June 1, 1954 R. MARPLE 2,680,037

LATCH MECHANISM

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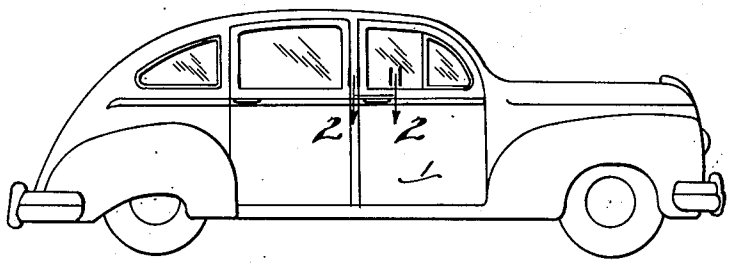


Fig. 1.

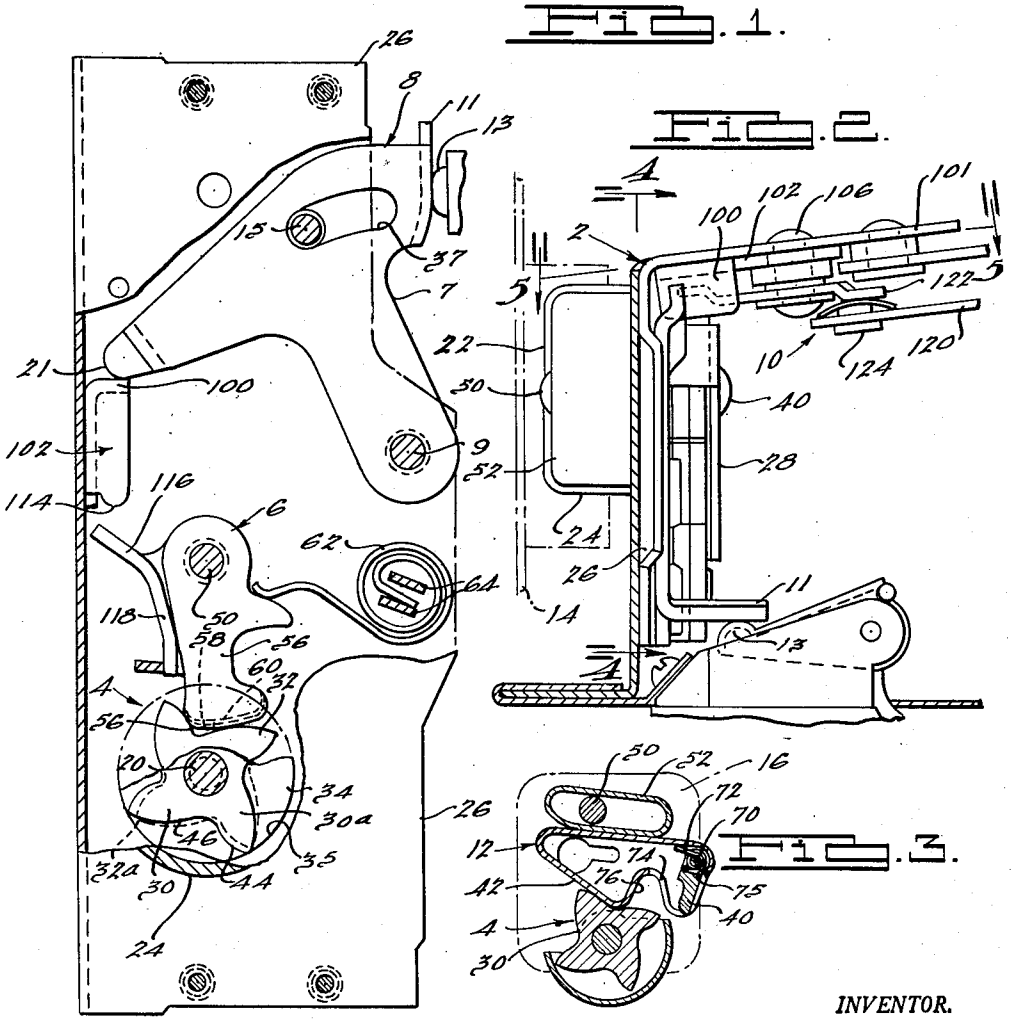


Fig. 2.

Fig. 4.

Fig. 3.

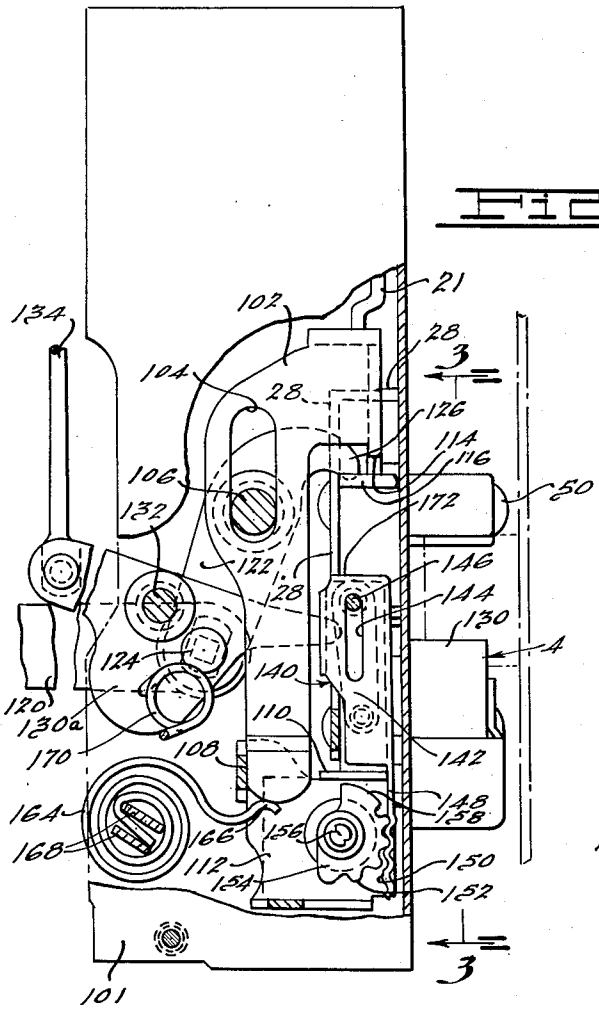
INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce.
ATTORNEYS.

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LATCH MECHANISM

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FIG. 5.



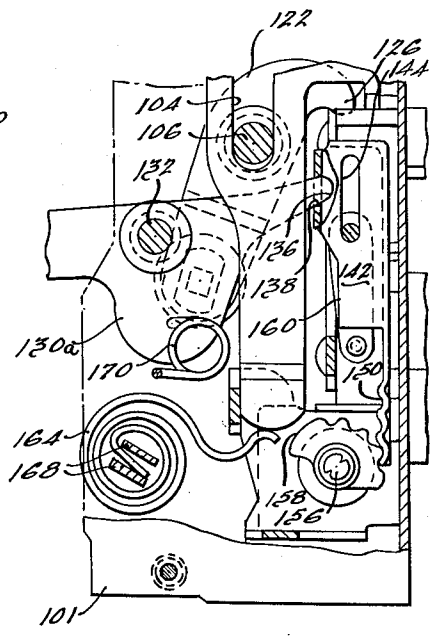


FIG. 6.

