United States Patent

[11] **3,572,065**

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[54] **CLOSURE LATCH**
10 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **70/156,** 292/201, 292/302, 292/335, 292/341.13, 292/341.15
[51] **Int. Cl.** **E05b 65/19,** E05c 3/30, E05c 11/00
[50] **Field of Search** 70/137, 142, 156, 157, 240, 279, 282; 292/201, 302, 335, 341.13, 341.15, 341.16; 49/35

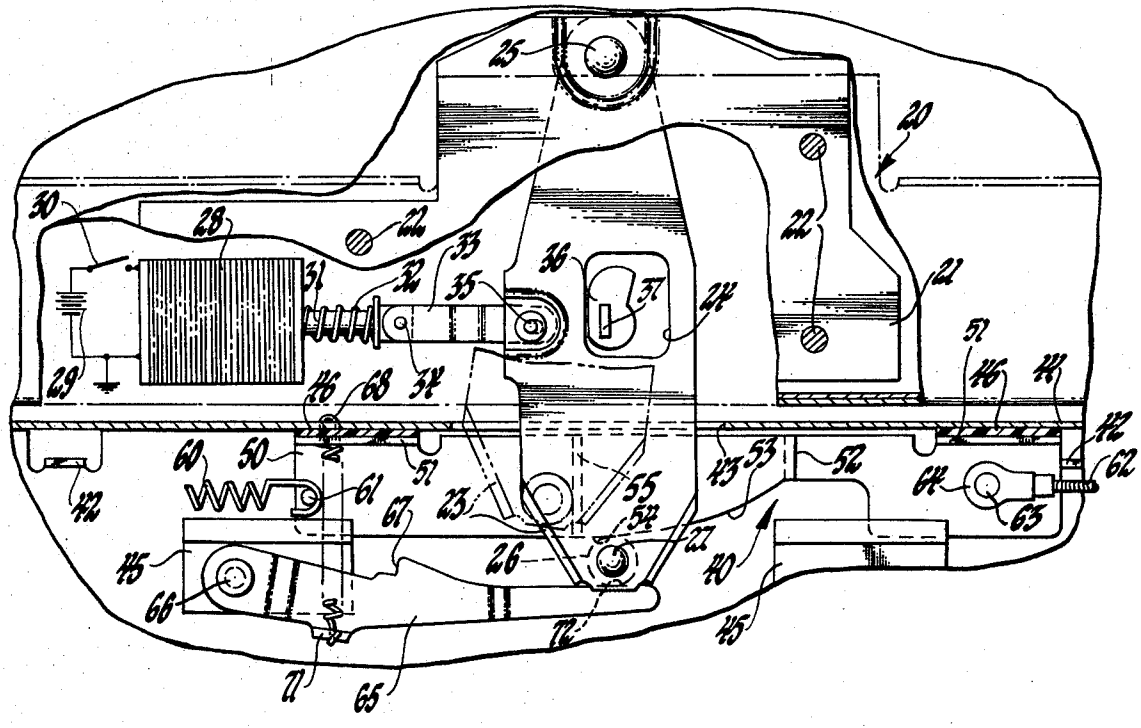
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ABSTRACT: A closure latch for a vehicle body deck lid or the like includes a striker pivotally mounted on the deck lid for movement from a first position in operative relation to a latch member slideably mounted to the vehicle body to a second position out of engagement with the wedge plate, movement of the striker to the second position to unlatch the deck lid being effected by a power source from within the vehicle or by a conventional key lock from the exterior of the vehicle. The latch member is slideably mounted on the vehicle body for movement from an unlatched position to a latched position relative to the striker and is power driven to the latched position.



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SHEET 1 OF 2

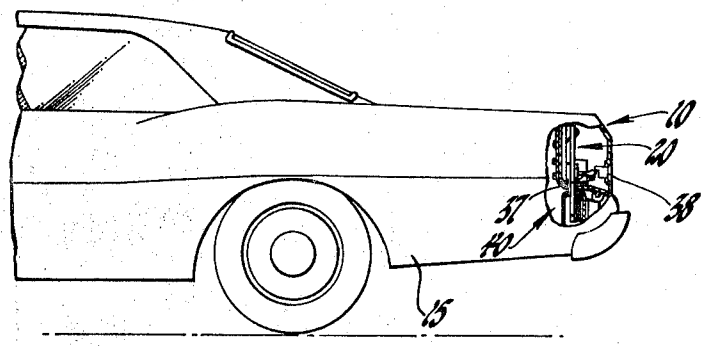


Fig. 1

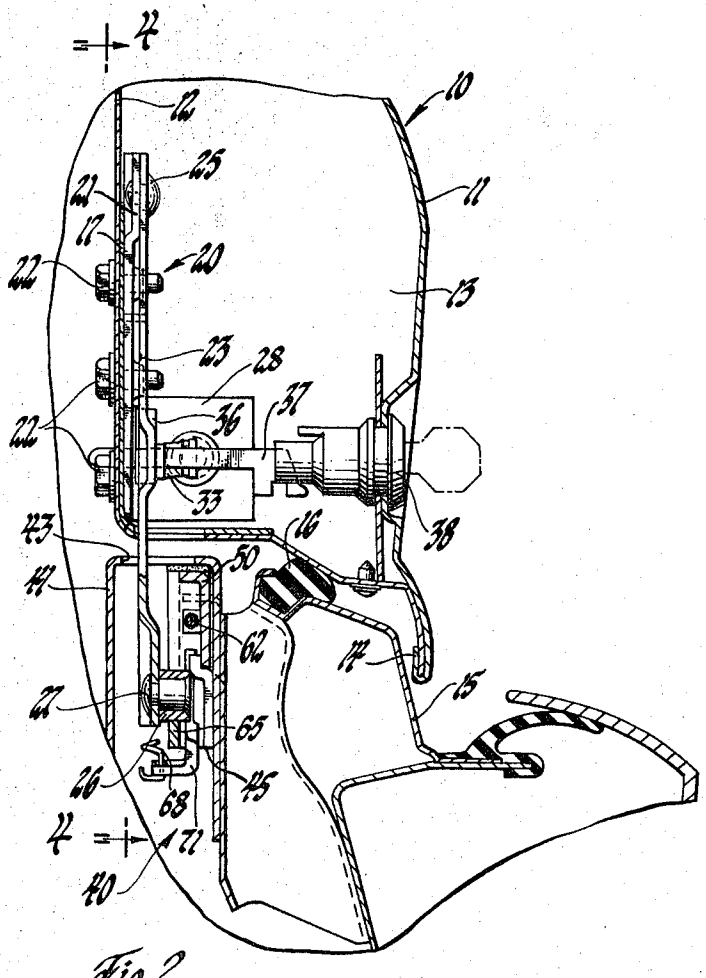


Fig. 2

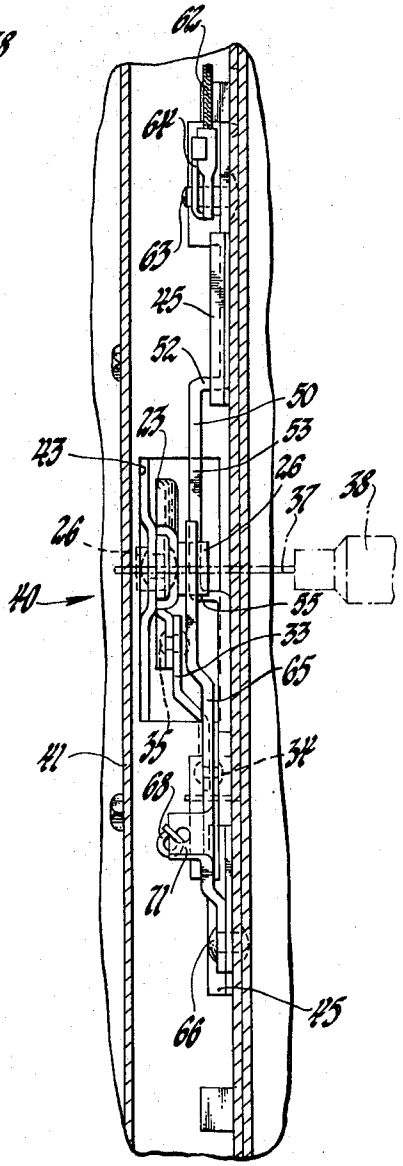


Fig. 3

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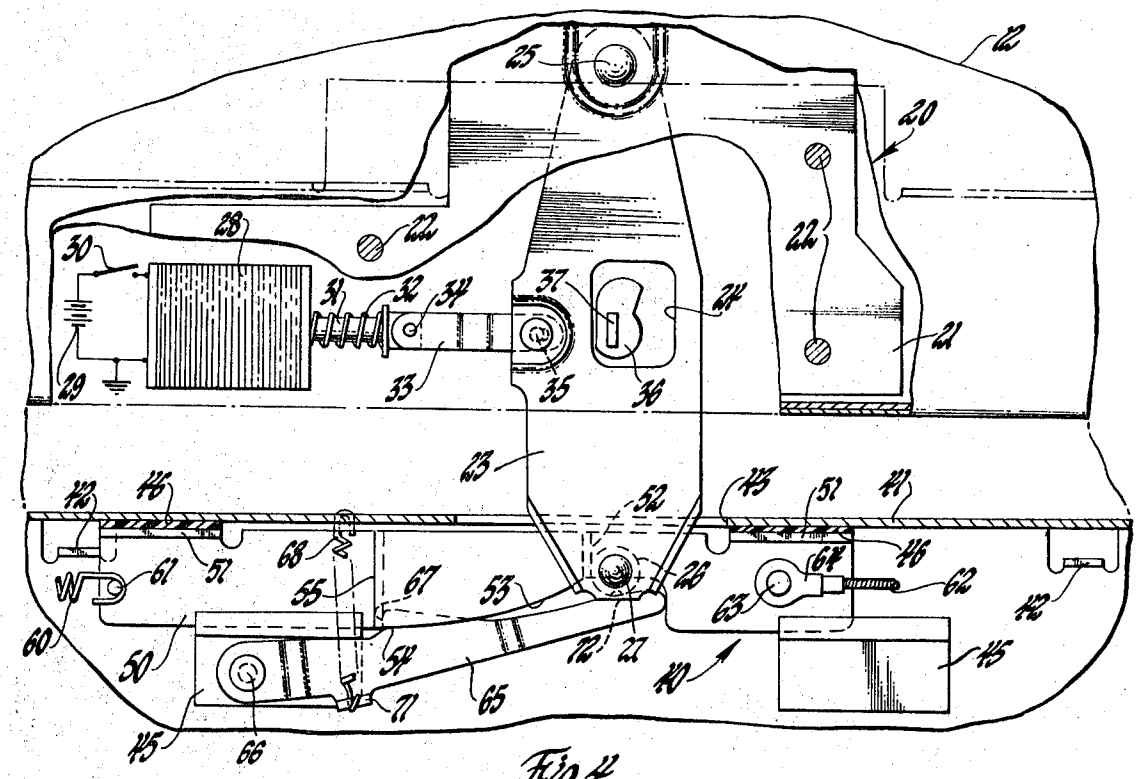


Fig. 4

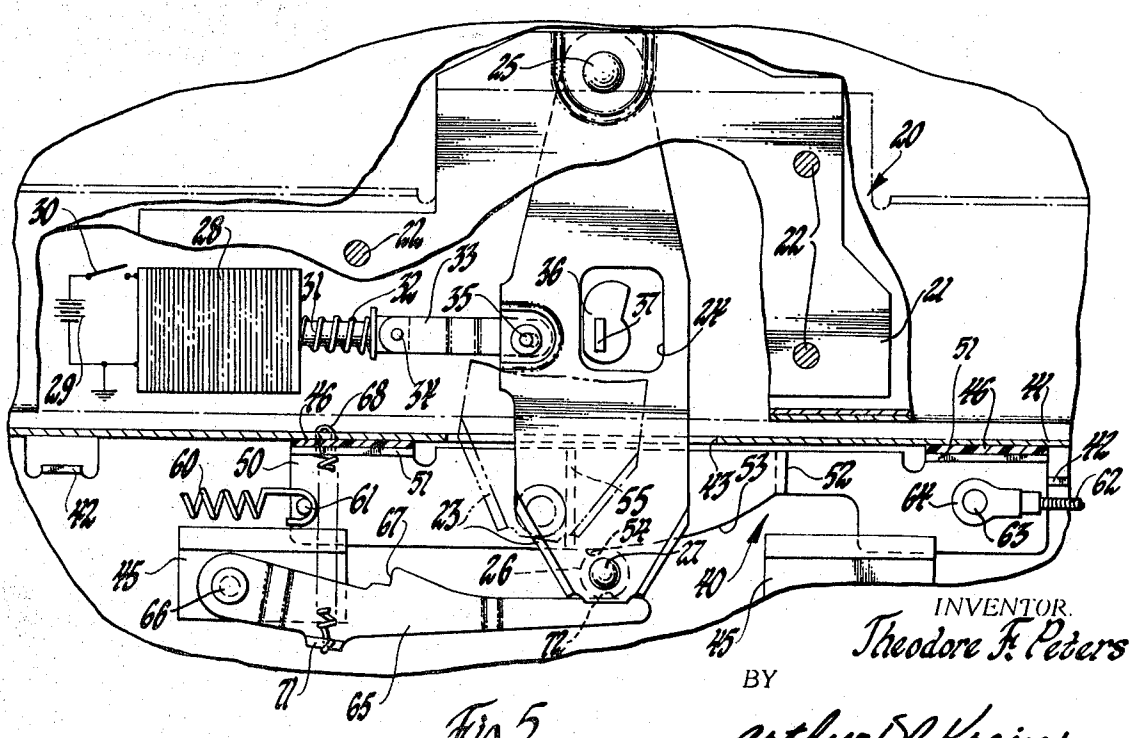


Fig. 5

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CLOSURE LATCH

This invention relates to closure latches and more particularly to an improved power-operated vehicle closure latch.

In various applications of closure latches, for example, in motor vehicle deck lids, it is desirable that the closure latch be capable of closing the deck lid tightly against the vehicle body assuring adequate compression of a conventional sealing gasket therebetween. It is also desirable that this compression of the sealing gasket be accomplished without reliance upon the operator closing the deck lid with sufficient force to compress the gasket. A further desirable feature is that the closure latch be operable either from within the interior of the vehicle or from the exterior thereof to unlatch the deck lid to permit its movement to a fully opened position.

Accordingly, the primary object of this invention is to improve a closure latch mechanism whereby the closure latch is power actuated for moving a vehicle deck lid or similar member from a partially closed position to a fully closed position with a sealing gasket effectively compressed between the deck lid and the vehicle body.

Another object of this invention is to improve closure latch mechanisms whereby a latch release mechanism for the closure latch is operable selectively from either the interior or exterior of the vehicle.

A further object of this invention is to improve closure latch mechanisms whereby all of the above-described desirable features are incorporated into a closure latch.

According to the embodiment of the invention disclosed, these and other objects are achieved by providing a closure latch having a striker pivotally mounted to the deck lid to be in normal operative relation with a power-actuated pulldown latch member in the form of a wedge plate reciprocably mounted to the vehicle body, with movement of the striker out of operative relation to the wedge plate being effected either by a power source from within the interior of the vehicle or by a conventional key lock assembly externally of the vehicle.

A more complete understanding of this invention will be had by referring to the following detailed description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a fragmentary, partly broken away elevational view of a vehicle body having a closure latch according to this invention mounted thereon;

FIG. 2 is an enlarged view of a portion of FIG. 1 with the closure latch of the invention illustrated in closed position;

FIG. 3 is a bottom view of the closure latch of FIG. 2;

FIG. 4 is a view of the closure latch taken along line 4–4 of FIG. 2 with parts broken away to show details of the structure, but with the deck lid in partially closed position; and,

FIG. 5 is a view similar to FIG. 4 but with the deck lid in fully closed position.

Referring now in particular to FIGS. 1 and 2 of the drawings, a vehicle deck lid 10 includes an outer panel 11 and an inner panel 12 secured in spaced relation to each other at their rear portions to provide a housing 13 at the back of the deck lid. The rear portions are secured together by bending a flange 14 of the outer panel over an edge portion of inner panel 12, as shown, although other means can be used to join these panels together. It will be understood, of course, that the deck lid is swingably mounted at its forward edge portion, not shown, to the vehicle body 15 for movement between open and closed positions in relation to the vehicle body, only the closed position being shown. Preferably, the deck lid is swingably mounted by spaced conventional counterbalanced spring hinges, one of which has connected thereto an energy storage device, of the type disclosed in U.S. Pat. 3,056,619 granted to Robert M. Fox and James D. Leslie on Oct. 2, 1962, which is operative to store operating energy as the deck lid moves from a fully open position to a partially closed position.

The closure latch constructed in accordance with the invention includes a striker assembly 20 mounted in housing 13 of the deck lid 10 and a power-actuated latch assembly 40 mounted to the vehicle body in operative relation to the striker assembly.

Striker assembly 20 includes a mounting bracket 21 suitably secured to inner panel 12 and backing plate 17, secured as by welding to the inner panel, by bolts 22. A striker plate 23 is pivotally supported on the mounting bracket 21 by a pivot stud 25 extending through a suitable aperture in the upper end of the striker plate 23 and in the mounting bracket 21. At its opposite or lower end, the striker plate is provided with a striker which can be formed integral therewith or preferably, as shown, the striker can be a separate element such as striker roller 26 rotatably mounted to it as by stud shaft 27 and intermediate these ends a cam aperture 24 is formed in the striker plate.

Pivotal movement of the striker plate 23 about the axis of pivot stud 25, from a lock position as shown in FIGS. 4 and 5 to an unlocked position shown by broken lines in FIG. 5 for a purpose to be described, can be done either from the interior of the vehicle or from the exterior of the vehicle. For pivotal movement of the striker plate 23 from the interior of the vehicle, there is provided a suitable remotely controllable power push-pull device, which in the embodiment shown is a solenoid 28 secured to mounting bracket 21 and suitably connected to the vehicle power supply 29 by a normally open control switch 30, shown schematically in FIG. 4, which may be located on the dash of the vehicle. A link 33 is pivotally secured at one end by pin 34 to the armature 31 of the solenoid, the opposite end of the link 33 being provided with a slot to receive shoulder pin 35 by which it is pivotally and slideably secured to striker plate 23 intermediate the ends thereof. When the striker plate 23 is swung clockwise about the axis of pivot stud 25 to the position shown by broken lines in FIG. 5, the link 33 moves the armature 31 toward and into the solenoid 28 compressing the spring 32.

The armature 31 is normally biased to the right, as seen in FIG. 4, when the solenoid is in a deenergized condition by spring 32 encircling the armature and abutting at one end against the body of the solenoid and at the other end against the shoulder of the armature whereby the striker plate is normally biased to the locked position.

Movement of the striker plate 23 from the exterior of the vehicle is done by means of cam 36 swingably mounted for movement within the cam aperture 24 in the striker plate 23, the cam 36 being provided with a square-shaped bore which receives the complementary-shaped end of a shaft 37. Shaft 37 is part of a key cylinder assembly 38, shown schematically in FIGS. 2 and 3, mounted on the outer panel 11 of the deck lid 10. The key cylinder assembly is of a known type and upon insertion of a key therein, the shaft 37 can be turned to in turn rotate the cam 36 for a purpose to be described. However, when the key cylinder assembly 38 is in the locked position, cam 36 is in the position shown in FIGS. 4 and 5 but when the key is inserted and turned, the cam 36 will be rotated in a counterclockwise direction as seen in these same FIGS. The flat side of cam 36 also acts as a stop for the striker plate, thus limiting the extent of its swing in a counterclockwise direction.

Referring now to the latch assembly 40 mounted to the vehicle body 15, it includes a substantially inverted U-shaped frame 41 secured by one leg to the vehicle body, as by welding, to support the remaining elements of this assembly. A pair of guide plates 45 are secured to the frame 41, as by welding, in spaced relation to each other to between them and the cross leg of frame 41 support a latch plate in the form of wedge plate 50 for reciprocating movement, that is, for sliding movement from the left to right and back again, between an unlatched position as seen in FIG. 4 and a latched position as seen in FIG. 5, relative to the striker roller 26, this movement being limited in opposite directions by stops 42 in the form of turned over flanges provided in frame 41. Slide pads 46 are secured to in turned flanges 51 at opposite ends of latch plate 50 to reduce the frictional contact between the latch plate and the cross leg of frame 41 when the latch plate is forced upward during engagement with striker roller 26.

Latch plate 50 is provided with a first vertical cam portion 52, inclined cam ramp 53, substantially horizontal dwell por-

tion 54 and a second vertical cam portion 55, all offset from the main body portion of the latch plate for a purpose to be described. The latch plate 50 is normally biased to the left to the unlatched position, as shown in FIG. 4, by a spring 60 secured at one end by pin 61 to latch plate 50 and at its other end, not shown, to frame 41. The latch plate 50 is moved to the right to the latched position, as shown in FIG. 5, by a pull cable 62 connected at one end by stud 63 and clip 64 to the latch plate 50 and at the other end, not shown, to a suitable source of intermittent power, such as an energy storage device of the type disclosed in the aforementioned U.S. Pat. 3,056,619 to Fox et al.

A hook 65 is pivotally secured at one end by stud pin 66 to the left-hand guide plate 45, as seen in FIGS. 4 and 5, and is provided intermediate its ends with a catch portion or detent 67 to engage the backside of cam portion 55 of latch plate 50 to hold the latch plate in the unlatched position, necessary while arming the energy storage device previously described. The hook 65 is normally biased in a counterclockwise direction, as shown in FIG. 4, to engage the latch plate and retain it in the unlatched position by means of spring 68 having one end engaging the apertured tab 71 formed on hook 65 and the other end engaging an apertured portion of frame 41. The opposite end or free end of the hook is provided with a cam portion 72 extending into position beneath the opening 43 in frame 41 to be engaged by striker roller 26, as described hereinafter, to effect rotation of hook 65 in a clockwise direction to the position shown in FIG. 5 to release the wedge plate 50.

Referring now particularly to FIGS. 4 and 5 of the drawings, the operation of the closure latch and, particularly, the relationship of the various elements to each other from an unlatched position, as shown in FIG. 4 to a fully latched position, as shown in FIG. 5 will now be described. Assuming that the deck lid is in the fully open position, when the operator begins to close the deck lid, energy will begin to be stored in the energy storage device to arm it for moving the latch plate to the right as seen in FIGS. 4 and 5. Although energy is being stored in this device, it cannot be used to move the latch plate at this time because the latch plate 50 is restrained in the position shown in FIG. 4 by engagement of detent 67 of hook 65 with the latch plate 50.

When the deck lid is lowered further to a substantially closed, but not fully closed position, the striker roller 26 on striker plate 23, which would be in a substantially vertical locked position held there by spring 32 of solenoid 28, not energized at this time, and by the flat portion of cam 36 within cam aperture 24 of striker plate 23, it being assumed that the key cylinder assembly 38 is in lock position, will pass through opening 43 in frame 41, passing by vertical cam portion 52 of latch plate 50 into contact with the cam portion 72 of hook 65 causing the hook 65 to rotate clockwise against the biasing action of spring 68, this position of the elements being illustrated in FIG. 4.

Further downward travel of the striker roller 26 will bring it beneath the lower edge of the vertical cam portion 52 and adjacent to cam ramp 53 while at the same time affecting sufficient clockwise rotation of hook 65 so that detent 67 will disengage from latch plate 50, thus freeing the latch plate for movement from the unlatched position as shown in FIG. 4 to the latched position shown in FIG. 5. However, by this time, the energy storage device is fully armed with sufficient energy, sufficient to overcome the force of spring 60 and to compress the conventional sealing gasket 16 between the deck lid 10 and vehicle body 15, and it now slides the latch plate 50 via pull cable 62 to the right to the latched position shown in FIG. 5. As the latch plate 50 moves to this position, cam ramp 53 engages striker roller 26 pulling it and therefore the deck lid to a lower position, that is, toward a fully closed position in which the sealing gasket 16 is compressed between the deck lid and the vehicle body. Thus, the cam ramp 53 of the latch plate serves as a wedge and for this reason latch plate 50 has also been referred to as a wedge plate now slideable against the connecting leg of frame 41 and the striker roller 26 to wedge the striker roller downward. Striker roller 26 will ride down under cam ramp 53 onto the dwell portion 54 at which time the latch plate has reached the latched position and the deck lid is now in a fully closed position. Thus, the closure latch of the invention effectively locks the deck lid in a fully closed position with the sealing gasket effectively compressed between the deck lid and vehicle body; the operator having exerted only minimum effort to effect this closure and compression of the sealing gasket.

As previously described, unlatching of the closure latch can be accomplished either from the interior of the vehicle or from the exterior of the vehicle. From the interior of the vehicle, the operator wishing to move the deck lid from the fully closed position toward the open position merely energizes solenoid 28, thereby causing armature 31 to retract, move to left as seen in FIG. 5, to rotate the striker plate 23 via connecting link 33 clockwise to the moved position or unlocked position shown by broken lines in this FIG., forcing the striker roller 26 to roll off the edge of cam dwell portion 54 adjacent vertical cam portion 55 allowing the deck lid to move upward under the influence of the conventional counterbalanced spring hinges. When the deck lid is thus moved upward, a sufficient distance to allow striker roller 26 to move beyond the upper edge of second vertical cam surface 55 of latch plate 50, movement of the latch plate is not longer restrained. The deck lid 10 is now free to be moved by the operator to the fully open position. As the deck lid is moved to the fully open position, the energy storage device is deactuated releasing the pull on pull cable 62 permitting spring 60 to slide latch plate 50 to the left back to the unlatched position shown in FIG. 4. In the meantime, the upward travel of striker roller 26 has permitted hook 65 to rotate counterclockwise under the biasing force of spring 68 until detent 67 of the hook engages with the latch plate 50 to again lock it in the unlatched position of FIG. 4 preparatory to another latching cycle.

In a similar manner opening of the closure latch from the exterior of the vehicle is accomplished by turning the key of the key cylinder assembly 38 to rotate cam 36 counterclockwise to swing the striker plate clockwise, to the unlocked position shown by broken lines in FIG. 5, forcing the striker roller 26 to roll off the edge of dwell portion 54 adjacent vertical cam portion 55 allowing the deck lid to move upward under the influence of the conventional counterbalanced spring hinges, as previously described.

Thus, this invention provides a deck lid closure latch which is power operated to move the deck lid to a fully closed position after an operator outside the vehicle has moved the deck lid so as to cause the striker assembly to engage the latch assembly. The closure latch is also operable from either the interior of the vehicle or from the exterior of the vehicle to unlatch the deck lid by disengaging the striker assembly from the latch assembly.

Although the closure latch of this invention has been shown and described in conjunction with a vehicle deck lid, it is obvious that it will be useful in conjunction with other vehicle closures or other closure mechanisms.

While a specific embodiment of this invention has been shown and described, various changes and modifications may be made without departing from the scope and spirit of the invention.

I claim:

1. A closure latch mechanism for latching a closure member to a support member, the closure member being swingably mounted for movement between open and closed positions relative to the support member, the closure latch mechanism including:

striker means pivotally mounted on one of said members for movement from a locked position to an unlocked position;

actuator means connected to said striker means for moving said striker means between said locked position and said unlocked position;

latch means slideably mounted on said other member for movement normal to the axis of pivotal movement from an unlatched position, to a latched position, said latch means when moving from said unlatched position to said latched position being engageable with said striker means when said striker means is in said locked position to pull said members into a fully closed position relative to each other;

a biased detent means positioned to normally engage and hold said latch means in said unlatched position and to be engaged by said striker means when said striker means is in said locked position to release said latch means; and

latch moving means connected to said latch means for moving said latch means between said unlatched position and said latched position.

2. A closure latch mechanism according to claim **1** wherein said striker means includes:

a striker plate; and

a striker roller rotatably mounted on said striker plate in operative relation to said latch means; and

wherein said latch means includes:

a wedge plate having an offset cam and an offset dwell portion integral therewith and contiguous to each other whereby said striker roller first engages said cam and then said dwell portion as said latch means is moved from said unlatched position to said latched position.

3. A closure latch mechanism according to claim **1** wherein said latch moving means includes;

power connector means connected to one end of said latch means and connectable to a source of intermittent power to effect power driven movement of said latch means from said unlatched position to said latched position; and

bias means connected to said latch means to normally bias said latch means to said unlatched position.

4. A closure latch for latching a closure member to a support member, the closure member being swingably mounted for movement between open and closed positions relative to the support member, the closure latch mechanism including:

striker means mounted on one of said members for pivotal movement about an axis from a locked position to an unlocked position;

latch means slideably mounted to said other member for movement normal to said axis of pivotal movement from an unlatched position to a latched position, said latch means engaging said striker means when moved to said latched position to effect closure;

biased detent means swingably positioned to releasably hold said latch means in said unlatched position and engageable by said striker means to release said latch means;

means connected to said latch means and connectable to a source of intermittent power for moving said latch means from said unlatched position to said latched position;

bias means connected to said latch means to normally bias said latch means to said unlatched position; and

actuator means connected to said striker means for moving said striker means from said locked position to said unlocked position whereby said striker means is disengaged from said latch means.

5. A closure latch according to claim **4** wherein said striker means includes:

a striker plate; and

a striker roller mounted on said striker plate for rotation about an axis parallel to said axis of pivotal movement; and

wherein said latch means includes:

a wedge plate having an offset cam and an offset dwell portion integral therewith and contiguous to each other

whereby said striker roller rolls across said cam and then onto said dwell portion as said latch means is moved from said unlatched position to said latched position.

6. A closure latch mechanism according to claim **4** wherein said actuator means includes:

power means operatively connected to said striker means to effect pivotal movement of said striker means from said locked position to said unlocked position; and

control means mountable in spaced relation to said striker means and connected to said power means for operation to selectively energize said power means.

7. A closure latch mechanism according to claim **4** wherein said actuator means includes

cam means swingably mounted for engagement with said striker means to effect pivotal movement of said striker means from said locked position to said unlocked position; and

means operatively connected to said cam means to pivot said cam means.

8. A closure latch for latching a closure member to a support member, the closure member being swingably mounted for movement between open and closed positions relative to the support member and connected to an energy storage device adapted to store operating energy as the closure member is moved from the open position to the closed position, the closure latch mechanism including;

striker means mounted on one of said members for pivotal movement about an axis from a locked position to an unlocked position, said striker means including a rotatable striker roller;

latch means slideably mounted to said other member for movement, at right angles to said axis of pivotal movement of said striker means, from an unlatched position to a latched position, said latch means when moving from said unlatched position to said latched position engaging said striker roller when said striker means is in said locked position to pull said members into a fully closed position relative to each other;

biased detent means swingably positioned to normally engage and hold said latch means in said unlatched position and to be engaged by said striker means when said striker means is in said locked position to release said latch means;

means connected to said latch means and connectable to said energy storage device for moving said latch means from said unlatched position to said latched position;

bias means connected to said latch means to normally bias said latch means to said unlatched position; and

actuator means connected to said striker means for moving said striker means from said locked position to said unlocked position, whereby said striker roller is disengaged from said latch means.

9. A closure latch according to claim **8** wherein said latch means includes: a wedge plate having an offset cam means and offset dwell means contiguous to each other whereby said striker roller engages said cam means and then said dwell means as said latch means is moved from said unlatched position to said latched position.

10. A closure latch according to claim **8** wherein said actuator means includes:

first means operatively connected to said striker means to normally bias said striker means to said locked position and operable to move said striker means to said unlocked position; and

second means mounted in spaced relation to said striker means and connectable to said first means to selectively operate said first means.