July 5, 1960 J. G. JOACHIM ET AL 2,943,880

CLOSURE LATCH

Filed July 30, 1958 3 Sheets-Sheet 1

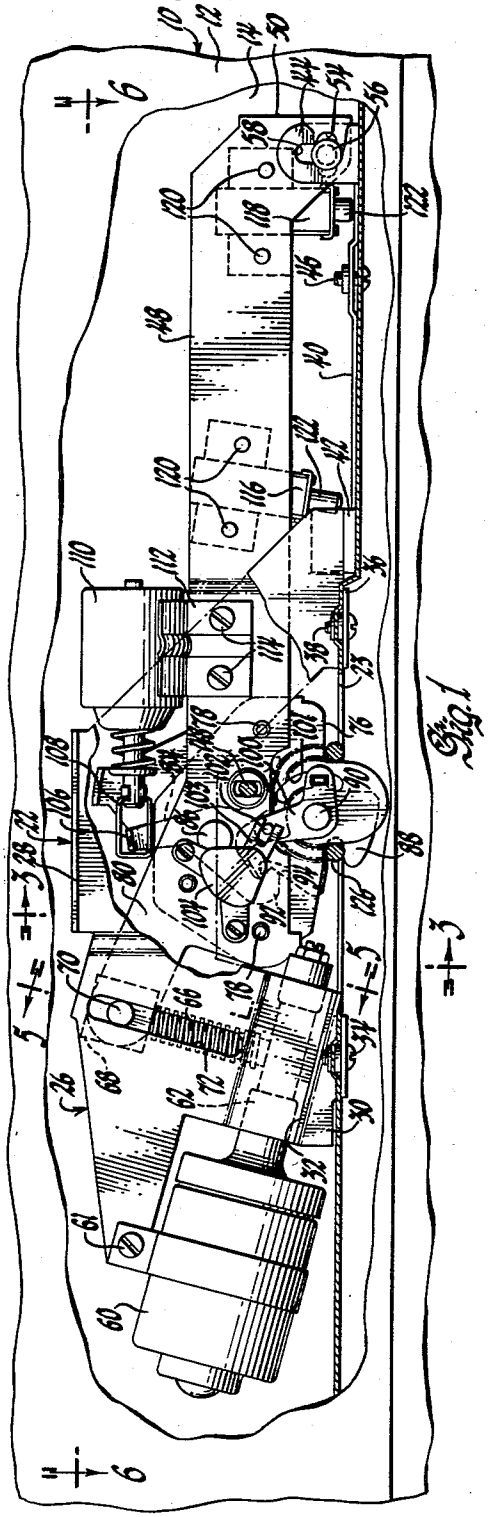


Fig. 1

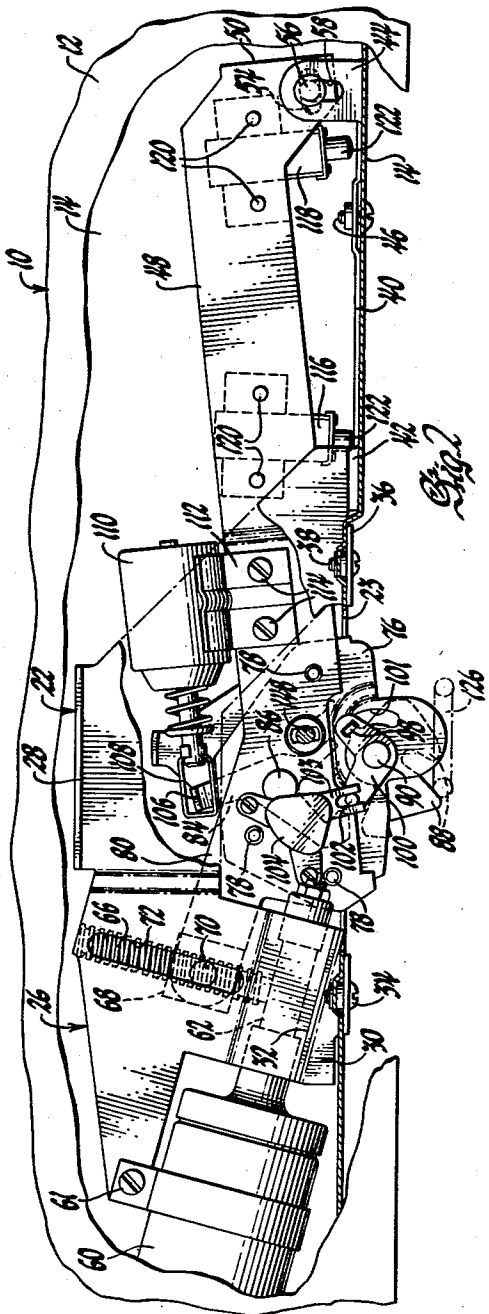