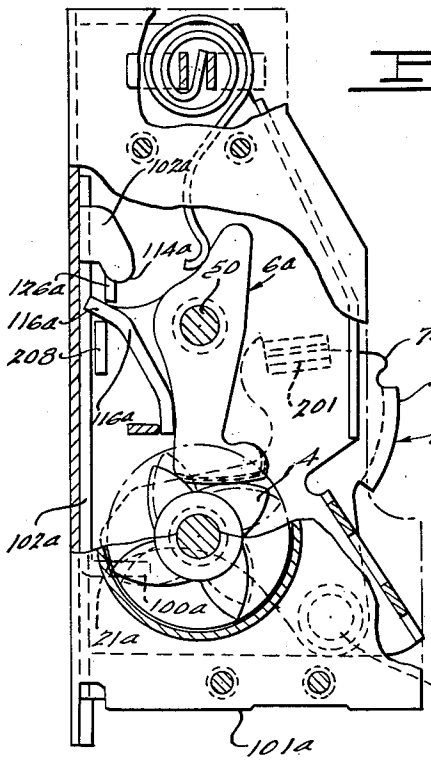
INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce.
ATTORNEYS.

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LATCH MECHANISM

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Fig. 7.



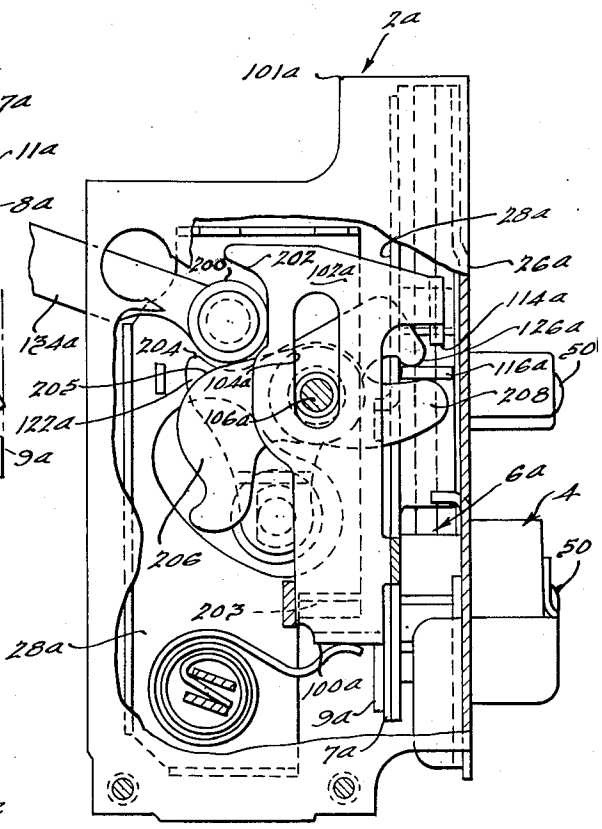


Fig. 8.

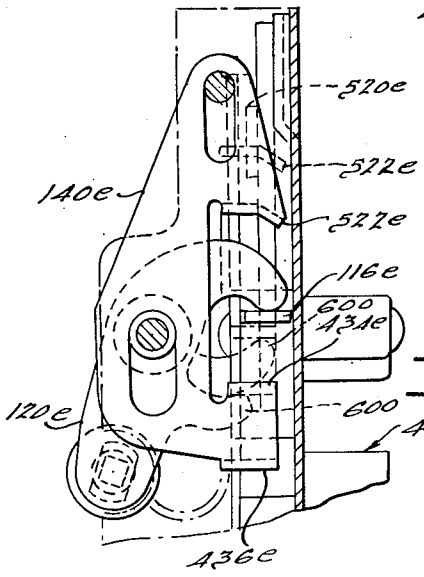


Fig. 15.

INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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LATCH MECHANISM

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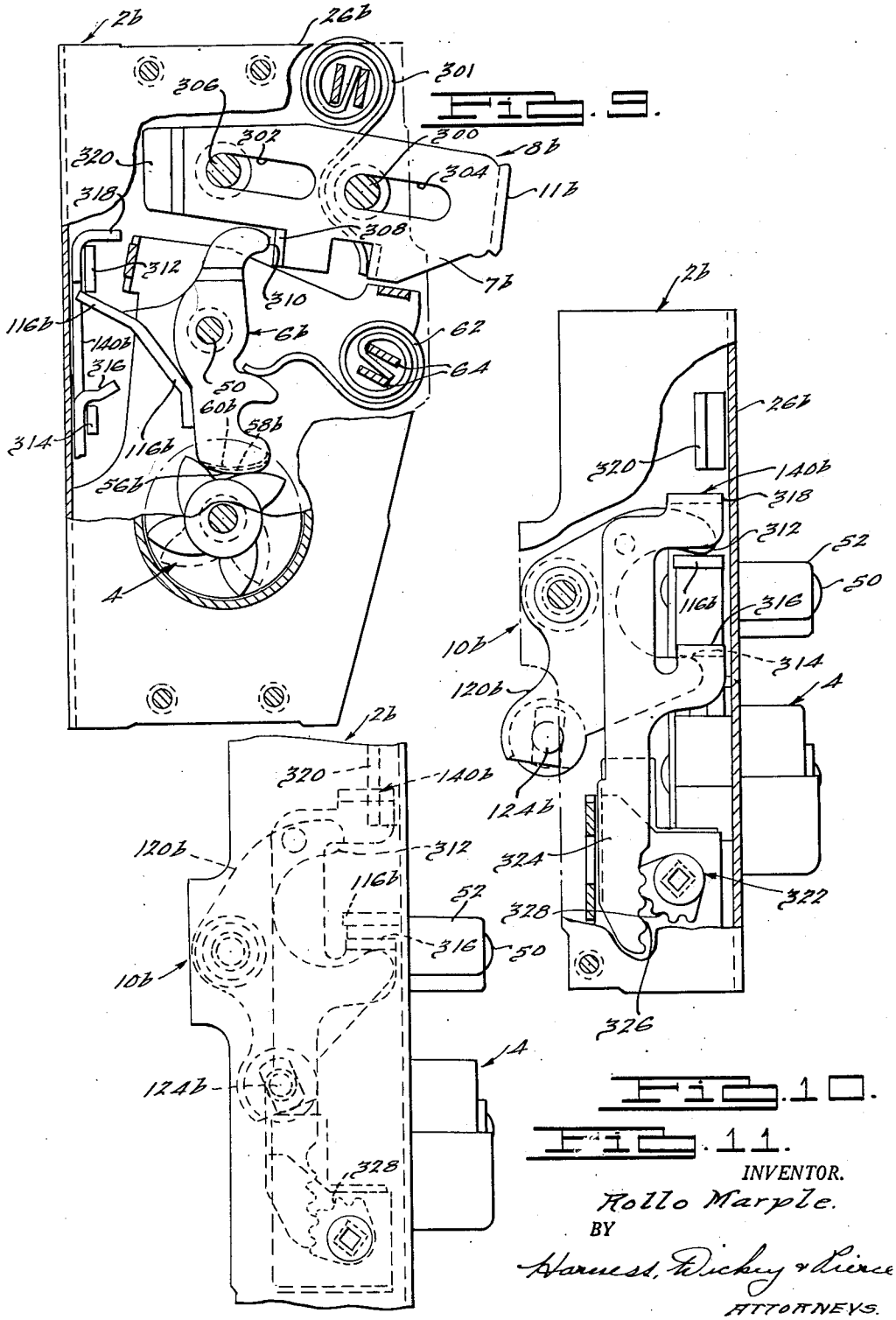


FIG. 9.

FIG. 10.

FIG. 11.

INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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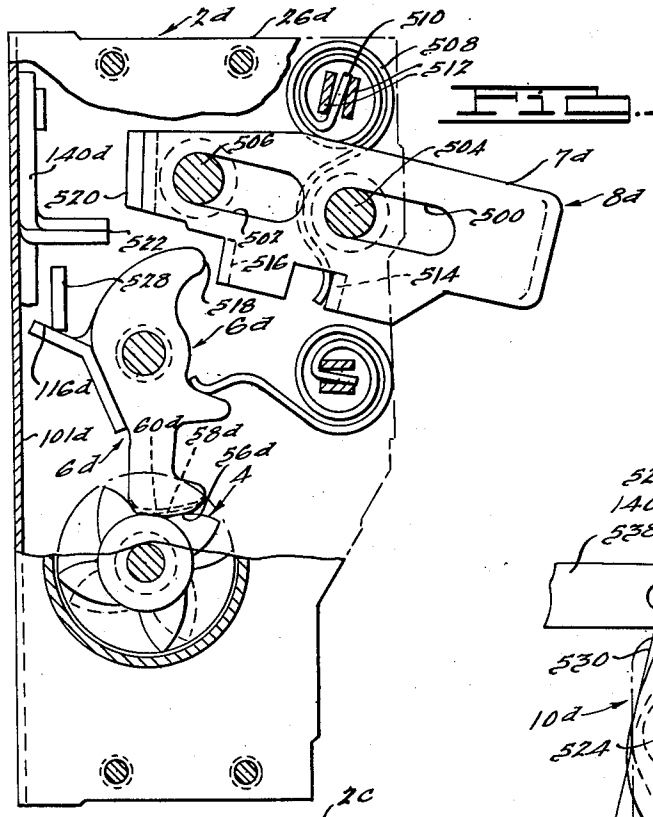


FIG. 13.

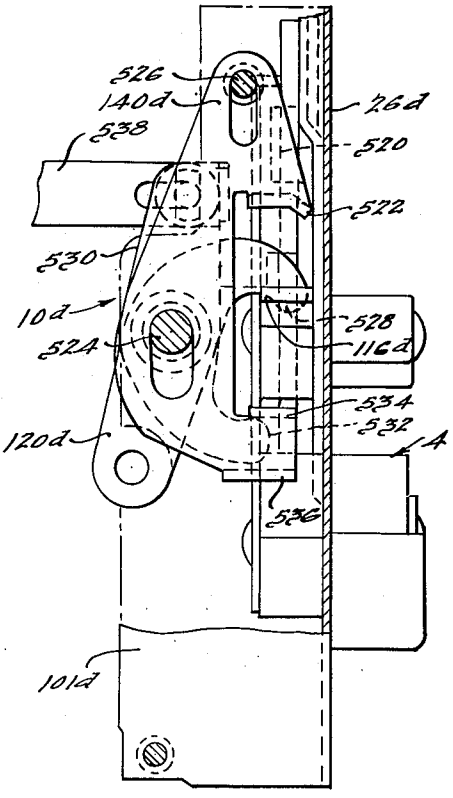


FIG. 14.

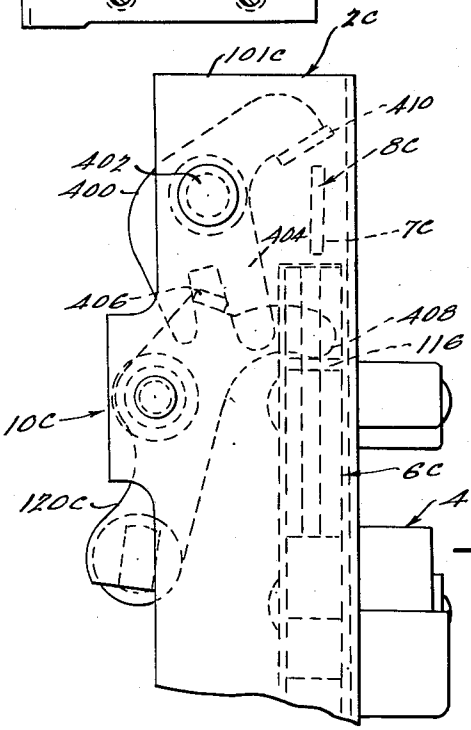


FIG. 12.

INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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LATCH MECHANISM

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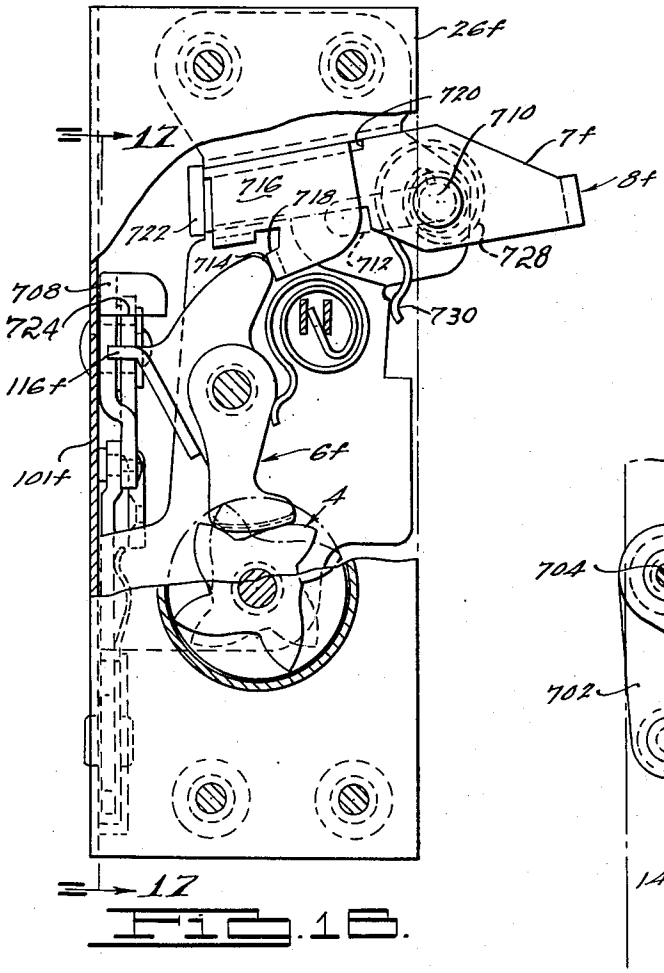


Fig. 16.

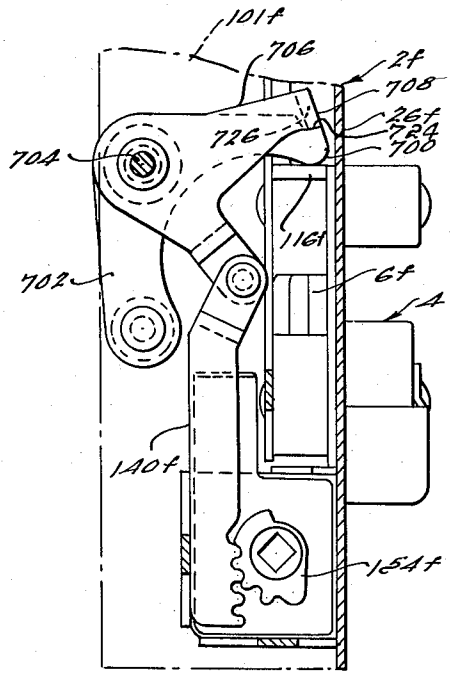


Fig. 17.

INVENTOR.
Rollo Marple.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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UNITED STATES PATENT OFFICE

2,680,037

LATCH MECHANISM

Rollo Marple, Jackson, Mich., assignor to Hancock Manufacturing Company, Jackson, Mich., a corporation of Michigan

Application July 15, 1948, Serial No. 38,821

7 Claims. (Cl. 292—280)

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The present invention relates to latching devices for closures, and in particular provides an improved latch construction for vehicle doors. In certain of its aspects the present invention provides improvements upon and modifications of the structures disclosed and claimed in applicant's United States Patent Nos. 2,195,179, 2,301,558, and 2,301,560.

