Oct. 2, 1962 R. M. FOX ETAL 3,056,619

CLOSURE LATCH

Filed April 28, 1961 3 Sheets-Sheet 1

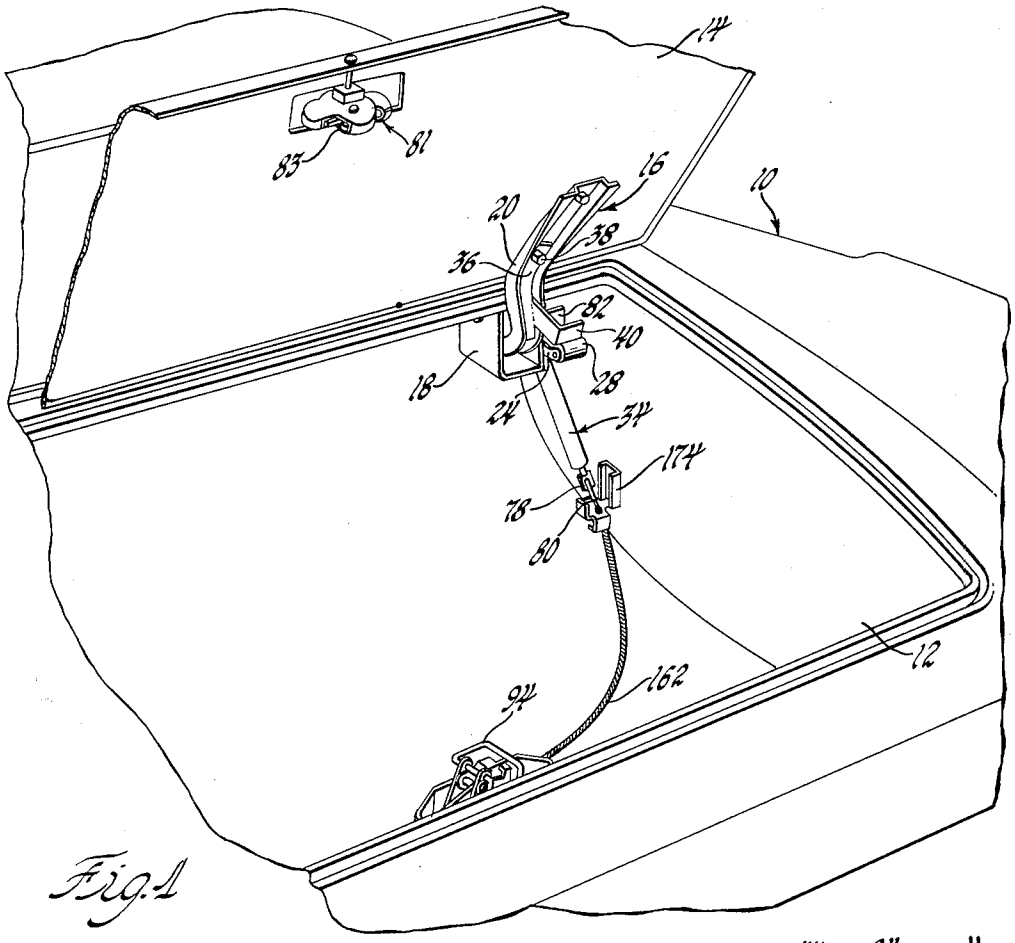


Fig. 1

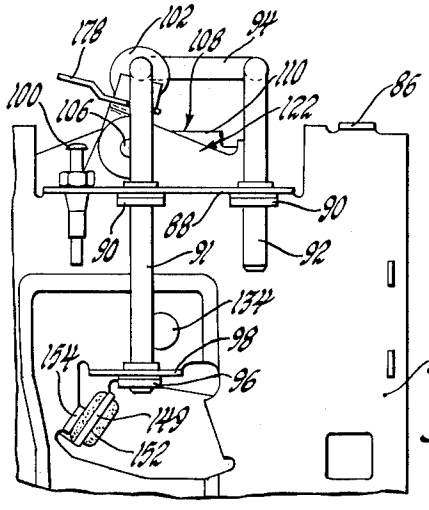


Fig. 3

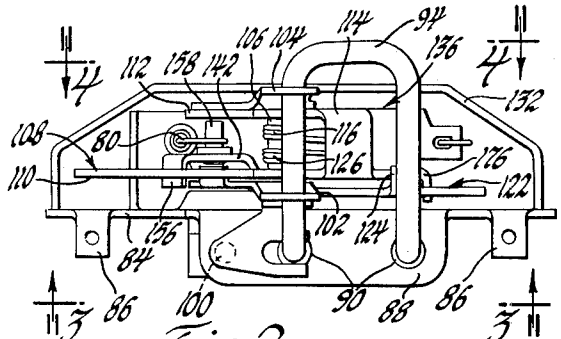


Fig. 2

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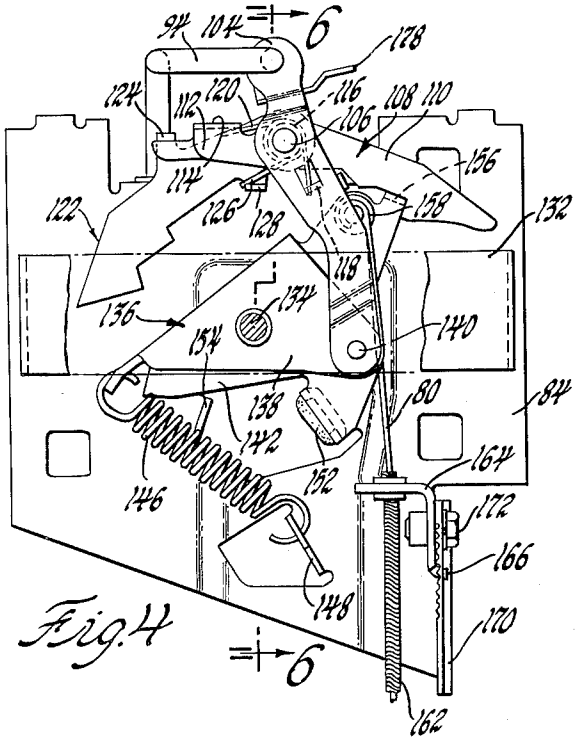


