Feb. 24, 1942. W. C. DEVEREAUX 2,274,362

LATCH MECHANISM

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FIG.2.

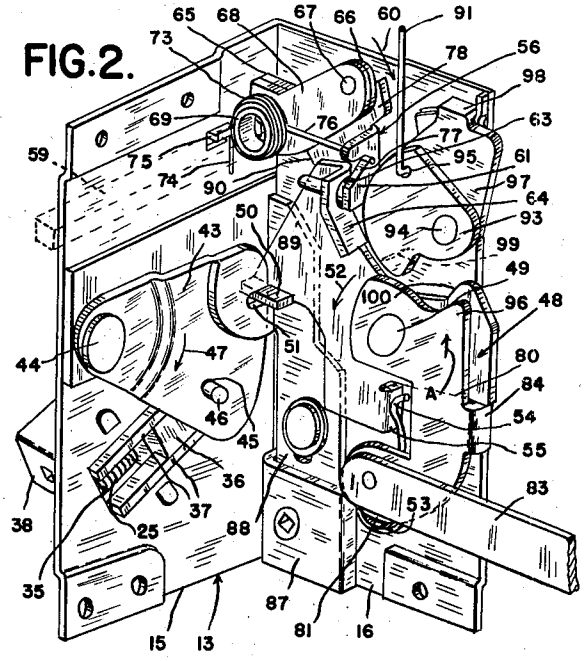
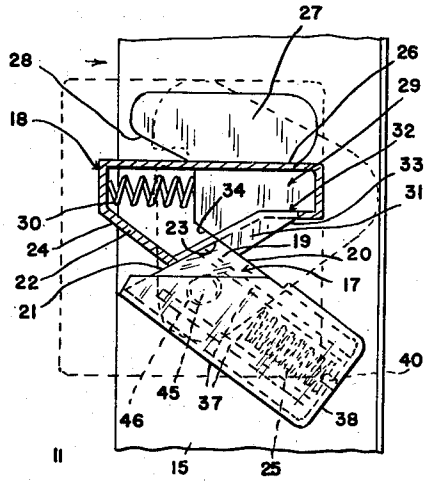


FIG.5.



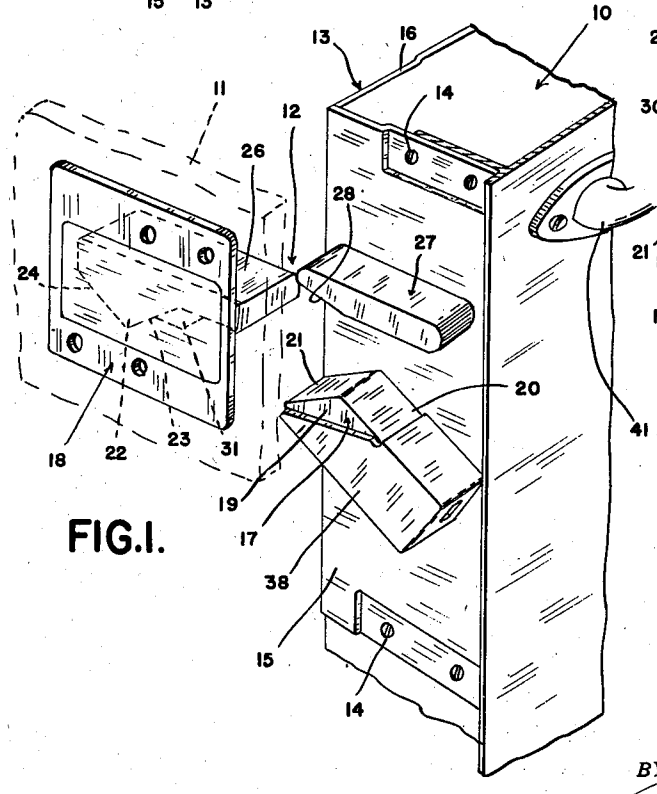


FIG.1.