The principal objects of the present invention are to provide an improved latch of the above generally indicated character, particularly adapted for, but not limited to, use in connection with vehicle doors, characterized as being simple in construction, economical of manufacture and extremely durable and efficient in operation; to provide a latch of the rotary bolt type embodying an improved actuating connection between the inside and outside door-operating handle and bolt-actuating means; to provide such a connection which may be operated by a reciprocatable as contrasted to a rotatable movement; to provide a latch of the rotary bolt type embodying improved means operable from within the vehicle for locking the outside handle against actuation; to provide improved means actuated by the bolt for releasing the locking means; to provide a door latch embodying means for supporting a bolt in relation to the latch casing and for also supporting the link actuated by the outside latch handle for operating the bolt; to provide a casing member having a base and a flange and providing for the link actuated by the outside door handle to be carried by the flange; and, to generally improve the construction and operation of vehicle door latches.

With the above as well as other objects in view, which appear in the following description and in the appended claims, a preferred but illustrated embodiment of the invention is 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 a view in elevation illustrating the application of the invention to automobile doors;

Fig. 2 is a view in transverse section taken along the line 2—2 of Fig. 1;

Fig. 3 is a view illustrating the interrelation between the bolt and keeper;

Fig. 4 is a view taken along the line 4—4 of Fig. 2;

Fig. 5 is a view taken along the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary view similar to Fig. 5 showing the parts in a locked position;

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Fig. 7 is a view similar to Fig. 4 showing a modified form of latch;

Fig. 8 is a view similar to Fig. 4 but showing the latch illustrated in Fig. 7;

Fig. 9 is a view similar to Fig. 7 showing another form of latch.

Fig. 10 is a view similar to Fig. 8 showing the form of latch of Fig. 9;

Fig. 11 is a view similar to Fig. 6 but showing the form of latch of Fig. 9;

Fig. 12 is a view similar to Fig. 8 showing a still further modified form of latch;

Fig. 13 is a view similar to Fig. 7 but showing still another form of latch;

Fig. 14 is a view similar to Fig. 12 but showing the form of latch of Figure 13;

Fig. 15 is a view similar to Fig. 14 but showing a still further form of latch;

Fig. 16 is a view similar to Fig. 9 but showing a still further modified form of the invention; and

Fig. 17 is a view taken substantially along the line 17—17 of Fig. 16 looking in the direction of the arrows.

Referring first to Figs. 1 through 6, the improved latch which is secured within the door 1 of the associated vehicle comprises generally a casing member 2, a rotary bolt 4; a plurality of cams designated collectively as 6 for holding the bolt 4 against rotation in a door opening direction; an outside operated roll-back means, designated as a whole as 8, for releasing the cams 6 and the bolt 4 in response to movement of a squeeze-type outside door handle; and a retracting member 10 which may be connected to the conventional inside door handle or the like (not shown) to release the cams 6 from operative engagement with the bolt. The keeper 12, which is described in more detail below, is suitably secured to the door pillar 14 as by means of a mounting plate 16.

The bolt 4 is rotatably journaled in the latch casing 2 upon a pin or trunnion 20. One end of the pin 20 is supported in the flange 22 of a housing 24 which is suitably secured as by welding to the flange 26 of the previously identified casing 2. The other end of the pin 20 is supported in a deck 28 which is suitably secured to the inner face of the flange 26. The bolt 4 is formed to provide a keeper-engaging portion 30 which projects externally of the lock casing 2 for co-operation with the keeper 12, an inner cam-engaging portion 32 and a separating fin or vane 34 which is somewhat larger in diameter than the portions 30 and 32 and serves to substantially

close the opening 35 which is provided in the flange 26 of the casing 2 to accommodate the bolt 4. The lower half of the outwardly projecting portion 30 of the bolt 4 is substantially enclosed by the previously mentioned housing 24 which is given a substantially semicylindrical form for this purpose.

As most clearly appears in Fig. 4, the outer portion 30 of the bolt 4 is formed to provide a plurality of radially extending equiangular spaced keeper-engaging teeth or projections 30*a*, any one of which is effective, as described hereinafter, to co-operate with the safety catch 40 associated with keeper or the keeper portion 42 to hold the door in either the partially closed or safety position, or in the fully closed position, respectively. It will be appreciated that the angular spacing between the projections or teeth 30*a* relative to the spacing between the safety catch 40 and the keeper portion 42 is such that the bolt 4 can roll over or cross the keeper in a manner similar to the co-operation between a gear and a rack.

As most clearly appears in Fig. 4, the inner portion 32 of the bolt 4 is formed to provide a number of dog-engaging teeth or projections 32*a*, the number and angular spacing between which corresponds to the number and angular spacing of the keeper-engaging teeth 30*a*. The teeth 32*a*, however, are angularly displaced from the teeth 30*a*. This relation results in reducing the space requirement for the lock since the positioning of the cam can thus be determined independently of the rotated position of the teeth 30*a*. Each tooth 32*a* is formed to provide a generally radially extending cam-engaging portion 44 and a locking portion 46, the purpose whereof is described hereinafter.

The cams 6 are provided to co-operate with the latching portion 46 of the bolt 4 to hold the bolt 4 against rotation in a counterclockwise or door-opening direction as viewed in Fig. 4. It is preferred to utilize a plurality of such cams of progressively increasing length to provide a take-up action for the latch as hereinafter described. In the present instance three cams are illustrated although a smaller or larger number may be utilized if desired.

Three cams, designated as a whole at 6, are rotatably supported in the lock casing upon a pinion or trunnion 50 which extends parallel to but is spaced from the previously mentioned pin 20. The outer end of the pin 50 is supported in the outwardly extending body portion of a member 52 suitably secured to the casing flange 26 and which serves, as most clearly appears in Figs. 3 and 5, as a dovetail member. The inner end of the pin 50 is supported in the previously mentioned supplemental casing or deck member 28. Each of the three cams, which are individually designated as 56, 58, and 60, includes a downwardly extending body which terminates in a laterally offset foot. The cam 56 is slightly longer than the cam 58 and the cam 58 in turn is slightly longer than the cam 60. Each of the cams 56, 58, and 60 is provided with a biasing spring 62 individual thereto. One end of each spring is secured between a pair of lugs 64 which are inwardly struck from the casing flange 26 and the free end of each spring 62 bears against edge of the associated cam and so continuously urges it in a clockwise or locking direction as viewed in Fig. 4.

Referring particularly to Fig. 3, the keeper 12 comprises a body which may be and preferably is formed of a relatively heavy metal stamping formed to define the previously mentioned bolt-engaging surface 42. The safety catch 40 is and may be formed of a die casting or the like and is pivotally supported by a pin 70 which extends between and is supported in the opposite side walls of the keeper 12. A spring 72 is connected between the catch 40 and the keeper body and continuously urges the safety catch to the active position shown in Fig. 3.

It will be noted that the otherwise continuous body of the keeper 12 is cut away, as indicated at 74, to afford a slot or opening through which the safety catch 40 may move from the active position, shown in Fig. 3, to a retired position. It will also be noted that the back of the safety catch 40 abuts the portion 75 of the body of the keeper 12 so that such portion 75 forms a limit stop to the rotation thereof under the influence of the spring 72. Also as clearly appears in Fig. 3 when the door is in a closed position the keeper 12 is in a position between the rotary bolt 4 and the previously mentioned dovetailed member 52, the upper surface of the keeper 12 as well as the under surface of the dovetailed member 52 is downwardly inclined in the direction of the door-closing movement. With this relation the dovetailed member tends to serve as a stop to the movement of the keeper 12 in the leftward or door-closing direction as influenced by the bolt 4. The members 4, 12, and 52 accordingly function in accordance with the functioning of the usual separately formed dovetails usually associated with locks of the conventional slidable bolt type and permits such separate dovetail structure to be dispensed with.

