

[54] CLOSURE LATCH ASSEMBLY

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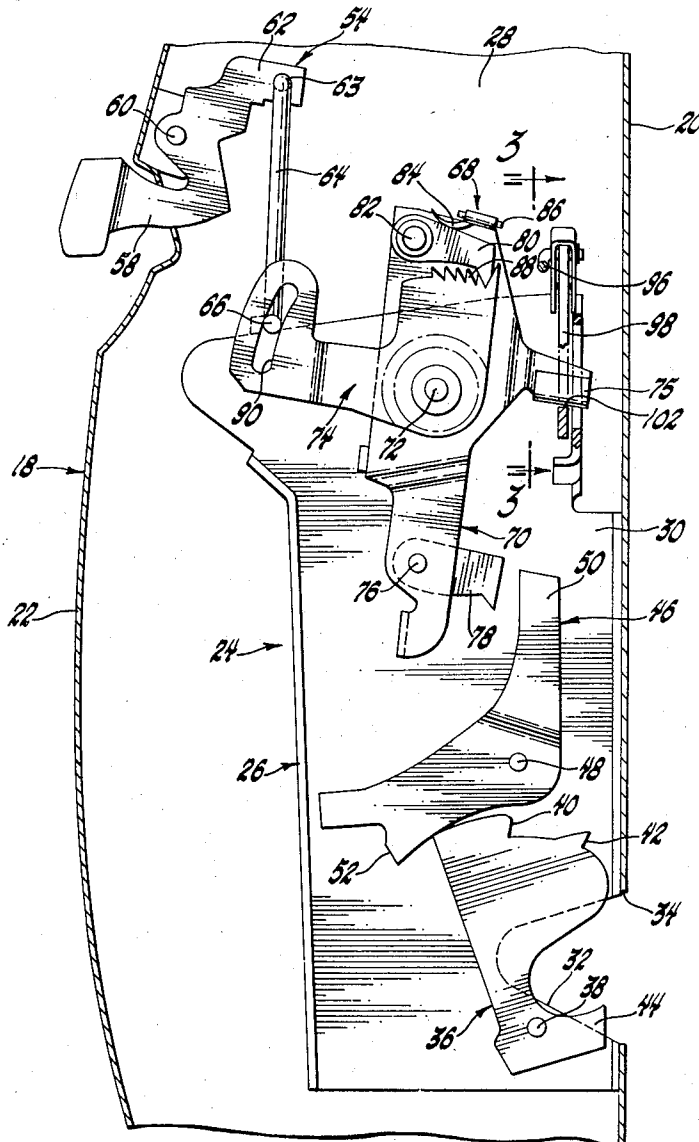
