June 4, 1968 S. KWASIBORSKI, JR 3,386,759

CLOSURE LATCH

Filed July 18, 1966 2 Sheets-Sheet 1

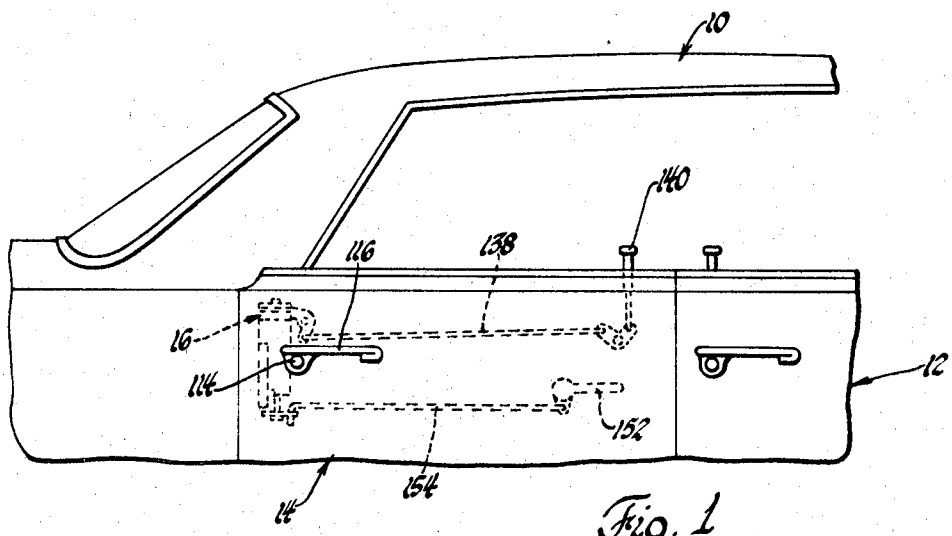


Fig. 1

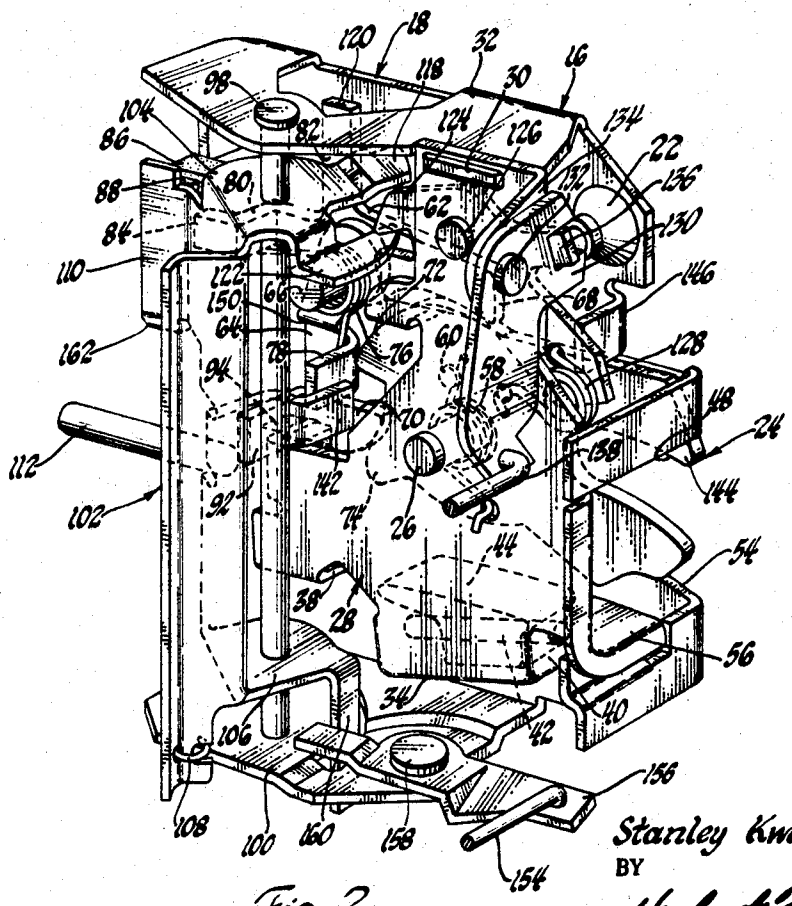


Fig. 2

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Filed July 18, 1966 2 Sheets-Sheet 2