Fig. 2

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CLOSURE LATCH

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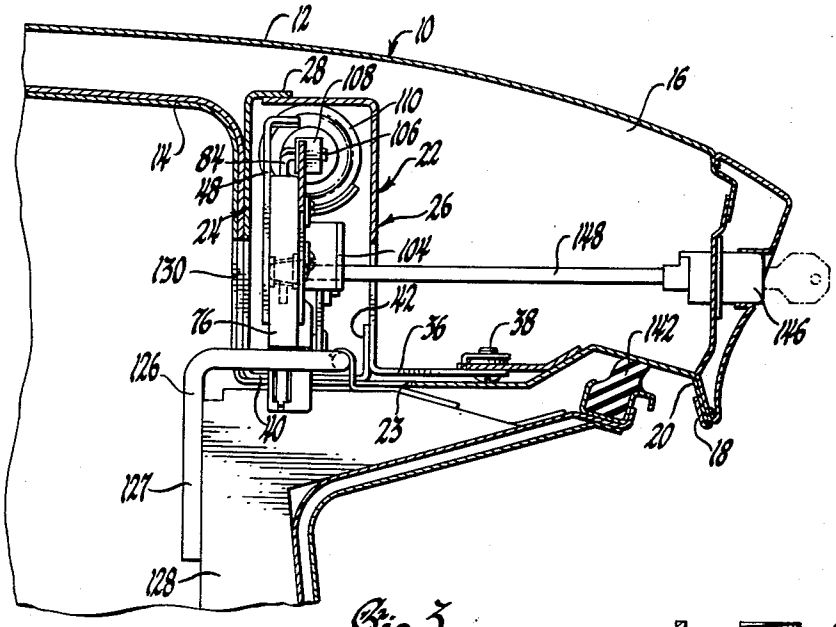