As the door 1 is closed, the keeper-engaging portion of the bolt engages the safety catch 40 rotating it in a clockwise direction out of path of movement of the portion 30 which, upon further closing movement of the door 1, engages a sloping face 76 of the keeper 12 whereby further closing movement of the door 1 applies a positive rotating force to the bolt 4. Further door-closing movement is effective to rotate the bolt 4 in a clockwise direction, as viewed in Fig. 3, thereby rotating the cams 56, 58, and 60 in a counterclockwise direction, as shown in Fig. 4. When the door reaches a substantially closed position, the heel of the shorter cam 60 rides up over the rounded end of the cam-engaging bolt face 32*a*. As soon as this action takes place the spring 62 associated with the cam 60 becomes effected to rotate the latter in a clockwise direction, as seen in Fig. 4, and forcibly continues the rotation of the bolt 4 in a clockwise or door-closing direction. At slightly spaced stages in the continued door-closing movement, the bolt face 32*a* successively passes beyond the heels of the cams 58 and 56 rendering the springs 62 associated with these cams successively effective to continue the clockwise or door-closing rotation of the bolt 4.

It will be appreciated that at any stage of the door-closing movement at which the inner bolt face 32*a* passes beyond the heel of a selected cam rendering such cam effective to assume position, as shown in Fig. 4, such cam becomes effective to prevent a counterclockwise or door-opening movement of the bolt 4. In such instance any tendency of the bolt to rotate in a counterclockwise direction applies a substantial radial force to the particular cam. The parts are preferably so adjusted that the shorter cam 60 reaches the just-mentioned blocking position as an incident to each door-closing movement. Accordingly

even though the vehicle door is only very lightly closed, a positive lock is applied to the door. With the cam 60 in a blocking position, the two longer cams 58 and 56 occupy positions in which the springs 62, associated therewith, are still effective to continuously urge the bolt 4 in a clockwise or door-closing direction. In addition to being positively held against an opening movement accordingly, the door is continuously urged to a door-closed position.

In certain instances it may be found that forces of the springs 62 acting upon the associated longer cams 56 and 58 will be effective to cause the door-closing movement to continue to a point at which the intermediate cam 58 is in the blocking position. In other instances where the resistance to further door-closing movement is sufficient to prevent such continued movement, it is found that the road shocks or the like cause the door to momentarily move inwardly a slight amount relative to the vehicle body. Any such inward movement immediately relieves the otherwise existing resistance to continue clockwise movement of the bolt 4 and is immediately taken up by movement of the intermediate cam 58 or the final cam 56 to a blocking position.

It will be seen accordingly that the several cams being of slightly different lengths assume the blocking positions thereof at different substantially closed positions of the door and that a minimum expectant closing force of the door is sufficient to render at least the shortest cam 60 effective to reach the blocking position, leaving the remaining cams effective to take up any additional closing movement.

Due to the fact that the bolt holding effects of the cams designated collectively as 6 result from the co-operation between the feet thereof and the bolt faces and not from the strength of the biasing springs 62, it is possible to utilize springs 62 which are relatively weak whereby a minimum of door-closing force is required to render the door in tightly closed position.

The outside roll back, designated as a whole at 8, embodies an improved arrangement which is susceptible of general application but finds particular utility when utilized in connection with a lock of the present character. In the illustrated instance the outside roll back 8 comprises a lever 7 which is pivotally mounted on pin 9 which is carried by the flange 26 of the casing 2. The lever 7 has an upturned flange or ear 11 which is engaged by the actuating portion 13 of the outside door handle. A pin 15 is carried by the flange 26 and projects through an arcuately shaped aperture 37 in the lever 7 for limiting rotational movement thereof about its pivot pin 9. A nose 21 of the lever 7 overlies and is engageable with a lip 100 of a slide 102 carried by the base 101 of the casing 2. The slide 102 has an elongated aperture 104 which receives a pin 106 carried by the base 101 and which guides the upper end portion of the slide 102 for reciprocal movement. The lower end of the slide 102 extends downwardly and is guided between downturned legs 108 and 110 of the deck 112. The slide 102 has a nose 114 which is engageable with a foot 116 associated with the cam 60. In order to render the cams 56 and 58 responsive to the movement of the cam 60, as influenced by the just-mentioned foot 116, the cam 60 is provided with a laterally turned portion 118 which extends around and behind the rear edges of the cams 56 and 58. With the just-mentioned arrangement, it will be appreciated that downward

movement of the slide 102 will cause the cams 56, 58, and 60 to rotate in a counterclockwise direction whereby they are moved out of locking engagement with the cam surface 46 of the adjacent tooth 32a of the bolt 4 whereby the bolt is permitted to rotate in a counterclockwise direction permitting the vehicle door 1 to be opened.

The retracting member 10 is connected with the inside door handle (not shown) through a longitudinally movable link 120. The member 10 comprises a lever 122 pivotally connected as by means of a pin 124 to the link 120. The lever 122 is pivotally supported on the base 101 of the casing 2 by means of the above-mentioned pin 106 and is provided with a nose 126 which is directly engageable with the foot 116 for rotation of the cams 6.

A locking lever 130a is pivotally mounted on a pin 132 carried by the base 101 of the casing 2. Pivotal movement of the lever 130a is controlled by means of rod 134 which extends upwardly through the interior of the door and outwardly through the garnished mold (not shown) associated with the door 1. The lever 130a also has a nose 136 which projects into a slot 138 in a side flange of a slide 140. The slide 140 is guided for reciprocal movement by a pin 146 carried by the base 101 and extending through an elongated aperture 144 in the base 142 of the slide 140. A longitudinally extending side flange 148 of the slide 140 extends downwardly between the deck 112 and the adjacent surface of the base 101. The extending portion is corrugated to provide rack teeth 150 which mesh with teeth 152 of a gear segment 154 also located between the deck 112 and the base 101. The gear segment 154 is carried on a collar 156 journaled at opposite ends in the deck 112 and the base 101 which collar is adapted to receive an actuating shaft of a key-locking mechanism (not shown) carried by the door 1. The gear segment 154 is provided with a cam-locking surface 158 which, when the gear segment 154 is rotated to its counterclockwise or locked position as shown in Fig. 6, underlies the lower end of the slide 102 thereby blocking the slide 102 and preventing its downward movement to rotate the cams 6 out of locking engagement. It will be appreciated that upon rotation of the sleeve 156 in a counterclockwise direction, the gear segment 154 will be rotated to its counterclockwise position whereby the cam surface 158 will be positioned as shown in Fig. 6 and whereby the teeth 152 meshing with the teeth 150 will move the slide 140 to its upward position.

The slide 140 is held in its upward position by means of a spring detent mechanism generally designated 160. Such upward movement of the slide 140 will be accompanied by a counterclockwise rotation of the lever 130a since the nose 136 thereof extends within the aperture 138. This counterclockwise movement of the lever 130a will cause downward movement of the rod 134. It will be observed at this time that the inner door handle is not prevented from unlatching the bolt 4 since the inner door handle acts through the link 120 and lever 122 to rotate the foot 116 directly and does not act through the now-locked slide 102 as does the outer door handle. It will similarly be observed that slide 140 may be moved to its unlocking position either by the key station or by rod 134 independently of which of these elements may have been actuated to move it to the locked position.