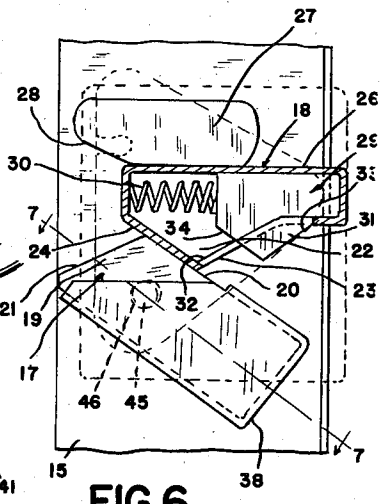


FIG.6.

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LATCH MECHANISM

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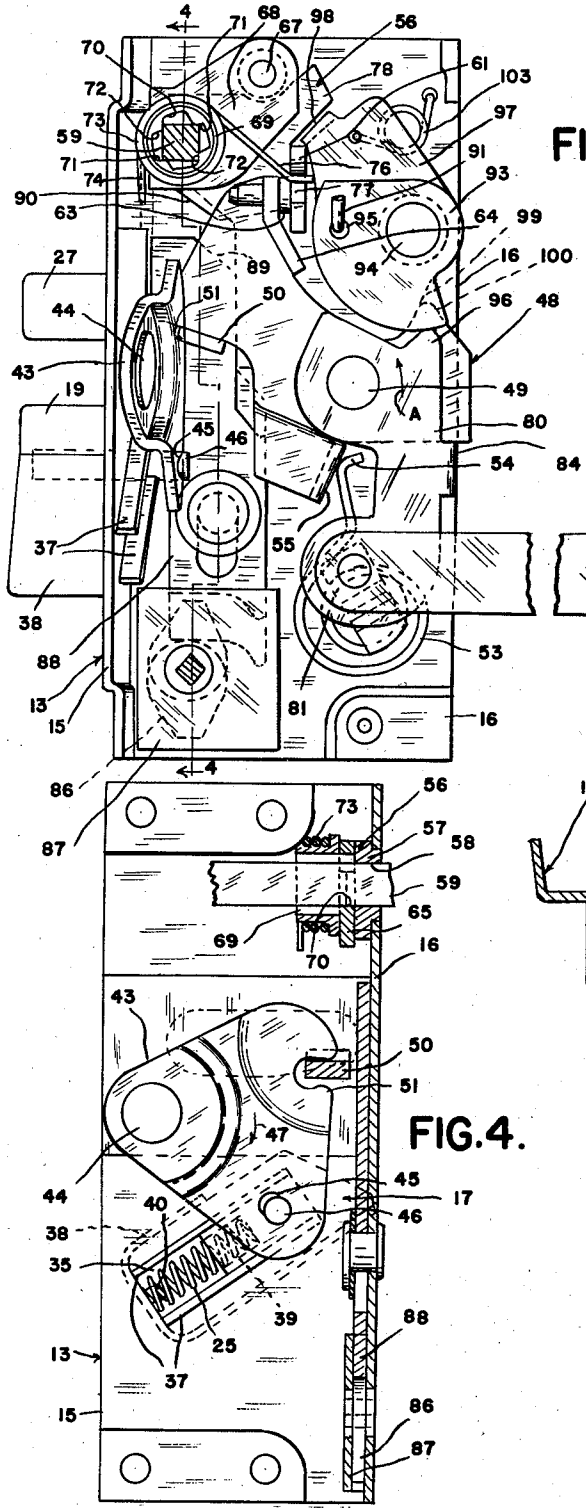


FIG.3.

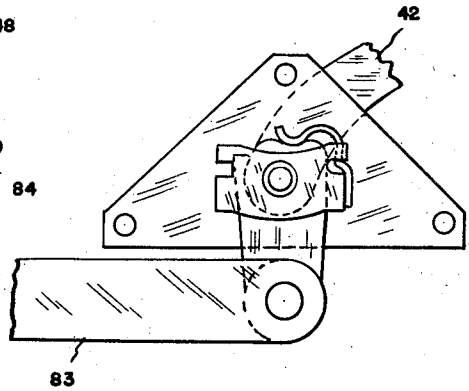


FIG.7.