Fig. 3

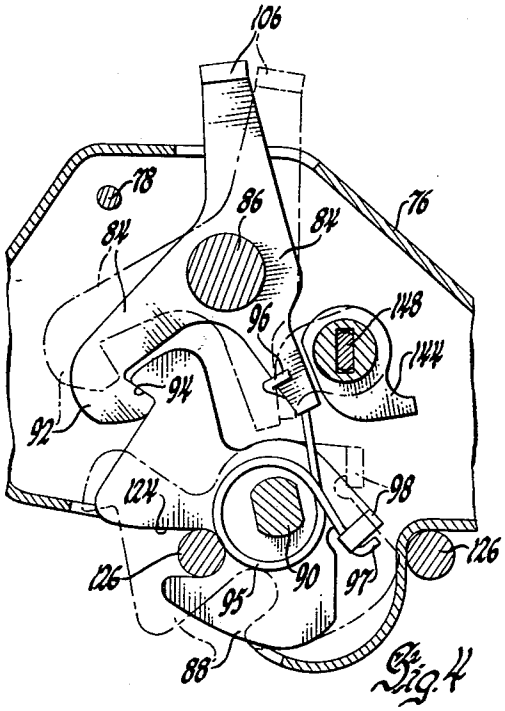


Fig. 4

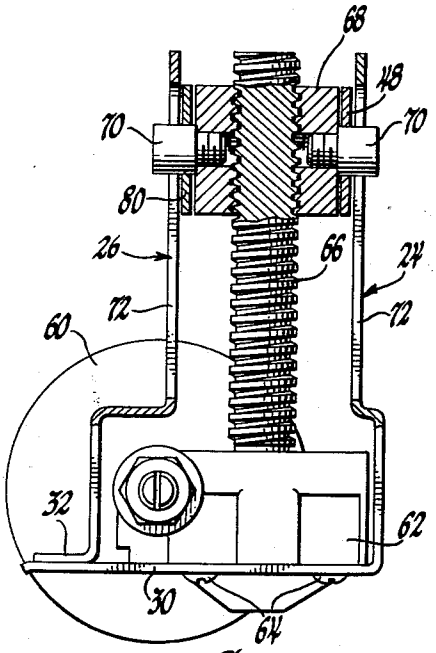


Fig. 5

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CLOSURE LATCH

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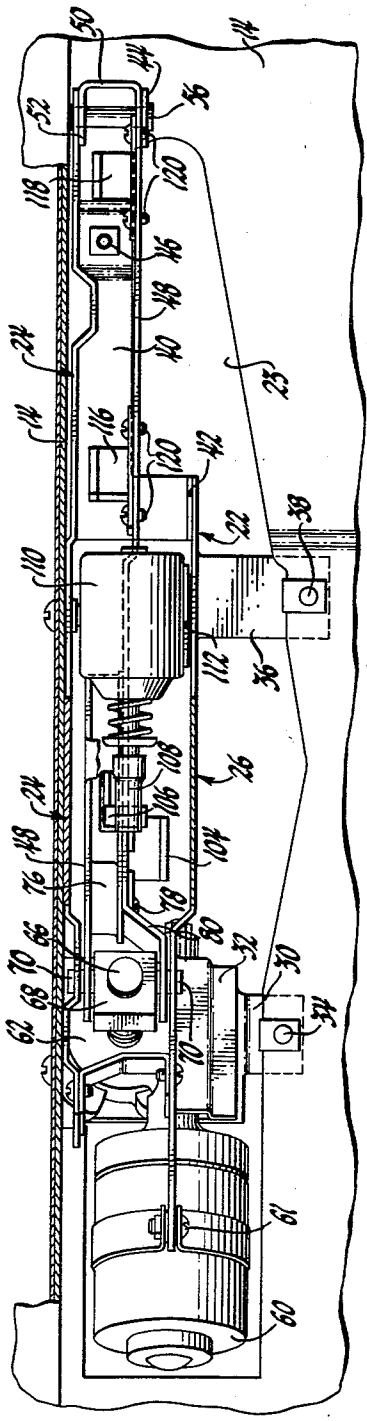


Fig. 6

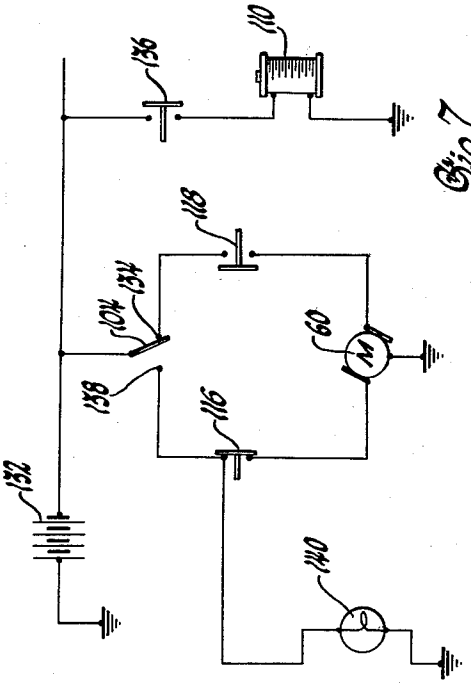


Fig. 7

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CLOSURE LATCH

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12 Claims. (Cl. 292—201)

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

The closure latch of this invention is intended primarily for use with vehicle body deck lids and is selectively operable to unlatch the deck lid from the body, either from the interior thereof by power means or the exterior thereof by manual means to move the deck lid to a partially open position, and is further operable to move the deck lid from a partially closed to a fully closed position in tight sealing engagement with the body after the deck lid has been moved from an open position to the partially closed position.

