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DOOR LATCH MECHANISM

Filed June 27, 1961

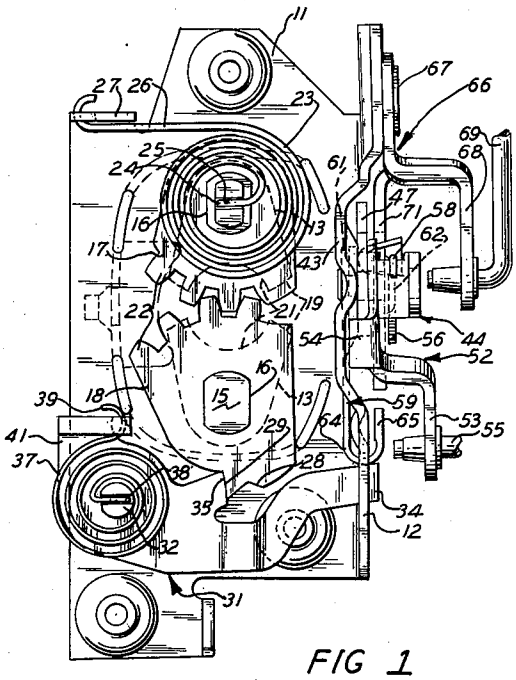


FIG 1

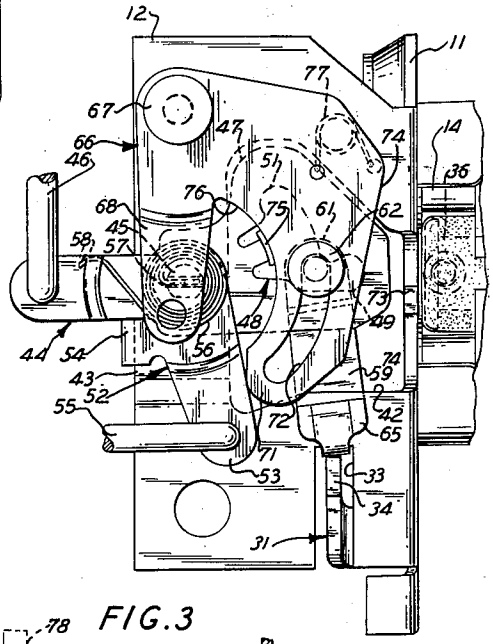


FIG.3

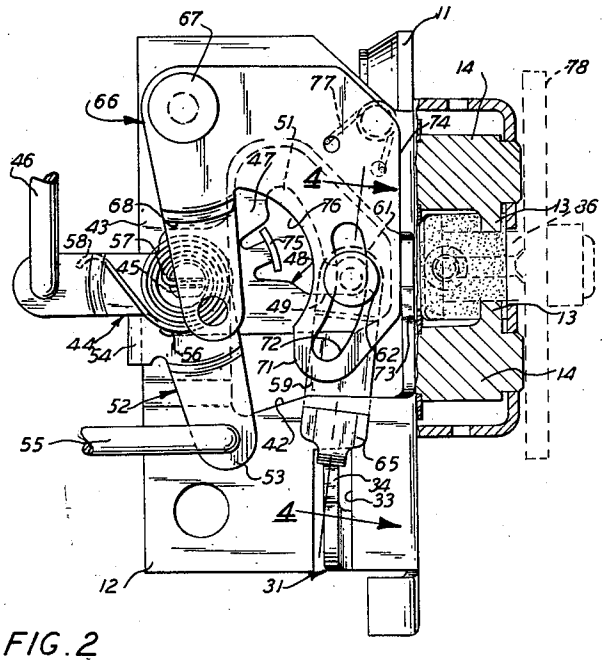


FIG.2

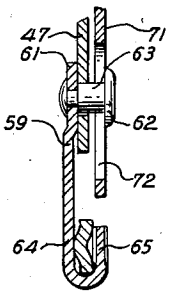


FIG.4

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DOOR LATCH MECHANISM

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This invention relates to latch mechanisms for swinging doors, especially the doors of automobile or other vehicle bodies.