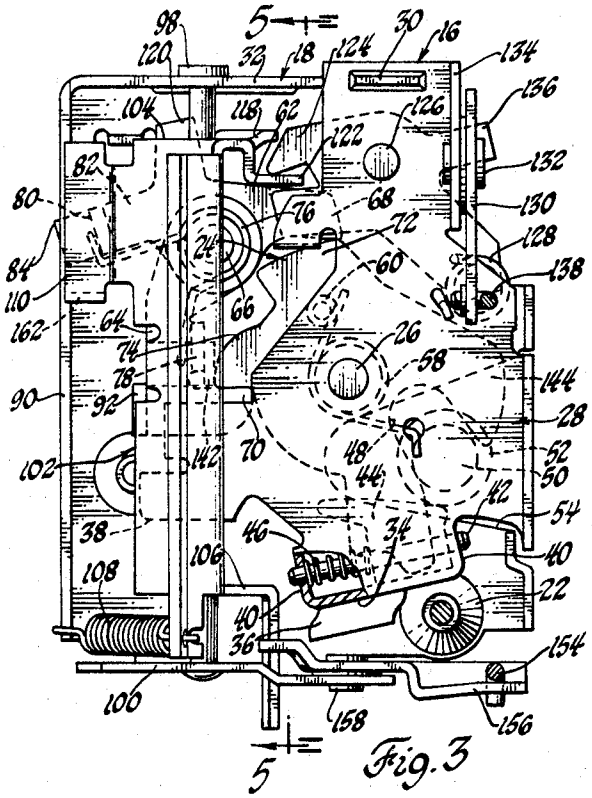


Fig. 3

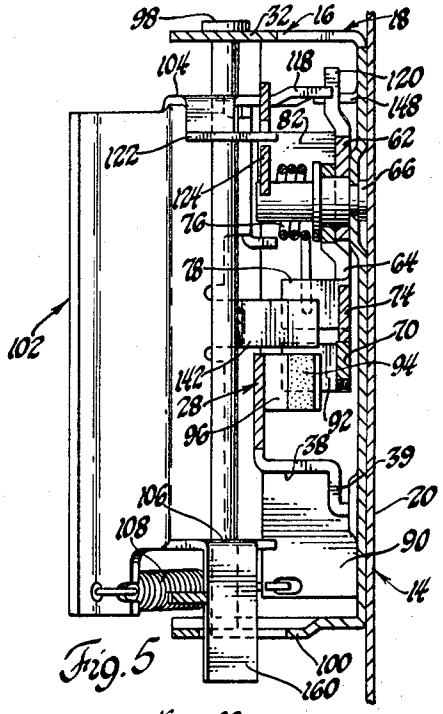


Fig. 5

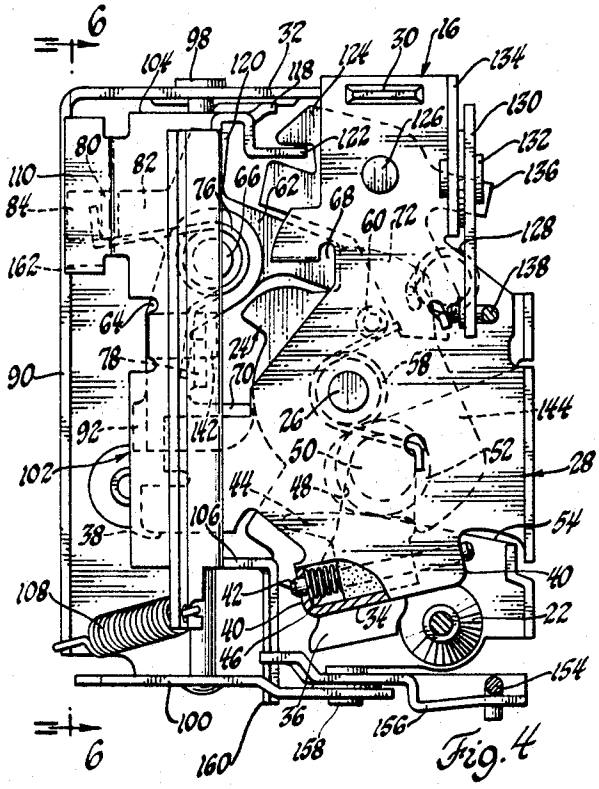


Fig. 4

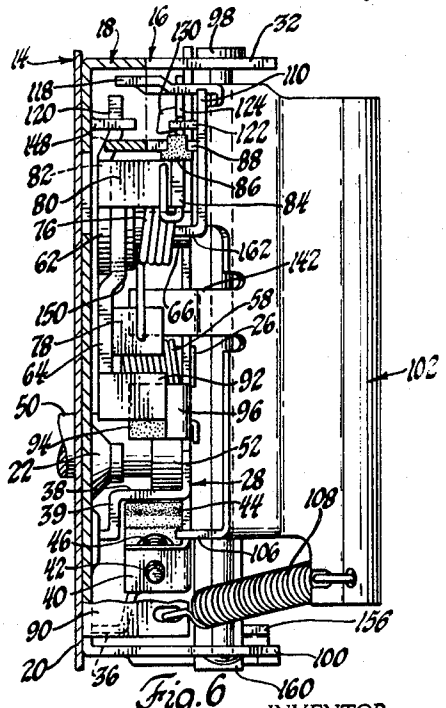


Fig. 6

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CLOSURE LATCH

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15 Claims. (Cl. 292—216)

ABSTRACT OF THE DISCLOSURE

A door lock includes a fork bolt rotatably mounted on a frame for movement between an unlatched position and primary and secondary latched positions. The bolt includes coplanar spaced shoulders defining each of the latched positions. A pair of detent members are coaxially pivoted on the frame and each includes an arm offset into the plane of the bolt for engagement with a respective shoulder to hold the bolt in the latched position defined by the one shoulder. A common torsion spring coaxial with the detent members biases both detent members opposite of each other toward detented position. An operating member is slidably mounted on a pin on the frame for shifting movement between locked and unlocked positions and rotation about the pin in each position. The operating member includes spaced tabs engageable with a tab or arm of each detent when the operating member is rotated in unlocked position to move the detents to undetented position against the action of the torsion spring. When the operating member is in locked position, only the secondary detent can be released. When the bolt is in the secondary latched position, the primary detent is partially rotated to block shifting movement of the operating member to locked position. Should the operating member be in locked position and the primary detent move into engagement with its respective bolt shoulder, the primary detent moves the operating member to unlocked position to accomplish automatic undogging. Keyless locking can be accomplished by rotating the operating member prior to the primary detent moving into engagement with its respective shoulder.

This invention relates to closure latches and more particularly to vehicle body door locks.

