

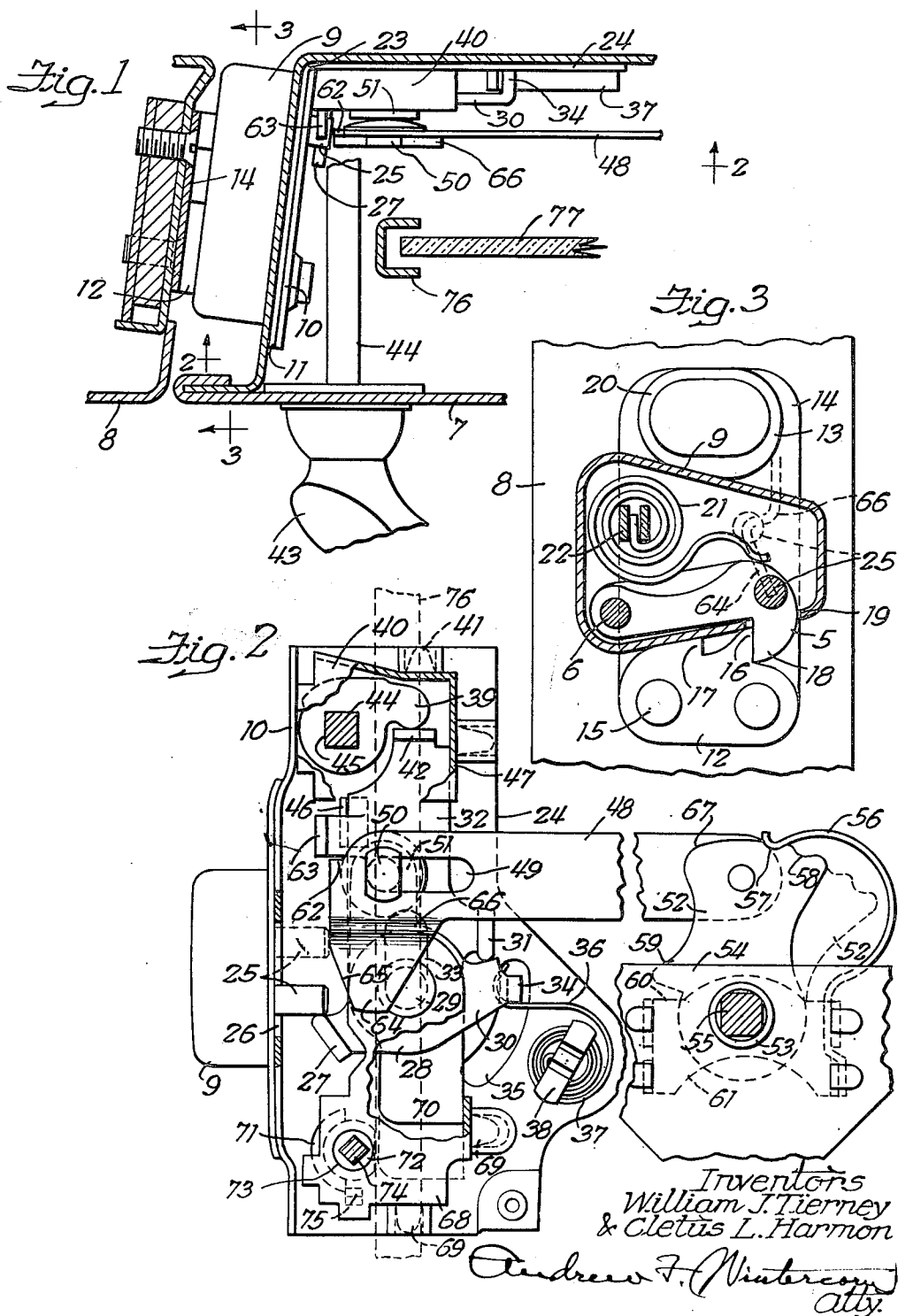
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AUTOMOBILE DOOR LATCH MECHANISM

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## AUTOMOBILE DOOR LATCH MECHANISM

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This invention relates to a new and improved automobile door latch mechanism.

