# United States Patent [19]

**Yoshimura**

[11] **3,767,243**

[45] **Oct. 23, 1973**


[54] **DOOR LATCH MECHANISM**


[75] Inventor: **Noboru Yoshimura**, Toyota, Japan

[73] Assignee: **Aisin Seiki Kabushiki Kaisha**, Kariya City, Japan



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**Related U.S. Application Data**

[62] Division of Ser. No. 75,848, Sept. 28, 1970, Pat. No. 3,705,738.

[30] **Foreign Application Priority Data**

Oct. 4, 1969 Japan ..... 44/94742

[52] **U.S. Cl.** ..... **292/216**, 292/DIG. 26

[51] **Int. Cl.** ..... **E05c 3/26**

[58] **Field of Search** ..... 292/198, 216, 280, 292/DIG. 25, DIG. 26



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*Primary Examiner*—Richard E. Moore

*Attorney*—Pierce, Scheffler & Parker



[57] **ABSTRACT**

An automotive door latch mechanism comprising a rotatable latch bolt in the form of a fork and a bolt-supporting shaft and a striker pin for engagement by said latch bolt, said mechanism including a cancelling lever to release engagement between the striker pin and the latch bolt, an open lever for actuating the cancelling lever and a locking lever for preventing the cancelling lever from releasing the engagement between the striker pin and the latch bolt.


**5 Claims, 9 Drawing Figures**

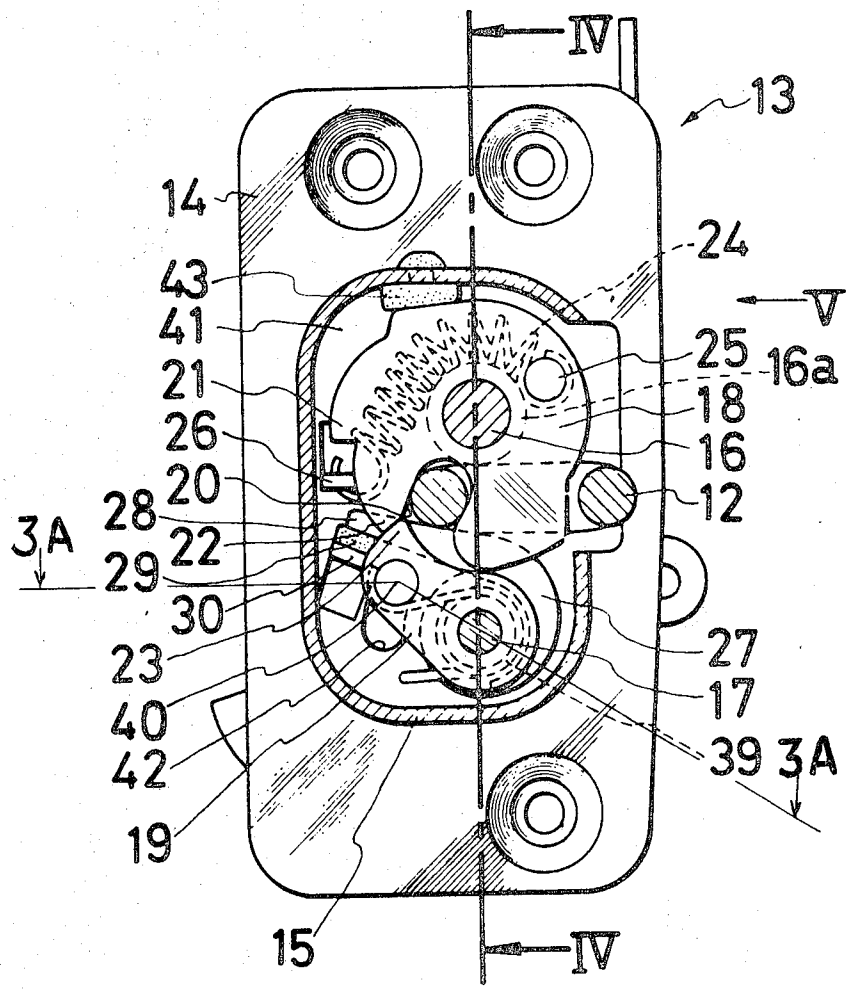
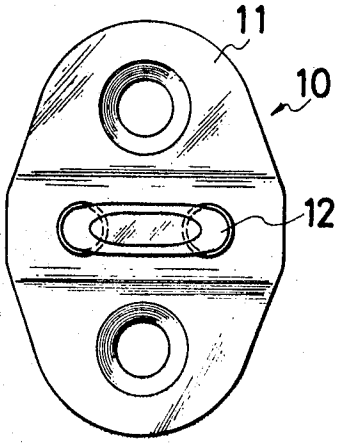


