FIGURE 19 and notching one of the cut edges to form an abutment shoulder **66***a*.

The connector bar **25** of FIGURE 30 used in the FIGURE 22 to FIGURE 34 embodiment is made from an extrusion having a main body of uniform thickness **66** terminating along each longitudinal edge in continuous cylindrical beadings **68***a* which serve in use as journal beadings for the hollow end beadings **52** of handles **23** and **24**. Inwardly from one journal beading **68***a* body portion **66** is provided with oppositely directed flanges or ribs **60***a* similar to flange **60** of FIGURE 4. Beadings **68***a* are dimensioned to freely pass through passage **40** of plates **21** and **22** and the vertical span of flanges **60***a* exceeds the vertical dimension of passages **40** sufficiently to assure abutting engagement of flanges **60***a* with the back face opening defining upper and lower portions of plates **21** and **22**.

These connector bars **25** may be connected to the extreme ends of handle portions **46** and mounted in doors **30** in any suitable manner to assure axial shifting movement of the connector bars in a direction normal to the planes of the opposite door faces upon depression of the opposite end of inner handle **23** toward door **36** or withdrawal of the opposite end of outer handle **24** away from the door as required respectively to push the door open or pull the door open. This push-pull operation is particularly desired since egress through a door is normally effected by pulling toward one while ingress is normally effected by pushing on the door. In cases where opposite directional swinging of the door is required, it is merely necessary to effect a reversal of the mounting of latch element **29**, its latch release member **26** about to be described, and handle connector bar **25**. Thus, a reversal would be effected if the door were to be an outside or lock equipped door as shown in FIGURES 33 and 34.

Referring to latch element **29**, it is contemplated by this invention to provide a simple spring steel plate member as shown in FIGURE 8 or 20 and 21 of the drawings. As illustrated in FIGURE 8, latch element **29** comprises a mounting portion **71** provided with a pair of laterally spaced through openings **72** to receive mounting screws to fix the latch element to the door jamb **28** as illustrated in this application and an angularly related catch portion **73** adapted to protrude away from jamb **28** into latching engagement with the vertically extending protruding rib **74** normally provided on a storm or metal door as illustrated in this application. In cases where the door edge is not provided with such a rib or a wooden door is involved, a flat metal catch or striker plate having a mounting portion **75** as illustrated in FIGURES 20 and 21 with spaced screw holes **76** therein and a right angular flange or rib **77** and a rectangular through opening **78** may be provided for mounting on the edge of door **30** at a point opposite latch element **29**. When so mounted the rib **77** is disposed to cooperate with catch element **73** as shown in FIGURE 24 with the shank of latch release member **26** passing freely through opening **78**. In lieu

of the striker plate the door edge may be notched opposite latch element **29** in a manner obvious to those skilled in the art to receive the end of catch portion **73** in door latching relation. In conjunction with such a striker plate and wooden door, a latch element **29** having an encircling mounting portion **71***a* and a struck out catch portion **73** as illustrated in FIGURES 28 and 29 is preferred.

The latch release members **26** comprise identical cut-off sections of a continuous aluminum extrusion **81** or **82** depicted respectively in FIGURES 7 and 10 and employed respectively in the FIGURES 1 to 3 embodiment and the FIGURES 11 to 13 and FIGURES 15 to 17 embodiments of the invention or a suitable extrusion to form the latch release member of FIGURE 31.

Referring to FIGURE 7, extrusion **81** comprises a generally T-shaped extrusion the stem **83** of which intersects head **84** at a point offset toward the head's fulcrum point **85** and extends at an angle such that end **86** will lie adjacent the outer wall of the door abutting shoulder **60** of connector bar **25** when the latch member **26** is in its normal rest position as shown in FIGURE 3. Preferably the inclination is such that the included angle A (FIGURE 7) is slightly greater than 90°. In a preferred construction, the angular slope of leg **83** off of a true 90° angle to the head is about one quarter inch per inch of length of leg **83**. The respective latch release members **26** employed in the FIGURES 1 to 3 embodiment are produced by cutting off segments of extrusion **81** of predetermined length along transverse lines of cut indicated at **87** (FIGURE 7).

