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3,408,100

TAIL GATE LATCH MECHANISM

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2 Sheets-Sheet 1

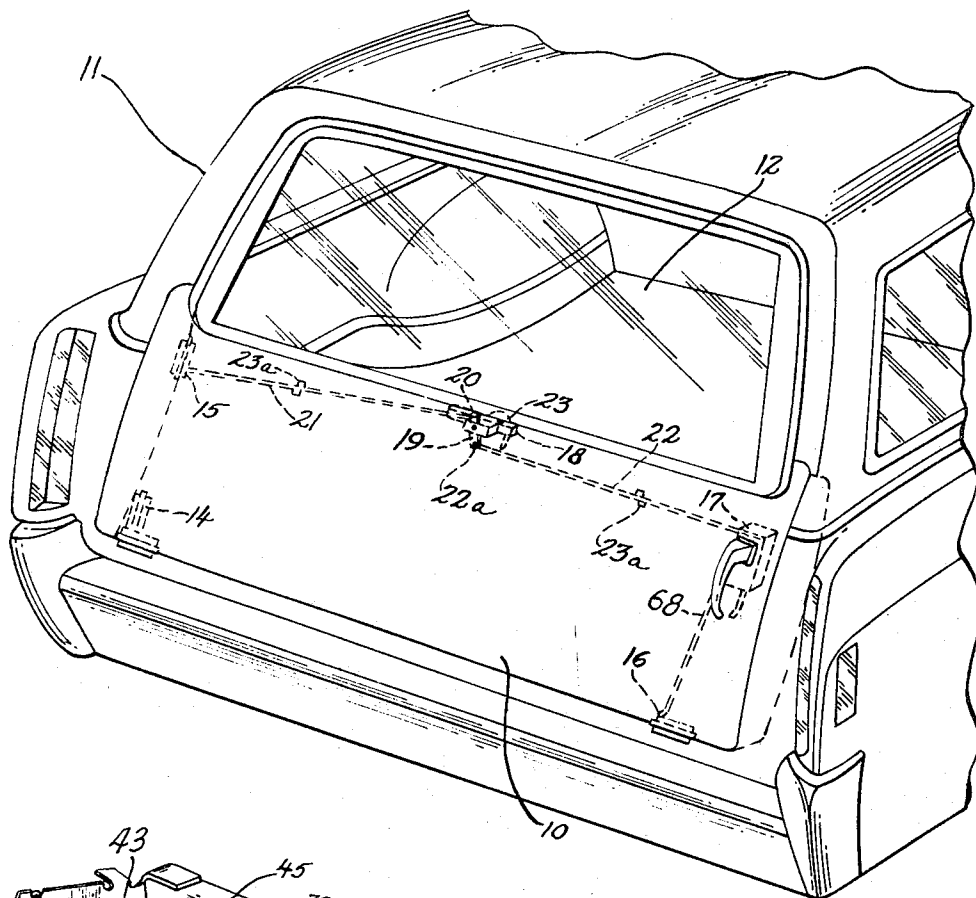


Fig. 1

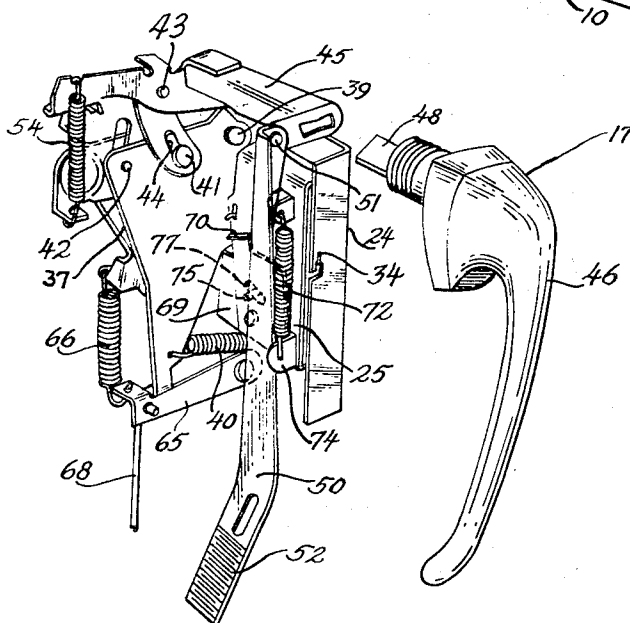


Fig. 2

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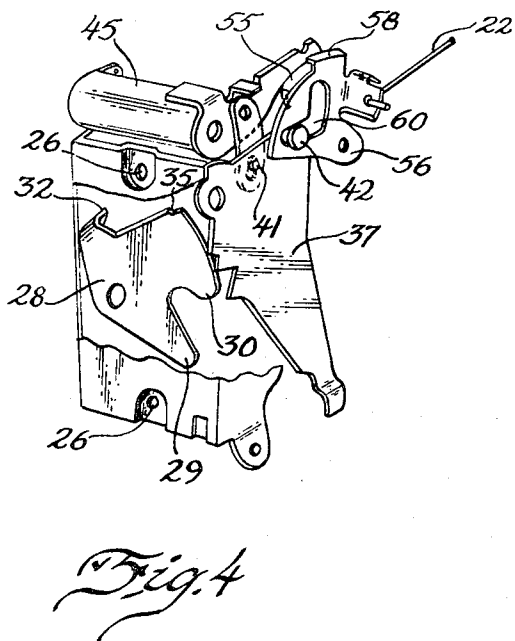
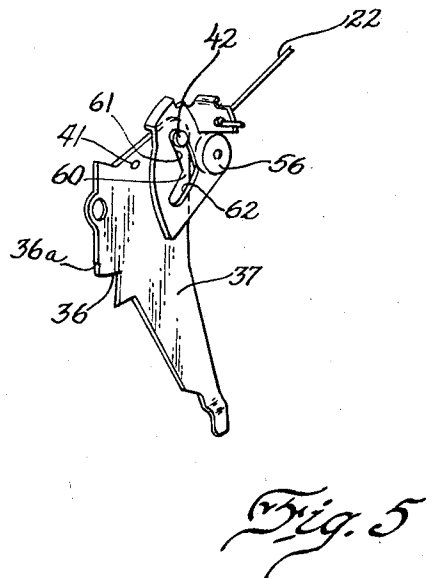
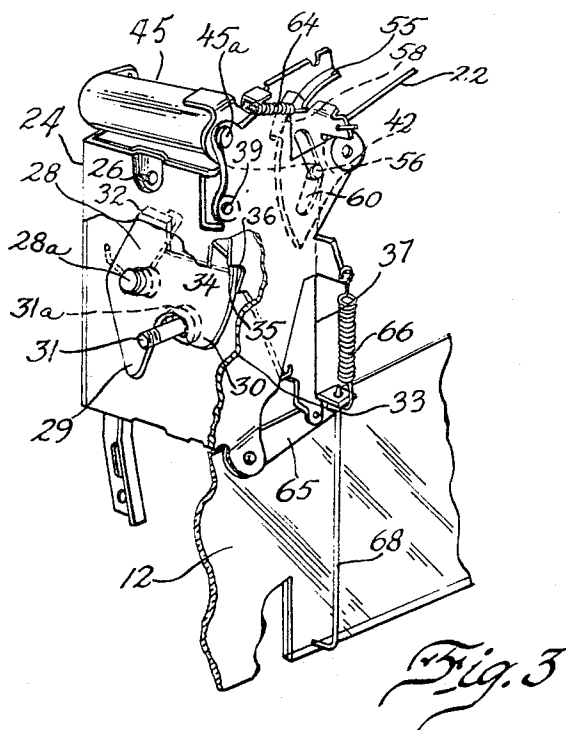
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TAIL GATE LATCH MECHANISM

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ABSTRACT OF THE DISCLOSURE

A mechanism for selectively operating a vehicle tail gate about either a pair of horizontal hinges or generally vertical hinges. The mechanism including a forked rotor for engaging a vehicle mounted striker, a pawl engaging the rotor and a pair of handle actuated levers constructed to selectively release the pawl. Actuation of one handle blocking movement of the other handle and vice versa primarily due to the slotted connection between the levers and the pawl. Actuation of one handle opening the latch mechanism and also the upper left latchable hinge for opening the tail gate about the horizontal hinges. Actuation of the other handle opening the latch mechanism and also the lower right latchable hinge for opening the tail gate about the vertical hinges.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention pertains to a mechanism for the selective operation of a vehicle tail gate about a horizontal or a generally vertical axis.