The gear segment 154 may be rotated clockwise to its unlocked position by means of the be-

fore-mentioned key mechanism to the position shown in Fig. 5 in which the surface 158 is out of the path of movement of the slide 102. Upon actuation of the outside door handle, the outside operated rollback means 8 can move the slide 102 downwardly whereby its nose 114 engages the foot 116 for movement of the cams 56, 58, and 60. Slide 102 is normally held in its upward position shown in Fig. 4 by means of a spirally coiled spring 164, one end 166 of which extends between the deck 112 and the base 101 and engages the lower end of the slide 102 and the other end of which is held between two outstruck lugs 168 of the base 101. The upper limit of movement of the slide 102 is of course determined by the pin 15 and slot 37 associated with lever 7. The lever 130a is normally held in either of its two positions by means of an overcenter spring 170 having one end portion received within an aperture in the base 101 and the other end portion received within an aperture in the lever 130a. Finally the inside operated lever 122 is normally held in the position shown in Fig. 5 by the usual return spring (not shown) which forms part of the inside handle mounting (not shown).

In order that the locking mechanism will kick off upon closure of the door 1 subsequent to the locking of the latch mechanism when the door 1 is open, the slide 140 is provided with a lip 172 which is positioned in the path of movement of the foot 116.

Since as above described upon a door-closing operation the cams, designated collectively as 6, are rotated in a counterclockwise direction upon closure of the door, similar to rotation thereof, by either the outside or inside door-operating handles, it will be apparent that the foot 116 will be rotated counterclockwise into engagement with the lip 172 provided on the slide 140 which rotation will move the slide downwardly into an unlocked position whereby the surface 158 is removed from its blocking position with respect to the slide 102 thereby permitting operation of the latch from the outside door handle.

The structure of Figs. 7 and 8 is functionally like that of Figs. 1 through 6 except that in Figs. 7 and 8 no key station is provided for, and the locking control, when locked, renders both the inside and outside handles ineffective. Referring now to Figs. 7 and 8, the lock is carried by a casing member 2a having a base 101a and a flange 26a, a rotary bolt 4, cams 6a carried by a pin 50. A slide 102a acts upon downward movement to engage a foot 116a of the cams 6a and is guided in its movement by a pin 106a carried by the base 101a received within an elongated aperture 104a of the slide 102a. A deck 28a is carried by and is spaced from the inside surface of the flange 26a and is substantially coextensive therewith and has an offset portion 203 which bears against the adjacent face of the slide 102a for positioning it against the adjacent face of the base 101a.

A lever 7a of the outside roll back is pivotally carried adjacent the underside of the deck 28a by means of the pin 9a carried by the deck 28a and supplementarily guided by an outstruck portion 201. The lever 7a has a flange 11a which is adapted to be engaged by an external cam door handle (not shown) for rotating the lever 7a in a counterclockwise direction (Fig. 7). The lever 7a further has a nose 21a which is engageable with a lip 100a on the lower end of the slide 102a whereby, upon movement of the lever 7a by the door handle, the slide 102a will be moved downwardly (Fig. 7) causing its nose 114a to engage the foot 116a for counterclockwise rotation thereof whereby the cams 6a will be rotated counterclockwise out of holding engagement with the rotary bolt 4, permitting the vehicle door 1 to be opened.

The inner door handle (not shown) acts through an intermediate linkage (not shown) to rotate the lever 122a which is carried by the pin 106a. Clockwise rotation of the lever 122a (Fig. 8) causes its nose 126a to engage the foot 116a for counterclockwise or unblocking rotation of the cams 6a whereby the rotary bolt 4 is released permitting the vehicle door 20 to be opened from the inside.

The base 101a is provided with a diagonally extending keyhole-shaped aperture which guides the movement of an inside locking cam roller 200. The position of the roller 200 within the said aperture is determined by means of rod 134a which is actuatable by occupants of the motor vehicle. Upon movement to the right of the rod 134a, the roller 200 is moved downwardly along the diagonally extending aperture and into a position which is in the path of a movement of a projection 202 of the slide 102a whereby downward movement of the slide is prevented. The roller 200 in this position is also in the upward path of movement of a projection 204 of the lever 122a whereby clockwise rotation of this lever 122a is prevented. It will thus be apparent that with the roller 200 in this position both the outside roll back and the inside retracting member will be blocked and the bolt 4 cannot be released by either the outside or inside door handles. This locking movement of the cam roller 200 also engages a cam surface 205 of a lever 206. The shape of the surface 205 is such that with the roller 200 in its locking position, force applied to the nose 208 will act to move the roller cam 200 upwardly and diagonally through its cam slot to unlocked position thereby releasing the outside roll back and the inside retracting member. The roller cam 200 can be moved manually to its upward position out of the path of movement of the cam surface 205 by manually moving the rod 134a for unlocking the latch. It will now be apparent that in the modification shown in Figs. 7 and 8, the locking of the latch will prevent release of the bolt by either the inside or the outside handle but will be unlocked upon closing of the door if for any reason the latch is locked with the door open. Such closing of the door causes the nose 116a of the holding cams to bear against the nose 208 and swing the latter, as aforesaid.

The embodiment of Figs. 9 and 10 differs from that of Figs. 1–6 primarily in that in Figs. 9 and 10 the outside operated, slidable roll-back member acts directly against the bolt-holding cams instead of acting through an intermediate slide. Referring now to Figs. 9, 10, and 11, the slide 7b is guided by a pair of spaced pins 300 and 306, both carried by the flange 26b of the casing 2b. The pins 300 and 306 extend into elongated slots 304 and 302 respectively of the slide 7b of the roll back 8b. Spring 301 biases slide 7b to the position shown.

The slide 7b is also provided with a lip 308 which is engageable with a nose 310 of the cam means 6b. The cam means 6b are pivotally mounted upon a pin 50 which is carried between the dovetail member 52 and the deck 26b. The cam means 6b more specifically comprises a plurality of individual cam members or dogs 56b,

58b, and 60b which are independently urged into camming position by means of biasing springs 62 individually thereto. One end of each of the springs 62 is secured between a pair of lugs 64 inwardly struck from the casing flange 26b, while the other end of the springs engages against an edge portion of its associated cam.

In the modification shown in Fig. 9, it will now be apparent that sliding of the slide 7b to the left will cause the lip 308 thereof to engage the nose 310 of the cam means 6b whereby the cam means 6b is rotated counterclockwise thereby releasing the foot of each of the cams 56b, 58b, and 60b from engagement with the rotary bolt 4 in substantially the same manner as described in connection with the other forms of this invention. The cam 60b has associated therewith a foot 116b which extends behind the rear edges of the cams 56b and 58b substantially as described in connection with the cams 56, 58, and 60.

The retracting member 10b is connected with the inside door handle (not shown) through a longitudinally movable link (not shown) pivotally connected, as by means of pin 124b, to a pivotally mounted lever 120b comprising a portion of the retracting member 10b. As before, the inside handle mechanism (not shown) biases lever 120b to the position shown. The lever 120b has a pair of spaced nose portions 312 and 314 which coact with the foot 116b of the cam means 6b and with a foot 316 of a locking slide 140b. Upon clockwise rotation of the lever 120b, the nose 312 will engage an upper surface of the foot 116b whereby the cam means 6b are rotated in a counterclockwise direction for releasing the bolt 4. Upon movement of the inside door handle in the opposite direction, the lever 120b will rotate in a counterclockwise direction whereby the nose 314 thereof will engage the underside of the flange 316 thereby moving the slide 140b upwardly causing a foot 318 thereof to be positioned in the path of movement of an offset rear portion 320 of the slide 7b whereby the slide 7b is blocked against longitudinal movement in a leftward direction (Fig. 9) for releasing the bolt 4. Therefore it will be apparent that the releasing member means 10b is operable by the inside door handle for movement in one direction to release the bolt 4 and for movement in a second direction to lock the bolt 4 against release by the outside door handle. In this modification there is no means for locking the latch against operation from the inside door handle.