Fig. 4

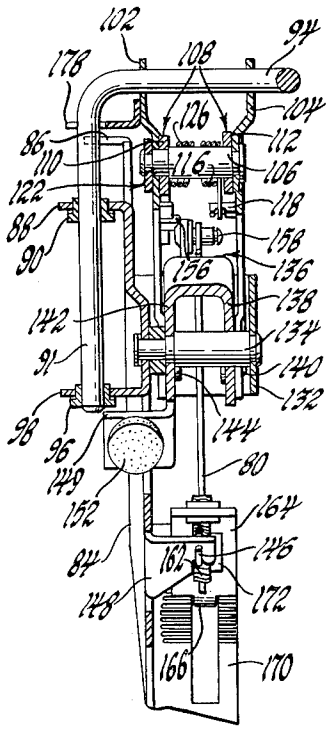


Fig. 6

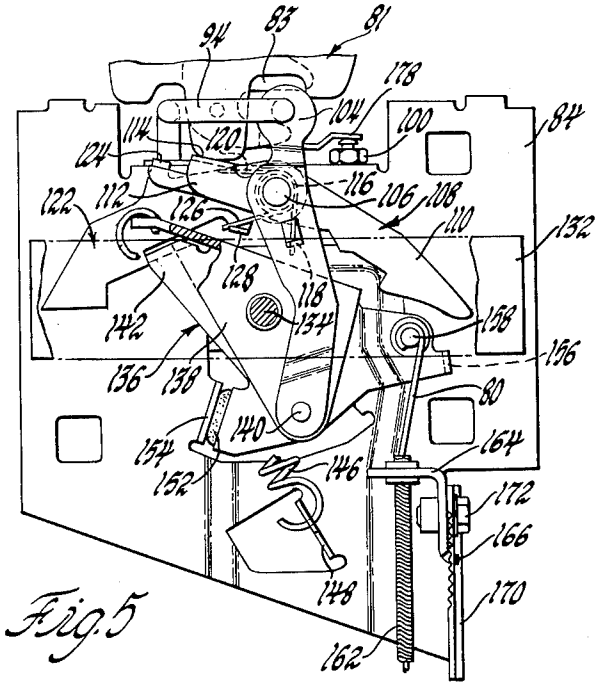


Fig. 5

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CLOSURE LATCH

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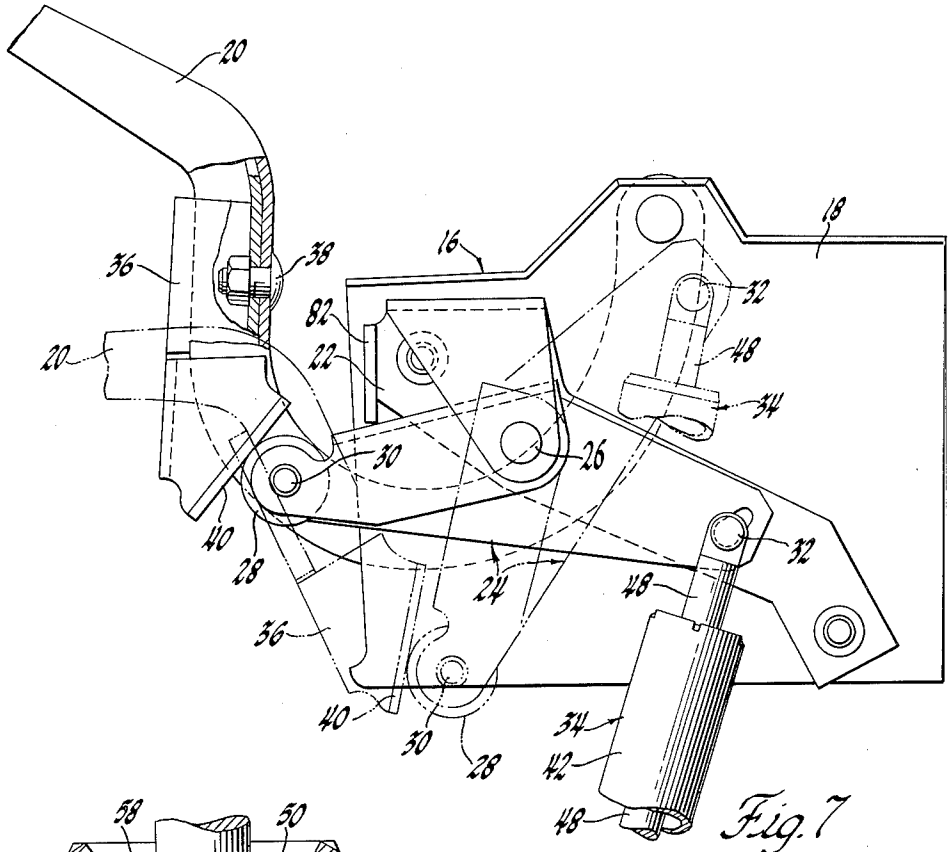


Fig. 7

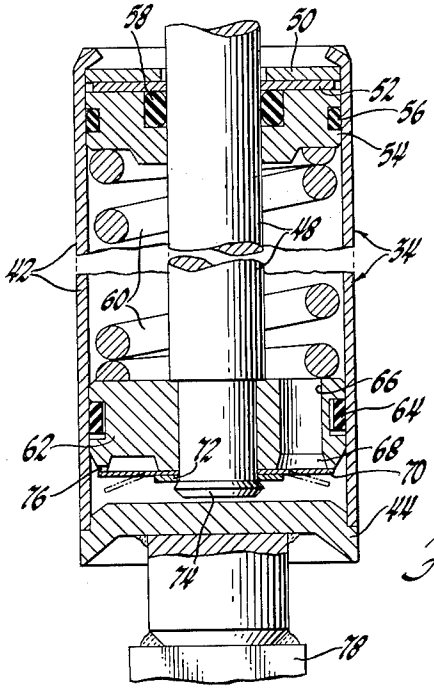


Fig. 8

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United States Patent Office 3,056,619 Patented Oct. 2, 1962

3,056,619

CLOSURE LATCH

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Filed Apr. 28, 1961, Ser. No. 106,363
11 Claims. (Cl. 292—341.15)

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

The latch of this invention is an improvement of that shown in the copending application of Leslie et al. S.N. 36,420, filed June 15, 1960, and assigned to the assignee of this invention, and generally includes a latch means and a bodily movable striker means which is movable between extended and retracted positions to thereby move a vehicle closure member between partially open and fully closed positions.