(2) Description of the prior art

The conventional dual action station wagon tail gate allows the tail gate to be lowered about a horizontal axis to provide a horizontal position as an extension of the floor cargo area. The tail gate can also be opened about a generally vertical axis as a door to permit access by passengers into the station wagon. Normally the dual action is accomplished by providing a lower hinge at the left rear of the station wagon (when facing the rear of same) that has horizontal and vertical hinge pins. The upper left hinge for door operation is also latchable to allow movement of the tail gate to the horizontal position. The lower right support may be a latchable hinge or a lock doubling as a hinge. The tail gate is opened as a door by actuation of the upper outside right rear latch mechanism through a suitable handle and as a conventional tail gate by actuation of the centrally located inside handle. Movement of the outside handle opens the right lower latchable hinge and the upper right mechanism while operation of the inside handle opens the upper left latchable hinge and the upper right mechanism.

Inasmuch as the tail gate is normally not a full door, the glass therefor is movable into suitable channels in the upper body. Consequently, to open the tail gate to either position requires the previous lowering of the window glass into the tail gate. When the glass is in the down position either the inside or the outside handle can be actuated.

A necessary feature of a dual type tail gate is the provision for selective operation of either the inside or the outside handle. Thus, if the tail gate is already open as a door, the inside handle cannot be actuated otherwise the tail gate will be left supported solely by the left lower hinge. Because of the weight of the door, this would cause damage to the tail gate or the balance of the station wagon. Similarly if the tail gate is in the open position as a drop gate for the extension of the cargo area the outside handle cannot be actuated lest the tail gate be left

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hanging on the lower left hinge. Of course, provision must also be made to prevent simultaneous actuation of both handles. Finally, the tail gate latch mechanism should be designed to be reasonably tamper-proof.

Heretofore, the conventional tail gate latch mechanism has included a double jawed type latch which squeezes a vehicle mounted striker. The latch can easily be closed manually with the tail gate open as a door which then makes possible the actuation of the inside handle with the aforementioned results.

Summary of the invention

Applicant's latch mechanism is designed to incorporate suitable blocking features to provide selective operation of the above noted handles and the associated linkage. Also, if both handles are operated simultaneously, the inside handle arrangement for drop gate operation overrides the outside handle and its linkage. A tamper-proof feature is also included in the latch mechanism.

Specifically, applicant's design for the upper right latch mechanism incorporates a fork type rotor for engaging a suitable, generally cylindrical striker or keeper mounted on the vehicle. The rotor which is spring loaded to the open position has detents engageable by a spring loaded, rotatably mounted pawl. A slotted lever for outside handle operation is provided to release the pawl and therefore the rotor to unlock the latch. A second slotted lever has a compound slot arrangement to permit movement thereof of the first lever without affecting same and to move the pawl upon actuation of the second lever. A tab on the second lever blocks the first lever when the handles are operated simultaneously and yet permits actuation by the second lever.

When the tail gate is open in any position the compound slot in the second lever and the tab prevent further actuation of the latch. A third blocking lever is provided to prevent motion of the pawl until the window glass is retracted into the tail gate. A fourth lever also is provided to block closing of the pawl when the rotor contacts the striker until moved by the enlarged safety collar of the striker. Thus, simultaneous movement of the rotor and fourth lever is needed to latch the mechanism when the tail gate is open to provide a reasonably tamper-proof feature. Of course, the pressure of the spring loaded pawl against the open rotor also restricts movement of same.

While conceivably various arrangements could be devised to perform all the functions of applicant's latch mechanism, it is felt that applicant has proved a unique design that solves the problem in a straight-forward and yet economical manner.

It is, therefore, an object of this invention to provide a new and improved tail gate latch mechanism for a dual action tail gate.

Another object of this invention is to provide a tail gate latch mechanism for a dual action tail gate that provides selective action of the mechanism therefor to pivot the tail gate on a horizontal or a vertical axis.

Another object of this invention is to provide a tail gate latch mechanism for a dual action tail gate that prevents simultaneous operation of the mechanisms therefor to pivot the tail gate about the horizontal and vertical axis.

Another object of this invention is to provide a tail gate latch mechanism for a dual action tail gate that incorporates tamper-proof features.

