April 18, 1944. A. F. BAKER 2,347,146

LATCH MECHANISM

Filed April 9, 1941 2 Sheets-Sheet 1

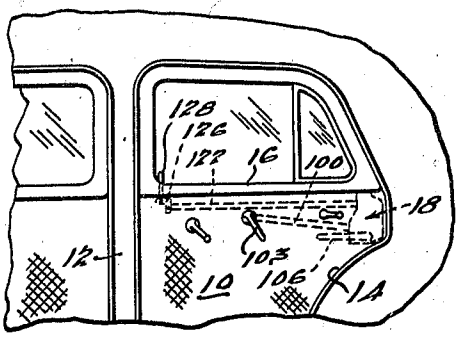


FIG. 1.

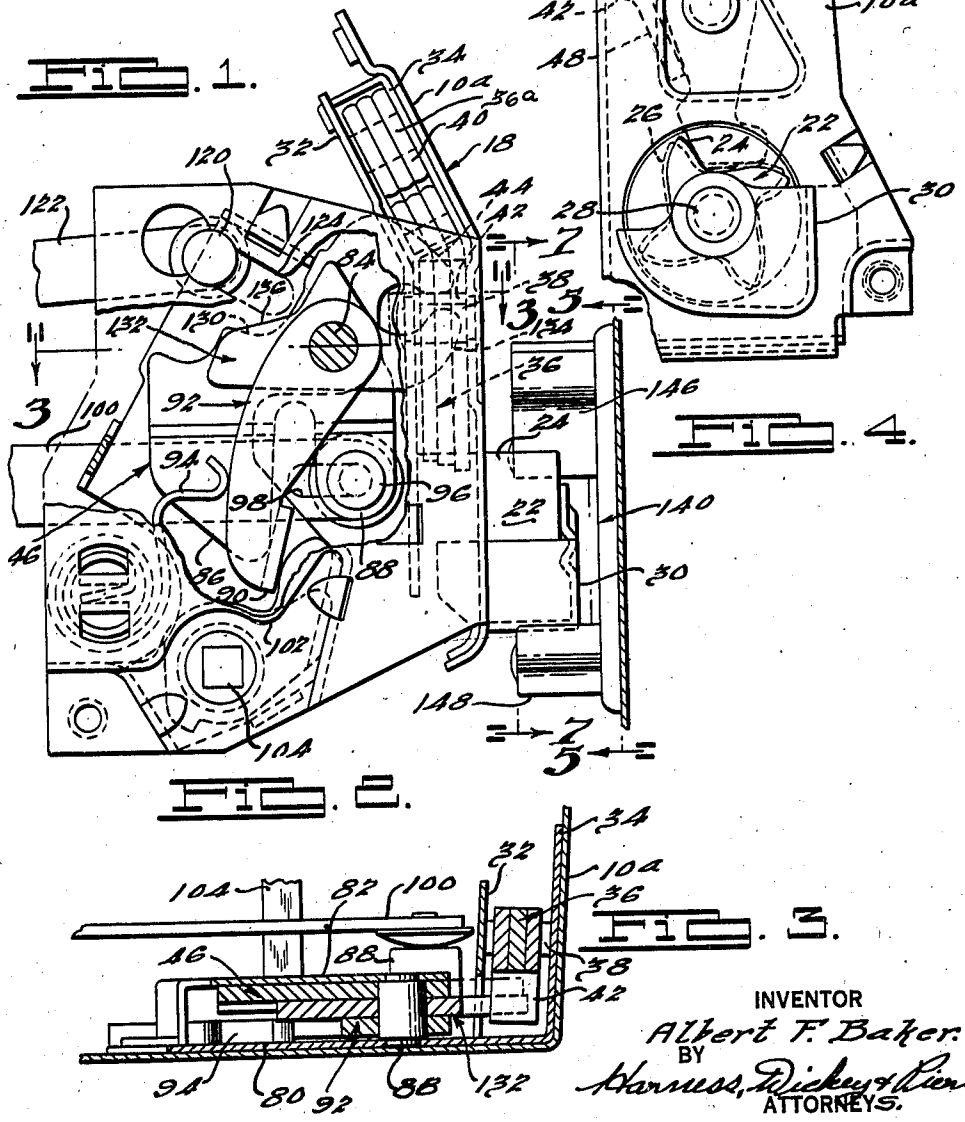


FIG. 2.

FIG. 4.

FIG. 3.