In the preferred embodiment of the invention, the striker means is movably supported on the body and is shiftable between its extended and retracted positions by linkage means. A swingable detented member is connected to the linkage means so as to shift the linkage means and in turn shift the striker means when the detented member moves between first and second positions corresponding to the extended and retracted positions of the striker means. A pair of detent members are swingably supported on the linkage means and are selectively and alternately engageable with the detented member to hold the member in each of its positions. During closing movement of the closure member, means are provided to store operating energy for moving the detented member between its first and second positions to thereby move the striker means from its extended to its retracted positions. Upon latching engagement of the latch means with the striker means, one of the detent members is released from the detented member and this stored operating energy is slowly dissipated to move the detented member from its first to its second position to thereby move the closure member to its fully closed position as the striker means moves to its retracted position. During this movement of the detented member, second means are provided to store operating energy for moving the striker means from its retracted position to its extended position when the latch means is thereafter released from the striker means and the other detent member is moved out of engagement with the detented member.

The closure latch of this invention is relatively simple in construction and includes a minimum number of parts and yet adequately performs its function of moving a vehicle closure member between partially open and fully closed positions. Further the striker means is of very compact construction so as to take up very little space within the vehicle body. The closure latch of this invention also includes means controlling the rate of movement of the closure member from a partially open to a fully closed position to thereby prevent slamming of the closure member whereby it moves very quietly when under the control of the closure latch.

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

FIGURE 1 is a partial rear perspective view of a vehicle body embodying a closure latch according to this invention;

FIGURE 2 is a top plan view of the striker assembly;

FIGURE 3 is a view taken generally along the plane indicated by line 3—3 of FIGURE 2;

FIGURE 4 is a view taken generally along the plane indicated by line 4—4 of FIGURE 2 and showing the striker assembly in extended position;

FIGURE 5 is a view similar to FIGURE 4 and showing the striker assembly in retracted position;

FIGURE 6 is a sectional view taken generally along the plane indicated by line 6—6 of FIGURE 4;

FIGURE 7 is an enlarged view of a portion of FIGURE 1, and

FIGURE 8 is an enlarged sectional view taken generally along the line indicated by line 8—8 of FIGURE 7.

Referring now particularly to FIGURES 1, 7 and 8 of the drawings, a vehicle body 10 includes a deck compartment 12 which is opened and closed by a deck lid 14. The deck lid is swingably mounted on the body by a pair of spaced counterbalanced hinges 16, each of which includes a hinge box 18 secured to the body and a hinge arm 20 swingably mounted on the hinge box and secured to the deck lid. As best shown in FIGURE 7 of the drawings, a U-shaped bracket 22 has the inboard leg thereof secured to the outboard wall of the right-hand hinge box 18. A bell crank lever 24 is swingably mounted at 26 between the legs of the bracket 22. One leg of the bell crank lever is of channel shaped formation and includes a roller 28 pivoted at 30 between the walls thereof. The other leg of the bell crank lever 24 is pivotally and slidably connected at 32 to the piston rod of a cylinder assembly 34, to be hereinafter described. A channel bracket 36 is bolted at 38 to the hinge arm 20, adjacent the goose-neck portion thereof, and includes a laterally extending flange 40 adapted to contact the roller 28 during closing movement of the deck lid so as to swing the bell crank lever 24 counterclockwise against the resistance of the cylinder assembly 34 as will be hereinafter described.

The cylinder assembly 34 includes a cylinder 42 having an end wall 44 welded thereto. The piston rod 48 of the assembly is slidably received through the centrally apertured other end wall 50 of the cylinder assembly which is staked at a number of places to the cylinder 42. A centrally apertured sealing washer 52 fits between the end wall 50 and a centrally apertured spring seat 54 to seal rod 48. The spring seat 54 is sealed to the cylinder 42 by an O-ring 56 and is sealed to the piston rod 48 by an O-ring 58, both of which are received in annular grooves in seat 54. A coil compression spring 60 surrounding the piston rod 48 has one end thereof seating on the seat 54 and the other end thereof seating on the lower side of a piston 62 which is secured to the shouldered upper end of the piston rod. The piston 62 includes an outer annular groove which receives a split type expandable sealing ring 64 and further includes a plurality of axially extending spaced bores 66 which open to an annular groove 68 provided in the lower side of the piston 62. A thin flexible annular member 70 covers the groove 68 and is secured to the piston 62 by a washer 72 and the staked-over end 74 of the piston rod 48 which also secure the piston 62 to the shouldered end of the piston rod. The outer wall of the groove 68 is provided with a plurality of shallow radial grooves or passages 76 to provide communication between the groove 68 and the lower side of the piston. The cylinder 42 is partially filled with hydraulic fluid. The wall 44 mounts an apertured tab 78 which is secured to one end of a push-pull cable 80, the other end of which is secured to the striker assembly as will be further described.