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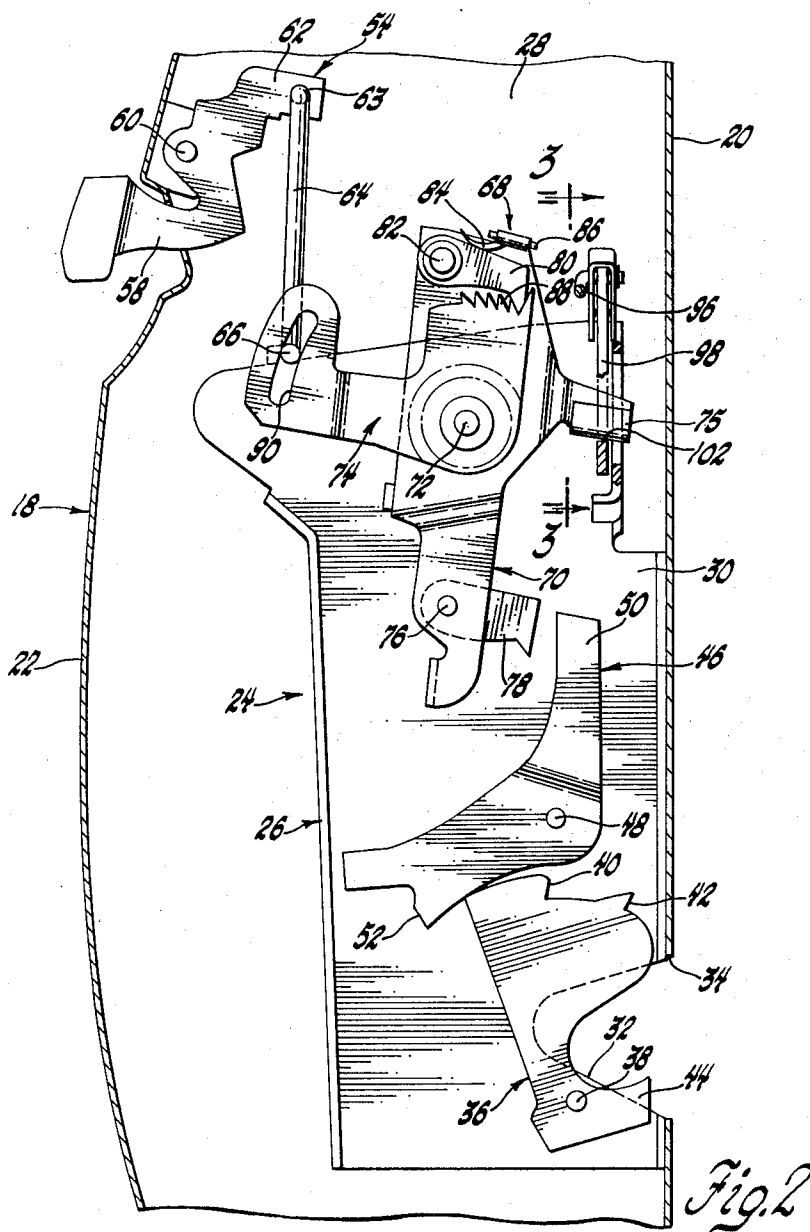
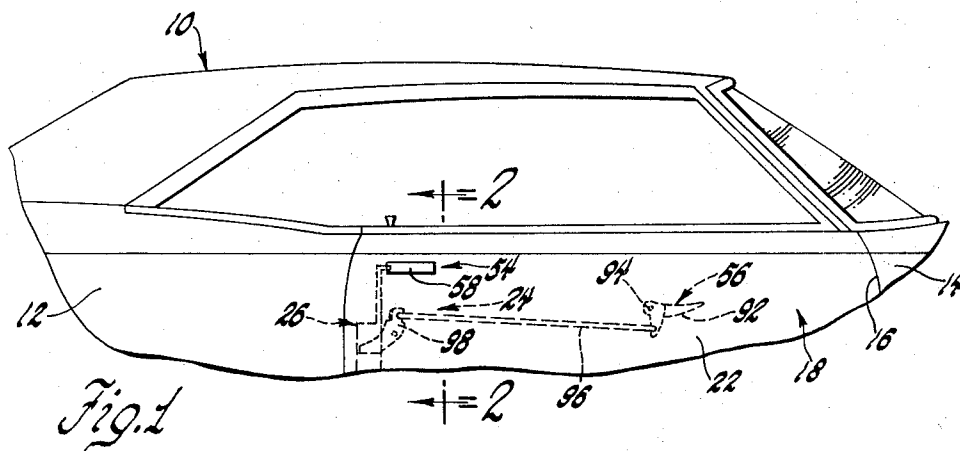