Brief description of the drawings

FIGURE 1 is a perspective view of the rear of a station wagon having a dual action type tail gate that employs the novel latch mechanism of this invention. The lower left dual axis hinge and the upper left and lower

right latchable hinges are only shown schematically as they do not form a part of this invention;

FIGURE 2 is a perspective and partially exploded view of the upper right tail gate latch mechanism of this invention in the closed position, with the vehicle tail gate not shown in the interest of clarity;

FIGURE 3 is a perspective view of the latch mechanism (also in the closed position) but from the opposite side with a part of the plate of the mechanism cut away in the interest of clarity;

FIGURE 4 is a perspective view from the same direction as FIGURE 3, but showing the latch mechanism in the horizontal tail gate open position, with the plate again cut away in the interest of clarity; and

FIGURE 5 is a perspective view from the same direction as FIGURE 3 showing the latch mechanism in the tail gate vertical open position, with parts deleted in the interest of clarity.

Description of the preferred embodiment

Referring to FIGURE 1, 10 indicates a dual action tail gate for station wagon 11. Tail gate 10 has glass 12 which is movable between the tail gate and the upper portion of the body of wagon 11. Tail gate 10 is mounted on wagon 11 for movement about a horizontal axis as a standard tail gate and about a generally vertical axis as a door. The action about either axis is accomplished by means of lower left hinge 14, upper left latchable hinge 15, lower right latchable hinge 16 and upper right latch mechanism 17.

The lower left hinge 14, and upper left and lower right latchable hinges 15 and 16 respectively, are only shown schematically as they do not form a part of this invention. Lower left hinge 14 has a pair of hinge pins which are parallel to the aforementioned axes which permit movement of the tail gate thereabout. Upper left latchable 15 has a generally vertical hinge pin that permits movement of the tail gate 10 thereabout when used as a door, and yet may be unlatched for the horizontal positioning of tail gate 10. Lower right latchable hinge 16 has a somewhat similar construction as hinge 15 except that the pin is located in a horizontal position.

The control system for operating the tail gate 10 about a horizontal axis includes a bracket 18 fixedly mounted on the interior of the tail gate. A crank 19 is pivotally mounted on bracket 18 and has one arm 20 connected to rod 21, and the other arm 22a connected to rod 22. Rod 21, which may be a spring wire, is connected to the latchable portion of upper left latchable hinge 15. Similarly, rod 22 is connected to upper right latch mechanism 17 by a lost motion connection. Handle 23 located inside of station wagon 11 is connected to crank 19 for actuation thereof. To prevent rattles of rods 21 and 22, clips 23a are mounted on the tail gate to provide a lateral bias thereto to deflect the rods from a straight line position.

Referring to FIGURES 2 through 5, the upper right latch mechanism 17 of this invention is shown in detail. Mechanism 17 includes plate 24 and cover 25 affixed thereto as by welding or the like. A pair of holes 26 are provided for attaching latch mechanism 17 to the tail gate 10. Rotor 28 is rotatably mounted on shaft 28a, which extends between plate 24 and cover 25 and which is rigid therewith. Rotor 28 has elongated tines or forks 29 and 30 for engaging therebetween vehicle mounted striker or keeper 31. Rotor 28 has a tab 32 engaged by clock type spring 34 which also is connected to plate 24. Spring 34 urges rotor 28 to an unlatched position relative to keeper 31. Plate 24 has an opening 33 for keeper 31 to move therethrough to engage rotor 28. A rotor detent 35 is engageable by pawl detent 36 of pawl 37 when the rotor is in the fully latched position relative to keeper 31. Pawl detent 36a (FIG. 5) provides an intermediate latched position with keeper 31.

Pawl 37 is rotatably mounted on plate 24 by means of pivot pin 39, and is located at an angle of approximately

90° relative to rotor 28. Coil spring 40 urges pawl 37 toward engagement with rotor 28. Pawl 37 also has a first pin 41 and second pin 42 projecting therefrom. Pin 41 is adapted to be engaged by slotted opening 44 in first lever 45. Slotted opening 44 is located in a portion of composite first lever 45. First lever 45 is formed from various stampings joined together to form an integral whole. The portion of first lever 45 including slotted opening 44 being connected to the balance of the lever preferably by rivet 43 or by welding. First lever 45 is also rotatably mounted on plate 24 by pin 45a. Outside handle 46 having a suitable extension 48 adapted to engage a suitable opening in first lever 45 is rotatably mounted on the outside of tail gate 10. Link means 50 is preferably pivotally mounted at one end 51 to first lever 45 and has serrated end 52 which is adapted to be connected to lower right latchable hinge 16 for actuation thereof.