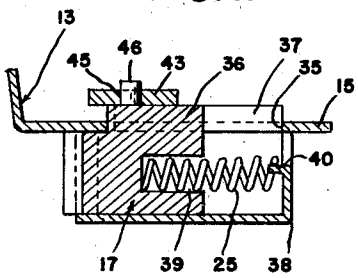


FIG.4.

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2,274,362

LATCH MECHANISM

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Application January 23, 1939, Serial No. 252,478

5 Claims. (Cl. 292—164)

This invention relates to latch mechanisms and refers more particularly to improvements in latch mechanisms of the type capable of performing the dual function of latching a closure in its closed position and effectively supporting the swinging edge of the closure relative to the surrounding frame structure.

One of the principal features of this invention resides in the provision of a relatively simple inexpensive latch mechanism constructed to insure easy and noiseless operation of the mechanism to effect both latching of the closure in its closed position and opening of the closure.

Another advantageous feature of the present invention which contributes materially to simplifying the construction and reducing the cost of manufacture consists in the provision of a combined latch mechanism and dovetail assembly effective to not only securely latch the closure in its closed position, but to also support the swinging edge of the closure against shifting movement relative to the surrounding frame structure.

Still another object of the present invention resides in the provision of latch mechanism of the character set forth above having an improved safety catch operating in a dependable noiseless manner to securely hold the closure against opening movement relative to the surrounding frame structure in the event the latch fails to catch, or in the event it is accidentally released.

A further object of this invention resides in the provision of latch mechanism having a bolt mounted for sliding movement transversely of the swinging edge face of the door in a plane parallel to the plane of said face, and having pivotally supported interconnected parts connected to the bolt for sliding the latter. By supporting the bolt retracting parts for pivotal movement, instead of sliding movement, the friction of the mechanism is reduced to the minimum and, as a result, less force is required to operate the latch mechanism.

A still further feature of the present invention resides in the provision of latch mechanism having a keeper embodying a spring-pressed safety catch retracted by the bolt upon initial closing movement of the closure and cooperating with the bolt to hold the closure in a partially closed position with respect to the surrounding supporting structure.

In addition to the foregoing, the present invention contemplates latch mechanism of the character hereinbefore set forth embodying novel means for locking the latch bolt against retraction, either from the inside, or the outside of the closure.

The foregoing, as well as other objects, will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein—

Figure 1 is a fragmentary perspective view illustrating a portion of the swinging edge face of a closure equipped with latch mechanism constructed in accordance with this invention;

Figure 2 is a perspective view of a part of the latch mechanism forming the subject matter of this invention;

Figure 3 is a side elevational view of the latch mechanism shown in Figure 2 and illustrating a remote control associated with the latch mechanism;

Figure 4 is a sectional view taken substantially on the plane indicated by the line 4—4 of Figure 3;

Figure 5 is a fragmentary sectional view showing the manner in which the latch bolt cooperates with the keeper to hold the closure in a partially closed position;

Figure 6 is a fragmentary sectional view showing the manner in which the latch bolt cooperates with the keeper to hold the closure in its fully closed position;

Figure 7 is a sectional view taken substantially on the plane indicated by the line 7—7 of Figure 6.

Referring now more in detail to the drawings, it will be noted that there is illustrated in Figure 1 a portion of a vehicle body door 10 mounted in the usual manner for swinging movement relative to the frame structure surrounding the door opening and including a jamb, designated generally in the drawings by the reference character 11. The swinging edge of the door 10 is latched and supported on the jamb 11 by means of latch mechanism 12 having a supporting plate 13 suitably secured to the swinging edge portion of the door 10 by means of the fastener elements 14. The supporting plate 13 is shown in the several figures of the drawings as comprising angularly disposed portions 15 and 16. The portion 15 of the plate is arranged in a plane parallel to the plane of the swinging edge face of the door 10 and the portion 16 is positioned in overlapping relation with the inboard side of the door 10.