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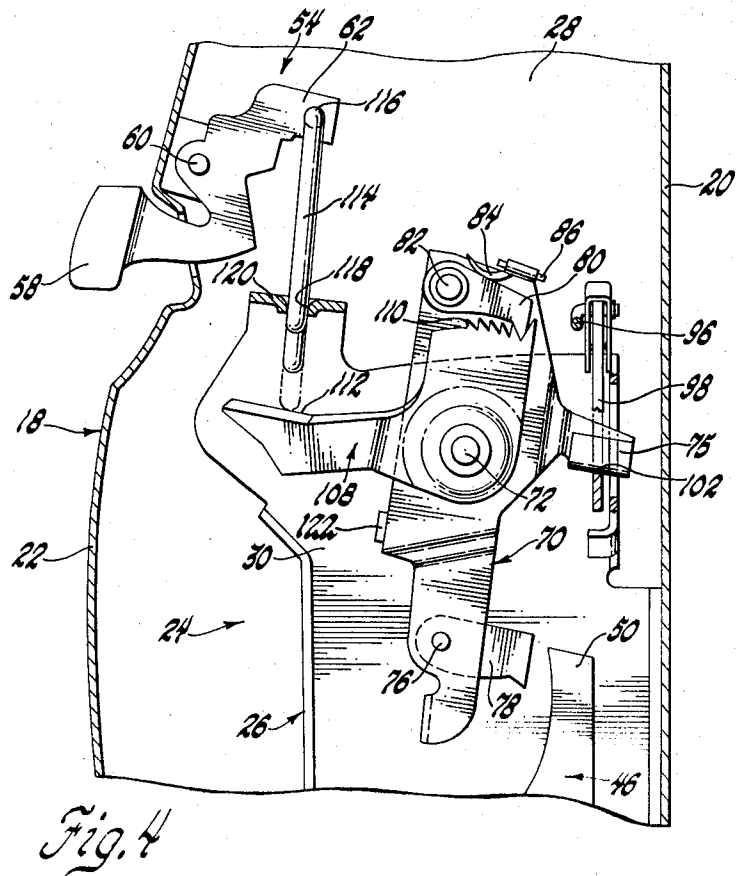
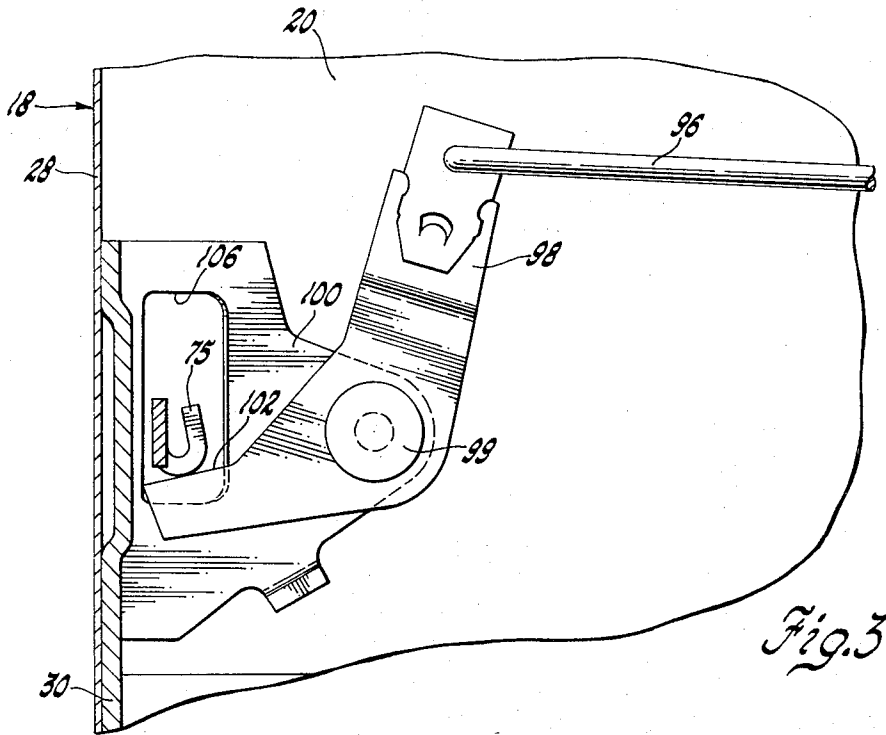
ABSTRACT