FIG. 1



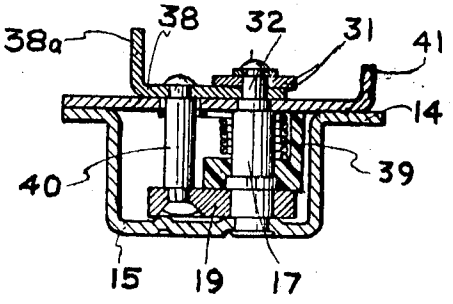




FIG 3a

FIG. 2

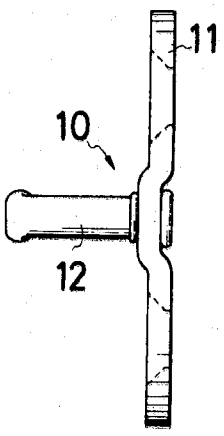



FIG. 3

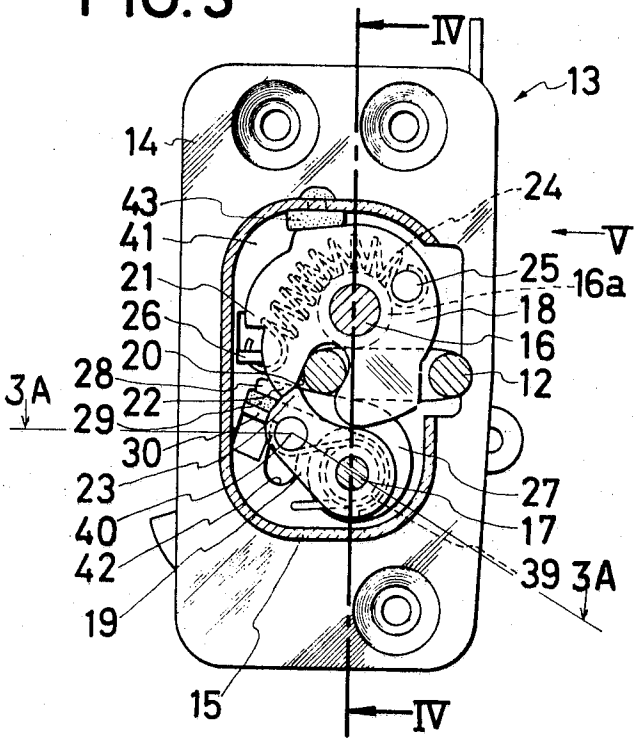


FIG.4

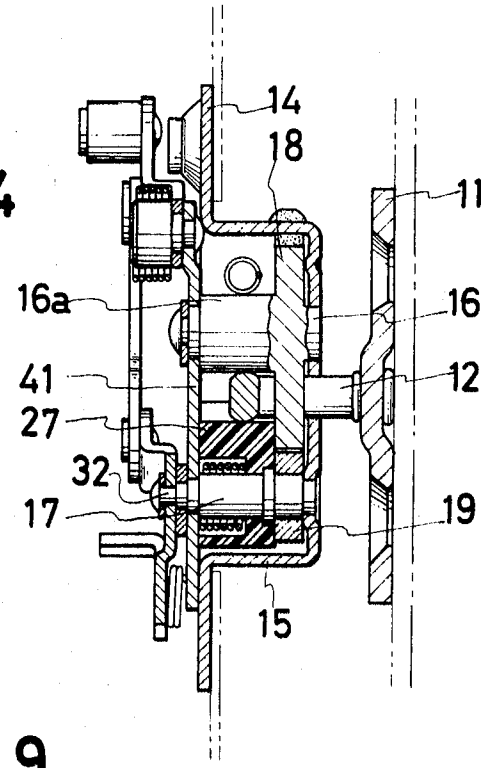



FIG.9

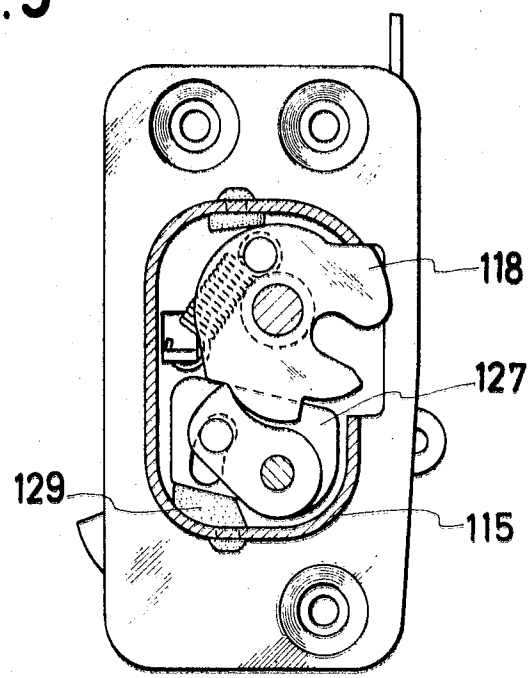


FIG.5

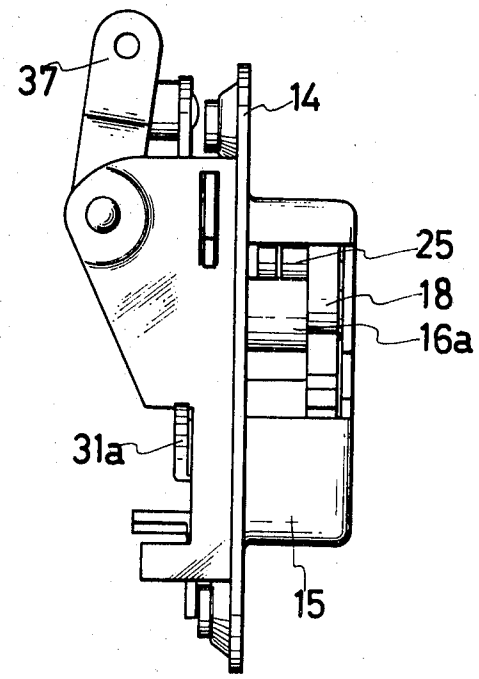

37
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25
18
16a
31a
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FIG.6