One feature of this invention is that it provides an improved vehicle body door lock. Another feature is that the lock includes bolt means movable between an unlatched position and a number of latched positions, and a plurality of detent means, at least one for each latched position of the bolt. A further feature of this invention is that bolt means is movable to at least an intermediate latched position and a fully latched position, the detent means respective to the intermediate latched position being located in the path of movement of the bolt means but in spaced relationship thereto when the bolt means is in the fully latched position and is engaged by the detent means respective to such position.

Yet another feature is that each of the detent means is engageable with the bolt means only in one latched position thereof. Yet a further feature is that the bolt means includes a plurality of abutments, each respective to one latched position of the bolt, and each detent means includes a movable member having a portion thereof located in the path of movement of only one abutment which is respective thereto. Still another feature is that the detent members are coaxially mounted. Still a further feature is that operating means is provided to move the detent members to a position wherein the portions thereof are out of the path of movement of their respective abutments to permit the bolt means to move

to unlatched position. Yet another feature is that the operating means is movable from an effective unlocked position to a locked position wherein the means is ineffective to so move the detent members. Yet a further feature is that at least one of the detent members includes cooperating with means on the operating means for returning the operating means from locked position to unlocked position upon movement of at least one detent member into engagement with a respective bolt abutment. Still a further feature is that the cooperating means can be rendered ineffective to return the operating means to unlocked position if so desired.