In the past, closure latches of this general type have often included a power operated extendable and retractable striker which was extended upon release of the latch, either from the interior or the exterior of the body, to move the deck lid to a partially open position, and was retracted upon engagement of the latch bolt with the striker to move the deck lid from a partially closed to a fully closed position. An arrangement such as this adequately performs the latching and unlatching of a deck lid from a vehicle body but in certain installations may not be used due to space limitations.

In the preferred embodiment of this invention, the closure latch generally includes a power operated lever member which is swingably mounted on the deck lid and mounts the latch mechanism which includes the latch bolt. The latch bolt cooperates with a striker which is fixedly secured to the body. Upon release of the latch bolt from the striker, either by power means operable from the interior of the body or manual means operable from the exterior of the body, the lever member is swung outwardly of the deck lid to extend the latch mechanism outwardly thereof and move the deck lid to a partially open position. Thereafter, when the deck lid is moved to a partially closed position and the latch bolt is engaged with the striker, the lever member is swung inwardly of the deck lid to move the deck lid to closed position in tight sealing engagement with the body.

The primary object of this invention is to provide an improved vehicle closure latch which is selectively operable by either manual or power means. Another object of this invention is to provide an improved power operated vehicle closure latch which is operable to move the closure from a closed to a partially open position and from a partially closed to a closed position in tight sealing engagement with the body. A further object of this invention is to provide an improved vehicle body closure latch which includes a fixed striker member and a swingably mounted latch mechanism swingable relative to the striker upon engagement and disengagement of the latch mechanism therewith to move the closure to fully closed and partially closed positions.

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

Figure 1 is a partial rear elevational view of a vehicle body and deck lid embodying a closure latch according to this invention, with the closure latch being shown in latched position;

Figure 2 is a view similar to Figure 1 showing the closure latch in unlatched position;

Figure 3 is a view taken along the plane indicated by line 3—3 of Figure 1;

Figure 4 is an enlarged broken away view of a portion of Figure 1 showing the latch mechanism;

Figure 5 is a partially broken away view taken along the plane indicated by line 5—5 of Figure 1;

Figure 6 is a view taken along the plane indicated generally by line 6—6 of Figure 1; and

Figure 7 is a circuit diagram.

Referring now particularly to Figures 1 and 3 of the drawings, a vehicle body deck lid **10** includes an outer panel **12** and an inner panel **14** which are located in spaced relationship to each other at their rear end portions to provide a latch housing **16** at the rear edge portion of the deck lid. The rear ends of the panels are secured together by bending a flange **18** of the outer panel over a flange **20** of the inner panel. It will be understood of course that the deck lid is swingably mounted on the body at its forward edge portion for movement between open and closed positions.

The closure latch of this invention is mounted within the latch housing **16** and generally includes a support frame **22** located over an opening **23** in panel **14** and including a forwardly disposed frame member **24** and a rearwardly disposed frame member **26**. Frame members **24** and **26** include upper laterally extending flanges **28** which are overlapped and spot welded together. Frame member **24** further includes a lower rearwardly extending lower lateral flange **30** which is welded to a flange **32**, Figure 5, of frame member **26** and is bolted at **34** to the inner panel **14** rearwardly of opening **23** to mount frame **22** on the body. Frame member **26** also includes a rearwardly extending lower lateral flange **36** which is bolted at **38** to inner panel **14** rearwardly of opening **23** to mount frame **22** on the body. In order to more fixedly secure the frame members **24** and **26** together, the frame member **24** includes a rearwardly extending lower lateral flange **40** having upwardly extending tabs **42** and **44**, with tab **42** being welded to frame member **26** adjacent the flange **36** thereof. Flange **40** is bolted to the inner panel **14** at **46** forwardly of opening **23** to more fixedly mount the frame **22** on the body.