Most door latch mechanisms currently in use on passenger motor vehicles comprise rotatable or pivotable latch device means adapted to engage a striker or keeper device mounted on a vehicle door framing structure, a detent means releasably engaged with the latch device to hold the latter in door latched position, an actuating or release lever operatively associated with the detent means for disengaging the same from the latch device, and manually operable means on the outside and the inside of the vehicle door operative to cause disengagement of the detent means. In almost all latch mechanisms of this general class, the manually operable means operative from the outside of the door acts on the detent means through the actuating or release lever. The manually operable means operative from the inside of the door may be constructed and arranged to act on the detent means through the actuating or release lever if it is desired to have a latch mechanism which can be rendered inoperative from the inside of the vehicle. Most vehicles are provided with at least one front door which can always be opened from the inside of the passenger compartment even if the latch mechanism is conditioned so that the door cannot be opened from the outside.

Latch mechanism may be categorized by the manner in which the manually operable means is rendered inoperative to disengage the detent means from the latch device, thus placing the latch mechanism in "locked" condition. This may be done by the use of a blocking means selectively positionable to block movement of the detent means actuating or release lever. This may also be done by use of a disconnection means interposed in the train of members extending from the manually operable means to the detent means.

Reference may be made to C. F. Kramer U.S. Patent No. 2,987,336, issued June 6, 1961, for a latch mechanism exemplifying the type in which a blocking means is used to render the manually operable means inoperative to disengage the detent means from the latch device.

It is an object of the present invention to provide a latch mechanism characterized by many of the features of the latch mechanism disclosed in the Kramer patent and which is further characterized by the inclusion of features of construction by which the means manually operable from the outside and the inside of the door, such as handle, push button or the like operated means, may be operatively disconnected from the detent actuator or release lever. More specifically, the train of parts or members operatively associating both the outside and inside operators with the detent means includes a part or member directly coupled to the detent means but being shiftable thereon from a detent actuating to a detent nonactuating position, said part or member being shiftable by a locking lever operable from the inside of the door. A latch mechanism so constructed and arranged is said to be a "free wheeling" as distinguished from a "blocked" type. In other words, the outside and inside operators are always responsive to manual manipulation ragardless of whether or not the latch mechanism is in "locked" or "unlocked" condition, even though such manipulation of the outside or inside operator is not effective in "locked" condition of the mechanism to

cause disengagement of the detent means from the latch device.

The major advantage to be derived from "free wheeling" latch mechanisms is that the latch mechanism parts, particularly those in the train of elements between the outside and inside operators and the detent means, may be made of much lighter gauge metal than the parts used in a blocked type lock. In a blocked type lock the parts must be made strong enough to withstand any force which might be exerted on the operators, particularly the outside operator, by means of a pry bar, hammer or other device which might be used to make a forceful entry through the door when the latter is in locked condition. It will be readily apparent that in a latch mechanism where part of the train of elements may be disconnected, any force exerted on the outside or inside operator by an implement of any kind is ineffective to distort or spring the latch mechanism parts to a degree sufficient to permit disengagement of the detent from the latch device and the door to be opened. This, of course, applies to any impact the operators might sustain in a collision or upset of the vehicle. The use of light gauge metal results in manufacturing cost savings since less metal is used and longer metal stamping die life is obtained.

Other objects and advantages and the features of construction of the present invention will be made more apparent as this description proceeds, reference being had to the accompanying drawing, wherein:

FIG. 1 is an elevational view of the latch mechanism embodying the present invention as it would appear from the inside of the free edge wall of a vehicle door;

FIG. 2 is an elevational view in part sectional taken from the right side of FIG. 1 as viewed in the drawing;

FIG. 3 is an elevational view in part similar to FIG. 2 illustrating parts of the latch mechanism in a second operative position; and

FIG. 4 is a sectional view taken substantially on the line 4—4 of FIG. 2 illustrating details of construction.

In the drawing there is illustrated, by way of example, a preferred embodiment of the present invention as applied to the doors and door frame structures of an automobile body. Adapted to be secured as by means of screws (not shown) to the inner side of the free edge wall or jamb opposing wall of a vehicle door is a case plate **11** having a flange **12** which is adapted to be positioned along the inner panel of the door. The present latch mechanism has a pair of pivoted latch devices comprising jaw elements **13** (see FIG. 2) positioned at the outer face of the case plate **11**. Each jaw element **13** is provided with an integral shaft or pivot portion **14** having a reduced bearing portion **15** extending through a suitable flanged aperture (not shown) in the case plate. The inner reduced end or bearing portion **15** of each shaft **14** is provided with diametrically opposed flats **16** thereon. Fitted over the bearing portion **15** and keyed thereto by the flats **16** are a pair of control plates **17** and **18**. Each jaw element **13** is thus rigidly coupled to a control plate **17** or **18**, being concentric therewith on a shaft **14**. As defined herein, each latch device comprises a jaw element **13**, a shaft **14** and a control plate **17** or **18**.