The piston 62 is shown in position when the deck lid 14 is in a partially open position, the striker assembly is in extended position, and the cable 80 is held against movement by the striker assembly as will be further described. It will be noted that the staked-over end 74 of the piston rod 48 is located adjacent the end wall 44 against the action of the spring 60 by engagement of a lateral flange 82 of bracket 22 with the web of the channel-shaped leg of the bell crank lever 24. As the deck

lid 14 is further closed, the flange 40 of the bracket 36 will engage the roller 28 to swing the bell crank lever 24 counterclockwise and thereby shift the piston 62 upwardly or toward the spring seat 54 to compress the spring 60, the cylinder 42 being held stationary by the cable 80 as will be further described. During this movement of the piston 62 relative to the cylinder 42, the fluid to the upper side of the piston 62 will quickly pass to the lower side thereof through the bores 66 and will deflect the member 70 as indicated in dotted lines to allow quick passage of the fluid to the lower side of the piston.

When the deck lid has been moved to a substantially closed position, immediately prior to latching engagement of the latch bolt with the striker assembly, the bell crank 24 will have moved to its position as indicated in dot-dash lines to substantially compress the spring 60. Thereafter when the latch bolt engages the striker assembly, the cable 80 will be released, as will be described, and the spring 60 will then move the cylinder 42 upwardly to shift the cable 80 forwardly of the body and thereby move the striker assembly to its retracted position, as will be described. As the cylinder 42 moves upwardly under the action of spring 60, fluid to the lower side of the piston will slowly flow to the upper side thereof by passing through the grooves 76 into the annular groove 68 and thence through the bores 66. Since the grooves 76 are very shallow, as previously mentioned, the fluid will pass very slowly from the lower side of the piston to the upper side thereof to provide a cushioning and delaying action for movement of the striker assembly from its extended to its retracted position to slowly move the deck lid to a fully closed position. When the latch bolt is thereafter released from latching engagement with the striker assembly, the striker assembly will move to its extended position as the deck lid moves toward an open position, and during this movement of the striker assembly, the cable 80 will be shifted rearwardly of the body to shift the cylinder assembly 34 downwardly and swing the bell crank lever 24 clockwise until the web of the channel shaped leg of this lever engages the lateral flange 32 of bracket 22 to thereby position the cylinder assembly preparatory to the start of another cycle of operation. The piston 62 will remain stationary with respect to the cylinder 42 during this downward movement of the cylinder assembly 34. Mounted on the rearward edge of the deck lid 14 is a latch assembly 81 of known construction which includes a fork type rotatable latch bolt 83. The details of the latch assembly form no part of this invention and accordingly will not be shown or described. Reference may be had to copending application S.N. 688,606, Fox et al., now Patent No. 2,886,365 issued May 12, 1959, for a showing of the details of such an assembly.

The striker assembly is suitably mounted on the rear wall of the deck compartment 12 and includes a main frame 84 having a pair of apertured tabs 86 extending laterally from the upper edge thereof. A laterally extending apertured flange 88 located intermediate tabs 86 mounts a pair of guide bushings 90 which slidably receive depending lateral legs 91 and 92 of a U-shaped striker member 94, the former leg being longer than the latter and being additionally slidably received within a guide bushing 96 mounted in an apertured flange 98 of the frame. Also mounted on the flange 88 is a grounding switch 100 for a purpose to be hereinafter described.

