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[72] Inventor **Theodore F. Peters**
Utica, Mich.

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[73] Assignee **General Motors Corporation**
Detroit, Mich.

[54] **LATCH MECHANISM**
5 Claims, 2 Drawing Figs.

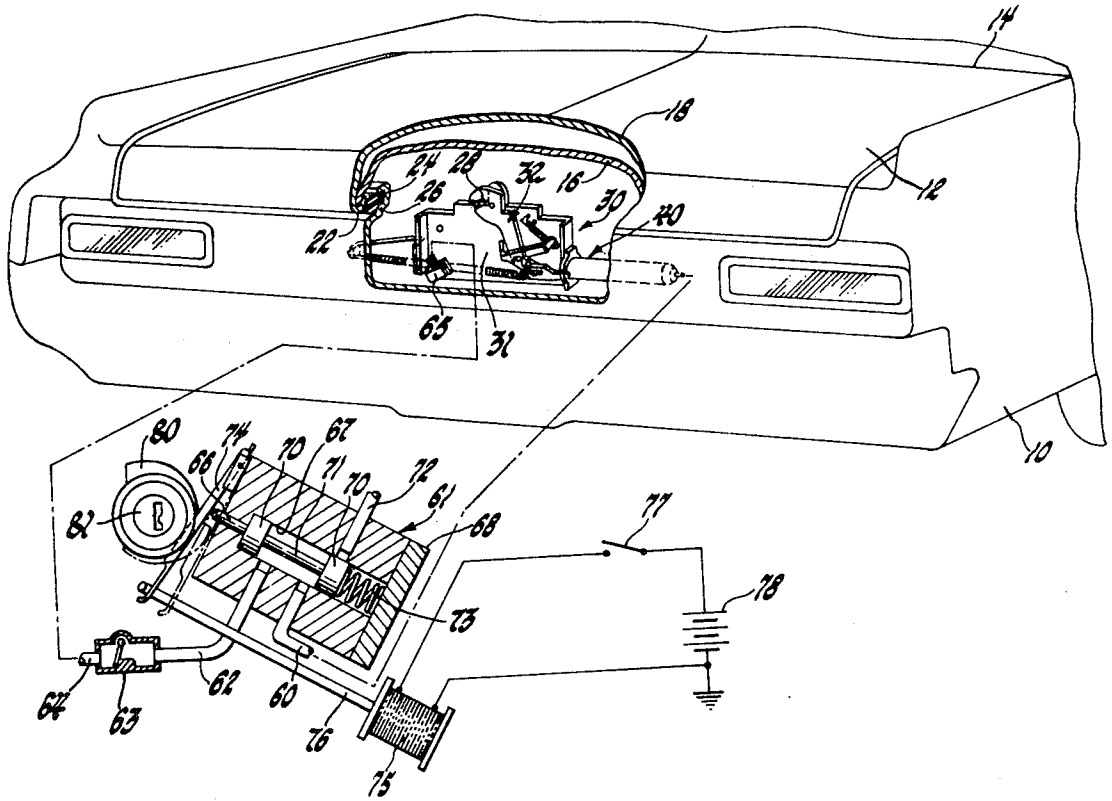
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E05c 3/06
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144, 201, 210, 344.3; 70/237—238, 241,
262—265, 275, 175

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Primary Examiner—James A. Leppink
Assistant Examiner—Robert L. Wolfe
Attorneys—Warren E. Finken and Arthur N. Krein

ABSTRACT: A latch mechanism of the type comprising a latchbolt pivotally mounted on a vehicle body for releasably engaging a striker secured to the vehicle deck lid, the latchbolt being moved from an unlatched position toward a latched position upon engagement with the striker. Continued movement of the latchbolt to the latched position is power assisted by a differential-fluid-pressure-operated motor connected to the latchbolt. The operation of the differential-fluid-pressure-operated motor is controlled by fluid valves, one of which is actuated upon initial movement of the latchbolt toward the latched position to operate the motor for effecting continued movement of the latchbolt to the latched position at which position it is releasably engaged by a latch hook.