A closure latch assembly particularly adapted for automobile door applications including a latch bolt engageable by a detent lever, a lift bar handle adapted to effect bodily movement of a rod element, a first pivoted lever engageable on the detent lever to effect release of the latch bolt, a second pivoted lever engageable by the rod element which effects pivotal movement of the second lever, and a pawl and ratchet clutch between the first and second levers for effecting a rigid connection between the first and second levers in one direction of pivotal movement corresponding to release of the latch bolt while permitting adjustment of the angle included between the first and second levers in response to relative angular movement therebetween in the opposite direction.

3 Claims, 4 Drawing Figures







CLOSURE LATCH ASSEMBLY

This invention relates generally to automotive type closure latch assemblies and more particularly to an improvement whereby final adjustment of the latch actuating arrangement is significantly simplified.

In closure latch assemblies of the type normally associated with automobile doors, the latching portion of the assembly is usually disposed adjacent one end of the door with inside and outside manual operators disposed elsewhere on the door and connected to the latching portion through rod elements or the like. The latching portion and the manual operators are, of course, disposed on different panels of the door so that normal dimensional variations between different doors, as might exist because of normal manufacturing tolerances, change the spacing between the latching portion and the inside and outside manual operators. Consequently, as the latch assemblies are installed on succeeding doors on the vehicle assembly line, individual adjustment is required to fit the rod elements accurately between the operators and the latching portion. A latch assembly constructed according to this invention incorporates an improved actuating arrangement which eliminates individual rod adjustment.

The primary feature, then, of this invention is that it provides an improved closure latch assembly particularly suited for automotive applications. Another feature of this invention is that it provides an improved closure latch assembly including a latching portion, a pair of remote operators, and an easily adjustable actuator arrangement disposed between the latching portion and one of the operators. Yet another feature of this invention resides in the provision of an adjustable actuator arrangement including a fixed length rod element adapted for bodily shiftable movement in response to corresponding movement of the one operator and an adjustable lever assembly on the latching portion adapted for automatic or manual angular adjustment for accommodating normal variations in the distances between the latching portion and the one operator on different doors. A further feature of this invention resides in the provision of an adjustable lever assembly including a pair of levers supported on a rigid structure for pivotal movement about a common pivot axis and interconnected by a one-way clutch which establishes a driving connection between the levers in one direction of pivotal movement yet allows adjustment of the angle included between the levers in response to relative pivotal movement in the opposite direction. A still further feature of this invention resides in the provision of a one-way clutch including a pawl on one of the levers resiliently engaging respective ones of a plurality of ratchet teeth on the other lever.

These and other features of this invention will be readily apparent from the following specification and from the drawings wherein:

FIG. 1 is a fragmentary side elevational view of an automobile type vehicle body incorporating a closure latch assembly according to this invention;

FIG. 2 is an enlarged sectional view taken generally along the plane indicated by lines 2—2 in FIG. 1;

FIG. 3 is a sectional view taken generally along the plane indicated by lines 3—3 in FIG. 2; and

FIG. 4 is a view of a portion of FIG. 2 but showing a modified actuating arrangement.

Referring now to the drawings, FIG. 1 depicts, in side elevations, an automobile type vehicle body designated generally 10 including a right rear quarter panel assembly 12 and a right front fender assembly 14. The quarter panel and front fender assemblies are longitudinally spaced apart by a door opening 16 through which access is had to the interior of the vehicle body, the door opening being selectively closable by a door 18 supported on the vehicle body adjacent the fender assembly 14 for pivotal movement about a generally vertical axis into and out of the door opening. As seen best in FIG. 2, the door 18 generally includes an inner panel 20 and an outer panel 22 spaced laterally from and conventionally hem flanged to the inner panel. Disposed within the door 18 between the inner and outer panels is a latch assembly according to this invention and designated generally 24, the latch assembly being operative as described hereinafter to selectively maintain the door in the closed position.

Referring now to FIGS. 1 and 2, the latch assembly 24 includes a generally conventional latching portion 26 disposed on a rear vertical edge 28 of the door 18 extending between the inner and outer panels 20 and 22. The latching portion 26 includes a mounting frame 30 rigidly attached to the rear vertical edge 28 by conventional means, not shown, the mounting frame having a mouth portion 32 in registry with a slot 34 in the inner panel 20 and a similarly shaped aperture in the rear vertical edge. The mouth portion 32 is adapted to receive in a well known manner a striker, not shown, rigidly attached to the rear jamb of the door opening 16 as the door moves from an open position, not shown, to a closed position in the opening, FIG. 1.

Referring again to FIG. 2, the striker engages a fork-type latch bolt 36 pivotally supported on the frame 30 at 38, the bolt having a pair of detent shoulders 40 and 42 and a retaining finger 44. A detent lever 46 is pivotally supported on the frame 30 at 48 and includes a raised arm 50 and a detent shoulder 52 adapted for engagement as described hereinafter on the shoulders 40 and 42 of the latch bolt 36. Conventional spring means, not shown, resiliently bias the detent lever 46 in a counterclockwise direction about the pivot 48 and the latch bolt 36 in a clockwise direction about the pivot 38, FIG. 2.