A pair of links 102 and 104 are swingably mounted at their upper ends on a leg of the striker bar 94 and are pivotally interconnected by a combination locating and pivot shouldered shaft 106 secured thereto adjacent their upper pivotally mounted ends. A detent member 108, including a leg 110 and a leg 112 connected thereto by a web 114, is swingably mounted on the shaft 106, and a coil torsion spring 116 surrounding the shaft 106 has one leg thereof engaging a notched bent tab 118

of link 104 and the other leg 120 thereof engaging the web 114 of the detent lever 108 to continuously bias the detent lever in a clockwise direction about the pivot shaft 106. Another detent member 122, pivotally mounted on the shaft 106 to the other side of the link 102 than leg 110 of member 108, includes a laterally extending flange 124 engaging one end of the leg 110 of detent member 108 under the action of a coil torsion spring 126 which also surrounds the shaft 106 and has one leg thereof engaging a lateral tab 128 of the detent member 122 and the other leg thereof engaging the web 114 of the detent member 108 to continuously bias the detent member 122 in a counterclockwise direction. Spring 126 is weaker than spring 116 for a purpose to be hereinafter described.

A generally U-shaped member 132 has its legs secured to the frame 184, with member 132 and frame 84 supporting a shouldered pivot shaft 134 as best shown in FIGURE 6. A U-shaped detentable member 136 is mounted on the shaft 134, one leg 138 thereof being pivoted at 140 to link 104 and the other leg 142 thereof being pivoted at 144 to the link 102, with the pivots 140 and 144 being aligned. A tension spring 146 hooked between the apertured web of member 136 and a notched lateral tab 148 of frame 84 continuously biases the member 136 in a counterclockwise direction, as viewed in FIGURES 4 and 5, to continuously bias the links 102 and 104 in an upward direction, with the member 136 being located against the action of the spring 146 by having a laterally extending flange 149 thereof extending through an opening in frame 84 and mounting a double headed rubber button 152 which engages a lateral flange 154 of the frame. The member 136 locates the links 102 and 104 which in turn locate the striker member 94 in its extended position as shown in FIGURE 4. The leg 142 of member 136 includes a lateral tab 156 which engages the hooked other end of the detent member 108 as shown in FIGURE 4 to swingably locate members 108 and 122 relative to links 102 and 104. A laterally extending pin or stud 158 on member 136 is secured to the other end of the cable 80, the one end of which is secured to the cylinder assembly 34, as previously described. The cable 80 moves within a tube 162, one end of which is secured to an angle bracket 164. Bracket 164 includes a guide tab 166 received within a guide slot in a lateral flange 170 of frame 84. Flange 170 is ribbed so as to provide for better retention of the bracket thereagainst when the securing bolt 172 is tightened. As best shown in FIGURE 1, the other end of the tube 162 is secured to a bracket 174 mounted on the right-hand side wall of the deck compartment 12.

The striker assembly is shown in FIGURES 2, 3, 4 and 6 in its extended position when the deck lid is in a partially open position and the latch bolt 83 is out of latching arrangement with the striker bar 94.

Assuming now that the deck lid 14 is moved from this partially open position toward closed position, the engagement of the flange 40 of the bracket 36 with the roller 28 will swing the bell crank lever 24 counterclockwise to thereby compress the spring 60 as previously described. The cylinder 42 is held stataionary by the cable 80, inasmuch as the cable cannot shift due to the engagement of the tab 156 of the member 136 with the hooked end of the detent lever 108 as shown in FIGURE 4. When the deck lid moves to a substantially closed position, the latch bolt 83 will engage the striker bar 94 and the web 114 of the detent member 108 to swing the detent member 108 counterclockwise about the pivot shaft 106 and move the hooked end thereof out of engagement with the tab 156 to thereby allow the cylinder assembly 34 to slowly shift the cable 80 forwardly of the body as previously described. This movement of the cable 80 will swing the member 136 clockwise about the shaft 134 until a lateral tab 176 of leg 142 engages the hooked end of the detent member 122. Member 122 will of

course swing with member 108. During this movement of the member 136, the links 102 and 104 will be shifted downwardly to in turn shift the detent members 108 and 122 downwardly, tension spring 146, and shift the striker bar 94 downwardly to slowly move the deck lid 14 into tight sealing engagement with the body, with this movement being delayed and cushioned by the transfer of the fluid from opposite sides of the piston 62 as previously described.