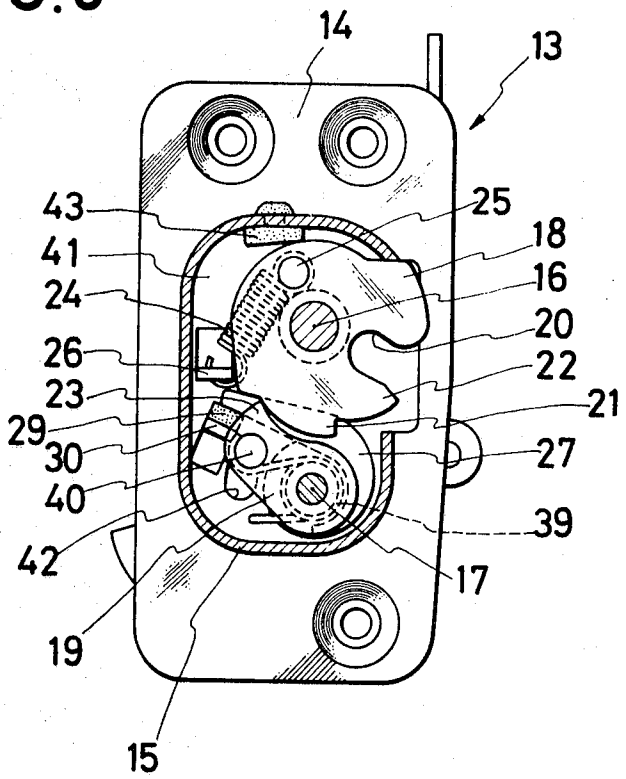

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FIG. 7

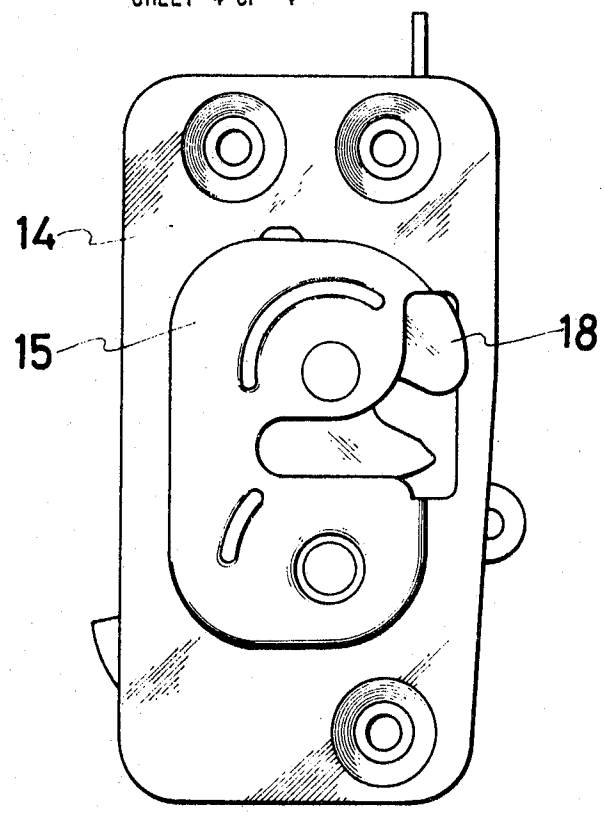
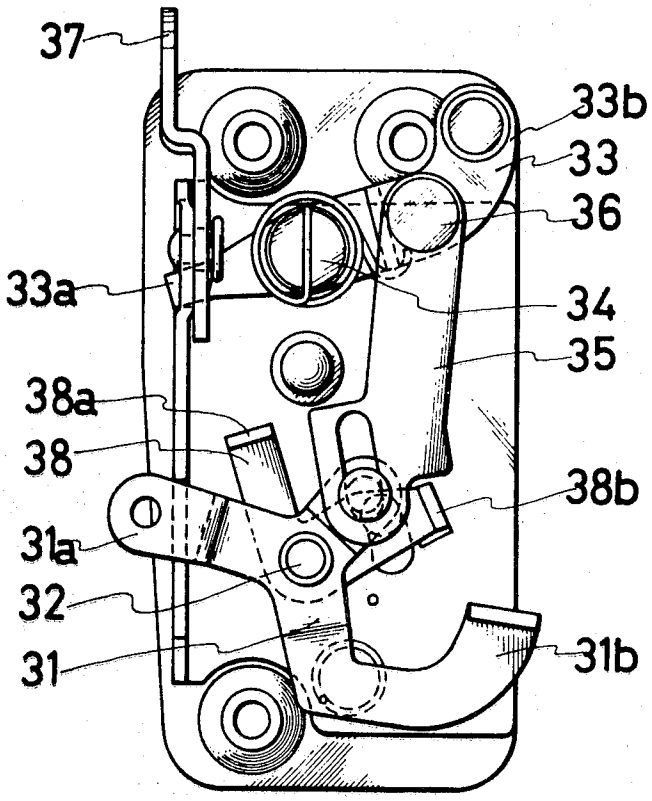



FIG. 8



# DOOR LATCH MECHANISM

This is a division, of application Ser. No. 75,848 filed Sept. 28, 1970 now U.S. Pat. No. 3,705,738.

This invention relates to a door latch mechanism for an automotive vehicle, and more particularly to a door latch mechanism including a latch bolt in the form of a rotatable fork, i.e. the fork-type latch mechanism.

In the field of automotive door latch mechanisms it is desired to provide a possibility for performing the following multipurpose functions:

1. When the vehicle door has been closed, the door is kept in its closed position without being lowered relative to a stationary member of the vehicle such as a center pillar.
2. When the vehicle is in its running condition, the door latch mechanism produces no noises and rattles due to the bumping of the vehicle along the rough road.
3. When the vehicle door has been closed, the door can be maintained in its closed condition even when a heavy force to open the door such as a heavy shock in emergency is applied thereto.
4. To provide a possibility of "lock cancelling operation" which means that when a person depresses the inside door locking knob and then leaves the vehicle and closes the door, the once latched door will be automatically released.
5. To provide a possibility of "keyless lock operation" which means that under the same conditions as is described above the door latch mechanism can be released by closing the door with its outside handle being intentionally kept in its door open position.