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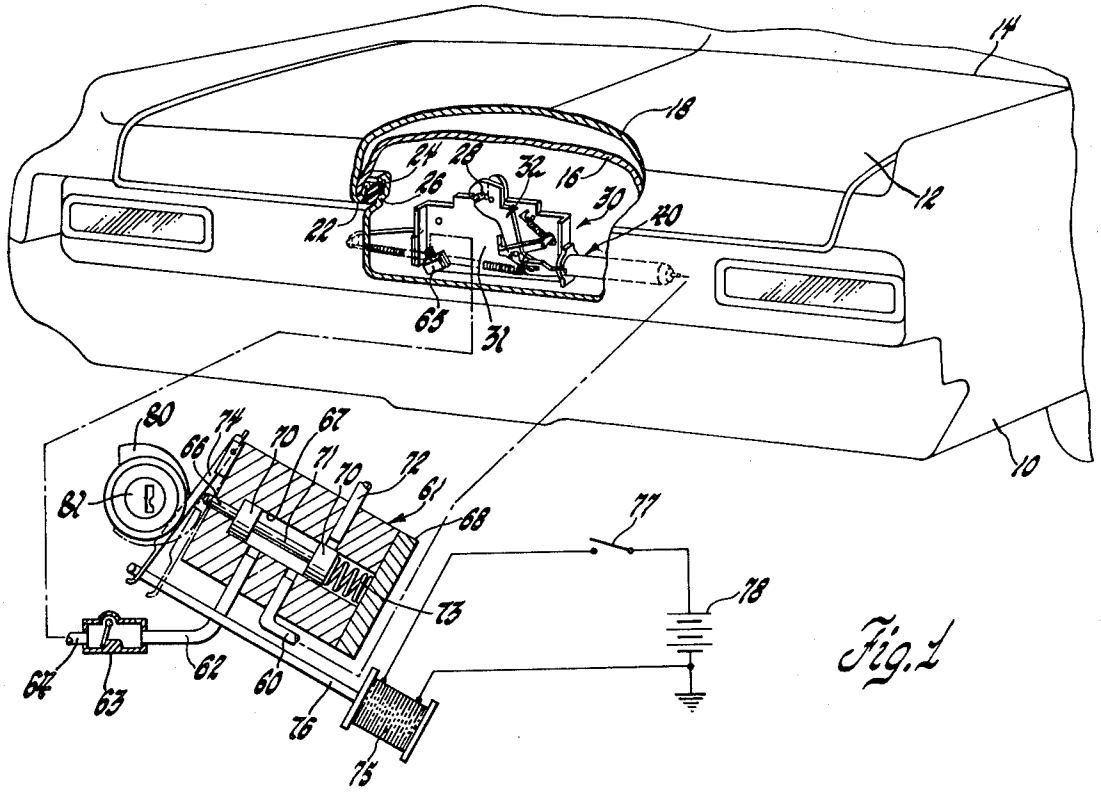