When the latch assembly 83 is thereafter unlatched, the release of the latch bolt from the web 114 of the detent member 108 will allow the spring 116 to swing this detent member clockwise and in turn swing the detent member 122 in the same direction by engagement of the leg 110 of member 108 with tab 124 to move the hooked end of member 122 out of engagement with tab 176. The spring 146 will then swing the member 136 counterclockwise to shift the links 102 and 104 upwardly and move the striker bar 94 to its extended position, shift cable 80 rearwardly of the body to position the cylinder assembly 34 as previously described, and position the tab 156 in engagement with the hooked end of detent member 108 to position the detent members 108 and 122 and to set the mechanism for another cycle of operation. An angle bracket 178 is secured to the link 102 to open the grounding switch 100 when the striker assembly is in its retracted position. The switch 100 is adapted to be connected to a suitable circuit so as to actuate a warning light within the body and thereby signal the operator when the deck lid is in open position.

What is claimed is:

1. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, detented means swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means interconnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detented means between said positions thereof, first and second detent means selectively and alternately engageable with said detented means in said first and second positions thereof, first means for disengaging said first detent means from said detented means in said first position thereof, second means for disengaging said second detent means from said detented means in said second position thereof, first means for swinging said detented means upon release of said first detent means to move said striker means from said extended position to said retracted position, and second means for swinging said detented means upon release of said second detent means to move said striker means from said retracted position to said extended position.

2. In a closure latch including a latch assembly, a striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, detented means swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means interconnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detented means between said positions thereof, first and second detent means selectively and alternately engageable with said detented means in said first and second positions thereof, means on said first detent means engageable with said latch assembly upon latching engagement thereof with said striker means for disengaging said first detent means from said detented means in said first position thereof, second means for disengaging said second detent means from said detented means in said second position thereof, first means for swinging said detented means upon release of said first detent means to move said striker means from said extended position to said retracted position, and second means for swinging said detented means upon release of said second detent means to move said striker means from said retracted position to said extended position.

3. In a closure latch including a latch assembly, a striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and contracted positions, detented means swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means interconnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detented means between said positions thereof, first and second detent means selectively and alternately engageable with said detented means in said first and second positions thereof, first means for disengaging said first detent means from said detented means in said first position thereof, means on said first detent means engageable with said second detent means upon release of said latch assembly from said striker assembly for disengaging said second detent means from said detented means in said second position thereof, first means for swinging said detented means upon release of said first detent means to move said striker means from said extended position to said retracted position, and second means for swinging said detented means upon release of said second detent means to move said striker means from said retracted position to said extended position.

4. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, detented means mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means interconnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detented means between said positions thereof, first and second swingable detent means selectively and alternately engageable with said detented means in said first and second positions thereof, means biasing said first and second detent means toward detented position, means holding said second detent means against movement toward detented position and against the action of said biasing means when said first detent means is in detented position, means for disengaging said first detent means from said detented means in said first position thereof, and means moving said detented means to said second position thereof upon release of said first detent means to move said striker means from said extended position to said retracted position, said biasing means moving said second detent means to detented position in engagement with said detented means in said second position thereof upon disengagement of said first detent means.

5. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, detented means mounted on said supported for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means intecronnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detented means between said positions thereof, first and second swingable detent means selectively and alternately engageable with said detented means in said first and second positions thereof, first and second means biasing said first and second detent means toward detented position, means on said first detent means holding said second detent means against movement toward detented position and against the action of said second biasing means when said first detent means is in detented position, means for disengaging said first

detent means from said detented means in said first position thereof, and means moving said detented means to said second position thereof upon release of said first detent means to move said striker means from said extended position to said retracted position, said second biasing means biasing said second detent means to detented position in engagement with said detented means in said second position thereof upon disengagement of said first detent means.

6. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, detented means mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, means interconnecting said detented means and said striker means to move said striker means between said positions thereof upon movement of said detent means between said positions thereof, first and second swingable detent means selectively and alternately engageable with said detented means in said first and second positions thereof, first and second means biasing said detent means oppositely to each other and toward detented position, said first biasing means being of greater force than said second biasing means, engageable means on said first detent means causing said second detent means to follow said first detent means against the action of said second biasing means, means for disengaging said first detent means from said detented means in said first position thereof, and means moving said detented means to said second position thereof upon release of said first detent means to move said striker means from said extended position to said retracted position, said second biasing means biasing said second detent means into engagement with said detented means in said second position thereof upon disengagement of said first detent means.

7. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, a detented member swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, linkage means interconnecting said detented member and said striker means to move said striker means between said positions thereof upon movement of said detented member between said positions thereof, first and second detent members mounted on said linkage means selectively and alternately engageable with said detented member in said first and second positions thereof, first means for disengaging said first detent member from said detented member in said first position thereof, second means for disengaging said second detent member from said detented member in said second position thereof, first means for swinging said detented member to said second position upon release of said first detent member to move said striker means from said extended position to said retracted position, and second means for swing'ng said detented member to said first position upon re'ease of said second detent member to move said striker means from said retracted position to said extended position.

8. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, a detented member swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, linkage means pivotally interconnecting said detented member and said striker means to move said striker means between said positions thereof upon movement of said detented member between said positions thereof, first and second detent members pivotally mounted on said linkage means for movement therewith and movement relative thereto to detented position wherein said detent members are selectively and alternately engageable with said detented member in said first and second positions thereof, first means for disengaging said first detent member from said detented member in said first position thereof, second means for disengaging said second detent member from said detented member in said second position thereof, first means for swinging said detented member to said second position thereof upon release of said first detent member to move said striker means from said extended position to said retracted position, and second means for swing said detented member to said first position thereof upon release of said second detent member to move said striker means from said retracted position to said extended position.

9. A striker assembly comprising, a support, striker means mounted on said support for bodily movement relative thereto between extended and retracted positions, a detented member swingably mounted on said support for movement between first and second positions corresponding to said extended and retracted positions of said striker means, a pair of spaced links pivotally interconnecting said detented member and said striker means to move said striker means between said positions thereof upon movement of said detented member between said positions thereof, first and second detent members swingably mounted on said links and being selectively and alternately engageable with said detented member in said first and second positions thereof, first means for disengaging said first detent member from said detented member in said first position thereof, second means for disengaging said second detent member from said detented member in said second position thereof, first means for swinging said detented member to said second position upon release of said first detent member to move said striker means from said extended position to said retracted position, and second means for swinging said detented member to said first position upon release of said second detent member to move said striker means from said retracted position to said extended position.

10. In a vehicle body having a body member, a closure member swingably mounted thereon for movement between opened and closed positions, latch means mounted on one of said members, and striker means mounted on the other of said members for movement between extended and retracted positions, the combination comprising, means operative to store operating energy as said closure member moves from a fully open position to a partially open position, detented means, means operatively connecting said detented means to said striker means, means for applying said stored operating energy to said detented means, detent means engageable with said detented means for holding said striker means in said extended position against the force of said operating energy, means for releasing said detent means from said detented means upon latching engagement of said latch means with said striker means in the partially open position of said closure member to allow said stored operating energy to dissipate and move said striker means to said retracted position thereof to move said closure member from said partially open position to a fully closed position in engagement with said body member, and means restricting the rate of dissipation of said stored operating energy to slowly move said closure member from said partially open position to said fully closed position.

11. In a vehicle body having a body member, a closure member swingably mounted thereon for movement between opened and closed positions, a latch assembly mounted on one of said members, and a striker assembly mounted on the other of said members and including striker means movable between extended and retracted positions, the combination comprising, means operative to store operating energy as said closure member moves from a fully open position to a partially open position, detented means mounted on said striker assembly, means operatively connecting said detented means to said striker means, means for applying said stored operating energy to said detented means, detent means mounted on said striker assembly and engageable with said detented means

for holding said striker means in said extended position against the force of said operating energy, means for releasing said detent means from said detented means upon latching engagement of said latch assembly with said striker means in the partially open position of said closure member to allow said stored operating energy to dissipate and move said striker means to said retracted position thereof to move said closure member from said partially open position to a fully closed position in engagement with said body member, and means restricting the rate of dissipation of said stored operating energy to slowly move said closure member from said partially open position to said fully closed position.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,056,619 October 2, 1962

Robert M. Fox et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 61, for "supported" read -- support --; column 7, line 18, for "detent" read -- detented --; column 8, line 9, for "swing" read -- swinging --.

Signed and sealed this 26th day of February 1963.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents