

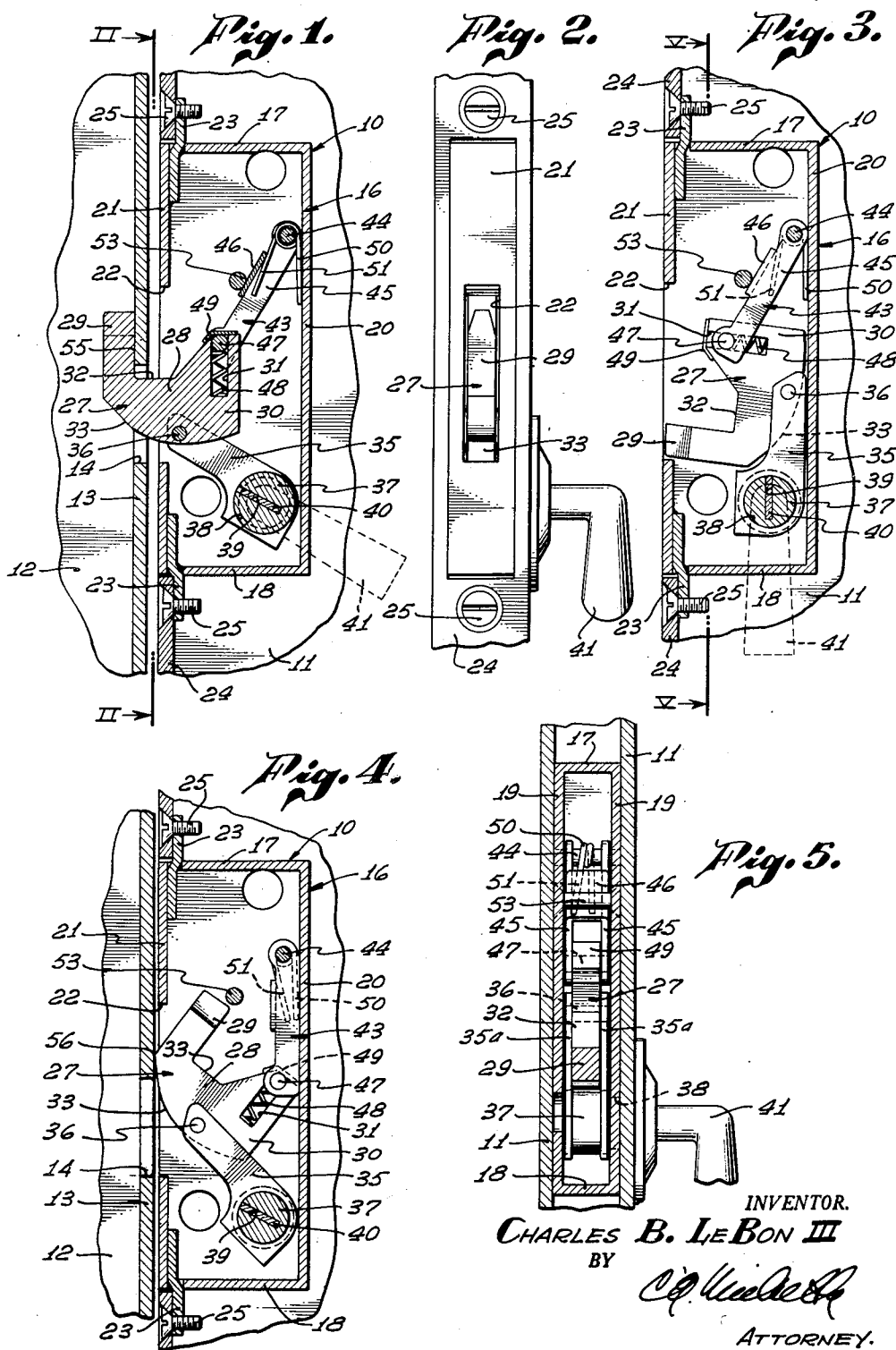
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LATCH MECHANISM

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LATCH MECHANISM

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This invention relates to a latch mechanism and more particularly to a three-position non-jamming latch mechanism for use with sliding panels and doors.

This application is an improvement of the latch means disclosed in application, Serial No. 315,042, filed October 16, 1952, by Charles S. Palmer, entitled "Latch."

Prior proposed latch means for sliding panels and doors have usually included a mechanism wherein a latch member was adapted to be manually positioned in either latch or retracted position. In the event the latch member on such prior proposed latch mechanisms was moved to latch position when the door was open, upon closing of the sliding door, the latch member would strike an opposed jamb without latching and would prevent closure thereof. The shock of striking the opposed jamb with the latch member caused damage and excessive wear on the latch mechanism. This problem of protecting the latch mechanism is peculiar to sliding doors which are movable in a vertical plane as compared to hinged doors which swing about a vertical axis.