The main object of the invention is to provide an automotive door latch mechanism adapted for performing the aforementioned various and desirous functions.

Another object of the invention is to provide a door latch mechanism which is characterized by its simplicity and compactness in construction and which is relatively small in size, economical to manufacture comparatively quiet in operation and efficient in use.

The door latch mechanism according to the present invention comprises,

1. a bolt-supporting shaft, said shaft being enlarged at a part which is engageable with and slightly raised by the striker on the stationary member of the vehicle whereby the lowering of door relative to the latter will be prevented;
2. a rotatable striker-pressing member, said member being provided with a resilient means for urging said member to press resiliently against the striker in its fully-latched position whereby no noises or rattles of the latch mechanism will be produced;
3. a latch base plate fixed to the door and a hanger plate to which the heavy longitudinally acting force to destroy the door latch mechanism may be applied, said hanger plate being integral with said base plate whereby the said heavy force may not destroy the latch mechanism;
4. a rotatable pawl to engage the latch bolt for performing the door locking operation, the engagement point of the pawl and latch being positioned in the same plane as that of the striker and latch bolt whereby no twisting force is applied on the pawl, thus the engagement of the pawl and latch bolt is kept in safety even when a heavy laterally acting shock may be applied; (It should be recognized that in the conventional door latch mechanism the ratchet to engage the pawl has been rotatably mounted on the bolt-supporting shaft on the back of the base plate relative to the latch bolt so that when the laterally acting shock is applied to the vehicle the engagement of the ratchet and pawl is liable to be released.)
5. an open lever operatively connected both to the inside open handle and to the inside open button, and a locking lever operatively connected both to the outside key means and to the inside lock button, both said levers being adapted to accomplish the above-mentioned lock cancelling operation and keyless locking operation.



The invention will now be further described with reference to the accompanying drawings which illustrate, by way of example, a door latch mechanism in accordance with the invention.

In the drawings:

FIG. 1 is a plan view of a conventional striker alone;

FIG. 2 is a side elevational view of the striker of FIG. 1;

FIG. 3 is a plan view partly in section showing the inside of the door latch mechanism according to this invention in the fully latched position

FIG. 3*a* is a cross-sectional view taken along line 3A—3A of FIG. 3.

FIG. 4 is a vertical cross sectional view taken on the plane indicated by the line IV—IV of FIG. 3;

FIG. 5 is a side elevation in the direction of the arrow V in FIG. 3;

FIG. 6 is a view similar to FIG. 3, but in the unlatched condition;

FIG. 7 is an external face view of the latch mechanism;

FIG. 8 is an internal view opposite to that of FIG. 7; and

FIG. 9 is a view similar to FIG. 3, but showing a modified form of the latch mechanism.

Referring to the drawings, the numeral 10 denotes generally a conventional keeper or striker which is fixedly attached to a certain stationary member of the automotive vehicle. The striker 10 comprises a striker plate 11 and a U-shaped pin 12 fitted integrally therewith.

A door latch mechanism 13 is fixedly attached to each door of the vehicle to cooperate with the striker 10. The mechanism 13 comprises a door latch base 14 which is secured to the door and a hanger plate 15 which is made integrally with the base plate 14 by stamping and protruded therefrom outside of the door in a manner of so-called "plant-on" type. A cover plate 41 is secured to the base plate 14. The hanger plate 15 and cover plate 41 mount rigidly two separate shaft 16 and 17. A rotatable fork-shaped latch or bolt 18 is made integrally with the former shaft 16 while a swinging detent or pawl 19 is mounted on the latter shaft 17. The latch bolt 18 is formed with a recess 20 which straddles over the striker pin 12, and further with first and second ratchet teeth 21 and 22, respectively, either thereof being adapted for engagement with tooth 23 formed on the pawl 19.

The numeral 24 indicates a coil spring which is mounted on and between an inwardly projecting rod or pin 25 integral with the bolt 18 and an outward projection 26 of the cover plate 41. Thus the bolt 18 is resil-

iently urged to turn in counter clockwise direction in FIG. 3. The spring 24 may be positioned between the hanger plate 14 and cover plate 41 as is clearly seen in FIG. 4, so that there is no need to provide a space for only the said spring. In addition, when the latch bolt 18 is caused to rotate about the shaft 16 in the clockwise direction in FIG. 6 by engagement with the striker 10, the coil spring 24 will be expanded around and along the shaft 16. Thus the exerting force of the spring 24 on the bolt 18 is proportional to the rotated amount of the bolt, so that an operating person can easily feel the door closing degree.