First lever 45 also has a coil spring 54 extending therefrom and connected to plate 24. Spring 54 urges first lever 45 and therefore outside handle 46 toward a neutral position. First lever 45 also has a projection 55 extending therefrom. Rotatably mounted on plate 24 adjacent first lever 45 is second lever 56. Second lever 56 has a flange 58 adapted to over-ride projection 55 to block movement of first lever 45 when the tail gate is in the horizontal open position. Second lever 56 has also a slotted aperture 60 having a compound curvature for engaging pin 42. One part 61 of aperture 60 allows movement of pin 42 therein when the first lever 45 releases the pawl. This part 61 of aperture 60 in conjunction with pin 42 also prevents movement of second lever 56 when the first lever 45 has released the pawl 37. The second part 62 of aperture 60 is adapted to move pin 42 and therefore pawl 37 upon actuating of the second lever 56. In this condition, the second part 62 and flange 58 prevent movement of first lever 45 after the pawl has been released by the second lever 56. Pin 42 is in the center of aperture 60 in the latch closed position (see FIG. 3). Coil spring 64 attached to plate 24 urges second lever 56 to a non-blocking position relative to projection 55 of first lever 45, thereby allowing actuation of either lever to open upper right latch mechanism 17. Rod 22 is connected to second lever 56 with a lost motion connection primarily to simplify the assembly of the control system actuated by handle 23.

Conventional keeper 31 (see FIG. 3) has an enlarged head 31a to prevent disengagement from rotor 28 in the event of a collision. Keeper 31 also has a threaded end adapted for connection to side jambs of the tail gate opening.

To prevent movement of the pawl 37 to open upper right latch mechanism 17, a third lever 65 is rotatably connected to plate 24 (see FIG. 3). Coil spring 66 extending between plate 24 and lever 65 urges the third lever into a blocking position relative to pawl 37 in latched position of upper right mechanism 17. Wire 68 is hooked around the edge of glass 12 in the down position and also connected to third lever 65. Wire 68 may be journaled in a suitable clip (not shown) located in tail gate 10 to prevent lateral movement thereof. Movement of glass 12 into the tail gate moves wire 68 and the third lever 65 attached thereto to free pawl 37 for unlatching upper right mechanism 17.

No standard key locking provision is required for tail gate 10 inasmuch as the tail gate cannot be opened when the glass is in the full up position. Therefore entry cannot be gained into the station wagon through the tail gate. Also as a safety feature, the tail gate cannot be opened unless the glass is virtually completely retracted into the tail gate. A conventional window regulator arrangement may be provided to enable lowering of the tail gate glass from inside the station wagon. Also an electrically operated key actuated arrangement can be provided to lower the tail gate window from the outside of the station wagon. An inside electrical switch would permit lowering same from the inside of the station wagon.

A fourth lever 69 (see FIG. 2) is rotatably mounted on cover 25. Lever 69 has one end 70 adapted to slide between pawl 37 and rotor 28 to prevent engagement of same. Thus though pawl 37 is biased toward rotor 28 by spring 40, even if rotor 28 has been moved into position by striker 31 to have rotor detent 35 engaged by pawl detent 36 or 36a, end 70 of lever 69 will prevent this engagement or latching of mechanism 17. Of course lever 69 will not prevent the moving of pawl 37 away from rotor 28. Further movement of pawl 37 after unlatching is controlled by the slotted connections between pawl 37 and first lever 45 and second lever 56 as will later be detailed. Spring 72 extending between cover 25 and the other end 74 of lever 69 urges same to the above noted blocking position. Lever 69 has pin 75 projecting therefrom into the space between plate 24 and cover 25. Pin 75 extends through a slotted passage 77 in cover 25 and is adapted to be struck by safety collar 31a of striker 31 during the latching process. Thus to latch the latch mechanism 17 to keeper 31 requires that the keeper 31 force the rotor 28 back to a latching position relative to pawl 37 and simultaneously that collar 31a move pin 75 and thus lever 69 out of the way to permit the pawl 37 to engage the rotor 28.

In operation, the glass 12 of the station wagon 11 is first lowered into tail gate 10. As the bottom of glass 12 (FIG. 3) approaches its lowest position it contacts wire 68 and moves same downward. Since wire 68 is connected to third lever 65, it moves lever 65 from its normal blocking position relative to pawl 37, thereby freeing the pawl for movement.