The structure described hereinbefore is generally conventional and functions to retain the door in the closed position. More particularly, as the door approaches the closed position, the striker engages the latch bolt 36 and pivots the latter counterclockwise about the pivot 38 until one or the other of the shoulders 40 and 42 slide beneath the shoulder 52 on the detent lever. As the shoulders 40 and 42 pass under the shoulder 52, the spring bias on the detent lever forces the shoulder 52 down into a blocking position with respect to the shoulders on the latch bolt thereby maintaining the latter in a semi-latched or fully latched condition. In either of the two latched conditions of the bolt 36 the retaining finger 44 prevents withdrawal of the striker from the mouth portion 32 so that the door is maintained in a semi-closed or fully closed position. When it is desired to unlatch or release the door, the detent lever 46 must be pivoted clockwise until the shoulder 52 clears the shoulders on the latch bolt thereby to permit clockwise rotation of the bolt and withdrawal of the striker.

As seen best in FIGS. 1 and 2, the latch assembly 24 further includes a first handle means 54 for actuating the latching portion 26 to the unlatched condition from outside the vehicle and a second handle means 56 for similarly actuating the latching portion from inside the vehicle. The first handle means 54 includes a lift bar 58 pivotally supported on the door 18 inboard of the outer panel at 60. The lift bar projects through the panel 22 and defines the exterior latch operating handle of the latch assembly. Interiorly of the door, the lift bar 58 includes an integral lever arm 62 to which is pivotally attached at 63 one end of a rod element 64. The rod element descends generally vertically from the lever arm 62 and at the lower end defines a short horizontal section 66. The lift bar is pivotable in a clockwise direction, FIG. 2, from a normal position shown to an actuating position, not shown, and is resiliently biased in a counterclockwise direction toward the normal position. Pivotal movement of the lift bar in the clockwise direction effects generally vertical downward bodily shiftable movement of the rod element 64 from a retracted position, FIG. 2, to an extended position, not shown.

Referring again to FIG. 2, disposed between the first handle means 54 and the latching portion 26 of the latch assembly is an adjustable lever arrangement or unit designated generally 68. The lever arrangement 68 includes a first lever 70 supported on a rivet 72 rigidly projecting from the frame 30 for pivotal movement about an axis defined by the rivet and a second lever 74 similarly pivotally supported on the rivet 72. The first lever 70 includes a generally U-shaped projection 75, FIG. 3, and has supported thereon at 76 an intermediate lever 78 adapted for engagement on the raised arm 50 of the detent lever 46 so that when the first lever is pivoted counterclockwise, FIG. 2, the detent lever is actuated to release the latch bolt 36 as described hereinbefore. Spring means, not shown, resiliently bias the first lever 70 for pivotal movement in the clockwise direction. A pawl 80 is pivotally supported on a rivet 82 rigidly projecting from the first lever 70 and is resiliently biased for clockwise pivotal movement, FIG. 2, about the rivet by a leaf spring 84 attached to a tab 86 integral with the first lever 70.

The pawl 80 is biased by the spring 84 into engagement on respective ones of a plurality of ratchet teeth 88 disposed on the second lever 74, the second lever further including an arcuate slot 90 adapted for sliding reception of the horizontal section 66 of the rod element 64. The ratchet teeth are arranged on the second lever such that a rigid connection is established between the first and second levers through the pawl 80 and rivet 82 when the second lever 74 is pivoted in a counterclockwise direction about the rivet 72. Conversely, when the second lever is pivoted clockwise about the rivet 72 relative to the first lever 70, the pawl 80 ratchets over successive ones of the teeth 88 thereby changing the angle included between the first and second levers when the direction of rotation of the second lever reverts back to the counterclockwise direction.

Referring now to FIGS. 1 and 3, the second handle means 56 includes an interior operating handle 92 pivotally supported on the door inner panel at 94. Between the door inner and outer panels, a depending portion of the operating handle 92 has attached thereto one end of a link 96, the other end of the link 96 being pivotally attached to a remote lever 98. The remote

lever is supported on a rivet 99 projecting rigidly from a tab portion 100 of the frame 30 for pivotal movement in a plane generally perpendicular to the plane of the first lever 70 between an inoperative position, FIG. 3, and an operative position pivoted clockwise from the inoperative position. The remote lever includes a lifting edge 102 which underlies the U-shaped projection 75 on the first lever 70 and the tab 100 includes a slot 106 which provides clearance for the distal end of the projection 75. Accordingly, when the remote lever is pivoted clockwise to the operative position, not shown, the lifting edge 102 engages the projection 75 to effect counterclockwise pivotal movement of the first lever 70 and consequent release of the latch bolt 36.