In the later designs of automobile doors, the trend has been to widen the glass, thereby reducing the space next to the glass run within which the door latch mechanism can be installed. The square shaft turned by the handle is accordingly crowded over close to the edge of the door, and the same is true of the shaft connected with the door lock. The rotary type latch bolt disclosed in the Van Voorhees Patent 2,143,965, and others, arranged to operate in a substantially vertical plane between the edge of the door and the pillar, is particularly well adapted to these conditions, whereas a horizontally reciprocated bolt of the conventional type is not suitable. The rotary type bolt provides ample travel in locking and unlocking without interference with the adjacent channel for the glass run and offers the further advantage that the opening up of the joint between the door and pillar, due to body distortion, does not affect the operation of this type of latch, whereas it presents serious difficulties with the reciprocable type bolt. It is, therefore, the principal object of our invention to provide a door latch mechanism incorporating the rotary type latch bolt, the actuating and locking mechanism cooperating therewith being all compactly arranged in a plane in transverse relation to the bolt alongside the inner wall of the door, and designed for operation by the door handle and door lock shafts extending substantially in right angle relation thereto and alongside the adjacent edge portion of the door.

The present door latch mechanism has been further designed so as to permit locking either door from the inside and to prevent locking out of the driver when the door is slammed, in the event the inside locking means has been operated to locked position.

A further object of the present invention consists in the provision of a bolt actuating and locking mechanism of relatively few parts all of simple, economical and durable construction.

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

Fig. 1 is a horizontal section through the free edge portion of an automobile door and the adjacent pillar, showing the dovetail portion in which the latch bolt is provided, and also the arrangement of the door latch mechanism of our invention in relation to the latch and the adjacent channel for the glass run;

Fig. 2 is a vertical cross section on the broken line 2—2 of Fig. 1, and

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Fig. 3 is a vertical sectional detail through the dovetail in the plane of the line 3—3 of Fig. 1.

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

Referring first to Fig. 3, the reference numeral 5 designates the spring pressed rotary latch bolt pivotally mounted, as at 6, on a horizontal axis for swinging movement in a vertical plane between the edge of the door 7 (Fig. 1) and the pillar 8. The stud providing the pivot 6 has upset ends serving to secure the dovetail shaped housing 9 to the back plate 10. The housing 9 is also suitably secured to the plate 10 by its flange portion 11 and the two parts thus secured together are adapted to be riveted or otherwise suitably secured to the edge wall of the door 7. The dovetail shaped housing 9 projects through an opening in the edge wall of the door and is arranged to have wedging engagement between a striker plate 12 and a bumper 13 carried on a mounting plate 14 suitably secured to the door pillar 8. The striker plate 12 is rigidly secured to the mounting plate 14 by rivets 15 and has two teeth 16 and 17 for cooperating with the tooth 18 of the latch bolt 5, that projects through an opening 19 provided in the bottom wall of the dovetail shaped housing 9. When the door is closed properly, the tooth 18 is engaged under spring pressure behind the tooth 16, the tooth 17 being merely a safety catch as is well known in this art. The bumper 13 consists of a sheet metal wedge shaped housing 20 fastened to the mounting plate 14 with freedom for limited up and down, as well as in and out, movement parallel to said plate under the restraint of a rubber block with which the housing is filled, the rubber block having a tight fit in the housing and around the fastening stud for this purpose. It is obvious, therefore, that when the door is closed the dovetail shaped housing 9 entering between the striker plate 12 and bumper 13, in the manner of the conventional dovetails of automobile doors, will accurately locate the latch bolt 5 with reference to the striker plate 12 and, therefore, insure positive latching of the door. The wedging action obtained, particularly with the yielding of the rubber block in the bumper 13, eliminates likelihood of the door rattling when the car is in motion, and also insures keeping the tooth 18 properly engaged behind the tooth 16 at all times. It should also be clear that regardless of the usual amount of distortion and consequent opening of the gap between the door and pillar, the tooth 18 always maintains the same length of engagement in a vertical direction with the tooth 16 so

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that there is no danger of accidental opening of the door, as there is with the reciprocable type bolt where the amount of engagement between the bolt and its striker varies according to the size of the gap between the door and pillar, and the fact that the latching is done directly in the dovetail portions on the door and pillar obviously insures uniformly better results than would be obtainable otherwise. The latch bolt 5 is urged toward engagement with the striker plate by means of a spiral spring 21, the inner end of which is carried on a stud 22 rigid with the dovetail shaped housing 9, the active outer end of the spring bearing on top of the outer end of the latch bolt, as clearly appears in Fig. 3. This much of the present structure is disclosed in the Van Voorhees Patent 2,329,232 and no invention is, therefore, claimed in these details, excepting insofar as they form a part of the novel structure of our invention.

