July 12, 1960 H. I. MANDOLF 2,944,848

LATCH

Filed Feb. 10, 1958

FIG. 2

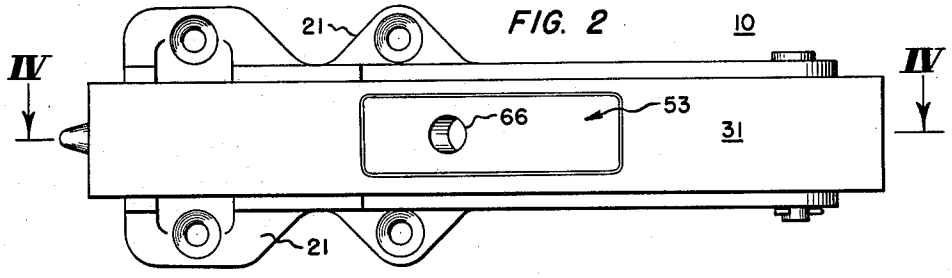
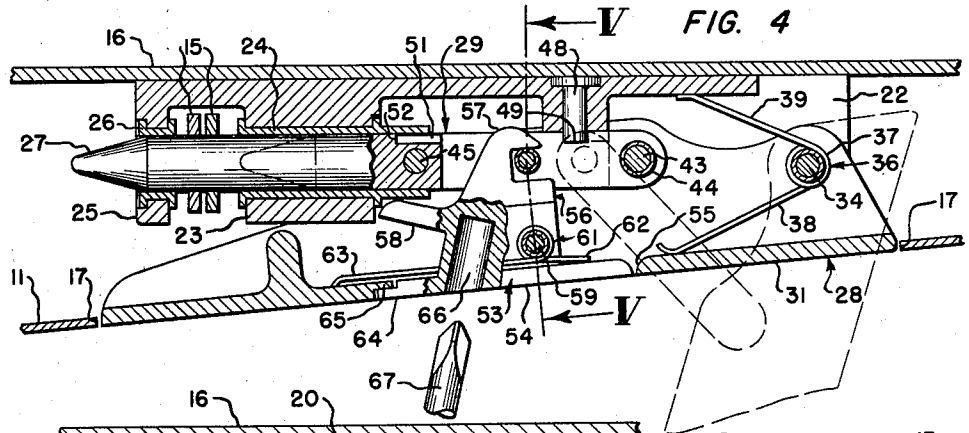