The latch assembly 24 is intended to function to release the door from the closed and latched condition. More particularly, with the bolt 36 held by the detent lever 46 in the fully latched position, clockwise pivotal movement of the lift bar 58 effects engagement between the horizontal section 66 of the rod element 64 and the lower end of slot 90. After such engagement the first lever 70 is pivoted by the second lever 74 through the pawl and ratchet clutch in a counterclockwise direction to release the latch bolt. From inside the vehicle, counterclockwise pivotal movement of the handle 92, FIG. 1, places the link 96 in tension to similarly pivot the first lever 70 through the remote lever 98 and the U-shaped projection 75. As the first lever is then pivoted the second lever 74 is rotated as a unit therewith by the pawl 80 which is maintained in engagement with the ratchet teeth by spring 84, the slot 90 providing lost motion relative to the rod element 64.

In fabricating a plurality of doors for different vehicles, manufacturing tolerances create dimensional variations which, if the latch assembly 24 is to function as described, must be compensated for. For example, on some doors the horizontal section 66 of the rod element 64 might, in the normal position of the lift bar, FIG. 2, be disposed near the upper end of the slot 90. In this situation, the vertical travel of the rod element might be insufficient to effect release of the latch bolt 36 without adjustment, as by rebending the rod element in a manner well known in the prior art.

In the latch assembly 24 according to this invention, however, automatic adjustment is effected by merely cycling the second handle means 56.

More particularly, and with reference to FIG. 2, with the horizontal section 66 being disposed near the upper end of the arcuate slot 90, counterclockwise pivotal movement of the interior operating handle 92, FIG. 1 affects counterclockwise movement of the first lever 70, FIG. 2, through the link 96 and the remote lever 98. The pawl 80 disposed between the first and second levers effects unitary counterclockwise pivotal movement of the lever unit defined by the two until the upper edge of the slot 90 engages the horizontal section 66 of the rod element 64. Thereafter, the second lever is restrained against pivotal movement by the rod element while the remote lever continues to pivot the first lever thereby causing the pawl 80 to ratchet over successive ones of the teeth 88 until the remote lever reaches the limit of its angular movement. When the interior operating handle 92 is thereafter released, the spring bias on the first lever 70 pivots the latter clockwise as the remote lever returns to the inoperative position, FIG. 3, under the influence of the return spring,

not shown, in the second handle means 56. The pawl 80 simultaneously drivingly engages one of the ratchet teeth 88 thereby to pivot the second lever 74 clockwise as a unit with the first lever. When the first lever achieves the limit of its angular movement, FIG. 2, the horizontal section 66 assumes a new position in the arcuate slot 90 which assures that subsequent normal pivotal movement of the lift bar 58 will provide sufficient angular movement of the lever unit defined by the first and second levers to effect release of the bolt 36 as described hereinbefore.

Referring now to FIG. 4, there is shown a modified latch assembly according to this invention wherein elements generally identical in structure and operation to those described hereinbefore are similarly numerically identified. The modified latch assembly is intended for manual adjustment as opposed to automatic adjustment through cycling of the second handle means 56 as described hereinbefore. More particularly, the modified latching assembly includes a modified second lever 108 supported on the frame 30 by the rivet 72 for pivotal movement and including a plurality of ratchet teeth 110 and a generally horizontal flange portion 112. The flange portion is adapted for engagement by one end of a modified rod element 114, the other end of which is pivotally connected at 116 to the lever arm 62 of the lift bar 58. The modified rod element 114 projects through a guide aperture 118 defined by a tab 120 on the frame 30 and is vertically bodily shiftable by the lever arm 62 in response to pivotal movement of the lift bar 58 about the pivot 60.