The shaft 16 comprises an enlarged portion 16*a* adapted for engagement with the striker pin 12, whereby the lowering of the door relative to the stationary member of the vehicle will be prevented. It will be apparent that any suitable collar may be fitted around the shaft 16 in place of the enlarged portion 16*a*.

A further coil spring 39 is mounted on the shaft 17. One end of the spring 39 is kept in engagement with an inward projection 40 of the pawl 19 so as to urge the pawl 19 to turn in clockwise direction in FIG. 3 whilst its other end is kept in engagement with a slot of the cover plate (not shown). There is provided an elongated slot 42 on the cover plate 41. Within the elongated slot 42 the projection 40 is movably fitted thereby limiting the movable range thereof.

A rotatable striker-pressing member 27 made from a plastics material is mounted on the shaft 17 coaxially with the pawl 19. The striker-pressing member 27 comprises a free end 28 one face of which is adapted for engagement with the striker pin 12, the other face being provided with a resilient member 29 secured thereto and preferably made from a rubber material. The numeral 30 denotes an outwardly projecting flange or abutment the cover plate 41 which is engageable with the resilient member 29 as a stopper when the door is in its fully latched position as is seen in FIG. 3. It should be noted that the resilient member 29 may be secured to the stopper flange 30 in place of the pressing member 27. The numeral 43 denotes a resilient stopper for prevention of excess turning of the latch bolt 18 in the counter clockwise direction in FIG. 6.

Referring to FIG. 9, a modification of the striker-pressing member is illustrated. This modified pressing member 127 is engageable resiliently with the rubber member 129 which is securely attached to the hanger plate 115. When the striker engages the latch bolt 118 in its fully latched position, the pressing member 127 is urged to press resiliently against the striker by means of the rubber member 129.

The engaging point of the striker 10 and latch bolt 18 is positioned in the same plane as the engaging point of the pawl 19 and latch bolt 18 as is seen in FIG. 4. By virtue of this construction, no twisting force will be applied to the pawl 19 when the latch bolt 18 is urged to disengage with the striker pin 12 due to the laterally acting force. Thus the engagement of the pawl 19 with the bolt 18 may be maintained in safety.

Then, referring to FIGS. 5 and 8, the numeral 31 indicates a locking lever which is pivotally mounted on an end portion 32 of the shaft 17. One end 31*a* of the locking lever 31 is operatively connected to an inside locking button (not shown) while its other end 31*b* is operatively connected to an outside key cylinder (again not shown).

Open lever 33 is pivoted on a pin 34 studded on the cover plate 41. One end 33*a* of the open lever 33 is operatively connected to an inside open handle (not shown) through an inside open lever 37 whilst its other end 33*b* is operatively connected to an outside door handle (again not shown). An intermediate lever 35 is pivotally mounted on the open lever 33 at a pivot pin 36.

A cancelling lever 38 connected to the pawl 19 through its projection 40 secured to the lever 38 and provided with two projecting flanges 38*a* and 38*b* is pivotally mounted on the end portion 32 of the shaft 17 coaxially with the locking lever 31. When the locking lever 31 is positioned in the unlocking position as in FIG. 8, the rocking operation of the open lever 33 about the pivot 34 will be transmitted to the cancelling lever 38 at the flange 38*b* thereby permitting the cancelling lever 38 to rotate in the clockwise direction to allow disengagement of the pawl 19 and latch bolt 18. When the locking lever 31 is positioned in the locking position, the intermediate lever 35 is rotated in the clockwise direction in FIG. 8 by rotation of the locking lever 31 so that the rocking action of the open lever 33 results in an idle movement.

In operation, the door latch mechanism 13 fixed on the door advances in the direction from left to right in FIG. 3, the striker pin 12 is brought into engagement with the latch bolt 18 at its recess 20 which is thus caused to rotate in the clockwise direction in FIG. 3 against the exerting force of the spring 24. By this actuation, the front edge of first ratchet tooth 21 on the bolt 18 is brought into engagement with the tooth 23 of the pawl 19 which is thus rotated in the counter clockwise direction against the urging force exerted by the coil spring 39. In this way, the ratchet tooth 21 is brought into contact with the pawl member 19 so that the door latch mechanism is maintained in its secondary latched position.