Fig. 1

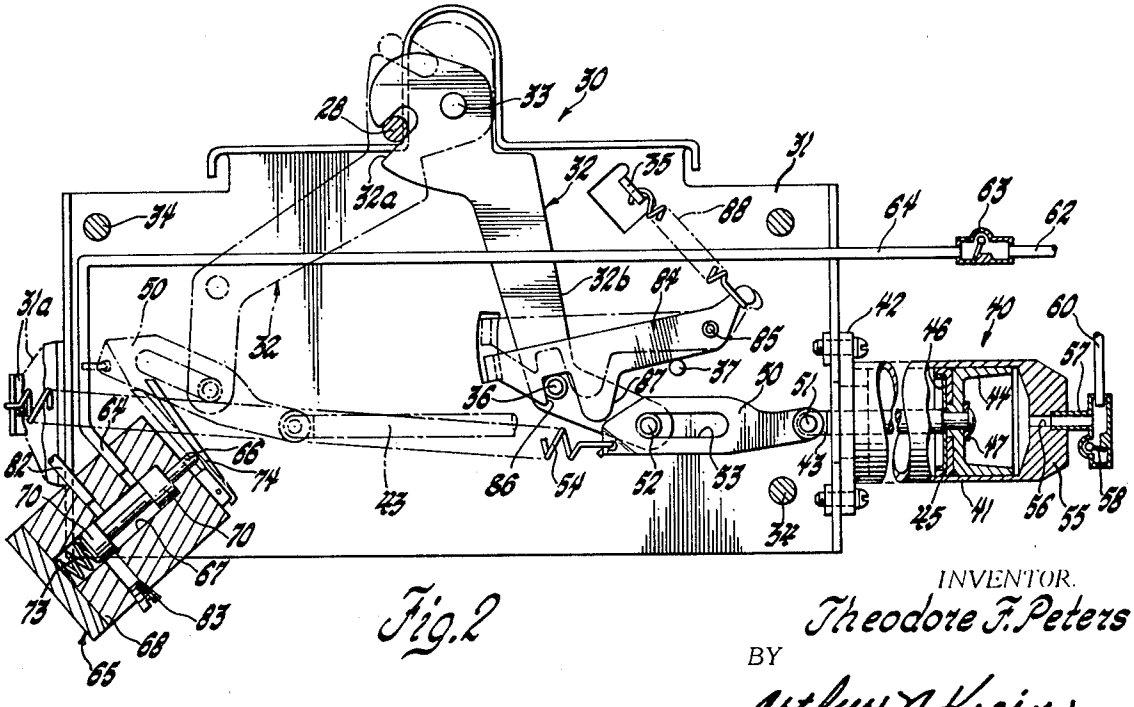


Fig. 2

INVENTOR.
Theodore F. Peters
BY
Arthur N. Krein
ATTORNEY

LATCH MECHANISM

This invention relates to a latch mechanism for use in a vehicle in which a rear deck lid is provided with a fixed striker and, particularly, to a latch mechanism in which a pivotal latchbolt is power-assisted during latching by a differential-fluid-pressure-operated motor but which can also be manually latched.

The primary object of this invention is to improve a latch mechanism for use in a vehicle to releasably secure a deck lid against the vehicle body with a weather seal compressed therebetween. Another object of this invention is to improve latch mechanisms whereby latching can be accomplished either mechanically or manually.

A further object of this invention is to improve latch mechanisms whereby a power actuator is connected to a latchbolt to move the latchbolt to the latched position against the reaction forces of a seal strip but, when the power actuator is inoperative, manual latching can still be accomplished.

These and other objects of the invention are attained by providing a latchbolt mounted on a vehicle body in operative relation to a striker unit fixed on the deck lid, the latter being movable between open and closed positions, relative to the vehicle body. The latchbolt is pivotally mounted for movement between unlatched and latched positions and is engageable when in the unlatched position with the striker unit when the deck lid is in a partially closed position whereby the latchbolt upon engagement with the striker is caused to move from the unlatched position toward the latched position. A differential-fluid-pressure-operated motor having a piston and piston rod is mounted on the vehicle body with the piston rod connected by a cam link to the latchbolt for moving the latchbolt from the unlatched position to the latched position, movement of the latchbolt in the opposite direction being effected by means of a return spring. A latch hook is also pivotally mounted to the vehicle body in position to releasably engage the latchbolt when the latter is in the latched position. The differential-fluid-pressure-operated motor is connected by control valves to sources of differential-fluid pressure, one of the valves being positioned to be actuated by the cam link when the latchbolt is in the unlatched position. A second control valve, positioned to connect the differential-fluid-pressure-operated motor to multiple sources of differential-fluid pressure, is selectively operable by a key cylinder lock assembly or by an electrical power actuator.

For a better understanding of the invention, as well as other objects and further features thereof, reference is had to the following detailed description of the invention to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a partial rear perspective view of a motor vehicle having a latch assembly constructed in accordance with the invention; and

FIG. 2 is an enlarged view of the latch assembly shown in FIG. 1.

Referring now particularly to FIG. 1 of the drawings, a vehicle body **10** includes a deck lid **12** hingedly mounted adjacent its forward edge **14** for swinging movement between an open position, not shown, and a closed position, as shown, preferably being swingably mounted by a pair of conventional spaced counterbalanced spring hinges. The deck lid, as shown, includes an inner panel **16** and an outer panel **18** hem-flanged together around the perimeter of the deck lid as shown at the rearward edge **22** thereof. When in its closed position, deck lid **12** engages and compresses a seal strip **24** extending substantially around the perimeter of the deck opening and, in its rearwardly generally horizontal portion, being mounted within a channel-shaped terminal edge portion of the body back panel **26**. A conventional bar-type striker **28**, only a portion of which is shown, is suitably fixed on the inner panel **16** to be in cooperative relationship to the latch assembly, generally designated **30**, mounted to the vehicle body **10**.

The latch assembly **30** includes a frame **31** having a hat-shaped portion at the upper end thereof, the frame supporting the remaining elements of this assembly whereby it can be suitably mounted to the vehicle body **10**, as by bolts **34**. A latchbolt **32** is swingably mounted to the frame **31** by pivot head stud **33** and is provided with a leg having a fork end **32***a* and a depending leg **32***b*. Latchbolt **32** is rotatable between a latched position in the closed position of the deck lid **12**, as shown in FIG. **2**, wherein the hooked end **32***a* of the latchbolt is engaged by the striker, and an unlatched position wherein the latchbolt is disengaged from the striker as illustrated by the broken lines in FIG. **2**.

