Oct. 21, 1941. H. E. VAN VOORHEES 2,259,670

AUTOMOBILE DOOR LATCH MECHANISM

Filed Nov. 16, 1938

Fig. 1

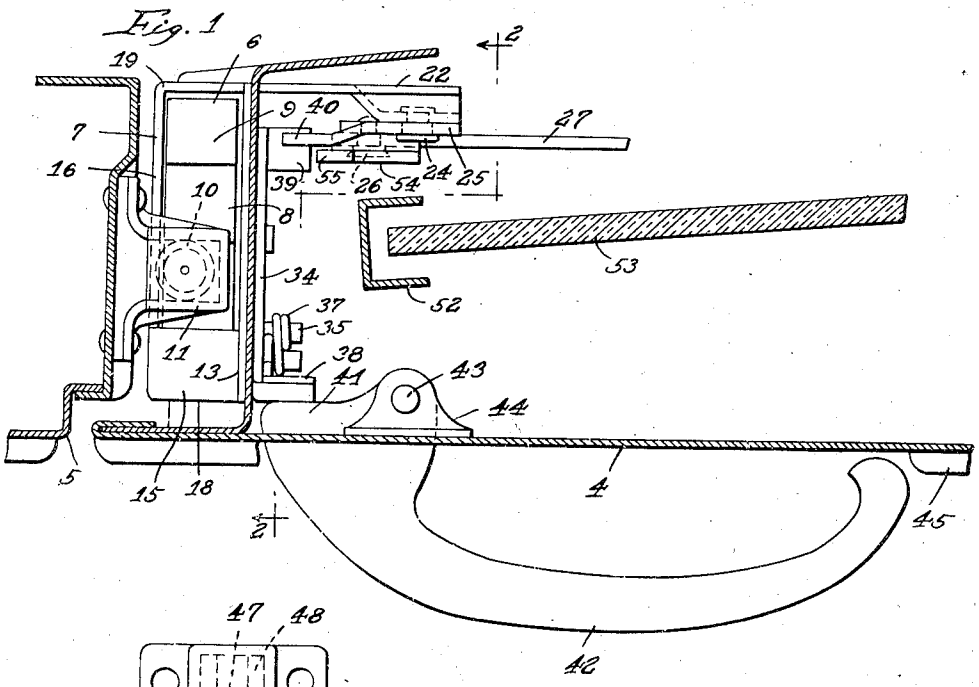


Fig. 2

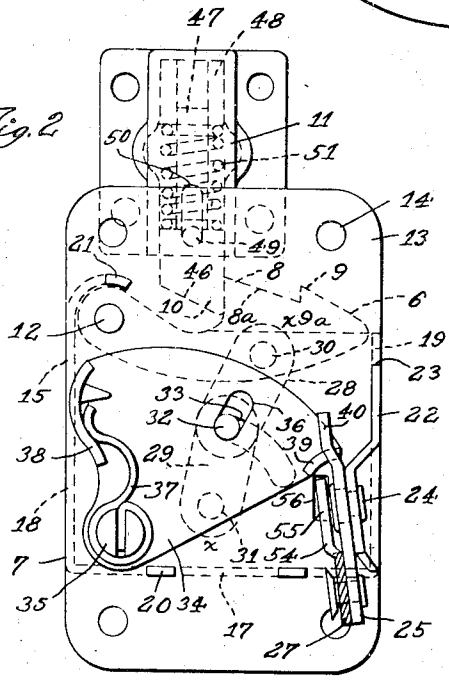
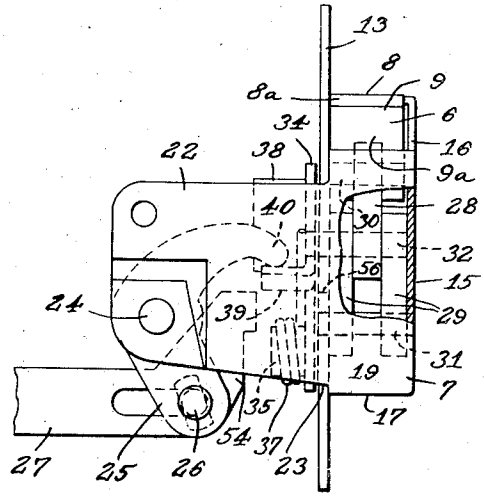


Fig. 3



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Patented Oct. 21, 1941

2,259,670

UNITED STATES PATENT OFFICE

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AUTOMOBILE DOOR LATCH MECHANISM

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Application November 16, 1938, Serial No. 240,752

4 Claims. (Cl. 292—122)

This invention relates to a new and improved automobile door latch mechanism, and is particularly concerned with improvements in the type of door latch mechanism disclosed in my copending application Serial No. 160,251, filed August 21, 1937, which resulted in Patent No. 2,143,965, issued January 17, 1939.

