This invention relates to a vehicle door latch, and more particularly to a vehicle door latch having a toothed bolt pivotally mounted inside a house housing and a detent mounted inside the housing and acting directly on the bolt.

One feature of the invention is that it provides an improved vehicle door latch; another feature of the invention is that it provides a vehicle door latch having a pivoted toothed bolt inside a house housing with a detent mounted inside the housing and acting directly on the bolt.

A further feature of the invention is that the detent is fixedly mounted with an actuating lever which is located outside the bolt housing, and another feature of the invention is that the detent is biased into engagement with the bolt by a spring located inside the bolt housing.

Other features of the invention will be apparent from the following description and from the drawings, in which:

FIGURE 1 is a fragmentary side elevational view of an automobile having the improved door latch mounted in a rear door thereof;

FIGURE 2 is an enlarged vertical section through the door and latch;

FIGURE 3 is a sectional view similar to FIGURE 2 but showing the parts in a different position;

FIGURE 4 is a detail section taken along the lines 4—4 of FIGURE 2;

FIGURE 5 is a section through the bolt housing taken along the line 5—5 of FIGURE 2; and

FIGURE 6 is a vertical section taken along the line 6—6 of FIGURE 2.

Latches used on the doors of many contemporary automobiles utilize a rotatable gear-type bolt which is detented against rotation in one direction in order to prevent the door from opening. In many of these latches, the bolt is located within a bore housing and the detent acts on a cam or ratchet mechanism which is rigidly mounted on the bolt shaft for rotation with the bolt but which is not located in the bolt housing but instead is located outside the bolt housing adjacent to a surface of the latch frame. Other latches utilize a detent which extends inside the bolt housing for direct engagement with the bolt, but which also projects outside the bolt housing for operation by the inside and/or outside operators. Constructions of both these types of latches are illustrated in the U.S. patent to Van Voorhees, No. 2,835,526, entitled "Door Latch." In constructions of these types, the latch is thicker in transverse section than is the latch of the present invention because in the old structure more parts are carried on the latch frame. In both embodiments of the prior art discussed above, the detent spring is outside the bolt housing so that the prior art arrangements utilize an unnecessary number of elements stacked together on the frame and the latch is thicker than is necessary.

In the latch of this invention, the detent acts directly on the bolt so it is not necessary to utilize a separate cam or ratchet member. The detent and its latch spring are carried inside the bolt housing, thus reducing to a minimum the number of parts which must be stacked on the frame. The thinner the latch is, as measured transversely to the jamb face of the door, the more room there is in the door to accommodate the window guide channel, the window regulator mechanism, and the like.

Referring now more particularly to the drawings, in FIGURE 1 an automobile as designated as 10. A rear door 12 is hingedly mounted adjacent its front edge in a conventional manner on the automobile body and the door 12 mounts a door latch designated generally as 14 and including a bolt later to be described which, when the door is closed, engages a rack-type striker which is not shown here but which may be similar to the striker shown in Prior Patent No. 2,852,296. The latch is operated from outside the door by a push button 16 which is slidably mounted in a fixed gripping-type door handle 18 that is bolted to the outer panel 20 of the door. The inner panel 22 of the door pivotally mounts a remote turn handle 24 which is connected by means of a rod 26 to the door latch to provide for inside operation. The door may be locked from inside by means of a conventional garnish molding button 28 which is connected by a rod 30 to the door latch and which is so arranged that the door is locked when the button 28 is depressed.

The latch, as shown in detail in FIGURES 2 through 6, includes a right angular frame having a body plate portion 32 which lies in a plane parallel with the jamb face 34 of the door and which is secured to the jamb face of the door by a plurality of bolts 36. A right angular flange portion 38 of the frame extends parallel to the inner panel 22 of the door. As shown best in FIGURES 5 and 6, a bolt housing 40 projects from the body plate portion 32 of the frame through an opening 34c in the jamb face 34 of the door, the housing being open at its lower end as shown in FIGURE 5. A rotatable gear-type bolt 42 is mounted in the housing 40 on a bolt shaft 44 which is journaled in the frame and bolt housing and staked at its ends to prevent axial movement, as shown in FIGURE 5. Those teeth of the bolt which are located adjacent the lower open end of the housing are adapted to engage a striker which is mounted on the automobile body in the manner shown in the above-mentioned Prior patent.

In order to hold the bolt against rotation in a door opening direction, a detent 46 is provided having a foot 46a which hooks over a tooth of the bolt and prevents rotation of the bolt in a door opening direction, which is a counterclockwise direction as the parts appears in FIGURES 2 and 3. The detent is fixedly mounted on a shaft 48 which is rotatably journaled in the body plate 32 of the frame and in the bolt housing 40, and a detent spring 50, which is carried on the shaft 48, has one end anchored to the shaft and the other end anchored to the bolt housing to bias the detent 46 in a counterclockwise direction (FIGURES 2 and 3) into engagement with the bolt.