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

FIGURE 1 is a partial side elevational view of a vehicle body embodying a door lock according ot this invention;

FIGURE 2 is a perspective view of the lock in unlatched position;

FIGURE 3 is a view of the lock in intermediate latched position;

FIGURE 4 is a view similar to FIGURE 3 showing the lock in fully latched position;

FIGURE 5 is a sectional view taken generally along the plane indicated by line 5—5 of FIGURE 3; and

FIGURE 6 is a sectional view taken generally along the plane indicated by line 6—6 of FIGURE 3.

Referring now particularly to FIGURE 1 of the drawings, a vehicle body **10** includes a front door **12** and a rear door **14**, each of which is swingably mounted in a suitable manner adjacent its forward edge portion on the body **10** for movement between a closed position, as shown, and an open position, not shown. Door **12** is held in its closed position by a door lock, such as that shown and described in Patent 3,190,682, Closure Latch, Robert M. Fox and Edwin H. Klove, Jr. Door **14** is held in closed position by a door lock **16** according to this invention.

Referring now particularly to FIGURES 2 through 2 of the drawings, the lock **16** includes a main frame or plate **18** adapted to abut the end or jamb wall **20** of door **14** and to be secured thereto in a suitable manner such as by bolts extending through wall **20** into tapped embossments **22** of the plate **18**. A fork type bolt **24** is pivotally mounted on a shouldered stud **26** extending between the main plate **18** and an auxiliary plate **28**. Plate **28** is staked at **30** adjacent its upper edge portion to a lateral flange **32** of plate **18** and includes a lower laterally extending flange **34** which terminates in an offset flange **36** staked to the plate **18**. The plate **28** further includes a laterally extending flange **38** which terminates in an offset flange **39** staked to the plate **18**. A pair of lateral flanges **40** are located ot either side and laterally of the flange **34** and fixedly support a stud or pin **42**. A wedge shaped nylon shoe **44** is slidably mounted on the pin **42** and is biased outwardly of the lock or to the right, as viewed in FIGURES 2 through 4, by a coil compression spring **46** seating against the left-hand flange **40** and the shoe **44**.

When the bolt **24** is in intermediate or fully latched position, as shown in FIGURES 3 and 4, respectively, the opening **48** of the bolt receives the shank **50** of a headed striker pin **52** which is secured in a suitable manner to the body lock pillar. The head of the striker pin engages the shoe **44** so that the pin is effectively trapped between the bolt **24** and the shoe **44**. The main frame **18** is cut away at **54** and the end wall **20** and inner panel of the door **16** are also cut away to permit the entry of the striker pin into the lock. Reference may be had to Gergoe et al. 3,149,866 for a more detailed showing of this structure. A flange **56** of plate **28** provides a lead-in ramp to the

shoe 44. Bolt 24 is normally biased toward unlatched position, as shown in FIGURE 2, or counterclockwise from the intermediate and fully latched positions shown in FIGURES 3 and 4, respectively, by a coil torsion spring 58 which surrounds the stud 26 and has one end thereof slidably engaging a headed pin 60 secured to the bolt and the other end thereof hooked within an opening in plate 28.

Primary and secondary detent means or detent members 62 and 64, respectively, are coaxially mounted on a shouldered stud 66 secured to the main plate 18. Each member includes a respective foot 68 and 70 which are coplanar and are selectively and alternately engageable with respective shoulders or abutments 72 and 74 of the bolt 24 to hold the bolt in either a fully latched position, as shown in FIGURE 4, or intermediate latched position, as shown in FIGURE 3.

A coil torsion spring 76 surrounds the stud 66 and has one end thereof engaging one side of a lateral tab 78 of detent 64 and the other end thereof engaging a lateral flange 80 of an arm 82 of the detent 62. Another lateral flange 84 of the detent 62 extends angularly to the flange 80 and engages a rubber bumper 86 mounted on a lateral tab 88 of flange 90 of plate 18 to locate the detent 62 against the action of the spring 76. The detent 64 is located against the action of spring 76 by engagement of a lateral tab 92 of detent 64 with a rubber bumper 94 secured to a tab 96 of plate 28.

A shaft or pivot pin 98 extends the full length of the lock 16 between the upper flange 32 thereof and a lower flange 100 thereof and provides both a pivotal axis and a shifting axis for an outside operating means or member 102. Member 102 includes upper and lower apertured lateral flanges 104 and 106 which pivotally and slidably receive the shaft 98 to mount member 102 thereon. A tension spring 108 interconnects the member 102 and the flange 90 of plate 18 to continually bias the member 102 in a clockwise direction, as viewed in FIGURE 2. The member 102 is located against the action of the spring 108 in its inoperative or non-operating position as shown by engagement of a flange 110 thereof with the tab 88 of flange 90.

Member 102 is adapted to be engaged at any one of a plurality of places thereon by a push rod 112 which is operated by conventional push button means 114, FIGURE 1, incorporated in an outside handle 116 secured to the outer panel of the door 14. Since the member 102 is elongated vertically and extends substantially the full depth of the lock 16, the handle 116 may be positioned at various vertical places on the outer panel of the door 14 without requiring repositioning of the lock 16.

The flange 104 of the member 102 includes an upwardly offset foot 118 which is adapted to selectively engage an upwardly extending foot or arm 120 of the detent 62, and a downwardly offset foot 122 which is received between the legs of a forked inside locking lever 124 pivotally mounted at 126 on the plate 28. The locking lever 124 is movable between an unlocked position, as shown in FIGURES 2 and 3, and a locked position, as shown in FIGURE 4, and is selectively and alternately held in either position by an overcenter type coil torsion spring 128 hooked between the plate 28 and the locking lever. The locking lever is moved between these positions by a forked inside operating lever 130 which is pivoted at 132 to a lateral flange 134 of plate 28 and straddles a foot or leg 136 of the locking lever. The lever 130 is connected by a conventional shiftable rod and lever arrangement 138 with a conventional garnish button 140, FIGURE 1.

When the locking lever 124 is in its unlocked position as shown in FIGURES 2 and 3, the foot 118 of lever 102 is located in opposition to the foot 120 of the detent 62, and when the locking lever 124 is in its locked position, as shown in FIGURE 4, the foot 118 of lever 102 is located above the foot 120 of the detent 62. The lever 102 includes a lateral tab 142 which is located in opposition to the other side of the tab 78 of the detent 64 when the locking lever is either in unlocked position, as shown in FIGURES 2 and 3, or locked position, as shown in FIGURE 4.

When the locking lever is in its unlocked position, depression of the push button means 114 will shift rod 112 inwardly of door 14 and swing the lever 102 counterclockwise, as viewed in FIGURE 2, to move the foot 118 into engagement with the arm 120 of the detent 62 and swing the detent 62 counterclockwise, as viewed in FIGURE 4, to move the foot 68 thereof out of engagement with the shoulder 72 of the bolt 24.

The engagement of the tab 142 of the lever 102 with the tab 78 of the detent 64 will swing the detent 64 clockwise or opposite to the detent 62 to move the foot 70 of the detent 64 out of the path of movement of the shoulder 74 of the bolt 24 so that the spring 58 can move the bolt to unlatched position. The bolt is located in this position by engagement of the outboard leg 144 thereof with a lateral tab 146 of the plate 18.

Counterclockwise swinging movement of the detent 62 is limited by the engagement of the foot 120 of the detent with a lanced lateral tab 148 of plate 18. Clockwise swinging movement of the detent 64 by the lever 102 is limited either by the engagement of an offset 150 of the detent with the arm 82 of the detent 62 or by engagement of the tab 92 with the flange 90 of plate 18.

Should the bolt 24 be in an intermediate latched position as shown in FIGURE 3, swinging movement of the lever 102 will release the foot 70 of the detent 64 from engagement with the shoulder 74 to permit the spring 58 to move the bolt to unlatched position.

When the locking lever 124 is in locked position, swinging movement of the member 102 will result in the foot 118 thereof swinging above and past the arm 120 of the detent 62 without engagement therewith. The bolt will thus remain in fully latched position. The locking lever 124 cannot be located in locked position if the bolt is in intermediate latched position as will be described.

The inside operating means includes a conventional remote handle 152, FIGURE 1, which operates a shiftable rod 154 interconnecting the handle and an inside operating lever 156 pivoted at 158 to the flange 100 of plate 18. Lever 156 is engageable with a depending foot 160 of member 102 to swing the member 102 when handle 152 is operated. The remote handle 152 is effective at all times to release the detent 64 and is effective to release the detent 62 only when the member 102 is in its unlocked position of FIGURE 3.