Extrusion **82** of FIGURE 10 comprises a generally L-shaped extrusion the long leg **88** of which defines with the short leg **89** an included angle A slightly greater than 90°. In a preferred construction, the angular slope of leg **88** is one quarter inch per inch of length of leg **88** off a true 90° angle to leg **89**. The free end of leg **88** is preferably bent along line B to form a terminal end section **88***a* disposed at right angles to short leg **89** for a purpose to be presently pointed out. The respective latch release members **26** of both the FIGURES 11 to 13 and the FIGURES 15 to 17 embodiment may be formed from an extrusion like **82**, the only difference being that the short leg **89** of the FIGURES 15 to 17 embodiment will be somewhat shorter than the corresponding leg **89** of the FIGURES 11 to 13 embodiment.

The latch release members **26** of the FIGURES 11 to 13 embodiment are produced by cutting off segments of extrusion **82** of predetermined length along transverse lines of cut indicated at **87**, drilling end section **88***a* as indicated at **90** in FIGURE 14 to form a bolt passage and notching the juncture between legs **88** and **89** as indicated at **97** (FIGURES 11, 13 and 14) into the respective legs for a purpose to be hereinafter pointed out.

The latch release members **26** of the FIGURES 15 to 17 embodiment are produced merely by cutting off segments of extrusion **82** of predetermined length along transverse lines of cut **87**.

The latch release member of FIGURE 31 requires an extrusion, the opposite longitudinal edges of which are flanged to provide a T-shaped head **84***a* and an abutment flange as shown at end **86** in FIGURE 31. This abutment flange is formed with a rounded end to provide, when end **86** is centrally notched, a pair of spaced abutment toes **86***a* designed to have rolling contact with flanges **60** in operation of the latch mechanism as shown in FIGURE 24. In this release member the included angle C is slightly greater than 90°.

While the cutting and notching of the various extrusions may be effected using conventional chop saws or manually operated saws, it is contemplated that quantity production processes employing cutting and punching dies would normally be used in commercial production. Likewise the aperturing of the doors to receive the latching mechanism of this invention would normally be effected at the factory in quantity production by use of suitable punching dies and drilling set ups. However, installation in existing doors may be effected utilizing portable drills and hand tools in a manner that will be clear to those skilled in the art. To this latter end, mounting plates **21** of the FIGURES 22 to 34 embodiment are oversize in area to permit the application of the latch mechanism of this invention to existing fabricated plywood wooden doors having two and one eighth inch drilled openings for conventional door latch mechanisms. In this new construction the through holes need not be over one inch diameter.

Installation and assembly of the latch mechanism of FIGURES 1 to 3 is effected by providing aligned, preferably rectangular, openings **101** in the opposite metal door walls at the desired point along the free edge of the door dimensioned laterally to freely pass the flanges **57, 58** of connector bar **25** and dimensioned vertically to provide a sliding fit with the cut edges of the connector bar **25**. The door edge in juxtaposition to aligned openings **101** is provided with a vertically extending slot **102** (FIGURES 1 and 3) approximately ⅜" high to freely pass stem **83** of latch release member **26** thereby assuring ready entry of stem **83** into position in the path of movement of flange **60** provided adjacent the outer end of connector bar **25**. Slot **102** is preferably vertically centered with respect to the common axis of openings **101** and is extended toward the wall of door **30** which forms the trailing wall during opening movement of the door as best illustrated in FIGURE 3 to permit the required swing movement of stem **83**. The door edge at a point below or above or both below and above slot **102** is drilled and tapped at **103** to receive mounting screws **104** for mounting spring metal leaf springs **27** provided to bias latch release member **26** to its normal rest position illustrated in FIGURE 3 as more fully described in my copending application Ser. No. 372,467, entitled Simplified Storm Door Latch, filed June 4, 1964.

Assembly of the latch release mechanism **20** of FIGURES 1 to 3 is effected by inserting connector bar **25** through openings **101** and positioning the bar so that its flange **60** is adjacent the inner face of the leading wall of door **30**, inserting stem **83** of latch release member **26** through slot **102** in the door edge in a manner to dispose its end in the path of movement of flange **60** provided on connector bar **25**, and fixing biasing spring **27** to the door edge with its free end overlapping head **84** of latch release member **26** as shown in FIGURES 1 and 3. This establishes the normal rest position of connector bar **25** and latch release member **26** and yieldingly retains these parts in position while the remainder of the latch mechanism is assembled.