The foot 116b is co-operable with the upper surface of the flange 316 of the slide 140b upon door-closing movement subsequent to locking of the latch with the door in the open position to kick off the lock whereby the door may be closed and the latch actuated by the outside door handle. As discussed above upon closing movement of the door the rotary bolt 4 will be rotated one tooth in a clockwise direction (Fig. 9) whereby the cam means 6b will be rotated counterclockwise, causing the foot 116b thereof to move downwardly and engage the upper surface of the flange 316 and push the slide 140b downwardly a sufficient distance so that the foot 318 is moved out of its blocking relation with the inner end 320 of the slide 7b.

As in Figs. 1 through 6, the locking slide 140b may also be actuated by a key-actuated mechanism generally designated 322, having an actuator opening externally of the outer surface of the door 1 with which the latch is associated. For this purpose the slide 140b is provided with a downward extension 324 which is provided with teeth 326 arranged to mesh with co-operating teeth 328 of the key-actuated mechanism 322. It is believed that it will be apparent that upon rotation of the key-actuated mechanism 322 in a clockwise direction, as seen in Fig. 10, the slide 140b will be moved upwardly into its blocking position for blocking movement of the slide 7b and consequently preventing opening of the door by means of the outside door handle. It is believed that it is also apparent that upon rotation of the key-actuated mechanism 322 in its counterclockwise direction the slide 140b will be moved downwardly out of its locking or blocking relation. In Fig. 11 the position of the slide 140b is shown in its blocking position and furthermore the lever 120b is shown in this figure in its position of engaging the slide 140b for movement to its locking position due to operation of the inside door handle. As will be evident from the form shown in Figs. 1–6, detent mechanism (not shown) may be provided for yieldingly holding the slide 140b in either of its two positions.

It will now be seen that the modification shown in Figs. 9, 10, and 11 provides the latch mechanism of the rotary bolt type which may be locked externally of the motor vehicle by means of the key-actuated mechanism 322 and may also be locked internally of the motor vehicle by movement of the inside door handle in its direction opposite to that for causing release of the bolt 4 for opening of the door 1 from the inside of the vehicle. Since the lever 120b acts directly on the cam means 6b for releasing of the bolt 4, the position of the slide 140b does not interfere with operation of the latch by the inside door handle. The latch of this modification is also provided with a kickoff whereby, when the latch is in locked position with the door open, closing of the door automatically unlocks the latch. It may also be seen that unlatching movement of the inside door handle, while not acting directly on the locking slide 140b, will nevertheless cause it to be moved downwardly out of blocking relation with the outside door handle since the foot 116b of the cam means 6b will engage the foot 316 and move it downwardly during releasing movement of the means 6b.

In Fig. 12 there is shown a modified form of latch which in general construction is quite similar to that shown in Figs. 9, 10, and 11. The locking of the outside roll back 8c is accomplished by providing a lever 400 which is pivotally mounted on a pin 402 carried by the base 101c of the casing 2c in which the latch mechanism is carried. The lever 400 is substantially L-shaped and has a bifurcated end portion 404 which extends downwardly toward the lever 120c which is operated by a link (not shown) pivotally connected to one end of the lever 120c and operated by the inside door handle. The lever 120c is provided with a lip 406 which is received within the bifurcated portion 404 of the lever 400. The lever 120c acts in the usual manner upon movement of the inner door handle whereby its nose 408 engages the foot 116c of the cam means 6c whereby the cam means 6c are withdrawn from locking engagement with the rotary bolt 4. Upon movement of the inner door handle in the opposite direction the lever 120c is rotated counterclockwise whereby the lip 406 acting in the bifurcated end portion 404 of the lever 400 rotates the lever 400 in a clockwise direction

whereby a foot 410 is rotated into path of movement of the slide 7c of the outside roll back 8c, thereby rendering the latter ineffective. It will be observed that upon movement of the inner door handle in an unlatching direction the lever 120c will be rotated clockwise first rotating the lever 400 in a counterclockwise direction removing the foot 410 from its blocking relation with respect to the roll back 8c; and thereafter, continued clockwise rotation of the lever 120c will cause its nose 408 to engage the foot 116 for releasing the bolt 4. Lever 120c is of course intended for association with a small inside handle mechanism (not shown) which is yieldingly held in either a neutral or a dogging position.

In Figs. 13 and 14 there is shown a still further modified form of latch which in general construction is quite similar to that shown in Figs. 9, 10, and 11. In the construction in Figs. 13 and 14, the latch is contained within a casing 2d having a flange 26d and a base 101d; a slide 7d of the outside roll back 8d is provided with elongated apertures 500, 502 through which extend pins 504, 506 which guide the slide 7d for longitudinal movement, the pins 504 and 506 being carried by the flange 26d. A spring 508 has one end portion 510 received between a pair of outstruck ears 512 of the flange 26d. The other end of the spring 508 engages a foot 514 of the slide 7d and acts to urge the slide 7d in a right-hand direction (Fig. 13). The slide 7d is also provided with a foot 516 which, upon leftward longitudinal movement thereof, engages nose portions 518 of the cam means 6d whereby the feet thereof are moved out of the path of movement of the rotatable bolt 4. The cam means 6d comprise three cam members 56d, 58d, and 60d respectively which are proportioned similarly to the cams 56, 58, and 60, the cam 60d having associated therewith a foot 116d similarly to the foot 116.

A lever 120d is pivotally mounted on the pin 524 and is adapted for actuation by an inside door-releasing handle (not shown) of the type described in connection with Figs. 1 through 6, whereby, upon clockwise rotation of the lever 120d, its nose 528 will engage the foot 116d for rotation of the cams 56d, 58d, and 60d out of their holding relation with the rotatable bolt 4.

The slide 7d has an offset end portion 520 into the path of movement of which a foot 522 of a locking slide 140d is movable. The slide 140d is carried by pins 524 and 526 which extend through elongated slots in the slide 140d and which are carried by the base 101d. A lever 530 is pivotally mounted upon the pin 524 and has a nose 532 which is received between spaced flanges 534 and 536 of the locking slide 140d. The lever 530 is actuated by means of a link 538, the movement of which may be controlled, as through a bell crank (not shown), by a locking button (not shown) extending upwardly through the door garnish molding. Detent mechanism as described in connection with Figs. 1 through 6 may be provided to yieldingly hold slide 140d in either of its two positions. Alternatively, this holding means may be associated with the locking-button mechanism.

Upon clockwise movement of the lever 530, its nose 532 will engage the flange 536 for movement of the slide 140d downwardly whereby the foot 522 thereof is moved out of the path of movement of the offset portion 520 of the slide 7d whereby the cam means 6d may be released upon movement of the retracting member 8d. Counter-clockwise rotation of the lever 530 will cause its nose 532 to engage the flange 534 and move the slide 140d upwardly, whereby the nose 522 thereof is positioned in the path of movement of the slide 7d whereby the inward or leftward movement of the latter, as seen in Fig. 13, will be prevented, and the retracting member 8d is prevented from sufficient movement by the outside door handle to cause release of the cam means 6d for release of the rotatable bolt 4. It will be observed that the lever 120d acts directly on the foot 116d whereby the cam means 6d may at all times be operated by movement of the inner door handle. As shown, the flange 534 of the slide 140d is located sufficiently downwardly so that the releasing rotation of the cam means 6d will not cause the foot 116d thereof to engage this flange 534 for automatic or unlocking of the movement of the slide 140d and consequently the locks as shown in Figs. 13 and 14 do not have the so-called kickoff operation.