Each jaw element **13** is a substantially triangular plate member having its pivot axis located near its apex end. The base side or side **19** opposite the apex end is outwardly rounded and is provided in the center thereof with a semicircular recess or enlarged notch **21**.

Each control plate is a gear sector having teeth **22**, the teeth being intermeshed to thereby couple the control plates **17** and **18** together for correlated movements. Both jaw elements are thus controlled for counterdirectional swinging movement in unison toward and from each other into and out of door latched condition.

A spiral spring **23** is disposed concentrically with and

adjacent the inner face of the control plate 17. The spring 23 is coupled at its inner end 24 to the shaft 14 carrying the control plate 17, the shaft having a diagonal slot or kerf 25 receiving the spring end. The outer or free end 26 of the spring 23 is looped over the edge of a tab 27 on the case plate 11. The spring 23 is installed in a preloaded condition so that it at all times tends to rotate or urge the control plate 17, the shaft 14 and associated jaw element 13 in a counterclockwise direction, as viewed in FIG. 1. Since the control plate 18 is coupled to the control plate 17 through the gear teeth 22, rotative force exerted by the spring 23 on the plate 17 is transmitted to the plate 18 so that it is also at all times under a rotative force urging it, the shaft 14 and associated jaw element in a clockwise direction as viewed in FIG. 1.

The control plate 18 is provided with two peripherally spaced abutments or ratchet teeth 28 and 29. Cooperable with the abutment or ratchet toothed edge of the control plate 18 is a swinging detent, pawl or dog 31 pivotally mounted on a shoulder rivet 32 secured to the case plate 11. It will be noted that the detent 31 extends in a substantially horizontal direction across the case plate 11 from its pivot, the shoulder rivet 32, toward the flange 12. The flange 12 is provided with an elongated vertically extending slot 33 through which an extension or arm 34 of the detent 31 projects.

Above the arm 34 the detent has an abutment portion 35 cooperable with the teeth or abutments 28 and 29 on the control plate 18. When the detent abutment 35 is in engagement with the control plate abutment 28, the jaw elements 13 will be held in what is known as a safety latched position. In other words, although the jaw elements 13 are not in a fully latched position, they are closed sufficiently to engage a striker or keeper pin therebetween to prevent opening movement of a vehicle door. When the abutment 35 is in engagement with the control plate abutment 29, as shown in FIG. 1, the jaw elements 13 will be in final latched position or fully gripping the striker or keeper pin 36, as shown in dotted outline in FIG. 2.

The detent 31 is urged in a counterclockwise direction or toward the control plate 18 by a spiral spring 37. This spring is anchored at its inner end 38 to the shoulder rivet 32 and at its free or outer end 39 to a short upwardly extending extension 41 of the detent 31.

Pivotal actuation of the detent in a clockwise direction, as viewed in FIG. 1, or in a direction away from the control plate 18 is accomplished through a lever and link means system carried on the flange 12. Referring now to FIGS. 3 and 4, it will be noted that the flange 12 is provided with a large aperture 42 extending from the inner or case plate edge toward the outer edge, the flange having at its outer edge an inwardly embossed or offset bridging portion 43.

A horizontally extending actuating or detent release lever 44 is pivotally mounted by a pivot stud 45 intermediate its ends on the outer or visible surface, as viewed in FIGS. 3 and 4, of the flange 12. At its left end, the lever 44 is apertured to receive a link 46 adapted to be coupled to a bell crank lever (not shown) operative by a push button or the like (also not shown) accessible at the outside of the vehicle door. Such outside operators are conventional. At its other side of the pivot stud 45, the lever 44 is provided with an enlarged portion 47 which is contoured to a shape complementary to the shape of the upper portion of the flange aperture 42. The plane of the enlarged portion 47 is substantially flush with the plane of the flange 12.

The enlarged portion 47 of the lever 44 has a substantially L-shaped slot 48 therein. The base leg 49 of the L-shaped slot extends radially of the pivot axis of the lever 44. The vertical leg 51 of the slot is curved upwardly about the center of the pivot axis of the lever arm 44.