With further continuation of the door advancement in its closing direction, the front edge of second ratchet tooth 22 will actuate the pawl 19 for further rotation and finally the tooth 22 is brought into meshing with the pawl, thus the desired fully latched position of the latch mechanism is attained, It should be noted that during this operation the enlarged portion 16*a* of the shaft 16 is negligibly affected by the striker pin 12. When the latch mechanism is in its fully latched position, the enlarged shaft 16*a* is rigidly contacted with and slightly lifted by the striker pin 12 thereby preventing the lowering of the door with respect to the stationary member of the vehicle. Meanwhile, the striker pin 12 causes the striker-pressing member 27 (or 127) to resiliently press on the stopper 30 through the resilient member 29 (or 129). The resilient force exerted by the member 29 (or 129) will allow the rocking of pressing member 27 (or 127) between the striker pin 12 and stopper 30 (or hanger plate 115) in dependence upon bumping of the vehicle so as to prevent the noise and rattles of the latch mechanism.

In addition, the striker pin 12 is engaged with the bolt 18 in the same plane in which the pawl 19 is engaged with the latter as is clearly seen in FIG. 4, whereby objectionable force to cause the pawl 19 to disengage with the latch bolt 18 is not applied to the pawl 19 even when the heavy laterally acting force is applied to the vehicle.

When the door is closed, keeping the locking lever **31** in its locking position, the latch bolt **18** is caused to rotate the pawl **19** in the counter clockwise direction in FIG. **3** whereby the cancelling lever **38** connected to the pawl **19** through the projecting pin **40** is rotated in the clockwise direction to strike the intermediate lever **35.** When the intermediate lever **35** is swung about the pivot **36** in the counter clockwise direction, the locking lever **31** is shifted to its unlocking position. Thus the lock cancelling operation is accomplished.

When it is desired to perform the keyless lock operation, it is only necessary to close the door by the outside door handle being held in its door opening position while keeping the inside door lock button in its locking position. While the latch bolt **18** is being brought into its fully latched position by engagement with the striker **10,** the projection **38***a* of the cancelling lever **38** can not strike the intermediate lever **35** so that the door latch mechanism **13** is kept in its locked position without use of the door key.

What is claimed is:

**1.** A door latching mechanism comprising,

a base plate including a hanger plate and affixed to the door,

a cover plate fixed to said base plate opposite to said hanger plate with respect to said base plate and provided with an elongated slot,

a first shaft rigidly mounted on and between said hanger plate and said cover plate,

a latch bolt in the form of a rotatable fork pivotally mounted on said first shaft and adapted for engagement with a striker pin,

a second shaft rigidly mounted on and between said hanger plate and said cover plate substantially in parallel relationship with said first shaft,

a pawl pivotally mounted on said second shaft to retain the engagement of said latch bolt and striker pin,

said pawl being provided with a pin mounted for movement in said elongated slot, and

a cancelling lever mounted coaxially with said pawl and fixed to said pin for moving said pawl to release the engagement of said latch bolt and striker pin.

**2.** A door latching mechanism as claimed in claim **1** and further comprising,

an open lever,

an intermediate lever operatively connected with said open lever,

said cancelling lever being provided with a first projecting flange for engagement by said intermediate lever when said open lever is actuated, whereby said pawl is released from said latch bolt.

**3.** A door latching mechanism as claimed in claim **2** wherein said cancelling lever has an L-shaped configuration, said first projecting flange being on one arm thereof and is further provided with a second projecting flange on the other arm thereof for engagement with said intermediate lever when said cancelling lever is actuated by said pawl, and further comprising

a locking lever operatively connected to said intermediate lever whereby said intermediate lever is moved to prevent engagement with said first projecting flange of the cancelling lever when said locking lever is actuated.

**4.** A door latching mechanism as claimed in claim **3** wherein said locking lever is mounted coaxially with said cancelling lever.

**5.** A door latching mechanism as claimed in claim **3** wherein said locking lever and cancelling lever are mounted on said second shaft.

* * * * *