An actuating lever 52 is fixedly mounted on the shaft 48 outside the bolt housing and adjacent the inner surface of the body plate 32 of the frame. Since both the detent 46 and the actuating lever 52 are fixed to the shaft 48, they swing as a unit.

Both inside and outside operating means are provided for swinging the actuating lever 52 to move the detent out of holding engagement with the bolt. The outside operating means includes an operating lever 54 which is pivotally mounted intermediate its ends at 56 on the body plate 32 of the frame. At its upper end, the operating lever 54 is formed with a right angular flange 54a so located that upon depression of the outside push button 16, the shaft 16a of the push button will swing the operating lever from the position of FIGURE 2 to the position of FIGURE 3. A coil tension spring 58 hooked between plate 32 and flange 60 biases lever 54 counterclockwise into engagement with the push rod 16a of push button 16. A C-shaped intermittent link 62 is pivotally mounted on the operating lever 54 by a stud 64. The lower arm of the C-shaped intermittent link is upwardly turned at its end to provide a pick-up tab 62a lying adjacent a pick-up flange 52a on the ac-
tuating lever. The upper arm of the C-shaped intermittent link mounts adjacent its end a short stud or pin 66 which projects through an elongated slot 65 formed in the locking lever 70. The locking lever is pivoted on the frame at 72 and its free end is bifurcated to form a notch 73. On the flange portion 38 of the frame, a second locking lever 74 is pivoted at 76. One end 74a of this lever extends into the notch 73 of the lever and the other end is connected to the locking rod 30 which extends downwardly from the garnish molding button 28. An overcenter spring 78 is connected between the second locking lever 74 and the latch frame to yieldably hold the lever 74 either in locked or unlocked position.

The inside operating means comprises a remote bell crank lever 80 pivoted at 82 on the flange portion 38 of the frame and having one arm connected to the remote rod 26 and the other arm so located that it overlies an arm 52b of the actuating lever 52.

The operation of the latch is as follows: When the door is closed, the downwardly extending teeth of the bolt 42 engage complementary teeth of the striker and the detent foot 46a holds the bolt against rotation in a door opening direction. In order to open the door from the outside, the push button 16 is pressed, swinging the operating lever 54 from the position of FIGURE 2 to the position of FIGURE 3. The pick-up tab 62a on the intermittent link engages the pick-up flange 52c on the actuating lever and swings the actuating lever so that the detent moves out of engagement with the bolt. Since the bolt is now freely rotatable, the door can be pulled open. The conventional compressible weather strip on the door frame aids in opening the door a sufficient distance to clear the striker teeth. If the inside handle 24 is turned, the remote bell crank 80 is swung in a counterclockwise direction in FIGURE 6. This also results in swinging the actuator lever so that the detent moves out of engagement with the bolt.

The door may be locked from the inside by pressing down on the garnish molding button 28. This swings the lever 74 which in turn moves the locking lever 70 from the unlocked position of FIGURE 2 to the locked position of FIGURE 3, swinging the intermittent link 62 about its pivot so that the pick-up flange 52c of the actuating lever no longer lies in the path of movement of the pick-up tab 62a of the intermittent link. When the door is locked from the inside, the parts merely "free wheel". The outside push button is depressed. The latch includes the features of "automatic undogging" and "keyless locking." Automatic undogging is an automatic unlocking arrangement which insures that the door cannot be inadvertently locked by depressing the garnish molding button 28 while the door is open and then by closing the door. There are complementary portions on the intermittent link and actuating lever which operate to shift the intermittent link from locked position to unlocked position in the event the door is closed while the garnish molding button is depressed. The intermittent link has an undogging shoulder 62b and the actuating lever has an undogging flange 52c. When the intermittent link 63 is shifted to locked position, the undogging shoulder 62b will overlie the undogging flange 52c. As the door is closed, the bolt will rotate as it rides over the teeth of the striker, camming the detent over the back side of the bolt teeth. This causes the actuating lever to pivot and the undogging flange 52c engages the undogging shoulder 52b and it kicks the intermittent link back to unlocked position. Keyless locking is provided to render this automatic locking means ineffective in the event the operator desires. If the operator depresses the push button 16 as the door is being closed, it will swing the operating lever and intermittent link to the position shown in FIGURE 3, wherein the undogging shoulder 62b is out of the path of movement of the undogging flange 52c of the actuating lever and the door may be locked without using a key.

While we have shown and described certain embodiments of our invention, it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

In the claims:
1. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt pivotally mounted in said housing; a detent pivotally mounted in said housing and having a foot adapted to engage a tooth of said bolt to hold the bolt against pivotal movement in one direction; an actuating lever mounted on said body plate outside said bolt housing for pivotal movement rigid with said detent; and operating means adapted to engage said actuating lever to swing the detent out of holding engagement with the bolt.

2. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt pivotally mounted in said housing; a detent pivotally mounted in said housing and having a foot adapted to engage a tooth of said bolt to hold the bolt against pivotal movement in one direction; spring means mounted in said bolt housing for biased the detent into engagement with said bolt; an actuating lever mounted on said body plate outside said bolt housing for pivotal movement rigid with said detent; and operating means adapted to engage said actuating lever to swing the detent out of holding engagement with the bolt.

3. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt pivotally mounted in said housing; a shaft rotatably journaled in said body plate and bolt housing; a detent fixedly mounted on said shaft inside said bolt housing and having a foot adapted to engage a tooth of said bolt to hold the bolt against pivotal movement in one direction; an actuating lever fixedly mounted on said shaft adjacent a surface of said body plate outside said body housing for pivotal movement as a unit with said detent; and means adapted to engage said actuating lever to swing the detent out of holding engagement with the bolt.

4. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a gear-type bolt rotatably mounted in said housing; a shaft rotatably journaled in said body plate and bolt housing; a detent fixedly mounted on said shaft inside said bolt housing, said detent having a foot adapted to engage a tooth of said bolt to hold the bolt against rotation in one direction; an actuating lever fixedly mounted on said shaft adjacent a surface of said body plate outside said body housing for pivotal movement as a unit with said detent; a spring carried on said shaft mounted inside the bolt housing for biasing said actuating foot into engagement with said bolt; and operating means adapted to engage said actuating lever to swing the detent out of holding engagement with the bolt.

5. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt pivotally mounted in said housing; a detent pivotally mounted in said housing and having a foot adapted to engage a tooth of said bolt to
hold the bolt against pivotal movement in one direction; an actuating lever mounted on said body plate outside said bolt housing for pivotal movement rigid with said detent; an operating lever pivotally mounted on said body plate; an intermittent link pivotally mounted on said operating lever; said intermittent link having a pick-up portion adapted to engage said actuating lever when the lever is swung to swing the detent out of holding engagement with the bolt; a locking lever movably mounted on said frame; and means providing a movable connection between said locking lever and said intermittent link, whereby movement of said locking lever swings said intermittent link to a position where said actuating lever lies outside the path of movement of the pick-up portion of the intermittent link.

6. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt rotatably mounted in said housing; a shaft rotatably journaled in said body plate and bolt housing; a detent fixedly mounted on said shaft inside said bolt housing, said detent having a foot adapted to engage a tooth of said bolt to hold the bolt against rotation in one direction; an actuating lever fixedly mounted on said shaft adjacent a surface of said body plate outside said housing for pivotal movement as a unit with said detent; an operating lever pivotally mounted on said body plate; an intermittent link pivotally mounted on said operating lever, said intermittent link having a pick-up portion adapted to engage said actuating lever when the operating lever is swung to swing the detent out of holding engagement with the bolt; a locking lever movably mounted on said frame; pin and slot means providing a movable connection between said locking lever and said intermittent link whereby movement of said locking lever moves said intermittent link to a position where said actuating lever lies outside the path of movement of the pick-up portion of the intermittent link; and automatic unlocking means comprising complementary portions on the intermittent link and actuating lever for shifting said intermittent link from locked position to unlocked position upon movement of the detent and actuating lever as a function of movement of the bolt as the door is closed.

7. A vehicle door latch of the character described, including: a latch frame having a body plate lying in a plane generally parallel with the jamb face of the door; a bolt housing projecting from said body plate through said jamb face; a toothed bolt rotatably mounted in said housing; a shaft rotatably journaled in said body plate and bolt housing; a detent fixedly mounted on said shaft inside said bolt housing, said detent having a foot adapted to engage a tooth of said bolt to hold the bolt against rotation in one direction; an actuating lever fixedly mounted on said shaft adjacent a surface of said body plate outside said bolt housing for pivotal movement with said detent; a spring carried on said shaft inside the bolt housing for biasing the detent foot into engagement with the bolt; an operating lever pivotally mounted on said body plate; an intermittent link pivotally mounted on said operating lever, said intermittent link having a pick-up portion adapted to engage said actuating lever when the operating lever is swung to swing the detent out of holding engagement with the bolt; a locking lever movably mounted on said frame; pin and slot means providing a movable connection between said locking lever and said intermittent link whereby movement of said locking lever moves said intermittent link to a position where said actuating lever lies outside the path of movement of the pick-up portion of the intermittent link; and automatic unlocking means comprising complementary portions on the intermittent link and actuating lever for shifting said intermittent link from locked position to unlocked position upon movement of the detent and actuating lever as a function of movement of the bolt as the door is closed.

References Cited in the file of this patent

UNITED STATES PATENTS

2,835,526 Van Voorhees May 20, 1958
2,892,653 Harman June 30, 1959