The modification as shown in Fig. 15 is very similar to that shown in Figs. 13 and 14 except that there is no lever corresponding to the lever 530 of Fig. 14. Instead, a finger 600 is provided on the lever 120e which extends between the flanges 434e and 436e of the slide 140e. The slide 140e also has a foot 522e movable into blocking position with an offset end portion 520e of an outside roll back. The dot-dash position of the finger 600 and foot 522e shows their locked positions. The finger 600 has sufficient lost motion between the time that it engages the upper of the flanges 434e and the lower of the flanges 436e so that within this range of movement, with the slide 140e in its lower or unlocked position, the lever 120e is operable to engage the foot 116e of the cam means holding the rotary bolt 4 whereby the cam means may be moved out of holding engagement with the rotary bolt 4. Upon movement of the inner door handle in the opposite direction, the lever 120e will be rotated counterclockwise whereby the finger 600 engages the upper flange 434e whereby the slide 140e is moved upwardly into the path of movement of the outside roll back (not shown) so that the latch is locked from release by the outside door handle. The inside handle mechanism (not shown) associated with lever 120e is, of course, of the type which is yieldingly held in either of its neutral and dogging positions. In other respects the latch of Fig. 15 is substantially identical with that of Figs. 13 and 14.

In the modification shown in Figs. 16 and 17, the latch is carried by latch casing 2f which is provided with a flange 26f and a base 101f. The bolt 4 is carried by the flange 26f in the usual manner and is held against rotation by cam means 6f similar to cam means 6 and which cam means 6f may be rotated to released position upon downward movement of a nose 116f of the cam means 6f, the nose 116f being rotated upon engagement therewith of a nose 700 of a rotatable lever 702 carried by a pin 704 rigid with the base 101f. Pivoted on this pin 704 is a locking lever 706 which has a lip 708 movable into the path of movement of a slidable slide 7f forming part of the outside roll back 8f which is operated by means of the outside door handle. Positioning of the lever 706 is accomplished by means of a locking slide 140f which may be adjustably positioned by means of a gear segment 154f, which gear 154f may be rotated from the outside of the vehicle by means of a key. Clockwise rotation of the gear segment 154f serves to

move the slide 140f upwardly thereby rotating the lever 706 in a counterclockwise direction and moving the lip 708 thereof into the path of movement of the roll back 8f. Counterclockwise rotation of the gear segment 154f will act likewise to rotate the lever 706 into the position shown in Fig. 17 in which the lip 708 thereof is removed from the path of movement of the outside roll back 8f. The slide 7f is somewhat similar to the slide 7b. However, it is reciprocally guided for movement relative to the flange 26f of the case plate by means of a pin 710 which is carried rigidly by the slide 7f and is guided in its sliding movement in an elongated aperture 712 in the flange 26f. In this modification the slide 7f does not directly engage the nose 714 of the cam means 6f but engages a second slide 716 which has a foot 718 engageable with the nose 714 for movement of the cam means 6f to release the rotatable bolt 4. The slide 716 is suitably carried for sliding movement on the flange 26f and is positioned adjacent the slide 7f intermediate a shoulder 720 thereof and an outturned lip 722. In this manner lost motion is provided between the slide 7f and the cam means 6f whereby provision is made for manufacturing tolerances in the doors which might cause the outside door unlatching handle in a series of doors to be spaced at slightly different positions from the latch. A spiral spring 728 is carried by pin 710, the outer end 730 of this spring engaging the casing for resiliently urging slide 7f toward its retracted position. In this modification the locking lever 706 may also be actuated by means of the lever 702 whereby movement of the lever 702 by the inner door handle in a direction opposite to that for releasing of the rotary bolt 4 acts to cause a shoulder 724 to engage a shoulder 726 formed on the underside of the lip 708 whereby the lever 706 is rotated clockwise into blocking relation with respect to the end flange 722 of the slide 7f. It is believed that in view of the detailed description of the form of the invention shown in Figs. 1 through 6 inclusive that the specific operation of the various other forms of the invention shown in the subsequent figures will be apparent from the foregoing description.

What is claimed and is desired to be secured by United States Letters Patent is as follows:

1. In a latch, a casing having a flange and a base, a bolt carried by said flange, a dog carried by said flange and operable to hold said bolt, roll-back means comprising a slidable member carried by said flange and engageable with said dog for releasing said bolt, said member being movable in a direction transverse to the plane of said base, a locking member carried by said base and having a portion movable into the path of movement of said slidable member whereby said slidable member is held against releasing said dog, retracting means carried by said base and engageable with said dog for releasing said bolt, and an abutment carried by said retracting means engageable with said locking member for movement thereof in one direction upon movement of said retracting means in a direction opposite to the direction of movement thereof for releasing said dog.

2. The combination of claim 1 in which a member having a lost-motion connection with said roll-back means interconnects said first-named member and said dog.

3. The combination of claim 1 in which said first-named member carries a pin receivable within an elongated aperture in said flange and in which a resilient member is carried by said pin and is engageable with said casing for resiliently urging said first-named member to a retracted position.

4. In a latch, a casing having a flange and a base, a bolt carried by said flange, a dog carried by said flange and operable to hold said bolt, roll-back means comprising a slidable member carried by said flange and engageable with said dog for releasing said bolt, said member having a path of movement transverse to the plane of said base, a locking slide slidably carried by said base and having a portion movable into the path of movement of said member whereby said member is held against releasing said dog, retracting means carried by said base and engageable with said dog for releasing said bolt, and an abutment carried by said retracting means engageable with said slide for movement thereof in one direction upon movement of said retracting means in a direction opposite to the direction of movement thereof for releasing said dog.

5. The combination of claim 4 in which said abutment engages one surface of a flange on said slide and in which said dog in its movement to release said bolt is engageable with the opposite surface of said flange.

6. In a latch for association with a closure member and a supporting member, the combination of a latch casing carried by one of said members and having a flange for disposition at the free edge wall of said one member and a base extending from an edge of said flange, a rotary bolt carried by said flange and releasably engageable upon rotation with a keeper carried by the other of said members, a cam pivoted to said flange and movable into a blocking position engaging said bolt to hold said bolt against rotation in a releasing direction, a rollback member carried by said flange and adapted to be actuated by a latch-releasing means carried by said one member, said rollback member having a cam-engaging portion movable in a direction transverse to the plane of said base for rotating said cam about its pivot axis out of its said blocking position, a locking member carried by said base and having a portion movable into the path of said rollback member to prevent the latter from rotating said cam, inside rollback means comprising a lever pivotally mounted on said base and engageable with said cam upon movement in one direction for releasing said bolt relative to said keeper, said rollback member and said lever being connected to said cam independently of each other, and an abutment carried by said lever engageable with said locking member for movement thereof in one direction upon movement of said lever in a direction opposite to the direction of movement thereof for releasing said bolt.

7. In a latch, a casing having a flange for disposition at the free edge wall of a door and a base extending from an edge of said flange, a bolt carried by said flange, a dog carried by said flange and operable to hold said bolt, rollback means comprising a movable member carried by said flange and engageable with said dog for releasing said bolt, said member having a dog-engaging portion movable in a direction transverse to the plane of said base, a locking member carried by said base and having a portion movable into the path of movement of said movable member, whereby said movable member is held against releasing said dog, retracting means carried by said base and engageable with

said dog for releasing said bolt, and an abutment carried by said retracting means engageable with said locking member for movement thereof in one direction upon movement of said retracting means in a direction opposite to the direction of movement thereof for releasing said dog.

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