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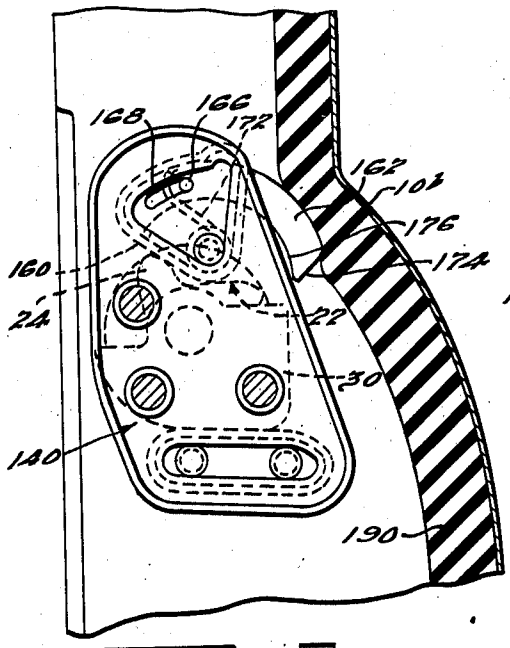


FIG. 5.

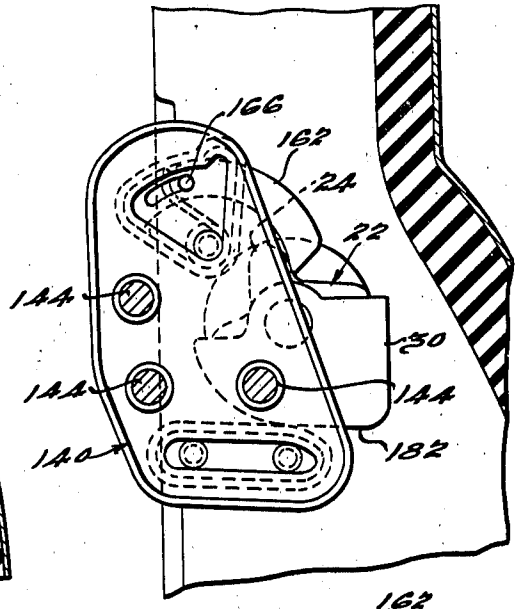


FIG. 6.

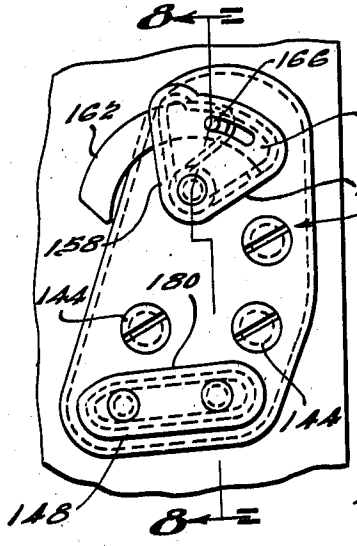


FIG. 7.

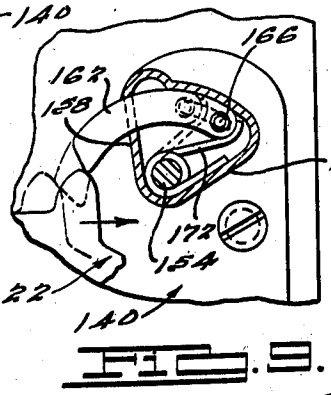


FIG. 8.

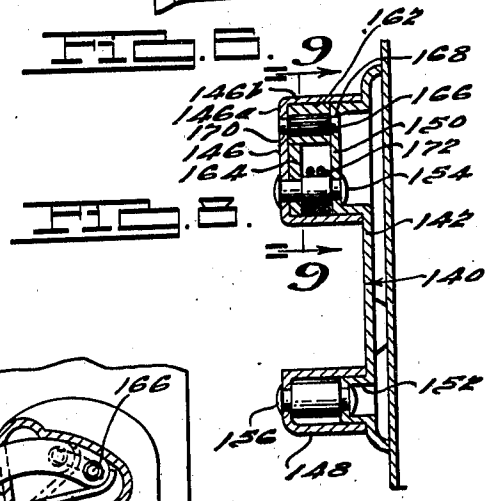


FIG. 9.

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LATCH MECHANISM

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Application April 9, 1941, Serial No. 387,714

2 Claims. (Cl. 292—340)

The present invention relates to latching devices, and in particular provides an improved latch construction of the rotary bolt type.

The principal objects of the present invention are to provide a latch construction of the above general type, which is simple in construction, economical of manufacture, and which is reliable and efficient in operation; to provide such a construction embodying an improved keeper structure which is cooperable with the latch bolt to hold the associated door in either a partially closed or a fully closed position; to provide such a construction so arranged that it can be applied to doors having relatively narrow rails; to provide an improved keeper structure having a fixed portion for cooperation with a bolt to hold the parts in a fully closed position and having a bodily movable safety catch which is cooperable with such bolt to hold the parts in a partially closed position; to provide such a keeper construction wherein the safety catch is bodily movable in an arcuate path between bolt engaging and retracted positions; and to provide such a construction in which the bodily movement of the safety catch can be effected by the bolt during the closing movement of the door but wherein such safety catch blocks movement of the bolt in an opening direction.

With the above, as well as other objects in view, which appear in the following description and in the appended claims, preferred but illustrative embodiments of the invention are shown in the accompanying drawings throughout the several views of which corresponding reference characters are used to designate corresponding parts and in which:

Figure 1 is an interior view of a vehicle body, showing the present latch structure applied to the right-hand rear door thereof;

Fig. 2 is a detail view of the latch structure of Fig. 1;

Fig. 3 is a view in section, taken along the line 3—3 of Fig. 2;

Fig. 4 is an end view of the latch structure of Fig. 2;

Fig. 5 is a detail view, taken along the line 5—5 of Fig. 2, and showing the parts in the fully closed position;

Fig. 6 is a detail view corresponding in general to Fig. 5, but showing the parts in the partially closed or safety position;

Fig. 7 is a detail view, taken along the line 7—7 of Fig. 2;

Fig. 8 is a view in section, taken along the line 8—8 of Fig. 7; and

Fig. 9 is a view in section, taken along the line 9—9 of Fig. 8.

It will be appreciated from a complete understanding of the present invention that in the broader aspects the improvements thereof may be applied to a variety of uses other than the latching of automobile doors, and that such improvements may be embodied in forms which differ from the specific forms herein disclosed. By way of illustration but not of limitation, the present improvements are herein disclosed as applied to the latching of the rear door of an automobile and the latch parts which are carried by the door are, in general, arranged as described and claimed in the copending application of Theodore N. King, Serial No. 385,513, filed March 27, 1941, which has become Patent No. 2,329,120, dated September 7, 1943, and assigned to the assignee of this application.

Referring to the drawings, the illustrative rear door 10 is hinged, by means not shown, along its front edge to the pillar 12 of the associated vehicle body. The rear edge of the door is provided with a cut-away portion 14 to accommodate the rear wheel housing of the associated body, and this cut-away portion extends upwardly to a point relatively close to the window opening 16 of the door 10. The latch 18 is received within the body of the door in the vertical space between the window opening and the cut-away portion 14.

Except in respects hereinafter noted, the latch 18 follows the construction of Patent No. 2,195,179, granted March 26, 1940, and comprises generally a rotary bolt 22, having a series of equi-angularly spaced, generally radially extending keeper-engaging teeth 24 and a corresponding series of cam engaging teeth 26. The bolt 22 is pivotally supported upon the flange of the case plate by means of a pivot pin 28, one end whereof is journalled in a housing 30, which encloses the lower portion of that part of the bolt 22 which projects outwardly of the rail 10a of the door 10, and the inner end whereof is pivotally supported upon a deck 32, which is secured to the flange 34 of the latch plate, but in inwardly spaced relation thereto. The door rail 10a and the flange 34 of the case plate are provided with registering openings through which the body of the bolt 22 and the housing 30 are projected, and it will be observed that the keeper engaging teeth 24 are positioned externally of the door rail 10a, whereas the cam engaging teeth 26 are positioned with-

in the door, in the space between the case plate flange 34 and the deck 32.

In order to prevent rotation of the bolt 22 in a door opening direction, the bolt is provided with a series, three being shown, of cams designated collectively as 36. The cams 36 are pivotally supported between the flange 34 and the deck 32 by means of a pin 38, and the upper end portions 36a of the cams 36 are deflected to accommodate the correspondingly angled portion of the rail 10a. The cams 36 are continuously biased to the normal positions shown in Fig. 4, by means of usual springs 40, one whereof is provided for each cam. In accordance with the arrangement disclosed in the above-numbered patent, the cams 36 are, relative to each other, of progressively increasing size, and the shortest cam is provided with a laterally offset foot 42 for cooperation with the nose 44 of the hereinafter described retracting lever 46. In addition, the just-mentioned shortest cam is provided with a second foot 48, which overlies the backs of the other cams, so that a retracting movement of such shortest cam is accompanied by corresponding retracting movements of the other cams.

The means for retracting the cams 36 from holding engagement with the bolt 22 comprises the previously mentioned retracting lever 46. Lever 46 is pivotally mounted between the base 80 of the case plate and a usual deck 82, which is carried thereby but spaced therefrom, by means of a pivot pin 84, and is provided with the previously mentioned cam engaging nose 44, a nose 86 and an armlike extension 88. The nose 86 is disposed in the path of movement of a laterally turned foot 90 formed on a supplemental lever 92, which is also pivotally mounted upon the pin 84 and is normally urged to the position shown in Fig. 2 by means of a usual spring 94. The arm 88 is provided with a pin 96, which is received in an elongated slot 98, provided in the link 100 which, as will be understood, extends to the usual inside handle 103. The just-mentioned pin and slot provide, as will be understood, a lost motion connection between the retracting lever 46 and the link 100.

The supplemental lever 92 is disposed to be operated by the usual rollback 102, which is provided with a squared spindle 104. The spindle 104, in turn, is connected to the outside door handle 106, and it will be understood that, if desired, the rollback 102 may be of the scissor-like form described and claimed in Moore Patent No. 1,895,893, which is assigned to the assignee of the present application.

In accordance with the disclosure of the copending application of Rollo Marple, Serial No. 235,982, filed October 20, 1938, and assigned to the assignee hereof, the present arrangement employs a locking roller 120, which is carried at the end of a link 122 and one end whereof rides in an elongated slot 124 in the plate 80. The other end of the link 122 is connected, through a bell crank 126, to a locking push button 128, which normally projects upwardly through the garnish molding of the door 10. A depressing movement of the push button 128 causes the roller 120 to advance downwardly and to the right, as viewed in Fig. 2, and brings the body of the roller 120 into blocking relation to the arcuate portion 130 of the retracting lever 46. With the roller 120 in the just-mentioned position, clockwise or retracting movement of the lever 46 is prevented; and both the inside and outside handles are consequently rendered ineffective to release the bolt.

In order to enable a closing movement of the door to reset the locking roller 120 to the unlocked position of Fig. 2, the kickoff lever 132 is provided. The lever 132 is pivoted on the previously mentioned pin 84 between the retracting lever 46 and the deck 82. One end 134 of the lever 132 lies beneath the previously mentioned foot 42, associated with the cams 36, and the other end 136 thereof lies below and in camming relation to the locking roller 120. As described below, a closing movement of the door swings the cams 36, and consequently rocks the lever 132 in a clockwise direction. This action is without effect if the locking roller 120 is in the normal position, but if such roller is in the locking position, this movement of the lever 132 cams the roller 120 to the unlocked position.

It is noted that the lever 92 lies immediately adjacent the plate 80, and the lever 132 lies immediately adjacent to the deck 82, the lever 46 being positioned therebetween, as aforesaid. The lower end of the arm 88 of the lever 46 is offset so as to clear the flange 90, so that the lever 46 may be operated by the inside handle without altering the position of the lever 92.

Referring particularly to Figs. 2 and 4 through 9, the keeper designated as a whole as 140 comprises a base 142 which may be and preferably is formed as a stamping and which is adapted to be secured to the door pillar by means of a plurality of screws 144. The keeper 140 carries an upper bolt engaging member 146 and a lower abutment 148. The member 146 and the abutment 148 may be and preferably are formed as cuplike stampings, which are telescoped over embossments 150 and 152, formed on the keeper base 142 and which are secured in place by means of rivets 154 and 156.

The bolt engaging keeper member 146 is of generally triangular form, having an upwardly sloping front face 158, which cooperates with the bolt 22 to rotate the latter into the locking position shown in Fig. 5. The member 146 is also provided with an upwardly sloping rear face 160, which is engaged by a tooth 24 of the bolt 22 to hold the door in the fully closed position.