A second lever 52 is also pivotally mounted on the bridging portion 43 of the flange 12 on the shoulder rivet or pivot stud 45. The lever 52 has a downwardly depending arm 53 and a short horizontally extending arm 54 underlying and in abutting relation to the lever 44 to the left of the pivot axis of the latter. The lever arm 53 is adapted to be coupled by a draft link 55 to any suitable remote control mechanism of a conventional nature mounted for manipulation from the inner side of a vehicle door.

It is believed readily apparent that the lever 44 may be swung in a clockwise direction by raising the link 46 or by swinging the lever 52 in a clockwise direction causing the arm 54 of the latter to raise the left end of the lever 51. Clockwise movement of the lever 44 results in a clockwise downward movement of its enlarged end 47. Clockwise movement of the lever 44 is resisted by a coil spring 56 which is wound about the pivot stud 45 with its inner end 57 hooked into the stud and its outer end 58 hooked over the left end of the lever 44.

The downward movement of the end 47 of the lever 44 is adapted to be transmitted to the end 34 of the detent 31 by a transmitting link 59. The link 59 extends in a substantially vertical direction. At its upper end 61 (see FIG. 4) it has secured thereto a shoulder rivet 62 having an elongated cylindrical portion 63. The cylindrical portion 63 is slidable within the slot 48 in the lever 44 enlarged portion 47, as will be more fully explained.

The lever end 64 of the link 59 terminates in a hook portion 65 which fits into the slot 33 of the flange 12 in position to abut the upper edge of the detent arm 34.

The ability of the transmitting link 59 to transmit movement of the lever 44 to the detent 31 is dependent upon the position of the shoulder rivet 62 within the slot 48. Referring to FIG. 2, the rivet 62 is shown positioned at the extremity of the base leg 49 of the slot 48. In this position clockwise movement of the lever 44 is transmitted through the link 59 to the detent 31 causing the latter to be swung in detent disengaging direction, i.e., clockwise from its FIG. 1 position to a point therebelow in which the abutment 35 is disengaged from the ratchet tooth 29. Referring to FIG. 3, the shoulder rivet 62 is shown in a position in which it is adapted to be nonresponsive to movement of lever 44. If the lever 44 is swung in a clockwise direction, the slot leg 51 merely moves over the shoulder rivet 62 without transmitting or exerting any downward force thereon.

The shoulder rivet 62 and thereby the upper end 61 of the link 59 is shiftable from the FIG. 2 position to the FIG. 3 position and vice versa by a lever 66, which may hereinafter be referred to as the locking lever. This locking lever 66 is pivotally fastened by a rivet 67 to the outer face of the case plate flange 12. The lever 66 has a first downwardly depending, outwardly embossed arm 68 which is adapted to be actuated through a link 69. The link 69 is coupled to an operator (not shown) such as a conventional push-pull locking button accessible on the inner panel or at the garnish molding of a vehicle door. The lever 66 has a second downwardly extending arm portion 71 laterally offset from the first arm 68. This arm portion 71 has an arcuate slot 72 through which cylindrical portion 63 of the rivet 62 projects (see FIG. 4).

The limits of swinging movement of the lever 66 are controlled by two stops. One of the stops is an upstanding lug 73 jutting out from the case plate 11 in the path of the edge 74 of the lever arm 71. The second stop is a curved lug 75 on the lever 44 which rides against the curved edge 76 of the lever arm 71. The lever 66 is held against either stop by a toggle spring 77.

The operation of the latch mechanism embodying the present invention is as follows. In FIG. 1 the latch devices (jaw elements 13) are in door latched position. The detent 31 is engaged with the final latched position abutment 29 on control plate 18. The detent 31 must

be moved in a clockwise direction to disengage its abutment 35 from the abutment 29.

If the latch mechanism parts mounted on the flange 12 are in the positions shown in FIG. 2, actuation of the detent may be accomplished from either the outside or the inside of the vehicle door. From the outside, it is only necessary to raise the link 46; from the inside, it is only necessary to pull the link 55 to the left. Raising of the link 46 causes the actuating lever 44 to be swung in a clockwise direction; pulling the link 55 to the left results in the lever 52 being swung in a clockwise direction so that its arm 54 engages the lever 44 to swing the latter in a clockwise direction.