In addition, the latch mechanism 12 is provided with a bolt 17 mounted on the portion 15 of the plate 13 for sliding movement in opposite directions in a plane parallel to the plane of the

swinging edge face of the door and cooperating with a keeper 18 on the door jamb 11 to effectively latch the door in both partially and fully closed positions. In the present instance, the keeper 18 is secured to the door jamb 11 at an elevation above the path of swinging movement of the bolt 17, and the latter is movable transversely of the swinging edge face of the door along a path inclined with respect to a horizontal plane toward and away from the keeper 18.

Upon reference to Figures 5 and 6, it will be noted that the bolt 17 is provided with a V-shaped nose 19 at the upper end having substantially flat side surfaces 20 and 21, respectively, facing the outboard and inboard sides of the door. The surface 20 is substantially parallel to the path of sliding movement of the bolt 17, and the surface 21 extends transversely of this path of travel. The V-shaped nose 19 on the bolt cooperates with a V-shaped projection 22 depending from the bottom side wall of the keeper to latch the door in its fully closed position. The keeper 18 is located on the jamb 11 in such a manner that the V-shaped projection 22 assumes a position in the path of movement of the V-shaped nose 19 on the bolt carried by the door, and this projection is shown in the above figures as having substantially flat surfaces 23 and 24, respectively, engaged by the surfaces 21 and 20 on the V-shaped nose 19 of the bolt when the door is swung to its closed position. In this connection, it will be observed that the surface 23 on the V-shaped projection of the keeper is inclined and engages the surface 21 on the bolt to cam the bolt to its retracted position during the final closing movement of the door. The surface 24 of the V-shaped projection 22 on the keeper is parallel with the surface 20 on the bolt and is adapted to be engaged by the latter surface when the door is in its fully closed position to latch the same in this position. As will be more fully hereinafter set forth, the bolt is moved by a spring 25, shown in Figure 7, to its extended position illustrated in Figure 6 as soon as the surface 21 on the bolt is released from the cam surface 23 on the keeper 18.

It will be noted from Figures 5 and 6 that the keeper 18 is in the form of a sheet metal housing capable of being readily pressed into the desired shape and having a top substantially flat horizontal wall 26 cooperating with a dovetail 27 projecting from the swinging edge face of the door above the bolt to insure proper engagement of the bolt with the keeper. The dovetail 27 is also in the form of a sheet metal stamping projecting through a correspondingly shaped slot formed in the portion 15 of the lock plate 13 and secured to the inner side of this portion. It will be observed from several figures of the drawings that the bottom surface of the dovetail is fashioned with an upwardly inclined cam surface 28 adapted to engage the outboard edge of the keeper and exert a lifting action on the swinging edge of the door to insure proper positioning of the parts in the closed position of the door.

Referring again to Figures 5 and 6, it will be noted that a safety catch 29 is mounted in the housing or keeper 18 for sliding movement transversely of the door jamb and normally urged in a direction toward the outboard side of the door jamb by means of a coil spring 30 positioned between the inboard side of the safety catch and the opposite wall of the keeper 18. The catch 29 is shown as having a depending substantially V-shaped portion 31 projecting downwardly through a slot 32 formed in the outboard side 23 of the V-shaped nose 22 on the keeper. The slot 32 is elongated in a direction extending transversely of the door jamb, or in the direction of the action of the spring 30 and, of course, possesses sufficient width to freely receive the V-shaped projecting portion 31 of the safety catch. The safety catch 29 is normally maintained by the spring 30 in a position wherein the outboard end abuts the adjacent end wall of the keeper housing and, when in this position, the V-shaped projecting portion 31 extends through the slot 32 into the path of travel of the V-shaped nose 19 on the bolt 17. The spring 30 is of less strength than the spring 25 so that as the door is swung to its closed position, the surface 21 on the nose 19 of the bolt abuts the outboard surface 33 on the catch 29 and moves the catch 29 against the action of the spring 30 in a direction toward the inboard side of the door jamb 11. Movement of the safety catch 29 in the above direction by the bolt continues until the inclined surface 33 on the catch assumes a position flush with the surface 23 on the keeper 18. As the closing movement of the door is continued, the bolt 17 is retracted by engagement of the surface 23 on the keeper with the surface 21 on the bolt and when the swinging edge face of the door assumes the position thereof shown in Figure 5 relative to the jamb 11, the safety catch is returned to its normal position by the spring 30 wherein the inboard surface 34 of the V-shaped projection 31 assumes a position in overlapping relation with the outboard surface 20 on the V-shaped nose 19 of the bolt. The surface 34 on the safety catch is parallel to the surface 20 on the bolt and, as shown in Figure 5, acts as an abutment for the bolt to latch the door in a partially closed position. Of course, continued movement of the door to its fully closed position initially further retracts the bolt 17 and finally permits the bolt 17 to assume the position thereof shown in Figure 6 wherein, as stated above, the door is securely latched in its fully closed position.