If it is desired to open tail gate 10 as a door about a generally vertical axis (FIGS. 1, 2 and 5) outside handle 46 is turned clockwise when facing the rear of the station wagon 11. Handle 46 then moves first lever 45 and slotted opening 44 in the lever pulls pin 41 and therefore pawl 37 from engagement with rotor 28. Spring 34 then urges rotor 28 to an unlatched position relative to striker 31. Simultaneously with the movement of first lever 45, link means 50 attached thereto unlatches lower right latchable hinge 16, thereby freeing tail gate 10 for rotation about upper left latchable hinge 15 and lower left dual hinge 14. Movement of first lever 45 was possible because spring 64 (see FIG. 3) maintains second lever 56 out of the blocking position relative to first lever 45 in the mechanism latched position.

With the tail gate 10 open as a door (see FIGS. 2 and 5), spring 54 returns first lever 45, outside handle 46 and link means 50 toward a neutral position suitable for relatching the tail gate 10. If an attempt is made to turn inside handle 23 and therefore crank 19, rods 21 and 22 to unlatch upper left latchable hinge 15 and move second lever 56 and therefore pawl 37, pin 42 since being located in part 61 of slotted aperture 60 prevents rotation of second lever 56 about its pivot. With second lever 56 held stationary, handle 23 cannot be moved to open upper left latchable hinge 15.

With the tail gate 10 (FIGS. 1, 3 and 4) in the closed and latched position, actuation of inside handle 23 will cause rotation of crank 19. Crank 19 will pull rod 21 to open upper left latchable hinge 15. Crank 19 will also simultaneously pull rod 22 to move second lever 56. Part 62 of compound aperture 60 will pull pin 42 and therefore pawl 37 from engagement with rotor 28 thereby freeing striker 31. Pin 41 of pawl 37 is free to move in slotted opening 44 of first lever 45 without affecting same. Tail gate 10 is thus free for lowering about a horizontal axis extending between the lower left hinge and the lower right latchable hinge. A suitable cable (not shown) attached between the left door jamb of the station wagon may be used to maintain the tail gate in a horizontal open position. Also a torsion rod (not shown) connected between the tail gate 10 and the vertical portion of lower left hinge 14 may be used to provide an assist to return the tail gate to a latched position while allowing the rota-

tion of the tail gate as a door. Door checks may also be incorporated to maintain tail gate 10 in the open position when used as a door.

With the tail gate 10 open in the horizontal position, actuation of outside handle 46 and therefore first lever 45 will be blocked primarily by the position of second lever 56 (see FIG. 4). As best shown in FIGURE 4, flange 58 of second lever 56 will be located above projection 55 of first lever 45 preventing its movement. Also part 62 of slotted aperture 60 in conjunction with pin 42 will prevent movement of first lever 45. With the movement of first lever 45 blocked, it will not be possible to turn outside handle 46 to open lower right latchable hinge 16 by use of link means 50.

With the tail gate 10 closed, if an attempt is made to actuate inside handle 23 and outside handle 46 simultaneously, second lever 56 will move pawl 37 while blocking movement of first lever 45. This is due to the small movement of second lever 56 required to bring flange 58 over the projection 55 of first lever 45 to block action of same. Continued movement of second lever 56 will then release the tail gate 10 into the horizontal position.

One feature of applicant's tail gate latch mechanism that deserves mention is that light pressure by a person's fingers is not sufficient to move the rotor 28 to a latched position when the tail gate 10 is open as a door. This is due to the frictional resistance of the spring loaded pawl 37 against the rotor 28. As a consequence, it would not be a simple matter to damage the tail gate 10 by then actuating the inside handle 23 and thus releasing the upper left latchable hinge 15 which would leave the tail gate hanging on the lower left hinge 14. Similarly it would also be difficult to achieve the same end result, if tail gate 10 was open in the horizontal position and the outside handle 46 actuated. Further, simultaneous pressure must be applied to pin 75 to move fourth lever 69 in slotted passage 77 to enable the pawl to move into latched position relative to rotor 28.

Having thus described the invention it will be apparent to those skilled in the art that various modifications and changes can be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A latch mechanism comprising:

- (a) a support plate;
- (b) a rotor rotatably mounted on said plate, said rotor having a generally forked portion adapted to engage a striker therebetween, said rotor having a detent adapted for engagement by a pawl;
- (c) a pawl rotatably mounted on said plate, said pawl having a pawl detent adapted for engaging said rotor detent, said pawl having a pair of pins projecting therefrom;
- (d) first spring means for biasing said rotor to an open position for releasing the striker;
- (e) second spring means for biasing said pawl toward said rotor;
- (f) a first lever rotatably mounted on said plate, said lever having a slotted opening for engaging one of said pins for moving said pawl to unlatch said rotor from the striker, said lever having a projection extending therefrom; and
- (g) a second lever rotatably mounted on said plate, said lever having a slotted aperture having a compound curvature for engaging the other pin of said pawl, one part of said aperture being adapted to permit movement of said other pin upon actuation of said pawl by said first lever, the other part of said aperture being adapted to move said pawl by said other pin upon actuation of said second lever, said second lever also having a flange extending therefrom and covering said projection of said first lever for blocking movement of said first lever after said second lever has released said pawl and during simultaneous operation of both levers, said one part of

said aperture of said second lever being adapted in conjunction with said other pin to block movement of said second lever after said pawl has been released by said first lever.

2. The latch mechanism of claim 1 further comprising: 5
third spring means for biasing said second lever to a non-blocking position relative to said first lever when the latch mechanism is in the latched position.

3. The latch mechanism of claim 2 in which said pawl has a pair of pawl detents for engaging said rotor detent, the second pawl detent providing a partially latched, 10
safety position of said rotor relative to the striker.

4. The latch mechanism of claim 3 in which said rotor and said pawl are mounted on said plate at an angle of approximately 90 degrees therebetween. 15

5. A latch mechanism adapted for use with a vehicle dual action tail gate of the type wherein the tail gate glass is movable between the tail gate and the vehicle body, said latch mechanism comprising:

- (a) a support plate adapted to be mounted on the tail gate; 20
- (b) a rotor rotatably mounted on said plate, said rotor having a generally forked portion adapted to engage a striker therebetween, said rotor having a detent adapted for engagement by a pawl; 25
- (c) a pawl rotatably mounted on said plate, said pawl having a pawl detent adapted for engaging said rotor detent, said pawl having a pair of pins projecting therefrom; 30
- (d) first spring means for biasing said rotor to an open position for releasing the striker;
- (e) second spring means for biasing said pawl toward said rotor;
- (f) a first lever rotatably mounted on said plate, said lever having a slotted opening for engaging one of said pins for moving said pawl to unlatch said rotor from the striker, said lever having a projection extending therefrom; 35
- (g) a second lever rotatably mounted on said plate, said lever having a slotted aperture having a compound curvature for engaging the other pin of said pawl, one part of said aperture being adapted to permit movement of said other pin upon actuation of said pawl by said first lever, the other part of said aperture being adapted to move said pawl by 40
said other pin upon actuation of said second lever, said second lever also having a flange extending therefrom and covering said projection of said first lever for blocking movement of said first lever after said second lever has released said pawl and during simultaneous operation of both levers, said one part of said aperture of said second lever being adapted 50

in conjunction with said other pin to block movement of said second lever after said pawl has been released by said first lever;

(h) third spring means for biasing said second lever to a non-blocking position relative to said first lever when the latch mechanism is in the latched position; and

(i) means for blocking movement of the pawl from the latched position, said means being adapted to be actuated by the tail gate glass when in the substantially lowered position to move same from the blocking position.

6. The latch mechanism of claim 5 further comprising: a first handle mounted on said first lever for actuation thereof, and link means pivotally mounted on said first lever for movement therewith, said link means being adapted to be connected to a latchable hinge.

7. The latch mechanism of claim 6 further comprising: a rod connected to said second lever for movement therewith, a crank adapted to be mounted on the tail gate and having one arm connected to said rod, the second arm of said crank being adapted to be connected to a latchable hinge, and a second handle connected to said crank for actuation thereof.

8. The latch mechanism of claim 7 in which said rotor and said pawl are mounted on said plate at an angle of approximately 90 degrees therebetween.

9. The latch mechanism of claim 8 further comprising: fourth spring means for returning said first lever and said first handle attached thereto to a neutral position.

10. The latch mechanism of claim 9 in which said rod is made of spring wire and has a lost motion connection with said second lever and further comprising: a cover attached to said plate, a fourth lever rotatably mounted on said cover and having one end adapted to move between said pawl and rotor to prevent engagement thereof and having a pin projecting between the cover and plate, said pin being adapted to be contacted by a striker to move said fourth lever from between said pawl and rotor.

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