Clockwise movement of lever 44 results in its right or enlarged end 47 being swung downwardly. This movement is transmitted through rivet 62 to link 59. Downward movement of link 59 causes its lower end 64 to abut the detent extension 34. The detent is thus swung in a clockwise direction about its pivot axis moving its abutment 35 out of the path of the abutments 29 and 28 on control plate 18, freeing the latch devices for movement to door unlatched position. It will be noted that the transmission of the downward movement of the end 47 of lever 44 to the link 59 through the shoulder rivet 62 can only occur if the latter is located in the base leg 49 of the slot 48. This condition is illustrated in FIG. 2. If the shoulder rivet 62 is in alignment with the vertical leg 51 of slot 48, movement of lever 44 in a clockwise direction is ineffective to cause downward movement of link 59.

As has been described, the shoulder rivet 62 and the upper end of link 59 are shiftable from operative (FIG. 2) position to inoperative (FIG. 3) position by locking lever 66. The latter is actuatable from the inside of the vehicle door through link 69.

When the parts of the latch mechanism are in the FIG. 3 position, both the outside and inside operators are in a "free wheeling" condition. They are both responsive to manual manipulation, but such manual manipulation merely results in an idling movement of actuating lever 44 with no corresponding movement of link 59. The detent 31 cannot be disengaged from control plate 18 and the latch devices are held in latched condition.

It should be noted that the position of the latch mechanism parts on the flange 12 is independent of the condition of the latch devices. If the vehicle door is open and the latch devices are in unlatched position, the locking lever 66 may be shifted to place the flange mounted parts in the FIG. 3 positions. If the vehicle door is then closed and the latch devices are moved to latched position, the detent extension 34 will merely move down and up as the detent abutment 35 rides over the control plate abutments 28 and 29. The movement of the detent 31 is not transmitted to the link 59, as will be readily apparent. No damage to the latch mechanism can occur and it will remain in locked or free wheeling condition. Latch mechanisms having this characteristic are usually used on the rear doors of vehicles since it is desirable to be able to set the latch mechanism in locked condition when the door is open and to have the mechanism remain in locked condition when the door is slammed shut.

The manner in which the jaw elements 13 of the latch devices coact with the striker or keeper pin 36 of the striker or keeper device 78 (see FIG. 2) is fully described in the above mentioned Kramer U.S. Patent 2,987,336. Reference may be made to this patent for other details of construction only briefly described herein.

It will be understood that modifications and changes may occur to those skilled in the art without departing from the spirit and scope of the present invention.

We claim:

1. In a latch mechanism for a swinging door, a support having two angularly related plate portions, pivotal latch device means mounted on one of said plate portions, detent means pivotally mounted on said one plate portion and engageable with said latch device means for holding the same in door latching position, a detent actuating member pivotally mounted on the other plate portion, and a link means shiftable in a plane parallel to said other plate portion to transmit movement of said detent actuating member to said detent means to disengage the latter from said latch device means, said link means being movably coupled at one end thereof to said detent actuating member and at the other end having a part thereof in abutting relation to a part of said detent means, said one end of said link means being movable on said detent actuating member from a detent actuating to a detent nonactuating position, and means on said other plate portion operable to shift said one end of said link means on said detent actuating member.

2. In a latch mechanism for a swinging door, a support having two angularly related plate portions, pivotal latch device means mounted on one of said plate portions, detent means pivotally mounted on said one plate portion and engageable with said latch device means for holding the same in door latching position, a detent actuating member pivotally mounted on the other plate portion, and a link means shiftable in a plane parallel to said other plate portion to transmit movement of said detent actuating member to said detent means to disengage the latter from said latch device means, said detent means having an extension extending through a slot in said other plate portion, said link means being movably coupled at one end thereof to said detent actuating member and at the other end having a part thereof guided by said slot and maintained thereby in abutting relation to a part of said detent means, said one end of said link means being movable on said detent actuating member from a detent actuating to a detent nonactuating position, and means on said other plate portion operable to shift said one end of said link means on said detent actuating member.