It has previously been stated that the bolt 17 is slidably supported on the portion 15 of the latch plate 13. In this connection, it will be noted from Figures 2, 4 and 7 that the portion 15 of the lock plate is provided with a slot or opening 35 therethrough elongated in the direction of reciprocation of the bolt and having sufficient width to slidably receive a projection 36 on the bolt. The opposite longitudinally extending sides of the slot 35 are provided with flanges 37 having a width approximating the width of the projection 36 to provide an adequate bearing support for the bolt. It will also be observed from the several figures that the bolt is also supported in a housing 38 suitably secured to the exterior side of the portion 15 of the latch plate to extend in the direction of sliding movement of the bolt and having a portion cut away to expose the nose 19 of the bolt. The housing 38 is of sufficient length to provide for the necessary travel of the bolt 17 and the spring 25 is located in the housing. As shown particularly in Figure 7, one end of the spring extends into a recess 39 in the end of the bolt facing the outboard side of the door, and the opposite end of the spring is positioned on a projection 40 struck from the adjacent end of the housing 38.

It will be noted from the above that the spring 25 normally urges the bolt to a position wherein

the end of the projection 36, facing the inboard side of the door, engages the adjacent end wall of the slot 35 to limit the extent of projection of the bolt. As indicated above, however, the keeper 18 is so mounted on the door jamb 11 that when the door is in its fully closed position shown in Figure 6, the projection 36 is spaced a slight distance from the end wall aforesaid of the slot so as to provide sufficient clearance for any take up that may be necessary to effectively hold the door in its closed position.

Bolt retracting mechanism

Upon reference to Figures 2 to 4, inclusive, it will be noted that provision is made for retracting the bolt from the outboard side of the door by means of the operating handle 41 and from the inboard side of the door by means of the operating arm 42. In detail, a bolt retracting member 43 is pivoted, as at 44, to the inner side of the portion 15 of the latch plate 13 for swinging movement in a plane substantially parallel to the plane of the swinging edge face of the door. The bolt retracting member 43 is provided with an opening 45 therethrough adjacent the swinging end thereof for receiving a pin 46 extending inwardly from the projection 36 on the bolt, and this opening is elongated radially with respect to the pivot 44 so as to avoid binding of the parts when the bolt retracting member 43 is swung in the direction of the arrow 47 in Figures 2 and 4. It will, of course, be understood from the latter figures that movement of the member 43 in the direction of the arrow 47 about its pivot 44 retracts the bolt 36 against the action of the spring 25.

The bolt retracting member 43 is swung about its pivot 44 by means of a yoke 48 mounted upon the inner surface of the portion 16 of the latch plate 13 for swinging movement about a pivot 49 engaging the yoke at a point between the inner and outer edges thereof. The outer edge of the yoke, adjacent the portion 15 of the latch plate 13, is shown in Figure 2 as having a lateral projection 50 extending into a slot 51 formed in the swinging edge of the bolt retracting member 43 at a point spaced above the opening 45. The arrangement is such that swinging movement of the yoke 48 about the pivot 49 in the direction of the arrow 52 in Figure 2 effects the swinging movement of the member 43 in the direction of the arrow 47 to retract the bolt 17. Swinging movement of the yoke 48 in the direction of the arrow 52 is resisted by means of a spiral spring 53 having one end anchored to the portion 16 of the latch plate in any suitable manner and having the opposite end 54 abutting a lateral projection 55 formed on the yoke 48 at a point directly below the pivot 49.