The latchbolt is moved between the unlatched position and the latched position by a suitable differential-fluid-pressure-operated motor of the expansible chamber type in which movement in one direction is accomplished by the creation of a differential-fluid pressure on opposite sides of a movable wall of the expansible chamber and return movement is accomplished by a return spring. The return spring can be formed as an integral part of the differential-fluid-pressure-operated motor, or as shown, it can be operatively connected to an element of the differential-fluid-pressure-operated motor.

In the embodiment shown, the differential-fluid-pressure-operated motor, generally designated **40**, includes a cylinder **41** partly enclosed at one end by an apertured end plate **42**, secured thereto as by welding, by means of which the cylinder is secured to an apertured portion of frame **31**. A piston rod **43** extends through the apertured end of frame plate **31** and the end plate **42** into the cylinder **41** and supports a piston in the form of opposed piston cups **44** and **45**, and spacer **46** between a shoulder of the piston rod and a washer **47** suitably secured in place at the end of the piston rod.

The opposite end of the piston rod is connected by a lost-motion connector to the depending leg **32***b* of the latchbolt. This lost-motion connector consists of the cam link **50** pivotally connected at one end by a headed stud **51** to this end of the piston rod, the other end of the cam link **50** being slideably and pivotally secured to the depending leg **32***b* of latchbolt **32** by means of a headed stud **52** which extends through a slotted aperture **53** of the cam link and is secured to the lower end of the latchbolt. The return spring **54** for the differential-fluid-pressure-operated motor has one end hooked over an extension **31***a* of frame **31** and its other end engaging a perforated end portion of the cam link **50**. This return spring **54** normally acts to bias the piston rod and therefore, the piston of the differential-fluid-pressure-operated motor to the left, as seen in FIG. **2**, and to bias latchbolt **32** in a clockwise direction, as seen in the same Figure, to normally position the bolt in the unlatched position shown by the broken lines.

The opposite end of the cylinder is partly enclosed by an end wall **55**, which may be formed as a separate element or, as shown, formed as an integral part having a passage **56** connected to one leg of tee **57**. One of the opposed legs of tee **57** is vented to atmospheric pressure via check valve **58** while the other leg is connected by conduit **60** to control valve **61** for selective venting to atmospheric pressure or connection to a source of vacuum via conduit **62**, check valve **63**, conduit **64** and control valve **65**.

Control valve **61**, which may be of any suitable configuration, is illustrated schematically in FIG. **1** as having a spindle valve **66** slideably mounted within chamber **67** of casing **68**. The spindle valve **66** includes two lands **70** defining a reduced portion **71** which, depending on the position of the spindle valve, permits communication between conduit **60** and conduit **62**, or between conduit **60** and atmospheric vent **72**. Spring **73** positioned in chamber **67** normally biases the spindle valve **66** upward with the bottom land **70** normally blocking off the atmospheric vent **72**, with the conduits **60** and **62** in communication with each other via chamber **67** and with the lever **74**, pivoted at one end to the casing, biased in a clockwise direction, as seen in this Figure, which is the normal open position of this valve. When the lever **74** is depressed, that is, pivoted counterclockwise, the spindle valve is forced downward against the biasing action of spring **73** whereby the vent **72** is then uncovered by the bottom land **70** while the connection to conduit **62** is blocked off by the upper land **70**

at which time conduit 60 is placed in communication with atmospheric pressure, this being the closed position of this valve.

Lever 74 can be pivoted in a counterclockwise direction, as seen in FIG. 1 to the closed position by any suitable actuators operable from either the interior or exterior of the vehicle. For actuation from the interior of the vehicle, for example, a solenoid 75 is secured in position to have the hooked end of its armature 76 engage the lever 74. The solenoid 75 is connected by normally open switch 77, which may be mounted on the dash, to the vehicle battery 78. When the switch 77 is closed to energize the solenoid 75, the armature is retracted to pull the lever in a counterclockwise direction. Actuation from the exterior of the vehicle can be mechanically accomplished by means of cam 80 rotatably journaled adjacent to the lever 74, the cam 80 having a square-shaped bore to receive a shaft, not shown, which is part of a conventional key cylinder lock assembly 81 mounted to the rear of the vehicle. Upon insertion of a key therein, the shaft can be turned to in turn rotate the cam 80 clockwise as seen in FIG. 1, thereby pivoting lever 74 in a counterclockwise direction to close the valve 61.