FIG. 4



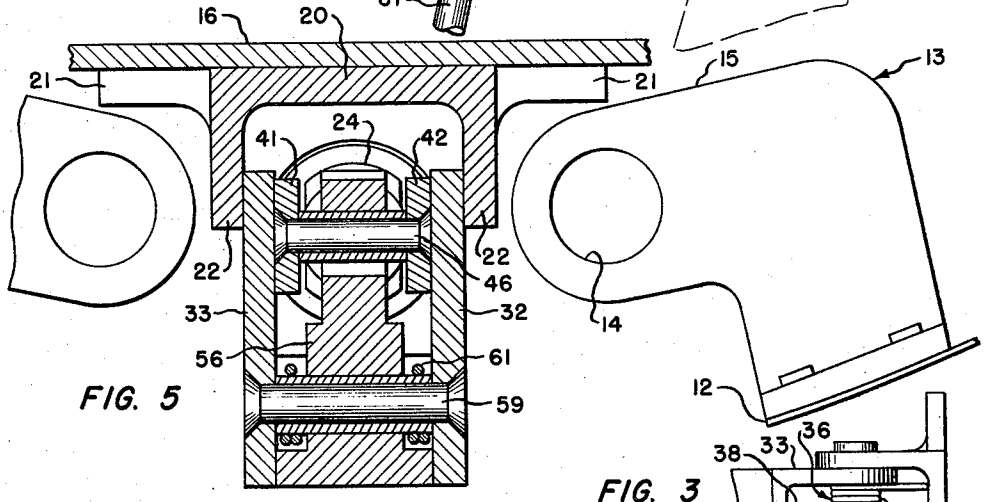


FIG. 5

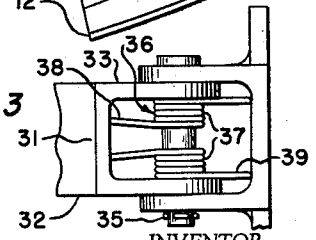


FIG. 3

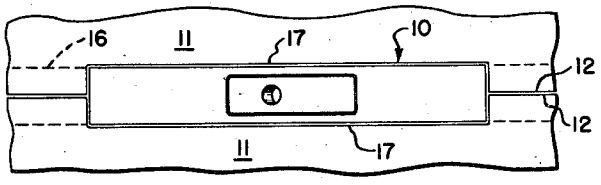


FIG. 1

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LATCH

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5 Claims. (Cl. 292—181)

This invention relates to latch mechanisms and more particularly to latches for doors or closures of flush or other types.

An object of the present invention is to provide a latch mechanism embodying an operating handle adapted to be positioned flush with the surface of the door or closure served by the latch mechanism and including an improved form of manually actuable latching lever for controlling the movement of the operating handle.

Another object of the present invention is the provision of a latch mechanism adapted for use in connection with aircraft closures and having an operating handle which may be exposed to weather and which includes novel means permitting effective control of the operating handle even though it has been subject to icing conditions.

Another object of the invention is to provide a latch mechanism including an exposed operating handle which is adapted to be actuated by a readily available tool for operation of the latch mechanism.

A further object of the invention is the provision in a latch mechanism of an improved flush-type operating handle which is readily actuable by a person even though heavy mittens are being worn.

A still further object of the invention is to provide a latch mechanism having an improved form of handle characterized by its ease of operation, simplicity and durability.

Other objects and features of the present invention will be readily apparent to those skilled in the art from the following specification and appended drawings wherein is illustrated a preferred form of the invention and in which:

Figure 1 is a view illustrating the present latch mechanism and fragmentary portions of closure members with which the latch mechanism is associated;

Figure 2 is top plan view of the present latch mechanism;

Figure 3 is an end elevational view but with certain structure omitted for clarity;

Figure 4 is a sectional view along the line IV—IV of Figure 2 and also showing the relationship of the latch mechanism to its support and to a closure member; and

Figure 5 is a sectional view taken along line V—V of Figure 4 but showing the closure members, in fragmentary form, disassociated from the latch mechanism.

Reference will now be had with greater particularity to the drawings wherein the present latch mechanism is indicated in its entirety by the numeral 10. For illustrative purposes only, the present latch 10 is herein described in connection with a pair of closure members or doors 11 which serve to close an opening which may be in an airplane, vehicle or any other structure. The closure members 11 may be pivotally mounted by suitable hinge means (not shown) which would be appropriately located on a wall, panel, wing, nacelle or the like such that the closure members 11 may be rotated toward each other and to a position where the latch 10 will act to secure the closure members 11 together at their longitudinal edges 12. Each of the closure members 11 carries a catch element 13 which may be of generally L-shape and having a through opening or eye 14 in its free leg 15. Catch elements 13 are suitably located on the closures 11 so that the eyes 14 thereof will be properly positioned relative to latch 10 for engagement by the bolt thereof when the closures 11 are moved to closed position. Latch 10 will be carried upon appropriate support structure, such as an elongated fixed member 16, suitably located and mounted relative to the opening to be closed by the closure members 11 so that the mating edges 12 of the closure members 11 when in closed position will over-lie and conceal support member 16. It is understood, of course, that the present latch mechanism is not limited to use with any particular form of vehicle, airplane or other structure; and it is understood that the form of closure member, the manner of mounting the closure member, and the manner of and the structure for supporting the latch mechanism in operative position do not form a part of the present invention.

The mating or abutting edges 12 of closure members 11 are cut away as at 17 to accommodate the outline of latch 10 so that the outer surface of the latch 10 merges and is flush with the outer surfaces of the closure members 11 to thereby afford surface continuity and provide a stream-line appearance for reducing drag and resistance when the closure members 11 are in closed position.