A lever member **48** is located between the frame members **24** and **26**, with one end of the lever member including a return bent generally U-shaped portion **50** having a lateral flange **52**. The lateral flange **52** and the lever member opposite thereto are provided with aligned horizontally disposed slots **54**. A pin **56** extends through these slots and through aligned generally vertically disposed slots **58** in tab **44** and frame member **24** whereby the one end of the lever member **48** is both pivotally and slidably mounted on the frame member **22**, the reason for which will be hereinafter described.

A reversible electric motor **60** is bolted at **61** to frame member **26** and is fixedly secured to a conventional worm and worm wheel reduction gear box **62** which is bolted at **64**, Figure 5, to the flange **30** of frame member **24**. Although the details of the gear box **62** are not shown since it is conventional, it will be understood that the armature shaft of the electric motor is fixed to a worm rotatably mounted with the box and that this worm meshes with a worm wheel which is also rotatably mounted with the gear box and drives a lead screw **66** projecting upwardly from the gear box, as best shown in Figures 1, 2 and 5 of the drawings. A nut **68** is threadedly mounted on the lead screw **66** and includes oppositely extending studs **70** which are slidably received within aligned slots **72** in frame members **24** and **26** to

thereby mount the nut on the screw **66** for axial movement relative thereto upon operation of the electric motor **60**. As best shown in Figures 3 and 5 of the drawings, the other end of the lever member **48** is pivotally mounted on the forwardly extending stud **70** whereby upon operation of the electric motor **60** to rotate the lead screw **66**, the lever **48** will both pivot and shift about the one end thereof upon vertical movement of the nut **68**. It can be seen that the pin and slot arrangements **56** and **54**, **58**, are necessary for the one end of lever member **48** since the other end thereof moves in a straight line path rather than in an arc.

A latch housing **76** is bolted at **78** to the lever member **48** and to a bracket **80** which is pivotally mounted on the rearwardly extending stud **70** of nut **68** whereby the latch housing will move with the lever member **48**. The latch mechanism is mounted within housing **76** and generally includes a detent member **84**, Figure 4, mounted therein at **86** and a latch bolt **88** mounted therein at **90**. The detent member **84** is provided with a detent foot **92** which engages against a detent shoulder **94** of the latch bolt to hold the latch bolt in latched position against the action of a coil torsion spring **95** which is mounted on pivot **90** and interconnected between the latch bolt and the detent member to bias the bolt to unlatched position and the detent member to detented position, one end **96** of the spring being hooked over the detent member and the other end **97** hooked over a lateral tab **98** of the bolt. A bell crank **100** swingably mounted on the pivot **90** has one leg thereof slotted to receive the tab **98** of the bolt **88** whereby the bell crank swings with the bolt during movement of the bolt between latched and unlatched positions. Tab **98** swings in slot **101** of housing **82**. The other leg of the bell crank mounts a pin **102** which is received within the bifurcated actuating arm **103** of a rotary two-position switch **104** secured to housing **76**. The detent member **84** extends outwardly of the housing **76** and includes a laterally extending flange **106** which is received within a yoke **108** fixed to the armature shaft of a solenoid **110**. The solenoid **110** is mounted on the lever member **48** by means of a bracket **112** which is welded to the solenoid and bolted to the lever member at **114**.

A pair of alternately opened and closed limit switches **118** and **116** are bolted to the lever member **48** at **120**. The switch **118** is in open position when the deck lid is in fully closed position and in closed position when the deck lid is in an open position, and conversely, the switch **116** is in closed position when the deck lid is in a closed position and in open position when the deck lid is in an open position. The movement of the switches to open and closed positions is controlled by pivotal and bodily movement of the lever member **48** whereby the actuating plungers **122** of the switches alternately engage the flange **40** of frame member **24**, as can be seen from a comparison of Figures 1 and 2 of the drawings.

The closure latch is shown in a latched position in Figures 1 and 4. In this position of the latch, the fork **124** of bolt **88** receives the striker **126** to hold the deck lid **10** in closed position. As best shown in Figure 3, the striker is a bent U-shaped rod, the legs **127** of which are secured to the body structure **128** below the rear edge of deck lid **10**. Striker **126** extends rearwardly over the body structure **128** through an opening **130** in panel **14** which is joined to opening **123** therein.

Referring now particularly to Figures 1, 2, 4, 6 and 7, the operation of the closure latch will be described. In the latched position of bolt **88**, the vehicle battery **132** is connected to the contact **134** of the rotary two-position switch **104** and the limit switch **118** is open so that no circuit to ground is completed across motor **60**. A normally open manually operable switch **136**, which is mounted within the body in a convenient place for manual operation, is connected between ground and battery **132** across solenoid **110**. The other limit switch **116** is closed and is connected between the other contact **138** of switch **104** and ground across motor **60**. A warning lamp **140** is also connected between contact **138** and ground. Lamp **140** is mounted within the body in a convenient place for view and indicates the open position of the deck lid.

Assuming now that the driver desires to open the deck lid from the interior of the body, switch **136** will be momentarily closed by the driver to energize the solenoid **110**. Upon energization of the solenoid, the solenoid armature will be moved inwardly thereof or to the right, as viewed in Figure 1, to swing the detent member **84** clockwise about pivot **86** and thereby move the detent foot **92** out of engagement with the detent shoulder **94** of bolt **88**. The bolt will then be swung to an unlatched position, as shown in Figure 2 and in dotted lines in Figure 4, by spring **95**, and the camming action of the fork **124** of the bolt and striker **126** will move the deck lid **10** to a partially open position. During this movement of the bolt, the bell crank **100** will move counterclockwise with the bolt about pivot **90** so that the bifurcated arm **103** of switch **104** will move the switch armature out of engagement with contact **134** and into engagement with contact **138** thereof. This completes a circuit from battery **132** to ground across the closed switch **116** and the motor **60** to energize the motor and also lights lamp **140** to indicate to the driver that the deck lid is in open position. Upon energization of motor **60**, the lead screw **66** will be rotated to move the nut axially downwardly thereof and thereby shift the lever member **48** and the latch housing and mechanism outwardly of the opening **23** in deck lid **10** to the position shown in Figure 2, as the one end of the lever member both pivots and slides in the slots **54** and **58**. When the lever member **48** starts to move from its position of Figure 1 towards its position of Figure 2 upon release of the latch bolt **88** from striker **126**, the switch **118** immediately closes, and the switch **116** remains closed until the plunger **122** thereof engages flange **40** to thereby open the switch and stop the motor **60**, although lamp **140** remains lighted.

It will be understood, of course, that as soon as the latch bolt **88** has been released from engagement with the striker **126**, the deck lid **10** may be manually moved to its fully open position, regardless of whether or not the motor **60** has moved the lever member **48** and the latch housing **76** and latch mechanism to their position as shown in Figure 2.

Assuming now that the deck lid **10** is manually moved from open position to a partially closed position wherein the fork **124** of bolt **88** has engaged striker **126** to move the latch bolt to its latched position as shown in Figure 4. The lever member **48** and the latch housing **76** and latch mechanism will then be in their position as shown in Figure 2, except, of course, that the bolt **88** will be in latched engagement with the striker **126**. Upon movement of the bolt **88** from an unlatched to a latched position, the bell crank **100** will be swung clockwise about pivot **90**, as viewed in Figures 1 and 2, to thereby swing the arm **103** of switch **104** and move the switch armature out of engagement with the contact **138** and into engagement with the contact **134**. Since switch **118** is closed, a circuit will be completed from battery **132** to ground across motor **60** to energize the motor. Upon energization of the motor to rotate the lead screw **66**, the nut **68** will move axially and upwardly along the lead screw to thereby move the lever member **48** and the latch mechanism from their position, as shown in Figure 2, to their position as shown in Figure 1 and thereby move the deck lid **10** from a partially closed position to a fully closed position in tight sealing engagement with the weather strip **142** on the body.