Control valve 65, which is similar to control valve 61 with like parts identified by the same reference characters, is illustrated schematically in FIG. 2, and includes a chamber 67 in communication with conduit 64 and a conduit 82 connected to a source of vacuum, not shown, such as the engine manifold or a vacuum storage tank, the third passage in the casing 68 in communication with chamber 67 being obstructed by plug 83. Thus, with the spindle valve 66 normally biased upward by spring 73, the normal open position of the valve, conduit 64 and 82 are normally in communication with each other via chamber 67, but when the spindle valve 66 is moved downward by counterclockwise rotation of the lever 74, the upper land 70 will block off conduit 64 and the valve is then in a closed position. Control valve 65 is secured to frame 31 in position to have lever 74 engaged by cam link 50, as shown in broken lines in FIG. 2, when the return spring 54 pulls the latchbolt 32 to the unlatched position, also shown by broken lines in this same Figure. In this unlatched position of the bolt, the pull of return spring 54 on the cam link 50 tends to pivot it about the axis of headed stud 51 to force the end of the cam link to which the spring is attached against the lever 74 to pivot it counterclockwise to move the spindle valve downward to close the valve. As the cam link 50 is moved out of engagement with lever 74 by rotation of latchbolt 32 counterclockwise upon engagement with striker 28, the spindle valve 66 is again biased upward by spring 73 and the control valve is again in the normally open position, as previously described.

When control valves 61 and 65 are open to place the right-hand side of the piston within cylinder 41, as seen in FIG. 2, in communication with a source of vacuum, atmospheric pressure acting on the other side of the piston forces it to the right to rotate latchbolt 32 counterclockwise to the latched position. When this end of the cylinder is then vented to atmospheric pressure upon actuation of control valve 61 as previously described, the equalization of fluid pressure on opposite sides of the piston permits the return spring 54 to pull the piston to the left while pivoting the latchbolt 32 clockwise to the unlatched position.

In the fully latched position, forced lifting of the deck lid is prevented by means of a latch hook 84 pivotally secured by pin 85 to frame 31 with one leg of the latch hook having a detent notch 86 adapted to engage detent pin 36 secured to the depending leg 32*b* of latchbolt 32. The latch hook 84 is normally biased in a counterclockwise direction, as seen in FIG. 2, by spring 88 having one end engaging the latch hook and the other end secured to an apertured tab 35 of frame 31, movement in a counterclockwise direction being limited by stop pin 37 secured to frame 31. Adjacent to the detent notch 86, the latch hook is provided with a cam follower portion 87 adapted to engage the upper surface of cam link 50 whereby the latch hook can be pivoted in a clockwise direction as the cam link moves thereagainst.

The operation of the latch mechanism will now be described with particular reference being made to FIG. 2. Assuming that the deck lid is open, bolt 32 would be in the unlatched position shown by broken lines and cam link 50 would be engaged with the lever 74 of control valve 65 to hold this valve in the closed position. As the deck lid 12 is moved toward the closed position, the striker 28 attached to the deck lid engages latchbolt 32 to effect counterclockwise rotation of the bolt toward the latched position. Initial movement of the bolt in this direction causes cam link 50 to become disengaged from lever 74 of control valve 65, thereby allowing the opening of this valve to provide a fluid connection between control valve 61 and the source of vacuum via conduit 82. With control valve 61 in the normal open position as shown, it being assumed that the key cylinder lock assembly 81 is in locked condition and switch 77 is open, the fluid connection from the source of vacuum is now continued through to the cylinder 41. Reverse movement of fluid between control valve 61 and control valve 65 being at all times prevented by check valve 63. Differential fluid pressure now acting on the piston will force it to the right pulling the latchbolt 32 to the latched position thereby fully closing the deck lid against the vehicle body with the seal strip compressed therebetween, assuring a tightly closed rear compartment.

As the bolt 32 reaches the latched position, the detent notch 86 of latch hook 84 engages the detent pin 36 to effectively lock the latchbolt in the latched position thus preventing forced lifting of the deck lid which, if permitted, would cause the striker 28 to effect rotation of the latchbolt 32 toward the unlatched position, in the event that the differential-fluid-operated motor 40 does not offer sufficient resistance to this movement.