The safety catch mechanism of the present structure comprises the arcuately formed finger 162, which is slidably received in a correspondingly arcuate pocket formed in the member 146 and which is defined by the wall portions 146a and 146b of the member 146, by the outer face of the embossment 150, and by the upper edge of a supporting member 164, which is received within the member 146 and is secured in place therein by means of the previously mentioned rivet 154. A pin 166 is driven through the finger 162 and the outer reduced ends of the pin 166 freely ride in arcuate slots 168 and 170 provided therefor in the embossment 150 and in the member 146. The slots and the pin 166 thus cooperate to define the limits of movement of the finger 162 and the latter is normally urged to the projected position shown in Figs. 5 through 8 by means of a spring 172, which is coiled about the rivet 154 and the respective ends of which bear against the end of the finger 162 and the wall of the member 146. The finger may, however, be moved to the retracted position shown in Fig. 9.

The outer end of the finger 162 is provided with an upwardly inclining leading face 174 and a substantially vertical rear face 176, and such exposed end of the finger is positioned in the path of movement of an uppermost tooth 24 of the bolt 22. The inclination of the leading

face 174, in relation to the form of the bolt teeth 24, is such that during a closing movement of the door the bolt is enabled to cam the finger 162 from the projected position of Figs. 5 through 8 to the retracted position of Fig. 9, thus enabling the bolt to pass the finger 162 without requiring any rotation of the bolt 22. As soon, however, as such uppermost bolt tooth 24 passes to the left, as viewed in Figs. 5 and 6, beyond the end of the finger 162, the spring 172 associated therewith restores the finger to the projected position. The inclination of the rear face 176 of the finger, in relation to the form of the teeth 24, is such that the finger 162 blocks movement of the bolt 22 in an opening or rightward direction, as viewed in Figs. 5 and 6. The finger 162 is thus ineffective to interfere with a closing movement of the bolt, but is effective to prevent an opening movement of the bolt, unless the latter is freed from the restraining influence of the cams 36, as hereinafter described.

It will be noticed that the horizontal spacing between the finger 162 and the leading face 158 of the keeper member 146 is sufficient to receive one tooth 24 of the bolt 22, so that during an opening movement of the door, as described below, the bolt 22 is enabled to roll past the member 146 and the finger 162 much in the manner that a gear rolls over a rack. As also described below, the member 146 is effective, during a closing movement of the door, to cause the bolt 22 to rotate in a clockwise direction, as viewed in Figs. 5 and 6. This clockwise rotation of the bolt occurs during the time that the bolt is being bodily moved to the left, as viewed in Figs. 5 and 6, and the just-mentioned spacing between the finger 162 and the member 146 is sufficient to freely enable such clockwise rotation of the bolt without causing the bolt teeth to engage the rear face of the finger 162.

The lower keeper abutment 148 is provided with an upper surface 180, which inclines slightly upwardly in the direction of door closing movement, and the under surface 182 of the previously mentioned bolt housing 30 is correspondingly inclined. When the door is in the fully closed position, accordingly, the bolt 22 and the housing 30 function as a male dovetail element, which is received between the member 146 and the abutment 148. In such closed position, the bolt 22 is continuously urged in a clockwise direction, as viewed in Figs. 5 and 6, by means of the cams 36, and this tendency causes the bolt 22 and the housing 30 to be wedged between the member 146 and the abutment 148.

Considering now the operation of the system as a whole, the parts are shown in Figs. 1 through 5 in the fully closed position of the door and the locking roller 120 is in the unlocked position. The bolt 22 may be released so as to permit an opening movement of the door by operating either the inside handle 103 or the outside handle 106. If the inside handle 103 is operated, the link 100 is drawn to the left, which action, through the pin 96 and the arm 88 of the retracting lever 46, rocks the latter in a clockwise direction, as viewed in Fig. 2. If the outside handle 106 is operated, the nose of the rollback 102 bears against the flange 90 of the lever 92 and the consequent clockwise motion of the latter is communicated to the lever 46 through the flange 90 and the arm 86 of the lever 46. Such a movement is, however, not communicated to the lever 100, since the pin 96 is enabled to ride in the previously mentioned slot 98 formed in the link 100.

The clockwise rotation of the lever 46 enables the nose 44 thereof to bear upon the cam foot 42 and rock the latter in a counterclockwise direction, as viewed in Fig. 4, thus moving the noses of the cams out of blocking relation to the inner or cam engaging teeth 26 of the bolt 22. This action enables the bolt 22 to freely rotate in either direction, and consequently, the outward pressure on the door 10 causes the bolt to move to the right, as viewed in Figs. 5 and 6, during which movement it rotates in a counterclockwise direction past the member 146 and the finger 162.