The bolt 24 is moved from unlatched position to intermediate and fully latched positions by engagement of the inboard leg of the bolt with the shank 50 of pin 52. Upon movement of the bolt 24 from unlatched position, as shown in FIGURE 2, to intermediate latched position, as shown in FIGURE 3, the foot 70 of the detent 64 will ride up and over and into engagement with the shoulder 74 to retain the bolt in intermediate latched position. The detent 64 will be located with the tip of the foot 70 thereof out of engagement with the edge of the bolt 24 by engagement of the tab 92 of the detent with the rubber bumper 94. The foot 68 of detent 62 will partially ride up the shoulder 72 to rotate the detent 64 counterclockwise to its position shown in FIGURE 3. Upon further movement of the bolt 24 from intermediate latched position to fully latched position, as shown in FIGURE 4, detent 64 will remain stationary in its position shown in FIGURE 3, while the foot 68 of the detent 62 will ride up and over and into engagement with the shoulder 72 to retain the bolt in fully latched position.

The foregoing step-by-step movement of bolt 24 will occur if the door is slowly closed. If the door is closed at a faster rate or slammed, the bolt 24 will be rotated a sufficient number of degrees so that the foot 68 of the detent 62 will ride up and over and into engagement with the shoulder 72 to retain the bolt in fully latched position.

Thus, the bolt will rotate directly from unlatched to fully latched positions. During this movement of the bolt, the foot **70** will ride up and over the shoulder **74**, as this shoulder moves relative to the foot, and be located as shown in FIGURES 3 and 4. The tab **92** and rubber bumper **94** will prevent the tip of the foot **70** from engaging the edge of the bolt. This avoids any objectionable click or noise which often occurs in a lock wherein only a single detent is provided for engagement with either of two shoulders on a bolt to retain the bolt in either fully lacthed or intermediate latched positions. Thus, the lock of this invention has a significant noise reduction.

Further, should the door be slammed with enough force to rotate the bolt **24** a sufficient number of degrees so that the foot **68** will ride up the shoulder **72** but not over this shoulder, the foot **70** of the detent **64** will, of course, be in a position to engage the shoulder **74** upon reverse rotation of the bolt **24** toward unlatched position. Thus at all times, in any latched position of the bolt, whether intermediate latched, fully latched or a temporary position between these latched positions, the foot **70** of the detent **64** is in a position to engage the shoulder **74**.

It will be noted that the shoulder **72** is larger or of greater circumferential extent than the shoulder **74**. This ensures that the detent **62** will always ride up the shoulder **72** when the bolt rotates from unlatched position to either intermediate or fully latched position to provide automatic undogging as will be hereinafter described. If this feature is not desired or is desired only when the bolt moves between intermediate and fully latched positions, then the circumferential extent of this shoulder can be reduced.

Automatic undogging is accomplished by depressing the garnish button **140** when the door is in an open position to move the member **102** from its unlocked position, as shown in FIGURE 3, to its locked position, shown in FIGURE 4, and thereafter moving the door **14** toward closed position. As the door moves to closed position and the bolt **24** moves from unlatched position to either intermediate or fully latched positions, the foot **68** of the detent **62** will ride up, and then either down or over the shoulder **72**, to rotate the detent **62** counterclockwise of its position shown in FIGURE 2. As the detent **62** rotates counterclockwise, the flange **84** of the detent will engage an angular tab **162** of flange **110** to shift the member **102** from its position of FIGURE 4 to its position of FIGURE 3 and move the locking lever **124** from its locked position of FIGURE 4 to its unlocked position of FIGURE 3. If automatic undogging is desired only when the bolt **24** moves to fully latched position, then the circumferential extent of the shoulder **72** should be reduced, as previously mentioned, so that the detent **62** is not rotated counterclockwise when the bolt moves to its intermediate latched position, or is rotated an insufficient distance to engage the tab **162**.

Keyless locking is accomplished in the same manner except that the push button means **114** is depressed and held during closing movement of the door to move the tab **162** of the member **102** from underneath the flange **84** of detent **62**. When the latter rotates counterclockwise, there is no engagement between the flange **84** and the tab **162**. Keyless locking can only be accomplished when the bolt **24** moves from an unlatched position to a fully latched position. Thus, when the member **102** is moved to its position shown in FIGURE 4 and the push button means **114** are depressed as the door is closed, only the detent **62** is in a position to engage the bolt **24**.