The yoke 48 is swung about the pivot 49 in the direction of the arrow 52 against the action of the spring 53 by means of a rollback or cam 56 rotatably mounted on the inner side of the portion 16 of the latch plate 13 and having a hub 57 extending through an opening in the portion 16 of the latch plate. The hub 57 is provided with a polygonal or rectangularly shaped opening 58 therethrough for slidably receiving a correspondingly shaped shank 59 secured to the operating handle 41. As a result, rocking movement of the operating handle 41 effects a corresponding rocking movement of the rollback 56 and, in the present instance, provision is made for swinging the yoke 48 in the direction of the arrow 52 when the rollback 56 is rocked in the direction of the arrow 60 in Figure 2, by the operating handle 41. In detail, the rollback 56 is shown in Figures 2 and 3 as having a laterally projecting portion 61 adapted to abut a rubber or non-metallic buffer 63, carried by a lateral projection 64 on the yoke 48. The projection 64 is arranged on the yoke 48 at a point spaced above the pivot 49 so that as the projection 61 on the rollback engages the buffer 63, the yoke 48 is rocked in the direction of the arrow 52 to retract the bolt 17 through the member 43.

The handle shank 59 is shown in Figure 4 as also extending through a positioning member 65 having an arm 66 secured to the portion 16 of the latch plate 13 by means of a shouldered pin 67 and a plate 68 having a hub portion 69 formed with an enlarged opening therethrough for the passage of the shank 59. The opening through the positioning member 65 for the passage of the handle shank 59 is designated in Figure 3 by the reference character 70 and, as will be observed from this figure, is provided with circumferentially spaced pairs of shoulders 71 and 72. The shoulders 71 cooperate with the shank 59 to position the handle in predetermined relationship with the door when the latch bolt is in its extended position and the shoulders 72 form stops to limit the operating movement of the handle. In this connection, it will be noted that the handle is normally maintained in a position determined by the shoulders 71 by means of a spring 73 having a coiled portion sleeved over the hub 69 on the plate 68 with one end 74 anchored against the portion 15 of the latch plate 13 by the lug 75 and having the opposite end 76 engaged in a V-shaped notch 77 formed in the lateral projection 61 on the rollback 56. The spring 73 tends to resist movement of the rollback 56 in the direction of the arrow 60 in Figure 2 and functions to return the rollback, together with the handle, to the position determined by the stops or shoulders 71. It may be pointed out at this time that prior to inserting the handle shank in assembled relationship, the arm 78 on the rollback is held in abutting engagement with the shouldered pin 67 by the spring 73. When in this position, the rectangularly shaped opening through the hub of the rollback is rocked to a position slightly out of line with the opening 70 through the positioning member 65. As a consequence, when the end of the shank 59 is initially inserted in the hub of the rollback, the latter must be rocked slightly in the direction of the arrow 60 to permit forcing the shank through the positioning member 65. It follows, therefore, that the rollback, under the action of the spring 73, cooperates with the positioning member 65 to exert, in effect, a scissors action on the shank 59 of the operating handle to resist removal of the latter.

As pointed out above, the bolt 16 may also be retracted from the inboard side of the door and, for accomplishing this result, an arm 80 is pivoted at its upper end to the pin 49 adjacent the yoke 48 for swinging movement relative to the yoke. The lower end of the arm is shown in Figures 2 and 3 as having an extension 81 operatively connected to the handle 42 through the medium of a link 83 in a manner such that when the handle 42 is raised, the arm 80 is rocked in the direction of the arrow A about the pin 49. This rocking movement of the arm 80 is transferred to the yoke 48 by means of a lug 84 extending laterally from the rear edge of the arm beneath the corresponding end of the

yoke 48. It follows, therefore, that movement of the arm 80 in the direction of the arrow A causes the lug 84 to abut the underside of the yoke 48 at the inner end of the latter and rock the same about the pivot 49 in the direction of the arrow 52. As stated above, rocking movement of the yoke 48 in the direction of the arrow 52 retracts the bolt 17 through the member 43. In this connection, it will be noted that the projection 64, carrying the rubber buffer 63 on the yoke, is moved away from the rollback during this operation and, therefore, does not interfere with the rollback. It will also be noted that the operating lug 84 on the arm 80 is so positioned with respect to the yoke 48 that the yoke may be operated by the rollback 56 from the outside of the door without interfering with the arm 80.