Latch mechanism 10 comprises a generally rectangular base or support element 20 which is adapted to be fixedly attached to support member 16 as by screws or any other suitable fastening means which pass through side-wise extending mounting flanges 21. Base 20 includes a pair of integral, laterally spaced, parallel, side walls or flanges 22 which are joined together at one of their ends by an integral, block-like, downwardly extending portion 23. Portion 23 is provided with a longitudinally extending through opening which accommodates a guide bushing 24. Base 20 also includes a downwardly depending, transverse, end flange 25 which is longitudinally spaced from portion 23 and has a through opening into which is fitted a guide bushing 26 which aligns with guide bushing 24.

An elongated latching bolt 27 is slidably positioned within guide bushing 24 and is adapted to be moved to bridge the space between block portion 23 and end flange 25 and extend through guide bushing 26 in the closing operation of the present latch. When closure members 11 are in closed position legs 15 of catch elements 13 carried by closures 11 will extend into the space between end flange 25 and block 23 and the eyes 14 of the catches 13 will align with guide bushings 24 and 26 so that bolt 27 will pass therethrough, thereby to secure closures 11 in their closed position.

Reciprocal movement of latching bolt 27 into and out of its latched position is effected by a pivotally mounted operating handle or actuating lever 28, which is interconnected with bolt 27 by connector means 29. Handle 28 is of elongated generally channel form having a base wall 31 and dependent side walls 32 and 33, which walls are adapted to extend into the space between side walls 22 of support elment 20. Walls 32 and 33 are suitably apertured adjacent one end for the extension therethrough of a pivot pin 34, which pin 34 also extends through apertures provided in side walls 22 thereby to connect handle 28 to support element 20. A Cotter pin 35 passing through an opening in the end of pivot pin 34 holds pivot pin 34 in place to maintain the handle 28 in this pivotal connection with support element 20.

Handle 28 is biased for movement in counter-clockwise direction toward its open position, shown in broken-lines in Figure 4, by a torsion spring 36. Spring 36 includes coil portions 37 which encircle pivot pin 34, an intermediate interconnecting portion 38 which bears against

the inner surface of base wall 31 of handle 28, and extending ends 39 which engage support element 20.

Connector means 29 which joins handle 28 and bolt 27 comprises a pair of laterally spaced link members 41 and 42 which are pivotally connected at one of their ends to handle 28 by a pin 43, which pin is suitably fixedly mounted on handle 28 and extends through suitable apertures in links 41 and 42. A spacer collar 44 is positioned on pin 43 and extends between links 41 and 42 to maintain them in spaced relation. The opposite ends of the links 41 and 42 are pivotally connected to an end of the latching bolt 27 by a pin 45. Fixedly located generally midway of links 41 and 42 is a pin 46 which carries a collar 47 and serves a purpose to be described.

To limit the extent of rearward movement of bolt 27 and to prevent its rearward withdrawal from its guide bushing 24 there is provided a stop pin 48 which is suitably rigidly affixed to support element 20 and projects its end 49 into the path of rearward movement of bolt 27. Bolt 27 has a slot or recess 51 formed in its upper rear surface which accepts the end 49 of stop pin 48 and permits limited movement of bolt 27 past pin 48 until end 49 engages shoulder 52 of slot 51. With the engagement of end 49 with shoulder 52 further rearward movement of bolt 27 is halted. It is noted that the position of stop pin 48 on support 20 is such that sufficient rearward movement of the bolt 27 is permitted that its forward end will clear eyes 14 of catches 13 of the closures 11 and will clear the space between end flange 25 and block portion 23.

It is apparent that te provision of stop pin 48 to determine the extent of rearward movement of bolt 27 also serves to limit the extent of movement of handle 28 and determines the location of its full open position by reason of the connection of handle 28 to bolt 27.

When handle 28 is moved to its closed position, as best shown in Figure 4, the outer surface of its base wall 31 will conform to the outer surface of closure members 11 and afford the desired flush appearance. The location of the closed position of handle 28 is determined by engagement of the edges of handle side walls 32 and 33 with shoulders (not shown) cut into block portion 23 of support base 20.