Beading **52** of door handle **24** is then inserted endwise into socket **38** of its mounting plate **22**, the handle end containing slot **49** is inserted upwardly between flanges **57, 58** of the connector bar **25** to dispose the slot defining portions of said handle end in operative position in the oppositely facing grooves **59** defined by flanges **57, 58**, and mounting plate **22** is positioned flat against the door face so the proper position of mounting plate **22** on door **30** can be marked. The handle **24** is then disassociated from its mounting plate **22** and connector bar **25** and the mounting plate is held in its marked position on the door and a center punch is inserted in each opening **41** to mark the door wall for drilling. Upon removal of the mounting plate **22** after center punching, the door is through drilled to provide the aligned openings **42** heretofore described. Handle **24** is then reassembled with plate **22** and grooves **59** and inner mounting plate **21** with its handle **23** associated with it and bolts **43** in its passages **41** is moved upwardly to engage connector bar body **56** in slot **49** and brought into position against the opposite door wall, the bolts **43** being passed through the door bolt passages **42** and hand threaded into the tapped apertures **41** of mounting plate **22** to effect an initial loose attachment of the latch mecha-

nism **20** to door **30** at this time. After an operational test establishes proper functioning of mechanism **20**, bolts **43** are tightened by applying a wrench to the bolt heads at the inner side of the door and the latch plate **29** is fixed to the door jamb **28** directly opposite the head **84** of the latch release member **26**.

Assembly of the latch release mechanism **20** of FIGURES 11 to 13 is effected by drilling aligned circular holes **108** in the opposite door walls; notching the outer door rib **74** at **109** to receive the reduced area section of latch release member **26** lying between notches **97**; passing round headed bolts **43** through bolt passages **41** of outer mounting plate **22**, door openings **42**, inner mounting plate **21** and applying nuts **44** to the inner protruding ends of bolts **43**; sliding the beads **52** of the handles **23** and **24** into the respective sockets **38** of the inner and outer mounting plates **21** and **22** to initially position the handles; passing the connector bar **25** in the form of a round headed bolt through passage **110** of outer handle **24**, through passage **90** of the latch release member **26** which is disposed in its mounting notch **109**, through a light coiled compression spring **27**, through door passages **108**, and through passage **110** of inner handle **23**; and applying nut **111** to the protruding threaded end of connector bar **25** until spring **27** is placed under sufficient compression to bias latch release member **26** counterclockwise around its fulcrum at **112** (FIGURE 13) to firmly abut leg **84** against the door edge.

Assembly of the latch release mechanism **20** of FIGURES 15 to 17 is effected by vertically slotting the door edge at **113** (FIGURE 17) opposite the axis of upper door passages **42** passing the connector bar **25** through the upper bolt passage **41** of either of the mounting plates **21** and **22**, the upper door passages **42** and the upper bolt passage **41** of the other mounting plate, being sure that shoulder **66***a* faces the free or latched edge of the door and is disposed adjacent the outswinging door wall; inserting leg **86** of latch release member **26** through door edge slot **113** until leg **87** lies flat against the door edge thus disposing the end of leg **86** in the path of movement of shoulder **66***a*; fixing leaf spring **27** (FIGURES 15 and 17) to the door edge with its upper end overlapping leg **87** and normally yieldingly biasing leg **87** into abutting engagement with the door edge; endwise inserting lower beading **52** of each handle into socket **38** of its mounting plate and entering upper beading **52** endwise into the socket formed by its opposing beading **68** of connector bar **25**; and finally crimping inwardly the opposite end extremities of mounting plate beadings **21** and **22** as indicated at **114** in FIGURE 15 to fix handles **23** and **24** against accidental disassociation from their respective mounting sockets.

Installation and assembly of the latch release mechanism of FIGURES 22 to 34 is effected by locating the vertical center of the latch mechanism mounting block B conventionally provided in fabricated wooden panel doors or the vertical center in the case of solid wood doors, scribing a guide line indicating the located center along one face adjacent the latch bearing edge of the door and along the latch bearing edge itself, through drilling the door through opposite face panels **122** and **123**, preferably with a one inch drill centered about two and five eighth inches inwardly from the latch bearing edge, to form passage **121** for connector bar **25**, drilling a one inch hole centered on the latch bearing edge scribed guide line midway between the door faces to form passage **124** intersecting passage **121**, and proceeding to assemble the latch mechanism as will now be described.