Locking mechanism

In accordance with the present invention, key operated means is provided for locking the bolt 17 against retracting movement, and this means is shown in Figure 3 as including a key operated cam 86 rockably supported in a lock housing 87 for engagement with the lower end of a locking slide 88. The slide 88 is mounted upon the inner surface of the portion 16 of the lock plate 13 and the upper end of the slide is provided with a tapered cam surface 89 engageable with a correspondingly tapered edge portion 90 on the rollback 56 when the cam is rocked to the uppermost position thereof shown in Figure 3. It follows, therefore, that any effort to operate the rollback by the door handle 41 to retract the bolt causes the inclined edge 90 on the rollback to abut the correspondingly inclined edge 89 on the slide and, inasmuch as the slide is held from downward movement by the cam 86, it follows that the bolt is locked against retracting movement.

The bolt may also be locked against retracting movement from the inner side of the door by merely depressing the rod 91. In detail, it will be noted from Figure 2 that the inside door locking mechanism comprises a cam 93 supported on the inner surface of the portion 16 of the latch plate by means of a pin 94 for swinging movement in the plane of the arm 80 and having an opening 95 therethrough adjacent the swinging edge thereof to provide for extending the lower end portion of the rod 91 therethrough. The arrangement is such that movement of the push rod 91 downwardly swings the member 93 about the pivot 94 from the position shown in Figure 2 to the position shown in Figure 3 wherein the swinging edge of the member 93 abuts a projection 96 extending from the upper end of the arm 80. The projection 96 is located inwardly with respect to the pivot 49 for the arm 80 and, as a consequence, swinging of the latter by the inside door handle 42 to retract the bolt is prevented.

It will also be noted that a knockout cam 97 is mounted on the pivot 94 between the locking cam member 93 and the inner surface of the portion 16 of the latch plate. The knockout cam 97 moves as a unit with the locking cam 93 in the same plane as the yoke 48 and is provided with an opening in alignment with the opening 95 to also receive the lower end of the push rod 91. Inasmuch as the knockout cam 97 moves as a unit with the locking cam 93, it follows that downward movement of the push rod 91 also effects a swinging movement of the knockout cam 97 from the position shown in Figure 2 to the position illustrated in Figure 3 wherein it will be seen that the portion 98 of the cam is located directly in the path of the arm 78 on the rollback so as to prevent retraction of the bolt by operating the handle 41. It will also be noted from Figure 3 that the knockout cam is provided with a shoulder 99 adapted to abut the inner side of a projection 100 formed on the yoke 48. The arrangement is such that if the latch mechanism is placed in the locked position shown in Figure 3 before the door is closed, the resulting movement of the yoke 48 in the direction of the arrow 52 will automatically swing the knockout cam member 97 and locking cam 93 to the inoperative position shown in Figure 2. This action, of course, is facilitated by means of the spring 103 shown in Figure 3 as acting on the knockout cam 97. With the above arrangement, it will be seen that it is impossible for anyone to lock themselves out of the vehicle by inadventently depressing the rod 91 before the door is closed.

Thus, from the foregoing, it will be observed that I have provided latch mechanism composed of a relatively few simple parts and capable of performing the dual function of supporting the swinging edge of the door in its closed position and effectively latching the door in the latter position, as well as in a partially open position. It will further be noted that the several parts of my improved latch mechanism cooperate to provide practically noiseless operation of the latch and to also insure easily closing and opening of the door.