To hold handle 28 in its closed position against the bias of torsion spring 36, there is provided a release or actuator lever 53 which includes a base portion 54 of generally rectangular form which fits within and closes an access opening 55 in handle 28. The outer surface of base portion 54, in closed position, is flush with the outer surface of handle 28. Release lever 53 also includes a depending portion 56 having a hook 57 at its end and a side-wise extending projection 58 which is adapted to be moved into engagement with the undersurface of base wall 31 of handle 28 to apply a moving force to the handle 28 in situations to be hereinafter described. Release member 53 is pivotally mounted on handle 28 by means of a pin 59 carried by side walls 32 and 33 of handle 28. Hook 57 is adapted to engage pin 46 carried centrally of link members 41 and 42 to hold handle 28 in its closed position against the bias of its torsion spring 36. Release member 53 is also provided with a torsion spring 61 which is coiled about pin 59 and has one end 62 which bears against the interior surface of base 54 of the release member 53 and has its other end 63 in engagement with the interior surface of base wall 31 of handle 28. Torsion spring 61 exerts its bias to continually urge release member 53 into its flush position relative to handle 28. In this flush position, a longitudinally extending projection 64 of base 54 engages a stop shoulder 65 cut into base wall 31 of handle 28. This projection 64 and stop 65 cooperate to limit the amount of pivotal movement of release member 53 under the spring force of spring 61 and to determine the closed position of release member 53.

Formed in release member 53 is a recess 66 having an opening to the exterior through base 54 of the release member, this opening to the exterior being located between the pin 59 and projection 64 of base 54. Recess 66 is angularly inclined generally in the direction of the hook 57, which, as shown, opens generally in the opposite direction to the direction that projection 64 extends. Recess 66 is adapted to receive the end of a usual tool, such as the working end of a tapered-ribbed type screwdriver shown at 67. The depth of recess 66 is sufficient that the tool end can be inserted an amount that will afford the operator a good grasp on the release member 53. Recess 66, it is contemplated, will be of such size that it will accommodate tools which are usually readily available to an operator.

Provision of the recess 66 in the release member 53 permits an operator to employ a tool as a lever for quick and effective actuation of release member 53. It is possible, of course, for a man to press upon release member 53 with his finger alone to rotate it to disengage hook 57 from catch pin 46 thereby to release handle 28 for movement by its spring 36 in the direction of its open position. In this movement latching bolt 27 will be withdrawn from bushing 26 and into unlatching position wherein its free end rests within bushing 24. However, movement of handle 28 to its full open position under the force of spring 36 alone assumes that catches 13 of closure members 11 are not binding against bolt 27. Should there be binding engagement between catches 13 and the bolt 27 the force of spring 36 may not be sufficient to move handle 28 and bolt 27. In such event insertion of a tool in recess 66 provides the operator with a lever by means of which he can rotate release member 53 to bring its side-wise extending projection 58 into engagement with base 31 of the handle 28. With projection 58 in engagement with handle 28 a continued application of force through the tool will obviously cause rotation of handle 28 toward its open position. This movement of handle 28 will cause a pulling force to be applied to bolt 27 through link members 41 and 42 to move bolt 27 from the eyes 14 of catches 13 and into its unlatched position thus freeing the closure members 11. Thus by use of a tool and recess 66 an effective opening force can be developed and applied to handle 28 which will free bolt 27 from binding forces applied to it.

As is well known, latches which are subjected to inclement winter weather conditions often become frozen in place. With the present latch it is a simple matter to effect the opening operation. A tool end can be inserted or worked into recess 66 whereby a sufficient force can be applied to release member 53 and therethrough to handle 28 which will break the release member and the handle free of their icy bed. Force can then be continued to be applied to the tool to move handle 28 to its full open position to move latching bolt 27 to its unlatched position. It is apparent that the operator need not remove his gloves to effect an opening operation and may maintain his hands protected against the weather.