Assembly is preferably effected by first centering passage **40** of mounting plate **22** with the through passage **121** and securing it in place by screwing home mounting screws **125**. Connector bar **25** is then inserted endwise from the opposite end of passage **121** with bar **25** positioned so the end **68***a* adjacent cross-flanges **60***a* may be passed through passage **40** of plate **22** until flanges **60***a* abut the back face of plate **22**. Handle **24** is then laterally aligned with its journal beadings **38***a* and **68***a* and slid into place to retain connector bar **25** in its initially assembled position. Completion of the assembly is preferably accomplished by threading the stem of latch release member **26** through opening **78** of striker plate mounting portion **75** and through passage **124** with the stem oriented so its notched end **86** will straddle connector bar **25** adjacent cross-flanges **60***a* and its abutment toes **86***a* will be disposed to engage the oppositely directed flanges **60***a* as best illustrated in FIGURES 24 and 25. Proper positioning can be assured by visual inspection through the opposite open end of passage **121** and once established can be fixed by positioning one or both retaining springs **27** in place using securing screws **125** which also serve to secure striker plate **75** in position on the door edge. While striker plate **75** may be secured to the finished edge face of the door, it is preferred to notch the door edge as indicated at **126** (FIGURES 24 and 25) to dispose the base of plate **75** in an encircling recess or depression so rib **77** will be backed up by door panel **123** thus relieving securing screws **125** of much of the shear load produced when it is attempted to open the door without releasing latch element **73**. The assembly of the door mounted mechanism is completed by telescoping mounting plate **21** over the opposite connector bar beading **68***a*, securing plate **21** in place with securing screws **125**, and mounting handle **23** on its journal beadings **38***a* and **68***a* in the manner previously described for handle **24**. Any suitable means may be employed to fix handles **23** and **24** against disassociation from their respective journal beadings. For example, suitable driven plastic plugs **127** or roll pins **128** may be inserted into the opposite ends of outer socket formations **52** into abutting engagement with the opposite ends of journal beadings **68***a*.

Latch plate **29** is then secured to door framing **28** with latch element **73** directly opposite latch release head **84***a* by securing screws **125**. Preferably the plate body **71***a* is inset into a recess **129** as best shown in FIGURE 24. The recessing of plates **71***a* and **75** as described in addition to relieving the securing screws **125** of shear forces in event someone tries to force the door also prevents ready access to the plate bases by someone seeking to pry the plates loose to gain unauthorized entry. In this latter connection, it will be noted that the inner and outer door handles are reversed with respect to the door stop **131** provided by frame **28** in FIGURES 33 and 34 from the showing in the earlier views. Such a reversal is desirable in event the latch mechanism is to be provided for an external entrance door or other door to be provided with a lock mechanism to dispose door stop **131** in overlapping relation to the edge of the outer door face so as to prevent access to latch element **73** upon insertion of a screw driver or other tool between the door edge and opposing door frame.

Such a lock mechanism could take the form of a simple double winged stop wedge **132** (FIGURES 33 and 34) fixedly secured by a screw **133** to the rotatable element **134** of a conventional key actuated barrel type lock mechanism **135** mounted in a laterally centered passage **136** drilled through the door or mounting block B and mounting plates **21** and **22** above connector bar **25**. Actuation of stop wedge **132** may be effected from the inside of the door merely by rotating the wedge in either direction to the dotted line angular position shown in FIGURES 33 and 34 to dispose one or the other of the thickened wing portions **136** in the path of movement of the upper beading **52** of inner door handle **24**. Insertion of a key to conventionally move the tumbler pins into coupled relation with the rotatable element **134** of the lock mechanism and turning of the key permits either locking or unlocking of the latch mechanism from the outside of the door.

Should it be necessary to gain access to the latch release member in emergencies, such as a small child lock-

ing himself in the bathroom, this may be accomplished by striking the outer handle member **24** edges between the journal beadings **38***a* and **68***a* to free one of the plugs **127** or roll pins **128** to gain access to the lower mounting plate securing screws **125**, removing the mounting plate **21** to gain access to the end **66** of latch release member **26**, and moving the latch release member **26** away from cross-flanges **60***a* in a latch release direction.