Means to prevent damage to such prior latch means for sliding doors have taken the form of selectively operable release means associated with the latch means so that the latch member could not be moved to latch position unless the release means was actuated either by contact with a jamb or by a specific act of the person closing the door. Such release means partially solved the problem, but were not effective when the release means was inadvertently actuated when the door was open so that the latch member was in latch position before the door was closed. Obviously, under such conditions, upon closing the door, the latch member would forcibly strike the jamb and such striking would cause damage to and wear of the latch means.

The present invention contemplates a novel latch mechanism which obviates the disadvantages of prior latch mechanisms and provides a fool-proof automatically operated non-jamming latch mechanism for sliding doors. The latch mechanism of the present invention contemplates a three-position latch mechanism wherein the latch member is manually moved into latched position and retracted position. The latch member is provided with a third position which is assumed when a latch member already disposed in latch position strikes a door jamb, the latch member being automatically retractable upon such striking into the third non-jamming position. The automatic retraction of the latch member of this invention is resiliently cushioned so that excessive wear and damage to the parts of the mechanism are reduced to a minimum.

It is therefore the primary object of this invention to disclose and provide a novel latch mechanism for sliding doors wherein the latch mechanism is provided with a third automatically assumed non-jamming position.

An object of this invention is to disclose and provide a novel three-position latch mechanism for sliding doors wherein a yieldably positioned latch member is required to be manually moved to latch and retracted position and is automatically movable to a third non-jamming retracted position.

Another object of this invention is to disclose and provide a novel three-position latch mechanism for sliding doors wherein the latch member in latch position is non-yieldable to substantially vertically applied forces and is resiliently yieldable to horizontally applied or inwardly directed forces.

A further object of this invention is to disclose and

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provide a novel three-position non-jamming latch mechanism wherein a latch member is resiliently yieldable to forces directed inwardly of the housing and may serve as a resilient cushioning means for reducing forceful striking of a sliding door against an opposed jamb.

Still another object of this invention is to disclose and provide a three-position latch mechanism for sliding doors having a maximum forwardly directed latching reach and adapted to resiliently and snugly hold an edge face of a sliding door against an opposed jamb.

A further object of this invention is to disclose and provide a three-position latch mechanism for sliding doors which is easy and inexpensive to manufacture.

Generally speaking, the latch mechanism of this invention contemplates a latch housing having a back wall and a front wall provided with an opening. A latch member normally positioned within the housing in retracted position is adapted to present a latch finger through said opening for engagement with an associated jamb member. Means for moving the latch member between a latched position and retracted position includes an arm connected to a shaft pivotally mounted in the housing and pivotally connected to the latch member rearwardly of the latch finger. Means for yieldably positioning the latch member within the housing for automatic retraction from latch position upon application of forces directed inwardly of the housing may include an outwardly biased positioning member pivotally connected to the housing adjacent the back wall and connected to a biased pin movable in an elongated slot provided in the latch member rearwardly of the latch finger whereby the latch member may move from latch position to a non-jamming retracted position without movement of the latch member moving means.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings in which an exemplary embodiment of the present invention is shown.

Fig. 1 is a sectional view of a latch mechanism embodying this invention mounted in a sliding door and shown in latch position with an associated door jamb, the section being taken in a vertical plane bisecting the device.

Fig. 2 is a front view taken in the plane indicated by line II—II of Fig. 1.

Fig. 3 is a vertical sectional view showing the latch mechanism of Fig. 1 in retracted position.

Fig. 4 is a vertical sectional view showing the latch mechanism of Fig. 1 in a third non-jamming position.

Fig. 5 is a sectional view taken in the plane indicated by line V—V of Fig. 3.

The exemplary latch mechanism generally indicated at 10, Fig. 1, is shown mounted in a horizontally sliding vertically arranged door or panel 11. A door jamb 12 is provided with a latch plate 13 having a latch receiving opening 14 therein. It is understood that jamb member 12 may be part of a stationary jamb member or may be part of a vertical stile forming one side of a cooperable movable sliding panel or door. The door 11 and jamb 12 lie in the same vertical plane.

The latch mechanism 10 comprises a rectangular box-shaped latch housing 16 having top and bottom walls 17 and 18, parallel side walls 19, a back wall 20, and a front wall 21 provided with vertically elongated opening 22. Front securing lugs 23 may be provided at the top and bottom of housing 16 for attaching the latch mechanism in a recess to a vertical stile 24 of the sliding door as by screws 25.