The back plate 10 mentioned above is bent nearly at right angles, as indicated at 23, to provide a portion 24 in fixed relation to the dovetail shaped housing 9, on which the actuating and locking mechanism now to be described is mounted. The latch 5 has a pin projection 25 on the outer end thereof which projects laterally through an opening 26 provided in the back plate 10 for operation by a lug 27 on the rotary dog 28 that is pivoted, as indicated at 29, on the back plate portion 24. The dog 28 has another lug 30 which is engaged by a lug 31 on a slide 32 that is slidable vertically with respect to the dog 28 and its pivot stud 29 within the limits of the elongated slot 33 provided in said slide. A lateral projection 34 on the lug 30 is movable in an arcuate slot 35 in the back plate portion 24 and has the active end 36 of a spiral spring 37 engaging the same and tending normally to return the dog 28 to the retracted position shown in Fig. 2. The other end of the spring 37 is fixed to the back plate portion 24 as at 38. A cam 39 suitably mounted for rotation with respect to the back plate portion 24, and the plate 40 fixed to the back plate portion, as indicated at 41, slidably engages a lug 42 formed on the end of the slide 32 to communicate reciprocatory movement to the slide when the handle 43 of the door is turned. The latter has a square shaft 44 extending therefrom and entered in a square hole 45 provided in the cam 39. It should now be clear that when the door is closed the latch 5 can be released by rotary movement of the roll-back dog 28, which movement is produced by reciprocatory movement of the slide 32, which in turn is produced by oscillatory or rotary movement of the cam 39 turning with the handle 43. The spring 37 resists this movement and restores the parts to their normal positions after such an operation. In Fig. 2 there is indicated a dotted position of the pin projection 25 which is the released position, the full line position being the normal or locked position of the latch bolt. The slide 32 is guided in its reciprocatory movement at one end by the pivot stud 29 working in the slot 33, and at the other end is guided between a lug 46 struck at right angles from the back plate portion 24 and the flanged end portion 47 of the cover plate 40.

The latch bolt 5 can also be retracted by reciprocatory movement of the remote control link 48, the outer end of which has an elongated slot 49 provided therein for detachably pivotally connecting the link to the stud 50 projecting from a third lug 51 provided on the roll-back dog 28.

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The link 48 is operable at its other end by a lever 52 having a hub portion 53 rotatable in a bracket 54 suitably secured to the door. The hub 53 has a square stem 55 projecting therefrom for connection to the inside handle (not shown). A leaf spring 56 suitably fixed at one end to the bracket 54 and slidable at its free end on the periphery of the outer end of the lever 52, is arranged to engage in either of two notches 57 and 58 so as to hold the lever 52 and the inside handle with it in either the neutral position shown or in a locked position angularly spaced in a counter-clockwise direction from the neutral position. A stop projection 59 on the lever limits the counter-clockwise movement by engagement with a portion 60 of the cover plate 61 that is fastened to the bracket 54 and forms a part of the mounting for the lever 52. There is, therefore, no possibility of the link 48 transmitting any counter-clockwise movement to the dog 28, because the movement is limited at 59—60 within the range of lost motion afforded by the slot 49. In the counter-clockwise movement of the lever 52 just mentioned, a shoulder 62 provided on the slotted end of the link 48 is moved into blocking position under the lug 63 struck from the edge portion of the slide 32, whereby to lock the door from the inside. Under these conditions, it should be obvious that the door can not be opened from the outside, because the slide 32 is blocked by the shoulder 62 on the link 48. If the driver has inadvertently operated the inside handle to locked position when the door is open, there is no danger of his locking himself out by slamming the door, because under those conditions the lug 64 projecting downwardly from the slotted end of the link 48 has its cam shaped edge portion 65 disposed over the pin projection 25, as indicated in dotted lines in Fig. 2, directly in the path of upward movement of the pin projection 25 produced in the slamming of the door as the toothed end 18 of the latch bolt 5 rides up over the striker 12. The link 48 is accordingly kicked back to retracted position automatically under these conditions, thus restoring the inside handle to neutral position. The lug 64, as indicated in dotted lines in Fig. 3, is bent outwardly, as at 66, in acute angle offset relation with respect to the substantially vertical plane of the link 48 so that its cam portion 65 substantially follows the arc of travel of the pin projection 25 on the latch bolt 5. The inside handle is turned in a clockwise direction to release the latch bolt and open the door, and in such operation the lever 52 is moved to the dotted line position, shown in Fig. 2, and the spring 56 rides on the plain arcuate portion 67 of the periphery of the lever. When the inside handle is released after such an operation, the spring 37 serves to return the parts to normal position in the same way as when the door is opened from the outside.