If desired, the two leaf springs **27** of FIGURES 22 to 26 may be replaced by a single leaf spring **27** as shown in FIGURE 35 extending lengthwise of passage **124** from the corner **139** formed by the juncture of plate **75** with the wall of passage **124** to a pair of spring abutment lugs **141** formed by notching of an oppositely directed continuous flange formed on the end **86** of the latch release member **26**. The end of leaf spring **27** cooperating with abutment lugs **141** is notched at **142** to provide abutment ears **143** straddling the body portion of connector bar **25** adjacent the area straddled by the notched end of latch release member **26** to retain spring **27** against accidental displacement. This spring arrangement avoids the need of screws for securing the biasing spring in place and improves the appearance of the exposed latch mechanism when viewed from the door edge by eliminating the pair of exposed springs **27**.

The operation of all forms of the invention is the same. One desiring passage through door **30** approaches the inner side of the door, places his hand on the portion **47** of handle **23** and pushes against it first tilting handle **23**, clockwise as viewed in FIGURES 2, 12 and 16 and counterclockwise in FIGURE 34 around its journal pivot **37**, **38***a* thereby shifting connector bar **25** in a direction to pivot latch release member **26** around its fulcrum **112** (FIGURES 3, 13, 17 and 24) due to engagement of flange **60**, **60***a* or shoulder **66***a* with stem **83** or leg **86** causing the free end of head **84**, **84***a* or leg **87** to contact and force latch element **29** or **73** out of engagement with door rib **74** or **77** thereby releasing the door for outward swinging movement, and, thereafter, under influence of the continuing pushing force applied to handle **21** and through it to door **30**, swinging the door open. One desiring passage from the opposite side of the door grasps portion **47** of handle **24** pulling it outwardly to first tilt handle **24**, clockwise as viewed in FIGURES 2, 12 and 16 and counterclockwise in FIGURE 34, around its journal pivot **37**, **38***a* thereby shifting connector bar **25** in the direction just described to effect release of latch element **29** or **73** in the manner previously described to release the door for outward swinging movement and, thereafter, under influence of the continuing pulling force applied to handle **24** and through it to door **30**, swinging the door open.

While the illustrated forms of the invention embody jamb mounted spring metal latching elements **29** or **73**, it is to be understood that latching plungers for cooperation with jamb mounted keeper plates could be actuated by the handle and handle connector bar mechanism of this invention by shaping rib **60**, **60***a* or shoulder **66***a* to provide axially directed camming surfaces, reversely disposing the modified rib and shoulder with respect to the free door edge and providing a plunger similar to that disclosed in FIGURE 14 of my aforementioned copending application with the plunger through passage shaped to provide a camming surface for mating cooperation with the modified rib **60**, **60***a* or shoulder **66***a*.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. Actuator means for door or like latching mechanisms including a spring biased latch element comprising:

(a) a pair of mounting plates each composed of a base portion adapted for connection to the opposite door faces and an angularly related support rib extending from one face of said base portion and terminating in a cylindrical journal beading;

(b) a pair of handle members each composed of an elongated body portion, an angularly related support rib extending from one face of said body portion and terminating in a beading shaped, dimensioned and disposed in parallelism to the two edges of said handle members for mating pivotal cooperation with a respective mounting plate journal beading, and connector means adjacent one of said ends of said handles;

(c) a handle connector member comprising a rod-like member having a body portion shaped for free axial shifting movement in a suitable through aperture provided in the door adjacent respectively aligned ends of said pair of mounting plates and also having respective terminal ends formed to be removably connected to said handle connector means so as to form a push-pull connection between said ends of said handle members;

(d) a latch release member positioned along an edge of said door in juxtaposition to said handle connector member and including a body portion engageable by said handle connector member for movement from a normal rest position to a latch release position upon axial shifting movement of said handle connector member under influence of the pivotal movement of said handles;

(e) spring means normally yieldingly biasing said latch release member to its normal rest position with its body portion in engagement with said portion of said handle connector member whereby said actuator means is conditioned for uni-directional, latch element releasing movement upon application of a respective pushing force to one of said handles and a pulling force to the other of said handles.