What I claim as my invention is:

1. In a latch mechanism for a swinging closure, the combination of a bolt mounted on the swinging edge of the closure for sliding movement in a plane parallel to the swinging edge of the closure along a path extending transversely of the swinging edge of the closure, a keeper having an inclined bolt retracting surface engageable with the latching end of the bolt to retract said bolt as the closure is swung to its closed position, a safety catch slidably supported in the keeper for movement toward the inner end of the keeper and having a portion projecting through the inclined bolt retracting surface of the keeper for engagement by the bolt as the closure is swung to its closed position, said projecting portion on the catch being movable by the bolt relative to the keeper in a direction toward the inner end of the keeper to a position flush with the inclined bolt retracting surface on the keeper and being releasable from engagement with the bolt when the closure is in its partially closed position, and means effective upon release of the safety catch by the bolt to return the safety catch to a position wherein the portion aforesaid thereof projects beyond the inclined bolt retracting surface and forms an abutment engageable with the adjacent side of the bolt to latch the closure in its partially closed position.

2. In a latch mechanism for a swinging closure, the combination of a bolt mounted on the swinging edge of the closure for sliding movement in a plane parallel to the plane of the swinging edge face of the closure in opposite directions along a path inclined with respect to the plane of the closure and having a surface at the latching end extending transversely to the path of travel of the bolt, a keeper having an inclined surface engageable with the trans-

verse surface aforesaid on the bolt as the closure is swung toward its closed position to retract said bolt and having an opposed surface extending substantially parallel to the path of sliding movement of the bolt for engagement with the adjacent side of the bolt in the extended position of the latter to latch the closure in its closed position, a safety catch supported in the keeper for sliding movement in a direction toward the inner end of the keeper and having a portion projecting through the bolt retracting surface of the keeper for engagement by the bolt as the closure is swung toward its closed position, said projecting portion of the catch having a surface inclined in the general direction of the bolt retracting surface of the keeper and having an opposed surface extending substantially parallel to the path of sliding movement of the bolt, the first mentioned surface on the projecting portion of the catch adapted to be engaged by the transverse surface of the bolt as the closure is swung to its closed position to slide the catch relative to the keeper to a position wherein the projecting portion of the catch is flush with the bolt retracting surface of the keeper, and means effective upon release of the catch by the bolt to return the catch to a position wherein the projecting portion of the catch extends beyond the bolt retracting surface and wherein the surface of the projecting portion extending parallel to the path of sliding movement of the bolt forms an abutment engageable with the adjacent side of the bolt to latch the closure in a partially closed position.

3. In a latch mechanism for a swinging closure, a bolt mounted on the swinging edge face of the closure for sliding movement in opposite directions extending transversely of the swinging edge face of the closure and cooperating with a keeper to latch the closure in its closed position, a member mounted for swinging movement in a plane substantially parallel to the plane of sliding movement of the bolt and connected to the bolt for actuating the latter, a second member engageable with said first member for swinging the latter to operate said bolt, a third member for operating said second member, a locking element movable into engagement with the third member to prevent operation of the latter to retract said bolt, and means on the second member responsive to retraction of the bolt by the keeper to move the locking element out of engagement with said third member.

4. In a latch mechanism for a swinging closure, a bolt mounted for sliding movement in a plane parallel to the swinging edge face of the closure along a path inclined with respect to the plane of the closure to cooperate with a keeper to latch the closure in a closed position, a member pivotally supported for swinging movement in a plane substantially parallel to the plane of the swinging edge face of the closure and connected to the bolt for retracting the latter from the keeper, means engageable with the member for swinging the latter to actuate said bolt from one side of the closure, additional means for operating the member to retract the bolt from the opposite side of the closure, means for locking both of the aforesaid member operating means from retracting the bolt, and means responsive to movement of the bolt to its retracted position by the keeper to render the locking means inoperative.

5. In a latch mechanism for a swinging closure, a bolt mounted for sliding movement transversely of the swinging edge face of the closure in a plane substantially parallel to the plane of said face and having a portion cooperating with a keeper to latch the closure in a closed position, a member pivotally supported for swinging movement in a plane substantially parallel to the plane of the swinging edge face of the closure and connected to the bolt for retracting the latter, a second member pivotally supported for swinging movement in a plane substantially perpendicular to the plane of swinging movement of the first member and connected to the first member for actuating the latter, means for dogging the second member including an element supported for rocking movement and having a projection engageable with a shoulder on the second member and movable to undogging position by the second member upon movement of the bolt to its retracted position by the keeper.

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