Another cover plate 68 extends over the roll-back dog 28 and is secured at its upper end by the riveting of the end of the pivot stud 29 and is anchored at its lower end to the back plate portion 24, as indicated at 69. The lower or tail end portion 70 of the slide 32 is movable under the cover plate 68 from the full line position shown to the dotted line position when the door handle 43 is turned to open the door. 71 is a locking cam, the hub portion 72 of which is mounted in a bearing opening 73 in the cover plate 68 and has a square center hole to receive the square shaft 74 adapted to be turned with a key from the outside of the door when the proper key

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is entered in the door lock (not shown). In locking the door from the outside, the shaft 74 is turned in a clockwise direction through 180° so as to bring the cam 71 into engagement with the opposite side of the stop lug 75 that is struck up from the back plate portion 24. The cam 71, in that position, blocks the movement of the slide 32 by abutment with the end portion 70. Under these conditions, the handle 43 can not be turned, and inasmuch as the operation of the roll-back dog 28 depends upon the reciprocation of the slide 32 by the cam 39 turning with the door handle, it is obvious that the latch bolt 5 can not be retracted until the door is unlocked by return of the cam 71 to the position shown in Fig. 2.

In conclusion, attention is called to the dotted line showing of the channel 76 for the window pane 77, in Fig. 2, which emphasizes the fact that the shaft 44 turned with the door handle 43, and the shaft 74 arranged to be turned with the key of the door lock, are located close to the edge of the door in the confined space between the edge of the door and the channel 76, whereas the dog 28, constituting the roll-back member, is disposed for pivotal movement about the pivot 29 farther removed from the edge of the door. In other words, the limited space next to the channel 76 does not impose any limitation upon the design and construction of that portion of the present door latch mechanism cooperating with the pin projection 25 on the latch bolt 5, the dog 28 being designed to accommodate the throw of the pin 25 without respect to the limited space left between the channel 76 and the edge of the door. This is, of course, by virtue of the fact that the dog 28 is located adjacent the inner face of the door with the slide 32 that cooperates with it, the slide 32 being in turn operatively associated at one end with the cam 39 operated by the door handle 43, and at the other end with the cam 71 operated by the shaft 74, the intermediate portion of the slide having the lug 63 on it for cooperation with the shoulder 62 on the inside operated link 48.

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

We claim:

1. Latch mechanism for a door of a vehicle body, said door being mounted for swinging movement to and from closed position and adapted to have movably mounted therein a window pane with a portion of the path of movement of one of its edges in close proximity to a portion of the free vertical edge wall of the door, said mechanism comprising a spring-tensioned latch bolt element mounted for swinging movement in a plane parallel to said free vertical edge wall of the door toward and away from latching position, said bolt element having a lateral projection thereon, an outside-operated handle arranged to turn a shaft extending substantially horizontally between the free vertical edge wall of the door and the window pane, a rotary roll-back disposed adjacent the inner face of the door substantially parallel to the window pane rotatable about a horizontal axis farther removed from the free vertical edge wall of the door than said handle shaft and arranged to engage the projection on said bolt element, a slide reciprocable vertically upon rotary movement of the handle shaft disposed in a plane parallel to the roll-back adjacent the inner face of the door and opera-

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tively connected therewith to transmit rotary movement thereto in the reciprocation of said slide, said slide having a projection thereon, and inside-operated retracting means comprising a horizontally reciprocable link disposed adjacent the inner face of the door and having a lost motion connection with said roll-back to retract the same when said link is moved in one direction, and said link being arranged to move into the path of movement of the projection on said slide to block reciprocatory movement of said slide when said link is moved in the opposite direction relative to the roll-back as permitted by its lost motion connection therewith.