A latch member 27 comprises a central body portion 28, a latch finger 29 integrally formed with said body portion and upwardly directed when in a latched position (Fig. 1), and a rear portion 30 provided with an elongated slot 31 lying generally parallel to latch finger 29. The rear portion 30 and the latch finger 29 form an upwardly facing recess 32, the forward portion of said recess being adapted to receive a portion of the jamb plate 13 above the latch opening 14. The central body portion 28 of the latch member may be provided with a convex bottom edge face 33 extending from the front edge face of latch finger 29 to the rear edge face of rear portion 30.

Means for manually moving latch member 27 between latched position (Fig. 1) and retracted position (Fig. 3) may comprise an arm 35 made of two parallel thin arm elements 35a each lying adjacent a side wall 19 and adapted to receive therebetween part of latch member 27. Arm 35 may be pivotally connected at one end as at 36 to the central portion 28 of the latch member 27. The pivotal connection 36 lies rearwardly of and below the latch finger 29 and adjacent to the bottom convex edge 33 of the latch member. At its other end, arm 35 is connected to a horizontal shaft 37 in any suitable manner. The shaft 37 may be rotatably mounted in aligned ports 38 provided in side walls 19 of housing 16. The shaft 37 may be provided with a longitudinally extending slot 39 forming a key-way for receiving a flat key-like extension 40 of a latch handle 41 which extends outwardly from one side of the latch housing. Rotation of handle 41 from a downwardly inclined position as shown in Fig. 1 to a vertical position as shown in Fig. 3 causes retraction of the latch member 27 into the housing 16.

Means for yieldably positioning the latch member 27 in cooperable relation to the latch moving means may comprise a positioning arm 43 pivotally connected at its upper end as at 44 to the housing 16 adjacent the back wall 20 thereof. The positioning arm 43 may comprise a pair of corresponding downwardly extending parallel elements 45 including a front transverse web portion 46 disposed intermediate ends of the arm. The lower ends of arm elements 45 may be interconnected by a pin 47 which is slidably movable and received within slot 31. The arm elements 45 extend over opposed side portions of latch member 27. The pin 47 is biased outwardly of the slot 31 by a coil spring 48 seated at one end against the bottom wall of the slot and at the other end against said pin. The pin 47 may be retained in slot 31 by a strap 49 which extends across the open end of slot 31 and which may be secured to the latch member in any convenient manner.

The positioning arm 43 may be biased forwardly by an angular spring means 50 having one leg seated against back wall 20 of the housing and its other leg 51 received between elements 45 and contacting the web portion 46. A transverse stop bar 53 extending between side walls of the housing limits forward displacement of the positioning arm 43 and is disposed forwardly of a plane passing transversely through the housing and through the axes of the pivotal connections 36 and 44 when the latch member 27 is in latch or retracted position.

Before describing operation of the latch mechanism, it should be noted that positioning arm 43 is normally in contact with bar 53 when the latch member is in both latched position and retracted position. Thus in normal use of the latch mechanism turning of handle 41 will cause the latch member 27 to move between retracted and latched position by pivotal movement of the latch member about pin 47 in slot 31 in its forwardmost position.

In operation of the latch mechanism, in Fig. 3 it will be noted that handle 41 is disposed vertically downward, and arm 35 is likewise vertically arranged with an edge face thereof abutting back wall 20 of the housing. The pivotal connection 36 lies virtually beneath pivotal connection 44 of the positioning arm 43 and the latch finger is completely retracted within the housing. As handle 41 is turned upwardly, arm 35 moves forwardly about the axis of shaft 37 and the latch member 27 is urged forwardly. The forward movement of latch member 47 causes compression of spring 48 in slot 31 until the pivotal connection 36 passes a line extending between the axis of shaft 37 and the pin 47 in slot 31. Upon just passing the said line, compressed spring 48 causes pivotal movement of the latch member about the pivotal connection 36 in a manner which results in the latch finger 27 snapping upwardly through the latch opening 14 for latching engagement as at 55 with the internal surface of the latch plate 13 above opening 14. During the movement of the latch member 27 between retracted and latch position it will be apparent that the latch member not only pivots about pin 47 but that the pin 47 is slidable in slot 31 due to relative movement of the latch member. The latch member is thus moved to latch position with a combined pivotal and translatory movement.

In latch position the pivotal connection 36 is disposed adjacent to and immediately rearwardly of the opening 22 in front wall 21. The spring 48 under normal compression in slot 31 causes pressure contact of latch finger

29 against the latch plate and draws the sliding door tightly against the opposed edge face of the door jamb.