It will be remembered that the closure latch of this invention may also be operated from the exterior of the body, and this will now be described with reference to

Figures 3 and 4 of the drawings. As best shown in Figure 4 of the drawings, a cam member **144** is swingably mounted within the latch housing **76** and is connected to a conventional key cylinder assembly **146** by means of an operating rod **148**. Cam **144** is normally positioned adjacent the detent member **84** when the detent member is in detented position and the key cylinder assembly **146** is in locked position. Upon insertion of a key, indicated schematically in Figure 3, within the key cylinder assembly **46** to rotate the actuating rod **148**, the cam **144** will be rotated into engagement with the detent member to thereby move the detent member from its detented position, as shown in full lines in Figure 4, to its undetented position, as shown in dotted lines therein to thereby allow spring **95** to move the latch bolt **88** from its latched position to its unlatched position. Thereafter, the operation of the closure latch is as immediately described hereinbefore in conjunction with release of the bolt **88** from within the body by means of solenoid **110**.

Thus this invention provides an improved vehicle closure latch which is selectively operable from within the body by power means or from the exterior of the body by manual means. The closure latch includes a fixed striker member and a swingably mounted latch mechanism which is swingable relative to the striker upon engagement and disengagement of the latch mechanism therewith to move the closure between fully closed and partially closed or open positions.

What is claimed is:

1. Means for latching a closure member to a support member comprising, a striker mounted on one of said members, a latch mechanism including a latch bolt engageable with said striker, support means mounting said latch mechanism on the other of said members for bodily movement relative thereto, operating means interconnecting said support means and said other of said members for bodily moving said support means relative thereto, and control means responsive to latching engagement of said bolt with said striker when said members are in spaced relationship for energizing said operating means to exert a force between said support means and said other of said members to move said other of said members relative to said support means and latch means into engagement with said one of said members.

2. Means for latching a closure member to a support member comprising, a striker mounted on said support member, a latch mechanism including a latch bolt engageable with said striker, means mounting said latch mechanism on said closure member for bodily movement relative thereto, and means responsive to latching engagement of said bolt with said striker when said members are in spaced relationship for exerting a force between said latch mechanism and said closure member to move said closure member relative to said latch mechanism and striker into engagement with said support member.

3. Means for latching a closure member to a support member comprising, striker means secured to one of said members, latch means engageable and disengageable with said striker means, means mounting said latch means on the other of said members for bodily movement relative thereto, means responsive to latching engagement of said latch means with said striker means when said members are in spaced relationship for exerting a force between said latch means and said other of said members to move said other of said members relative to said latch means into engagement with said one of said members, and means responsive to disengagement of said latch means from said striker means when said members are together for bodily moving said latch means relative to said other of said members.

4. Means for latching a closure member to a support member comprising, striker means mounted on one of said members, latch means engageable with said striker means, support means mounted on the other of said members for pivotal and bodily movement relative thereto, means mounting said latch means on said support means for movement therewith, operating means interconnecting said support means and said other of said members for moving said support means relative thereto, and control means responsive to latching engagement of said latch means with said striker means when said members are in spaced relationship for energizing said operating means to exert a force between said support means and said other of said members to move said other of said members relative to said support means and latch means into engagement with said one of said members.