The door latch mechanism with which my invention deals has a rotary type latch bolt operable with a pull type door handle, and the rotary bolt operates in a substantially vertical plane between the edge of the door and the pillar so as to provide ample travel for the latch bolt while avoiding interference with the adjacent channel for the glass run, that having always been a problem where the bolt works in a horizontal plane. The vertical bolt movement also has the advantage that the conventional dovetail on the door assures accurate location of the door within a small range measured vertically, and hence very little bolt travel is sufficient to latch the door securely, whereas the opening up of the joint between the door and pillar incident to body distortion was bound to affect the operation of a latch where the bolt moved horizontally.

It is the principal object of my present invention to provide a latch mechanism of the type mentioned in which the latch bolt cooperates with a sliding spring-pressed keeper bolt that takes the place of the striker plate, the same being forced out of the way against the action of its return spring as the door is closed and being thereupon shot into place to lock the door securely, and the latch bolt being arranged to be tripped in opening the door but being otherwise held securely in latched position.

The invention is illustrated in the accompanying drawing, in which—

Fig. 1 is a horizontal section through a portion of an automobile door and pillar, showing a latch made in accordance with my invention.

Fig. 2 is a view of the latch taken on the broken line 2—2 of Fig. 1, showing the remote operating link in section, and

Fig. 3 is an inside view of the main portion of Fig. 2.

The same reference numerals are applied to corresponding parts throughout the views.

In the drawing, the numeral 4 designates the door and 5 the pillar cooperating with the door on an automobile body. 6 is the rotary latch bolt in the casing 7 carried on the edge of the door and provided with a main tooth 8 and a secondary or safety tooth 9 to cooperate with a keeper bolt 10 in a casing 11 carried on the pillar 5. The rotary latch bolt 6, in accordance with the present invention, is swingable on a transverse pivot 12 in a substantially vertical plane, and the keeper bolt 10 is also slidable in that plane. The casing 7 comprises a flat sheet metal back plate 13 arranged to be secured to the edge of the door by screws entered through the holes 14, and a stamped sheet metal cover plate 15 formed to provide a front wall 16 parallel to the back plate 13, a bottom wall 17 and side walls 18 and 19. The bottom wall 17 has lugs 20 projecting therefrom through slots in the back plate and the ends are upset so as to rivet the cover plate in place. The same is true of a lug 21 on the side wall 18. An arm 22 integral with the side wall 19 projects through a notch 23 in the edge of the back plate and provides a support for the pivot 24 carrying the bell-crank lever 25, commonly referred to as the roll-back, operable through a pin and slot connection 26 by a link or strap 27. The latter is arranged to be reciprocated by the usual remote operating lever or handle (not shown) mounted on the inside of the door to open the door by movement of the lever in one direction, or latch the door by movement of the lever in the opposite direction from a central neutral position in the opposite direction from a central neutral position in the well known way. The pivot pin 12 for the latch 6 is supported at opposite ends on the back plate 13 and wall 16 of cover plate 15. A toggle link 28 cooperates with toggle links 29 to actuate the latch bolt 6 and hold it in the latched position shown in Fig. 2. The link 28 is pivoted in a slot in the bolt 6, as at 30, and the links 29 are pivoted as at 31 to the back plate 13 and cover plate 15 and disposed with their free ends on opposite sides of the link 28 so that they can be pivotally connected therewith by the cross-pin 32. The latter extends through an arcuate slot 33 provided in the back plate 13 concentric with the pivot 31. A bolt actuating bell-crank lever 34 pivotally mounted on a stud 35 riveted to the back plate has a slot 36 therein receiving the projecting end of the cross-pin 32, whereby when the lever 34 is swung in a clockwise direction, as viewed in Fig. 2, the toggle 28—29 is "broken" and the bolt 6 is swung downwardly to retracted position relative to the keeper bolt 10. The slot 36 is elongated sufficiently to permit movement of the cross-pin 32 by means of the lever 34 to the opposite end of the arcuate slot 33. A wire spring 37 coiled on and secured to the stud 35 has a free end bearing on a lug 38 projecting from the lever 34, whereby normally to hold the lever in the position shown in Fig. 2 with the latch 6 held

in latched position. Another lug 39 on the lever 34 is disposed under the finger 40 on the bell-crank lever 25, and when the latter is operated by a pull on the link 27, it is clear that the lever 34 will be moved against the action of the spring 37 in a clockwise direction to retract the bolt 6 from latching engagement with the keeper bolt 10. The lever 34 is also operable by a finger 41 provided on the end of the door handle 42 pivotally mounted on the outer side of the door, as at 43, on a suitable support 44 secured to the outer wall of the door. When the handle 42 is pulled outwardly, the finger 41 moving inwardly engages the lug 38 and turns the lever 34 in a clockwise direction, as viewed in Fig. 2 and accordingly withdraws the bolt 6 from latching engagement with the keeper bolt 10. The free end of the handle is shown projecting behind a bead 45 on the outer wall of the door to eliminate danger of the handle catching on anything.