When handle 41 is turned downwardly to vertical position, the movement of the latch member 27 is substantially the reverse of that described above. Upon initial downward movement of latch handle 41, the arm 35 moves rearwardly and causes compression of the spring 48 while at the same time the latch member pivots about pivotal connection 36. Pivotal movement of latch member 27 about pin 47 in slot 31 also occurs. In final retracted position the arm 35 is virtually vertically disposed and the rear edge face thereof contacts the back wall of housing 20. It may be noted that the convexly curved edge face 33 of the latch member facilitates rotation of the latch member through the openings 14 and 22.

It will be noted in latch position that if a vertically directed force were applied to the latch member 27 as by inserting a thin instrument between the faces of the door jamb and front wall 21, such a vertically applied force could not cause retraction of the latch member because of the closeness of pivotal connection 36 to the front wall 21 of the latch housing. The moment arm of such a force working about pivotal connection 36 would be very small and is opposed by compression spring 48.

In the event the latch member 29 is disposed in latching position when the sliding door is open, the yieldable positioning arm 43 affords a means for permitting retraction of the latch member into the housing automatically upon contact of the outer edge face of the latch finger with the opposed door jamb. When a latch finger in this position contacts the door jamb as illustrated in Fig. 4 at 56, the latch member is urged rearwardly into the housing. Upon initially contacting the opposed jamb, the latch member pivots in a clockwise direction about pivotal connection 36. The arm 43 is movable rearwardly about its pivotal connection 44, and pin 47 bears against strap 49 so that as the latch member moves inwardly it is pivoted about pivotal connection 36. The arm 43 is rotated counter-clockwise (as viewed in Fig. 4) until the rear edge face thereof contacts the back wall 20. Further retraction of the latch member 27 into the housing is accomplished by slight turning of arm 35 about shaft 37 so that the latch member 27 is substantially entirely retracted into the latch housing.

It will thus be noted that retraction of latch member 27 is permitted when an inwardly or horizontally directed force is applied against the latch member. Thus the latch member is automatically movable into a non-jamming retracted position upon striking the opposed jamb face.

When the sliding door is moved away from the opposed jamb, the latch member will be rotated outwardly and into normal latched position because of the compressed spring means 45. It may be noted that the spring means 45 actually serves to cushion non-jamming retraction of the latch member and to some extent closing of the sliding door and thereby serves to prevent or reduce to a minimum damage and excessive wear on latch parts which might result from slamming of the sliding door with the latch member in latched position.

The three-position latch mechanism described above thereby affords a simply constructed latch means for sliding doors manually operable from latched to retracted position and automatically operable into a third fool-proof non-jamming position. The yieldable positioning arm 43 permits the latch finger to be retracted into the housing without damage and at the same time serves to provide a relatively non-yielding pivotal connection for the latch member when the latch mechanism is normally operated by turning handle 41.

It is understood that various modifications and changes may be made in the latch mechanism described above and which come within the spirit of this invention and all such changes and modifications coming within the scope of the appended claims are embraced thereby.

I claim:

1. In a three position non-jamming latch mechanism including a housing having an opening, a latch member movable between latched and retracted position, and actuating means connected to the latch member for movement thereof, the combination of: means yieldable to position the latch member in non-jamming position by retraction through said opening comprising a positioning member pivoted to a housing, means pivotally and slidably connecting the positioning member and latch member; and spring means under compression between the

positioning member and the housing for biasing the positioning member.

2. A latch mechanism as defined in claim 1 wherein said connecting means includes a pin on said positioning member and a slot on said latch member receiving said pin.

3. A latch mechanism as defined in claim 1 wherein stop means carried by the housing limits movement of the positioning member.

4. In a three-position, non-jamming latch mechanism for a sliding panel, the combination of: a housing having a back wall and a front wall provided with an opening; a latch member within the housing including a latch finger upwardly directed and adapted to extend through the opening in latching position, said latch member being provided with an elongated slot spaced from and parallel to said finger; actuating means for moving the latch member into latching position and a retracted position including an actuating arm pivotally connected at one end to the latch member intermediate the latch finger and the slot and a rotatable shaft connected to the arm at its other end; means cooperable with said latch actuating means to yieldably position the latch member in latching position and including a positioning member pivotally connected at one end to the housing adjacent the back wall, a biased pin movable in said slot and connected to the other end of said positioning member; spring means biasing the positioning member in a direction towards the front wall; and a stop provided on the housing limiting displacement of said positioning member in said direction whereby said positioning member is movable toward the back wall against said spring means for retraction of the latch member from latching position by pivotal movement of the latch member about the pivotal connection of said actuating arm to the latch member.