5. Means for latching a closure member to a support member comprising, striker means secured to one of said members, latch means engageable with said striker means, means mounting said latch means on the other of said members for bodily movement relative thereto, operating means interconnecting said other of said members and said latch means for moving said latch means relative thereto, control means responsive to latching engagement of said latch means with said striker means for energizing said operating means to exert a force between said latch means and said other of said members to move said other of said members relative to said latch means into engagement with said one of said members, and means responsive upon a predetermined distance of movement of said other of said members relative to said latch means to de-energize said operating means.

6. Means for latching a closure member to a support member comprising, striker means mounted on one of said members, latch means engageable with said striker means, means mounting said latch means on the other of said members for bodily movement inwardly and outwardly thereof, and means interconnecting said latch means and said other of said members and responsive to unlatching of said latch means from said striker means when said latch means is inwardly of said other of said members for moving said latch means outwardly of said other of said members to thereby move said members apart.

7. Means for latching a closure member to a support member comprising, striker means mounted on one of said members, latch means engageable with said striker means, means mounting said latch means on the other of said members for bodily movement inwardly and outwardly thereof, operating means interconnecting said latch means and said other of said members for moving said latch means relative thereto, operating means responsive to unlatching of said latch means from said striker means when said latch means is inwardly of said other of said members for moving said latch means outwardly of said other of said members to thereby move said members apart, and means responsive upon a predetermined distance of movement of said latch means relative to said other of said members to de-energize said operating means.

8. Means for latching a closure member to a support member comprising, striker means secured to one of said members, latch means engageable with said striker means, means mounting said latch means on the other of said members for bodily movement relative thereto, operating means interconnecting said other of said members and said latch means for moving said latch means relative thereto, first control means responsive to latching engagement of said latch means with said striker means for energizing said operating means to exert a force between said latch means and said other of said members to move said other of said members relative to said latch means into engagement with said one of said members, first means responsive upon a predetermined distance of movement of said other of said members relative to said latch means to de-energize said operating means, second control means responsive to unlatching of said latch means from said striker means for moving said latch means relative to said other of said members to thereby move

said members apart, and second means responsive upon a predetermined distance of movement of said latch means relative to said other of said members to de-energize said operating means.

9. Means for latching a closure member to a support member comprising, striker means secured to one of said members, latch means engageable with said striker means, means mounting said latch means on the other of said members for bodily movement relative thereto, and means interconnecting said other of said members and said latch means and responsive to latching engagement of said latch means with said striker means when said members are in spaced relationship for moving said other of said members relative to said latch means into engagement with said one of said members.

10. Means for latching a closure member to a support member comprising, striker means secured to one of said members, latch means selectively and alternately engageable with and disengageable from said striker means, means mounting said latch means on the other of said members for bodily movement relative thereto, and means interconnecting said other of said members and said latch means and selectively and alternately responsive to latching engagement of said latch means with said striker means for moving said members together when in spaced relationship and unlatching disengagement of said latch means from said striker means for moving said other of said members and said latch means relative to each other to move said members apart from each other.

11. Means for latching a vehicle body closure to a vehicle body comprising, striker means mounted on said body, latch means engageable with said striker, a lever swingably mounted adjacent one end thereof on said

closure, means mounting said latch means on said lever adjacent the other end thereof for bodily movement relative to said closure upon swinging movement of said lever, power operating means interconnecting said lever and said closure for swinging said lever relative thereto, and control means responsive to latching engagement of said latch means with said striker means when said closure is spaced from said body for energizing said power means to exert a force between said lever and said closure to move said closure relative to said latch means into engagement with said body.

12. Means for latching a vehicle body closure to a vehicle body comprising, a striker fixedly mounted on said body, a latch mechanism engageable with said striker, a lever swingably mounted adjacent one end thereof on said closure, means mounting said latch mechanism on said lever for bodily movement relative to said closure upon swinging movement of said lever, power operating means interconnecting said lever and said closure for swinging said lever relative thereto, and control means responsive to the rotative position of said lever relative to said closure and latching engagement of said latch mechanism with said striker when said closure is spaced from said body for energizing said power means to exert a force between said lever and said closure to move said closure relative to said latch mechanism into engagement with said body.

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