Adjustment of the angle included between the modified second lever 108 and the first lever 70 to provide adequate angular movement of the lever unit in response to normal vertical travel of the modified rod element 114 is effected after the elements are installed on the door 18. In particular, with the first lever 70 biased against a stop 122, FIG. 4, integral with the frame 30 manual force is applied to the lower edge of the flange portion 112 of the modified second lever 108 to pivot the latter clockwise relative to the first lever 70 until the lower edge of the modified rod element 114 is engaged by the upper surface of the flange portion 112. During such pivotal movement, the pawl 80 ratchets over successive ones of the teeth 110. Following engagement between the flange portion 112 and the modified rod element 114, the pawl 80 maintains the modified second lever 108 in the relative angular position thus achieved so that subsequent counterclockwise pivotal movement of the modified second lever is transferred to the first lever 70 as described hereinbefore for effecting release of the latch bolt. With the modified second lever so adjusted subsequent downward bodily movement of the rod element 114 will effect a complete unlatching cycle of the latch assembly in response to pivotal movement of the lift bar 58.

Having thus described the invention, what is claimed is:

1. In a latch assembly disposed on a rigid support structure and including latch means actuatable from a latched condition to an unlatched condition and handle means having a rod element bodily shiftable between an extended position and a retracted position in response to corresponding movement of a handle portion of said handle means, the improvement comprising, a first lever disposed on said support structure for pivotal movement about an axis thereof and engageable on

said latch means for actuating the latter to the unlatched condition upon pivotal movement in one direction, a second lever disposed on said support structure for pivotal movement about said axis, said rod element being engageable on said second lever and operative to pivot the latter in said one direction in response to bodily movement of said rod element to the extended position, and one-way clutch means between said first and said second levers operative to establish therebetween a rigid connection only in said one direction of pivotal movement so that pivotal movement of either of said first and said second levers relative to the other in the opposite direction effects adjustment of the angle included therebetween.

2. In a latch assembly disposed on a rigid support structure and including latch means actuatable from a latched condition to an unlatched condition and handle means having a rod element bodily shiftable between an extended position and a retracted position in response to corresponding movement of a handle portion of said handle means, the improvement comprising, a first lever disposed on said support structure for pivotal movement about an axis thereof and engageable on said latch means for actuating the latter to the unlatched condition upon pivotal movement in one direction, a second lever disposed on said support structure for pivotal movement about said axis, said rod element being engageable on said second lever and operative to pivot the latter in said one direction in response to bodily movement of said rod element to the extended position, means on one of said first and said second levers defining a plurality of ratchet teeth, a pawl, means supporting said pawl on the other of said first and said second levers for pivotal movement and for engagement on respective ones of said ratchet teeth thereby to establish between said first and said second levers a rigid connection only in said one direction of pivotal movement while permitting relative angular movement between said first and said second levers in the other direction of pivotal movement, said pawl engaging successive ones of said ratchet teeth in response to relative angular movement between said first and said second levers in said other direction of pivotal movement thereby to effect adjustment of the angle included therebetween, and spring means urging said pawl into engagement on said ratchet teeth.

3. In a latch assembly disposed on a rigid support structure and including latch means actuatable from a latched condition to an unlatched condition, a first handle means having a rod element bodily shiftable between an extended position and a retracted position in response to corresponding movement of a handle portion of said first handle means, a second handle means having a remote handle portion, and a remote lever pivotable from an inoperative to an operative position in response to corresponding movement of said remote handle portion, the improvement comprising, a first lever disposed on said support structure for pivotal movement about an axis thereof and engageable on said latch means for actuating the latter to the unlatched condition upon pivotal movement in one direction, said remote lever being engageable on said first lever and operative to pivot the latter in said one direction upon movement from the inoperative to the operative position thereof, a second lever disposed on said support structure for pivotal movement about said axis and including an arcuate slot, means on said rod ele-

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ment for effecting engagement between one end of the latter and on end of said arcuate slot so that movement of said rod element from the retracted to the extended position thereof effects pivotal movement of said second lever in said one direction, means on said second lever defining a plurality of ratchet teeth, a pawl, means mounting said pawl on said first lever for pivotal movement and for engagement on respective ones of said ratchet teeth thereby to establish between said first and said second levers a rigid connection only in said one

direction of pivotal movement while permitting relative angular movement therebetween in the opposite direction of pivotal movement, said pawl engaging successive ones of said ratchet teeth in response to relative angular movement between said first and said second levers in said opposite direction of pivotal movement thereby to effect adjustment of the angle included therebetween, and spring means on said first lever urging said pawl into engagement on said ratchet teeth.

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