The keeper bolt 10 has an inclined end surface 46 so as to ride easily over the inclined leading faces 8a and 9a on the teeth 8 and 9 on the latch bolt 6 when the door is closed. The bolt 10 has a reduced cylindrical shank portion 47 operating in a guide 48 in the casing 11 and has a cross-pin 49 sliding in a longitudinal slot 50 in the wall of the casing to prevent the bolt from turning out of position. A coiled compression spring 51 in the casing surrounds the shank 47 and bears against the end of the guide 48 and tends normally to urge the latch outwardly, that is, downwardly toward the latch bolt 6, whereby to latch the door securely when it is closed.

The operation should be clear from the foregoing description. When the door is swung toward closed position, the rotary latch bolt 6 is held rigidly in the raised position shown in Fig. 2, and when it encounters the inclined end face 46 of the keeper bolt 10, it forces the latter upwardly against the action of the spring 51 by cam action. If the door doesn't happen to be swung with sufficient force to close it fully, the bolt 10 will catch on the safety tooth 9, so that the door will not be free to swing open, but otherwise the bolt 10 engages behind the main tooth 8, as shown in Fig. 2. It is important to note that the cross-pin 32 of the toggle linkage 28—29 is past dead-center relationship to the pivots 30 and 31, as indicated by the dot-and-dash line x—x in Fig. 2 when the door is being swung toward closed position. The bolt 6 is therefore rigidly supported against deflection by engagement with the keeper bolt 10, because any downward thrust on the bolt 6 tends to move the cross-pin 32 in a counter-clockwise direction, but there is no room for such movement with the pin engaging the end of the slot 33, as indicated. In opening the door from the outside, the handle 42 is simply pulled outwardly to release the latch bolt and swing the door open simultaneously, the finger 41 in this movement of the handle forcing the lug 38 inwardly and turning the lever 34 against the action of the spring 37 to retract the bolt 6 by means of the toggle linkage 28—29. In opening the door from the inside, the link 27 is pulled by turning the inside handle (not shown), and the bell-crank lever 25 operates the lever 34 by engagement of the finger 40 on the lug 39, the lever 34 being swung against the action of its spring 37 to retract the bolt 6 by means of the toggle linkage 28—29. A latch mechanism of this compact design wherein the largest dimensions are in a vertical plane along the outer edge of the door, avoids interference with the adjacent channel 52 serving as a runway for the raisable glass panel 53 in the door, whereas with other latch mechanisms, it was always a problem to provide sufficient bolt movement without interfering with the glass run. Another advantage of the present construction is the fact that the latch may be removed from the door without disturbing the handle, and vice versa, whereas with other constructions, the handle and latch formed a single assembly and if it was desired to remove the latch for inspection or repair, the handle had to be taken off with it. A very important advantage in the present design, as previously indicated, is the fact that distortion in the body and consequent wider separation of the edge of the door from the pillar will not affect the positive latching, because the tooth 8 merely slides sidewise on the bolt 10 and remains fully engaged, whereas in those latches utilizing a horizontal movable bolt, it is apparent that unless the striker plate remains in a certain spaced relation to the latch on the door, the end of the latch slips off the tooth on the striker plate. Automobile doors are invariably provided with interlocking dovetails to maintain the door in alignment with the body against up and down movement, and hence a latch of the present design where the bolts 6 and 10 work in a vertical plane is more reliable and will lock positively throughout the life of the car.

The link 27 for remote operation of the latch has a lug 54 on the end thereof having a projection 55 arranged to enter a slot 56 in the back plate 13 when the link 27 is moved by means of its operating lever on the inside of the door to a door locking position. With the lug 55 engaged in the slot, the lever 34 is not free to swing downwardly, because the lug 39 is directly over the lug 54. One cannot, therefore, open the door from the outside with the handle 42 under these circumstances.

No lock is illustrated, but it will be understood that I may provide a conventional door lock operable by means of a key to operate a bolt cooperating either with the lever 34 or with the handle 42 to prevent retraction of the bolt 6, such means having been illustrated in my copending application referred to above.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn with a view to covering all legitimate modifications and adaptations.