5. In a three-position, non-jamming latch mechanism for a sliding panel, the combination of: a housing having a back wall and a front wall provided with an opening; a latch member within the housing including a latch finger upwardly directed and extending through the opening in latching position, said latch member being provided with an elongated slot spaced from said finger; actuating means for moving the latch member into latching position and a retracted position including an actuating arm pivotally connected at one end to the latch member and a rotatable shaft connected to the arm at its other end; means to yieldably position the latch member in latching position including a positioning member pivotally connected at one end to the housing adjacent the back wall, a biased pin movable in said slot and connected to the other end of said positioning member; spring means between the housing and the positioning member biasing the positioning member in one direction; and a stop provided on the housing limiting displacement of said positioning member in said one direction whereby said positioning member is movable against the spring means for retraction of the latch member from latching position by pivotal movement of the latch member about the pivotal connection of the latch member to the actuating arm.

6. In a three-position, non-jamming latch mechanism for a sliding panel, the combination of: a housing having a back wall and a front wall provided with an opening; a latch member within the housing including a latch finger upwardly directed and extending through the opening in latching position, said latch member being provided with an elongated slot; actuating means for moving the latch member into latching position and a retracted position including an actuating arm pivotally connected at one end to the latch member and a rotatable shaft connected to the arm at its other end; means to yieldably position the latch member in latching position including a positioning member pivotally connected at one end to the housing, a biased pin movable in said slot and connected to the other end of said positioning member; and spring means biasing the positioning member into one position for providing a relatively fixed pivot for the latch member about said pin when moved into latching and retracted position by said actuating arm.

7. In a latch mechanism for a sliding door, the combination of: a housing having a back wall and a front wall provided with an opening; a latch member within the housing having a latch finger adapted to extend through the opening in latching position; means for mov-

ing the latch member into a latching first position and a retracted second position including an arm pivotally connected to the latch member and a rotatable shaft connected to the arm; means for yieldably positioning the latch member in latching position for movement to a non-jamming third position including a positioning member pivoted on the housing and pin means carried by the positioning member slidably cooperable with slot means on the latch member; and spring means for biasing the positioning member in the direction of movement of the latch member to latching first position whereby said positioning member is movable against said spring means in the opposite direction for retraction of the latch member from latching position by pivotal movement of the latch member about the pivotal connection of the arm to the latch member.

8. In a three-position, non-jamming latch mechanism including a housing, a latch member movable into latching and retracted position, and actuating means pivotally connected to the latch member for movement thereof into said positions, the combination of: means yieldable to position the latch member into a non-jamming, unlatched position from a latching position and including a positioning member pivotally connected at one end to the housing, a pin carried at the other end of said positioning member, said latch member being provided with a slot to slidably receive said pin, and spring means between the housing and the positioning member to bias the positioning member in the direction of movement of said latch member to latching position.

9. In a latch mechanism, the combination of: a housing having an opening therein; a latch member within the housing having a latch finger and a body portion provided with a slot spaced from said finger; a biased latch positioning means pivotally connected to the housing and having engagement means cooperable with said slot for positioning said latch member; spring means carried by the latch member cooperable with said engagement means for biasing the latch member into retracted and latching position; and actuating means for said latch member including an actuating arm having a pivotal connection to said latch member and pivoted about an axis spaced from said pivotal connection.

10. A latch means comprising: a housing having an opening therein; a latch member having a latch finger adapted to be extended and retracted through said opening; means for mounting said latch member in said housing for pivotal and translatable movement including an elongated slot; spring means associated with said mounting means in said slot for biasing the latch member into latching position; said mounting means including a positioning member pivotally connected to said housing; and actuating means for said latch member including an arm having a pivotal connection to said latch member and pivoted about an axis lying between the latching and retracted position of said pivotal connection of said arm; and spring means extending between said positioning member and said housing for biasing said positioning member into one position.

11. In a latch mechanism, the combination of: a housing having an opening therein; a latch member in the housing having a latch finger; an actuating arm pivotally connected to the housing and having a pivotal connection to and intermediate ends of the latch member; said actuating arm being operable into a position for latching the latch member and into another position for unlatching the latch member; a latch positioning member pivotally connected to the housing; means pivotally and slidably connecting the positioning member to the latch member in spaced relation to the pivotal connection of the actuating arm to said latch member; a spring means extending between said housing and said positioning member; said positioning member being movable for retraction of said latch member from latching position while said actuating arm remains substantially in latching position.

12. A latching mechanism as claimed in claim 11 including spring means for biasing the pivotal and slidable connection of the positioning member to the latch member.

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