3. In a latch mechanism for a swinging door, a support having two angularly related integral plate portions, pivotal latch device means mounted on one of said plate portions, detent means pivotally mounted on said one plate portion and engageable with said latch device means for holding the same in door latching position, a detent actuating member pivotally mounted on the other plate portion, a transmitting member interposed between said detent actuating member and said detent means, said detent actuating member having a slot therein having a first section extending radially and a second section extending circumferentially of the pivot axis of said detent actuating member, means coupling one end of said transmitting member to said detent actuating member, said coupling means being movable in said slot, the other end of said transmitting member lying in abutting relation to said detent means, and control means pivotally mounted on said other plate portion and coupled to said coupling means, said control means being operable to laterally swing said transmitting member and move said coupling means from said first section of said slot to said second section and vice versa, said transmitting member when said coupling means is in said first section being shiftable in detent means abutting direction by said detent actuating member to pivot said detent means out of latch device holding position, said transmitting member when said coupling means is in said second position being nonresponsive to movement of said detent actuating member.

4. In a latch mechanism for a swinging door, a support having two angularly related integral plate portions, pivotal latch device means mounted on one of said plate portions, detent means pivotally mounted on said one plate portion and engageable with said latch device means for holding the same in door latching position, said detent means having an extension projecting through an elongated slot in the other plate portion, a detent ac-

tuating member pivotally mounted on said other plate portion, a transmitting member interposed between said detent actuating member and said detent means, said detent actuating member having a control slot therein having a first section extending radially and a second section extending circumferentially of the pivot axis of said detent actuating member, means coupling one end of said transmitting member to said detent actuating member, said coupling means being movable in said control slot, the other end of said transmitting member lying in abutting relation to said detent means and guided by said elongated slot, and control means pivotally mounted on said other plate portion and coupled to said coupling means, said control means being operable to laterally swing said transmitting member and move said coupling means from said first section of said control slot to said second section and vice versa, said transmitting member when said coupling means is in said first section being shiftable in detent means abutting direction by said detent actuating member to pivot said detent means out of latch device holding position, said transmitting member when said coupling means is in said second position being nonresponsive to movement of said detent actuating member.

5. In a latch mechanism for a swinging door, a support having a main plate portion for disposition at a free edge wall of the door and an integral flange portion extending substantially at a right angle to said main plate portion, a pair of jaw elements pivotally mounted on one side of said plate portion for swinging movement about spaced axes perpendicular to the plane thereof, a pair of control members mounted on the opposite side of said plate portion, each control member being fixedly coupled to one of said jaw elements for pivotal movement therewith, said control members having intermeshed portions whereby said jaw elements are controlled for movement in unison toward and from each other to door latched and door unlatched positions, respectively, at least one of said control members being provided with detent engageable portions, detent means pivotally mounted on said plate portion and engageable with said detent engageable portions for holding said jaw elements in door latched position, said detent means having an extension thereon projecting through a slot in said flanged portion, a detent actuating member pivotally mounted on said flange portion, a link means shiftable in a plane parallel to said flange portion to transmit movement of said detent actuating member to said detent means to disengage the latter from said detent engageable portions to permit movement of both jaw elements to door unlatched position, said link means being movably coupled at one end thereof to said detent actuating member and at the other end having a part thereof guided by said slot in abutting relation to a part of said detent means, said one end of said link means being movable on said detent actuating member from a detent actuating to a detent nonactuating position, and means on said flange portion operable to shift said one end of said link means on said detent actuating member.

6. In a latch mechanism for a swinging door, a support having a main plate portion for disposition at a free edge wall of the door and an integral flange portion extending substantially at a right angle to said main plate portion, a pair of jaw elements pivotally mounted on one side of said plate portion for swinging movement about spaced axes perpendicular to the plane thereof, a pair of control members mounted on the opposite side of said plate portion, each control member being fixedly coupled to one of said jaw elements for pivotal movement therewith, said control members having intermeshed portions whereby said jaw elements are controlled for movement in unison toward and from each other to door latched and door unlatched positions, respectively, at least one of said control members being provided with detent engageable portions, detent means pivotally mounted on said plate portion and engageable with said detent engageable portions for holding said jaw elements in door latched position, a detent actuating member pivotally mounted on said flange portion, a link means shiftable in a plane parallel to said flange portion to transmit movement of said detent actuating member to said detent means to disengage the latter from said detent engageable portions to permit movement of both jaw elements to door unlatched position, said link means being movably coupled at one end thereof to said detent actuating member and at the other end having a part thereof guided by said slot and in abutting relation to a part of said detent means, said one end of said link means being movable on said detent actuating member from a detent actuating to a detent nonactuating position, and means on said flange portion operable to shift said one end of said link means on said detent actuating member.

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