While a certain preferred embodiment of the invention has been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims:

What I claim is:

1. A latch mechanism comprising a support member, a latching bolt, means on said support member for mounting said latching bolt for rectilinear movement into and out of latching position, an actuating handle pivotally mounted on said support member for movement between closed and open positions relative to said support member, means interconnecting said actuating handle and said latching bolt for common movement, and re-

lease means movably carried by said actuating handle, means on said release means engageable with said interconnecting means for releasably securing said actuating handle in closed position, said release means having a base portion, said base portion having a recess therein opening to the exterior surface thereof adapted to receive a force applying means whereby said release means may be actuated out of engagement with said interconnecting means to release said actuating handle for movement to its open position.

2. In a flush type latch, a support member, a latching bolt, guide means carried by said support member for mounting said latching bolt for rectilinear movement into and out of latching position, an actuating handle pivotally mounted on said support member for movement between closed and open positions, link means having one end pivotally connected to said actuating member and its other end pivotally connected to said latching bolt for movement of said latching bolt by said actuating member, a pin carried by said link means, said actuating handle having an exteriorly disposed base portion, said base portion having an opening therein, release means pivotally mounted on said actuating handle and spring biased normally to close said opening, said release means including a hook portion engageable with said pin for releasably securing said actuating handle in closed position, said release means having a recess opening to the exterior surface thereof adapted to receive a force applying means whereby said release means may be actuated to release said actuating handle for movement to its open position, and a projecting portion on said release means engageable with an interior surface of said actuating handle on continued actuation of said release means to apply an opening force to said actuating handle.

3. A latch mechanism comprising a support member, a latching bolt, guide means positioned on said support member for slidably mounting said latching bolt for rectilinear movement into and out of latching position, an actuating handle pivotally mounted on said support member for movement between closed and open positions relative to said support member, spring means biasing said actuating handle normally in the direction of its open position, link means having one end pivotally connected to said actuating member and its other end pivotally connected to said latching bolt, stop means carried by said support member in position for engagement by said latching bolt to determine the unlatched position thereof and to determine the open position of said actuating handle, a pin carried by said link means, release means pivotally mounted on said actuating handle and including a portion engageable with said pin for releasably securing said actuating handle in its closed position, said release means having a base portion, said base portion having a recess therein opening to the exterior surface thereof adapted to receive a force applying means whereby said release means may be actuated to release said actuating handle for movement to its open position, and a projecting portion on said release means engageable with an interior surface of said actuating handle on continued actuation of said release means to apply an opening force to said actuating handle.

4. A latch mechanism comprising a support member, a latching member movably mounted on said support member, an actuating handle pivotally mounted on said support member for movement between closed and open positions relative to said support member, means interconnecting said latching member and said actuating handle for common movement, a release member movably carried by said actuating handle for releasably securing said actuating handle in its closed position, said release member having a recess therein opening to the exterior surface thereof adapted to receive a force applying means whereby said release member may be moved to release said actuating handle, and a projecting portion on said release member engageable with said actuating handle on continued movement of said release member to apply an opening force to said actuating handle.

5. A latching mechanism for securing a pair of closures in endwise relation, said latch mechanism comprising a support member, a pair of longitudinally spaced guide means on said support member, a latching bolt rectilinearly movable within said guide means to span therebetween to secure a pair of closure catch elements positioned in the space between said guide means, an actuating handle pivotally mounted on said support member, the exterior surface of said actuating handle adapted to lie in flush relationship with the exterior surfaces of said closures when said actuating handle and said closures are in closed positions, link means having one end pivotally connected to said actuating handle and its other end pivotally connected to said latching bolt, a pin carried by said link means, stop means carried by said support member positioned for engagement by said latching bolt to determine the open position of said latching bolt and the open position of said actuating handle, spring means biasing said actuating handle for movement in the direction of its open position, said actuating handle having an opening in the exterior surface thereof, a release member pivotally mounted on said actuating handle, spring means biasing said release member normally to close said opening with its exterior surface flush with the exterior surface of said actuating handle, said release member having a hook portion engageable with said pin for releasably holding said actuating handle in closed position, the exterior surface of said release member having a recess therein adapted to receive a manual force applying member for applying force to said release member for movement thereof to release said actuating handle, and an extending portion on said release member engageable with the actuating handle whereby the force of said force applying member is transmitted to said actuating handle for movement thereof toward its open position.

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