2. A latch mechanism as set forth in claim 1, wherein the link has a cam-shaped projection thereon arranged to be moved into the path of retracting movement of the projection on said latch bolt element when said link is moved to slide locking position, whereby said latch bolt element is arranged to cam said link out of blocking position when the door is slammed.

3. A door latch mechanism comprising a vertically oscillatable latching element spring-pressed to move in one direction, a spring-tensioned roll-back operatively associated with a lateral projection on said latching element for direct engagement thereon, a support on which said roll-back is pivotally mounted, a vertically reciprocable slide having a projection arranged to engage a projection on said roll-back to turn the same against its spring action to retract the latching element, outside operated retracting means operatively associated with said slide to move the same in one direction, said slide being returnable under spring action of the roll-back, said slide having another projection thereon, said roll-back having an extension, and a horizontally reciprocable link member having a lost motion connection with said extension arranged upon movement of the link in one direction relative to said extension as permitted by said lost motion connection to move into blocking relation to the last-named projection on said slide, said link in a movement in the opposite direction being arranged to turn said roll-back against its spring action to retract said latching element.

4. A door latch mechanism as set forth in claim 3, wherein the link has a cam-shaped projection thereon which, when the link is moved in one direction into blocking relation to the slide projection, is disposed in the path of retracting movement of the projection on the latching element, whereby said latching element is arranged to cam said link out of blocking position when the door is slammed.

5. A door latch mechanism as set forth in claim 1, including a support on which the roll-back is pivotally mounted, the slide being guided in part on said support and in part on the roll-back pivot.

6. A door latch mechanism as set forth in claim 3, wherein the slide is guided in part on said support and in part on the roll-back pivot.

7. A door latch mechanism comprising a latching element movable to and from latching position and spring pressed to move toward latching position, a spring-tensioned roll-back operatively associated with a lateral projection on said latching element for direct engagement thereon, a reciprocable slide having a projection arranged to engage a projection on said roll-back to turn the same against its spring action to retract the latching element, outside operated retracting means operatively associated with said slide to move the same in one direction, said slide being

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returnable under spring action of the roll-back, said slide having another projection thereon, said roll-back having an extension, and a reciprocable link member having a lost motion connection with said extension arranged upon movement of the link in one direction relative to said extension as permitted by said lost motion connection to move into blocking relation to the last-named projection on said slide, said link in a movement in the opposite direction being arranged to turn said roll-back against its spring action to retract said latching element.

8. A door latch mechanism as set forth in claim 7, wherein the link has a cam-shaped projection thereon which, when the link is moved in one direction into blocking relation to the slide projection, is disposed in the path of retracting movement of the projection on the latching element, whereby said latching element is arranged to cam said link out of blocking position when the door is slammed.

9. A door latch mechanism, comprising a latch element movable to and from latching position and spring pressed toward latched position, a pivoted roll-back having a projection on one side of the pivot engaging behind a projection on the latch element to move the latch element to retracted position upon oscillation of said roll-back, said roll-back having another projection on the other side of its pivot, a slide reciprocable by outside-operated retracting means and having a projection on one side engaging the last named projection on the roll-back for oscillation of said roll-back, and having another projection on the

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other side for locking purposes, an inside-operated retracting means including a link disposed in transverse relation to said slide and having a lost motion connection with a third projection on said roll-back, whereby when the link is moved in one direction the roll-back is oscillated to retract the latch, but when the link is moved in the opposite direction it blocks the locking projection on the slide, and spring means operatively associated with the roll-back to return it together with the slide to a retracted position.

10. A door latch mechanism as set forth in claim 9, wherein the link has a cam-shaped projection thereon which, when the link is moved in one direction into blocking relation to the locking projection on the slide, is disposed in the path of retracting movement of the projection on the latch element, whereby said latching element is arranged to cam said link out of blocking position when the door is slammed.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name         | Date           |
|-----------|--------------|----------------|
| 1,923,688 | Rightmyer    | Aug. 22, 1933  |
| 2,270,559 | Rolph et al. | Jan. 20, 1942  |
| 2,274,362 | Devereaux    | Feb. 24, 1942  |
| 2,329,232 | Van Voorhees | Sept. 14, 1943 |