Upon release of the inside or outside handle, as the case may be, the spring 94 is again effective to move or retain the rollback 102 in the position shown in Fig. 2, and the usual mechanism (not shown) associated with the handle 103 becomes effective to move or retain the link 100 in the position shown in Fig. 2. Also, the springs 40 are rendered effective to restore the cams to the positions shown in Fig. 4, and the latter movement restores the lever 46 to the position of Fig. 2. The cam movement also brings the noses of the cams into blocking relation to the bolt 22 and holds the latter in the position of Fig. 4. Thus, if the inside or the outside handle, as the case may be, is released at a time when the parts are in the position of Fig. 6, the bolt 22 is unable to rotate in a clockwise direction past the finger 162, and the latter becomes effective to hold the door in the partially closed or safety position.

During a closing movement of the door, the leading face of an uppermost bolt tooth 24 engages the leading face 174 of the finger 162. The springs 40, associated with the cams 36, are stronger than the spring 172, associated with the finger 162, and consequently, as previously mentioned, this engagement enables the bolt 22 to cam the finger 162 from the position of Figs. 5 and 6 to the retracted position of Fig. 9, enabling the bolt to advance to the position of Fig. 6. As soon as such uppermost bolt tooth 24 has passed beyond the finger 162, the spring 172 restores the latter to the active position of Figs. 5 and 6, thus enabling it to prevent a reopening movement of the door. The continued door closing movement brings the leading face of the above-mentioned uppermost bolt tooth 24 into engagement with the face 158 of the member 146 and the latter is enabled to rock the bolt in a clockwise direction, as viewed in Figs. 5 and 6. This clockwise rotation enables an inner bolt tooth 26 to bear against the backs of the cams 36 and rotate them to a retracted position. As soon as the upper end of the inner bolt tooth 26, which causes the retracting movement of the cams, passes beyond the lower ends of the cams, the latter are enabled to resume the active positions shown in Fig. 4, in which they are effective to prevent a counterclockwise or door opening movement of the bolt 22. The final movement of the bolt also brings the next successive keeper engaging tooth 24 into solid bearing engagement with the rear face 160 of the keeper member 146, as previously described.

It will be noticed that the entire support for the finger 162 is comprised by the member 146, and that the over-all width of the keeper structure can, therefore, be minimized, thus adapting structures of the present type to doors having relatively narrow rails. Depending upon the form of the outer face 10b of the door, it may

be expected that the usual rubber door seal 190 will serve, during the final door closing movement, to move the finger 162 to the retracted position in the same manner that the finger is moved to the retracted position by the bolt. With the illustrated construction, in which the outer face 10b of the door angles inwardly in the region of the keeper, it may be expected that the sealing strip will be ineffective to so retract the finger, in which event the latter will remain in the projected position when the door is fully closed and will slightly compress the sealing strip. With this arrangement, the finger 162 is in readiness to engage a bolt tooth and hold the door in the safety position. In the former event, the initial opening movement of the door may be expected to release the finger 162 from the restraining influence of the seal, thereby enabling the spring 172 to move the finger 162 to the active position before the bolt 22 is enabled to pass therebeyond.

It will be appreciated from the foregoing description that the present invention provides an improved latch construction and that various modifications in the form, number and arrangement of parts may be made without departing from the spirit and scope of the present invention.

What is claimed is:

1. A keeper for cooperation with a toothed pivoted bolt, comprising means defining a housing and a tooth-like projection over which said bolt may rotate so as to bring a tooth thereof behind said projection, a safety catch received in said housing and guidably supported therein for bodily sliding movement thereinto and thereout of between a retracted position and a projected position in which the end of the catch projects outwardly of the housing sufficiently far to engage a tooth of said bolt, the said end of the catch when projected being spaced in advance of the said projection and said spacing being sufficient to receive a said tooth of the bolt so as to enable said bolt to roll past the said projection and end of said catch.

2. A keeper for cooperation with a toothed pivoted bolt, comprising means defining a housing and a tooth-like projection over which said bolt may rotate so as to bring a tooth thereof behind said projection, a safety catch received in said housing and guidably supported therein for bodily sliding movement thereinto and thereout of between a retracted position and a projected position in which the end of the catch projects outwardly of the housing sufficiently far to engage a tooth of said bolt, the said end of the catch when projected being spaced in advance of the said projection and said spacing being sufficient to receive a said tooth of the bolt so as to enable said bolt to roll past the said projection and end of said catch, said catch being bodily retractable to the retracted position by and when engaged by the bolt during a movement of the bolt relative to the keeper in one direction, but constituting a holding surface for the bolt when engaged thereby during movement in an opposite direction.

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