2. The latch actuator means of claim **1** wherein said handle connector member comprises a headed bolt having its shank end threaded, said handle connector means comprises through apertures at said handle ends, and a threaded nut is provided for threaded association with said bolt shank end.

3. The latch actuator means of claim **1** wherein said mounting plates comprise plate-like members provided along the longitudinal centers of one face with an upstanding rib terminating in a generally cylindrical journal formation.

4. The latch actuator means of claim **3** wherein said handle members comprise plate-like members each provided along one face with a generally medially located, upstanding, longitudinally continuous rib terminating along its free edge in a longitudinally coextensive cylindrical formation dimensioned for respective mating pivotal cooperation with said cylindrical journal formation of said mounting plates.

5. The latch actuator means of claim **4** wherein said handle members are composed of anodized aluminum and said mounting plates are composed of impact resistant, rigid plastic thereby assuring a corrosion resistant pivotal connection between said mounting plates and said handle members.

6. The latch actuator means of claim **1** wherein said latch release member comprises a head portion at the door edge end of said body portion for selectively engaging and releasing the spring biased latch element and said latch release member body portion comprises an elongated shank-like portion extending away from said

head portion at an inclination and terminating adjacent said handle connector member and said handle connector member is provided with an abutment formation disposed to move in a path to intersect the terminal end of said elongated shank-like portion whereby upon push-pull actuation of said handles said abutment formation will engage said terminal end and move said shank-like portion in a direction to tilt said head portion into releasing engagement with the spring biased latch element.

7. The latch actuator means of claim **1** wherein said handle connector member comprises an elongated body portion formed at its opposite ends with flange formations protruding from its opposite faces and providing coupling connections to the connector means of said handles and formed inwardly from one end on one face with an additional flange formation for engagement with said body portion of said latch release member.

8. The latch actuator means of claim **1** wherein said handle connector member comprises an elongated body portion formed at its opposite ends with laterally directed cylindrical beadings providing coupling connections to the connector means of said handles and formed inwardly from one end with axially facing shoulder means for engagement with said body portion of said latch release member.

9. The latch actuator mechanism of claim **1** wherein said latch release member comprises a generally T-shaped member the stem of which constitutes said body portion and the head of which provides a fulcrum portion at one side of said stem and a latch release portion at the opposite side of said stem, said stem being disposed to join said head substantially along the transverse centerline of said head and to extend away from said head at an angle such that the included angle between the stem and latch release portion of said head is greater than 90°.

10. The latch mechanism of claim **1** together with key actuated lock means including a wedge member shiftable between a normal inoperative position adjacent said one end of one of said handle members to an operative position in the path of movement of said one end of said one handle member.

11. The latch mechanism of claim **1** wherein said spring means comprises an elongated leaf spring having one end medially notched to form abutment ears, said latch release member is of generally T-shaped configuration in cross-section with its free stem end formed to provide laterally spaced abutment lugs for engagement with the free ends of said abutment ears, and said stem and said leaf spring are disposed inside the door with their abutment ears and lugs engaged on opposite sides of said handle connector member and their body portions diverging toward the door edge where the other end of said leaf spring abuts a portion of the door to tension the spring and bias the latch release member to its normal rest position.

12. The latch actuator means of claim **1** wherein said latch release member comprises an angle member providing a long leg which constitutes said body portion and a short leg which constitutes a latch release portion, said spring means comprises an elongated spring metal plate fixed at one end to said door edge and having its other end disposed in overlying, face abutting engagement with said short leg, and said latch release member is fitted to the door with its short leg in face abutting engagement with the door edge and its long leg extending laterally of the door to a point of connection with said handle connector member.

13. The latch actuator means of claim **12** wherein the angle member is of generally L-shaped configuration.

14. The latch actuator means of claim **13** wherein the long and short leg of said latch release means define an included angle slightly greater than 90° and the line of juncture therebetween is disposed in fulcrum bearing contact with a vertical corner of said door formed in part by a portion of said door edge.

15. The latch actuator means of claim **12** wherein the angle member is of generally T-shaped configuration with the long and short legs defining an included angle slightly greater than 90° and the free end of the long leg is provided on the face opposite said included angle with a pair of laterally spaced round ended flange formations forming fulcrumming toes for engaging with said connector member.

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