It will be remembered that the locking lever **124** cannot be located in locked position when the bolt is in intermediate latched position. Since the foot **68** of the detent **62** rides partially up the shoulder **72** when the bolt is in intermediate latched position, the detent **62** is rotated partially clockwise so that the tab **84** thereof will engage the tab **162** when the member **102** is only partially moved toward its locked position to prevent such movement.

Thus, this invention provides an improved vehicle body door lock.

I claim:

1. A closure latch comprising, in combination, a latch frame, a bolt mounted on the frame for movement between an unlatched position and primary and secondary latched positions and including a pair of bolt portions, each defining one of the latched positions of the bolt, a pair of detent members rotatably mounted on the latch frame for movement between detented and undetented positions with respect to the bolt, each detent member having a detent portion respective to one of the bolt portions and engageable with the respective one bolt portion upon movement of the bolt to the latched position defined by the respective one bolt portion, one detent member portion being in compression when engaged with a respective bolt portion and the other detent member portion being in tension when engaged with a respective bolt portion, and operating means having portions thereof engageable with cooperating portions on each of the detent members for moving the detent members to undetented position to locate the detent portions thereof out of the path of movement of the respective bolt portions and permit the bolt to move to unlatched position.

2. The combination recited in claim **1** wherein the primary latched position detent member portion is in compression and the secondary latched position detent member portion is in tension.

3. The combination recited in claim **1** wherein the detent members swing in directions opposite to each other when moved by the operating means to undetented position.

4. The combination recited in claim **1** wherein the operating means includes an operating member movable between an unlocked position wherein the operating member is effective to move both detent members and a locked position wherein the operating member is effective to move only one of the detent members.

5. The combination recited in claim **1** wherein the detent members have a common mounting on the frame, the detent portions of the detent members extending generally normal to each other in the plane of the respective bolt portions.

6. The combination recited in claim **1** including means for locating each of the detent members against the action of a common spring means biasing each of the detent members toward detented position.

7. The combination recited in claim **1** wherein the operating means is movable between an unlocked position wherein the operating means is effective to move both detent members and a locked position wherein the operating member is effective to move only one of the detent members, and means preventing movement of the operating member to the locked position when the other detent member is engageable with its respective bolt portion.

8. The combination recited in claim **1** wherein the operating means includes an operating member movable between an unlocked position wherein the operating member is effective to move both detent members and a locked position wherein the operating member is effective to move only one detent member, and cooperating means on one of the detent members and the operating member for moving the operating member from locked to unlocked position should the bolt be in unlatched position and be moved from this position to one of the latched positions.

9. The combination recited in claim **8** including means for rendering said cooperating means ineffective.

10. A closure latch comprising, in combination, a support, a latch bolt rotatably mounted on the support for movement between an unlatched position and a pair of latched positions and including a pair of generally coplanar bolt portions, each defining one of the latched positions of the bolt, a pair of detent members mounted

on the support for movement between detented and undetented positions with respect to the bolt, each detent member including a detent portion, the detent portions being coplanar with the bolt portions and each being engageable in detented position with a respective one bolt portion upon movement of the bolt to the latched position defined by the one bolt portion, and operating means having portions thereof engageable with cooperating portions on each of the detent members for moving the detent members to undetented position to locate the detent portions thereof out of the path of movement of the respective bolt portions and permit the bolt to move to unlatched position.

11. The combination recited in claim **10** wherein the detent members are coaxially mounted on the support for rotational movement in directions opposite of each other to undetented position.

12. The combination recited in claim **10** wherein the operating means includes an operating member mounted on the support for bodily shifting movement relative thereto between non-operating and operating positions and pivotal movement relative thereto in each position.

13. The combination recited in claim **12** including means for moving the operating member to non-operating position, and means on one of the detent members engageable with cooperating means on the operating member

to move the operating member from non-operating to operating positions upon engagement of the one detent member with a respective bolt portion.

14. The combination recited in claim **13** including means for rendering the cooperating means on the one detent member and on the operating member ineffective.

15. The combination recited in claim **12**, including means for moving the operating member to non-operating position, and cooperating means on one of the detent members and on the operating member for blocking movement of the operating member to non-operating position when the other detent member is in engagement with a respective bolt portion.

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