I claim:

1. A latch structure for mounting on a door to cooperate with a keeper on a door pillar comprising a mounting plate for attachment vertically to the edge of a door in substantially parallel relation to the door pillar, a latch bolt pivotally mounted at one end on one side of the plate for swinging movement toward and away from latching position in a plane parallel to the plate, a pair of toggle links having a pivot pin interconnecting the same, one of said links being pivotally mounted at its remote end with respect to the plate and the other being pivotally connected at its remote end to the latch bolt, said plate having a slot provided therein struck on an arc with the first link's pivot as a center, the aforesaid pivot pin extending through and movable lengthwise of the slot, spring pressed means for urging said pivot pin to move to one end of the slot to maintain the links in extended relation supporting the latch bolt rigidly in latching position, and manually

operable means having connection with the pivot pin and operable on the other side of the plate from the latch bolt and links to move the pivot pin toward the other end of the slot against the spring action of said last mentioned means whereby to retract the bolt from latching position.

2. A latch structure for mounting on a door to cooperate with a keeper on a door pillar, comprising a mounting plate for attachment vertically to the edge of a door in substantially parallel relation to the door pillar, a latch bolt pivotally mounted at one end on one side of the plate for swinging movement toward and away from latching position in a plane parallel to the plate, a pair of toggle links having a pivot pin interconnecting the same, one of said links being pivotally mounted at its remote end with respect to the plate and the other being pivotally connected at its remote end to the bolt, said plate having a slot provided therein struck on an arc with the first link's pivot as a center, the aforesaid pivot pin extending through and movable lengthwise of the slot, said pivot pin when disposed in one end of said slot being past a dead center relationship with respect to a line connecting the pivots at the remote ends of said links whereby to support the bolt against deflection from latching position, and a spring actuated lever pivotally mounted with respect to the plate on the opposite side thereof from the bolt for swinging movement in a plane substantially parallel with the plate and having an operating connection with the projecting end of said pivot pin, said lever tending normally to move the pivot pin toward the aforesaid end of said slot but being adapted to be operated manually to move the pivot pin toward the other end of said slot.

3. A latch structure for mounting on a vehicle door comprising a latching bolt element to engage a keeper element on a door pillar for holding the door closed, a casing attached to the edge portion of the door in which the latching bolt element is pivoted on a substantially horizontal axis near the outer face of the door so that the latching bolt element projects inwardly toward the inner face of the door, said bolt element having one or more teeth projecting substantially vertically therefrom for engagement with the keeper element, means in said casing for quickly releasably supporting said latching bolt element rigidly in a substantially horizontal position during the door closing movement and while the door is closed, comprising toggle linkage pivotally connected together at an intermediate point and pivotally mounted at one end in said casing and pivotally connected at its opposite end with said latch bolt element, and an abutment for supporting said toggle linkage in substantially fully extended position to support said latch bolt element rigidly in operating position, a lever pivoted on said casing having connection with the intermediate pivot of said linkage to swing the latching bolt element clear of the keeper element in door opening movement, spring means operative to move the lever to latching position, and a pull type handle pivotally connected to the outer face portion of the door and arranged when pulled outwardly in door opening movement to move the last-mentioned lever to unlatching position.

4. A latch structure for mounting on a vehicle door comprising a latching bolt element to engage a keeper element on a door pillar for holding the door closed, a casing attached to the edge portion of the door in which the latching bolt element is pivoted on a substantially horizontal axis near the outer face of the door so that the latching bolt element projects inwardly toward the inner face of the door, said bolt element having one or more teeth projecting substantially vertically therefrom for engagement with the keeper element, means in said casing for quickly releasably supporting said latching bolt element rigidly in a substantially horizontal position during the door closing movement and while the door is closed, comprising toggle linkage pivotally connected together at an intermediate point and pivotally mounted at one end in said casing and pivotally connected at its opposite end with said latch bolt element, and an abutment for supporting said toggle linkage in substantially fully extended position to support said latch bolt element rigidly in operating position, a lever pivoted on said casing having connection with the intermediate pivot of said linkage to swing the latching bolt element clear of the keeper element in door opening movement, spring means operative to move the lever to latching position, and a handle to move the last-mentioned lever to unlatching position simultaneously with the door opening movement of the handle.

HAROLD E. VAN VOORHEES.

CERTIFICATE OF CORRECTION.

Patent No. 2,259,670. October 21, 1941.

HAROLD E. VAN VOORHEES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 74, claim 1, after "relation" insert --on one side of dead-center--; page 3, first column, lines 20, 28 and 31, claim 2, before the word "bolt" insert --latch--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of December, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.