To unlatch the deck lid, control valve 61 is actuated to the closed position either by closure of switch 77 to energize solenoid 75 or by operation of the key cylinder lock assembly 81 to rotate cam 80, as previously described, thereby blocking the normal connection via conduit 62 to the vacuum source and opening the connection to the atmospheric vent 72, thus allowing the pressure on opposite sides of the piston to become equalized. This allows return spring 54 to pull the cam link 50 and the piston to the left, the cam link engaging the cam follower portion 87 of the latch hook 84 lifting it out of engagement with the detent pin 36 on the latchbolt 32. Continued movement to the left of the cam link 50 rotates the latchbolt 32 clockwise to the unlatched position to release the striker allowing the deck lid to move upward under the influence of the conventional counterbalanced spring hinges, and then, the cam link 50 will again engage lever 74 of control valve 65 to close it blocking off the connection between conduit 64 and the source of vacuum. The latch assembly is now in position for another latching cycle.

In the event that a source of vacuum is not immediately available, physical closing and latching of the deck lid can still be accomplished. Manual closing of the deck lid to the fully closed position will move the striker 28 downward causing it to engage bolt 32 to rotate it counterclockwise to the latched position which, in turn, via cam link 50 and piston rod 43 moves the piston to the right expelling the fluid in the cylinder out through check valve 58. Return of fluid is, of course, prevented by this same check valve. When the engine is operated to again establish a source of vacuum, the piston of the differential-fluid-pressure-operated motor 40 will then be moved to the far right position as shown in FIG. 2. Unlatching when desired can then be accomplished as described above.

While the invention has been described with reference to the structure disclosed herein, it is not confined to the details set forth, and this application is intended to cover such modifications or changes as may come within the purposes of the improvements or the scope of the following claims.

What I claim is:

1. A latch mechanism for latching a closure member to a support member by engagement with a striker fixed to one of the members, the closure member being swingably mounted

for movement between open and closed positions relative to the support member, the latch mechanism including

a latchbolt pivotally mounted on said other member for movement between an unlatched position and a latched position, said latchbolt having a fork at one end engageable with said striker when said members are partially closed,

a differential-fluid-pressure-operated motor means mounted adjacent to said latchbolt,

cam link means,

said differential-fluid-pressure-operated motor means being connected by said cam link means to said latchbolt and selectively operable to effect power-assisted movement of said latchbolt through said cam link means from said unlatched position to said latched position and from said latched position to said unlatched position,

valve-controlled conduit means connected to said differential-fluid-pressure-operated motor means and connectable to a source of differential fluid pressure and operable to control the supply of fluid to said differential-fluid-pressure-operated motor means to selectively operate said differential-fluid-pressure-operated motor to move said latchbolt from said unlatched position to said latched position and from said latched position to said unlatched position, and

latch-hook means swingably mounted for engagement with said latchbolt to releasably retain said latchbolt in said latched position and for engagement by said cam link means to release said latchbolt.

2. A latch mechanism according to claim 1 wherein said differential-fluid-pressure-operated motor includes

expansible chamber means having a movable wall,

means connecting said movable wall with said cam link to effect movement of said latchbolt to said latched position, and

bias means operatively connected to said movable wall to normally move said latchbolt to said unlatched position.

3. A latch mechanism according to claim 1 wherein said valve-controlled conduit means includes

first valve means connected to a first fluid source and connectable to a second fluid source, and

second valve means operatively connected to said first valve means for connecting said first valve means to said second fluid source, said second valve means being positioned for actuation by said cam link means.

4. A latch mechanism according to claim 3 wherein said valve-controlled conduit means includes

a relief valve connected to said differential-fluid-pressure-operated motor and vented to atmospheric pressure.

5. A latch mechanism for latching a closure member to a support member by engagement with a striker fixed to one of said members including

a latchbolt pivotally mounted on said other member for movement between an unlatched position and a latched position relative to said striker,

a differential-fluid-pressure-operated motor means for moving said latchbolt to said latched position,

cam link means connecting said differential-fluid-pressure-operated motor means to said latchbolt,

bias means connected to said cam link means to normally bias said latchbolt to said unlatched position,

fluid-control means including first valve means and second valve means connected to said differential-fluid-pressure-operated motor means and to sources of fluid, said first valve means being selectively operable and said second valve means being positioned for actuation by said cam link means, and

detent means swingably mounted for releasably retaining said latchbolt in said latched position and engageable by said cam link means to release said latchbolt.