# United States Patent

[11] 3,592,496


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Continuation-in-part of application Ser. No. 650,062, June 29, 1967, abandoned. Continuation-in-part of application Ser. No. 748,124, July 1, 1968, Continuation-in-part of application Ser. No. 751,194, Aug. 8, 1968.


[54] VEHICLE DOOR LATCH
4 Claims, 11 Drawing Figs.


[52] U.S. Cl. ..... 292/216
[51] Int. Cl. ..... E05c 3/26
[50] Field of Search ..... 292/216



[56] References Cited

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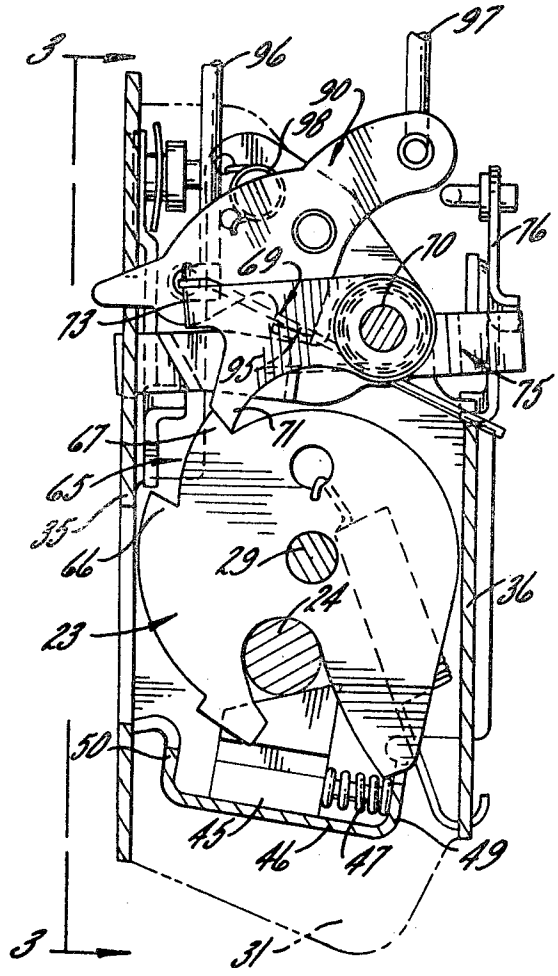
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**ABSTRACT:** A single preset latch adapted to be concealed entirely within a vehicle door. The latch includes a pivoted pawl, contactor and locking lever disposed in closely spaced side-by-side relation and mounted to turn about axes which parallel the pivot axis of a turnable latching. The latch is of the "hard button" type in that the contactor is physically blocked against movement when the latch is in a locked condition.

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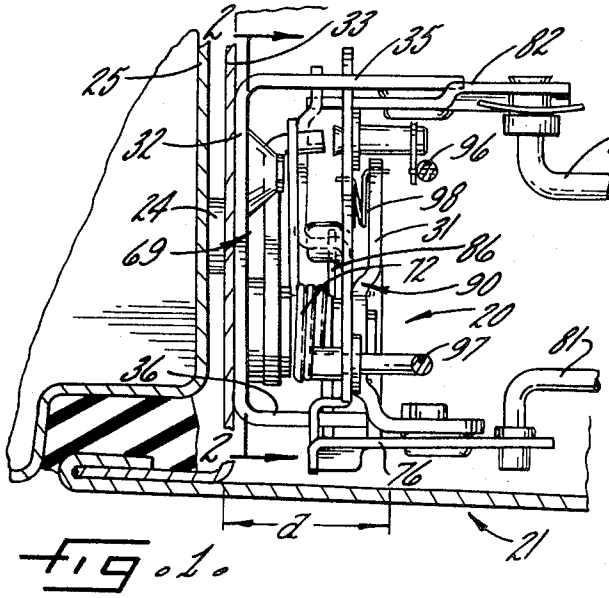



Fig. 1.

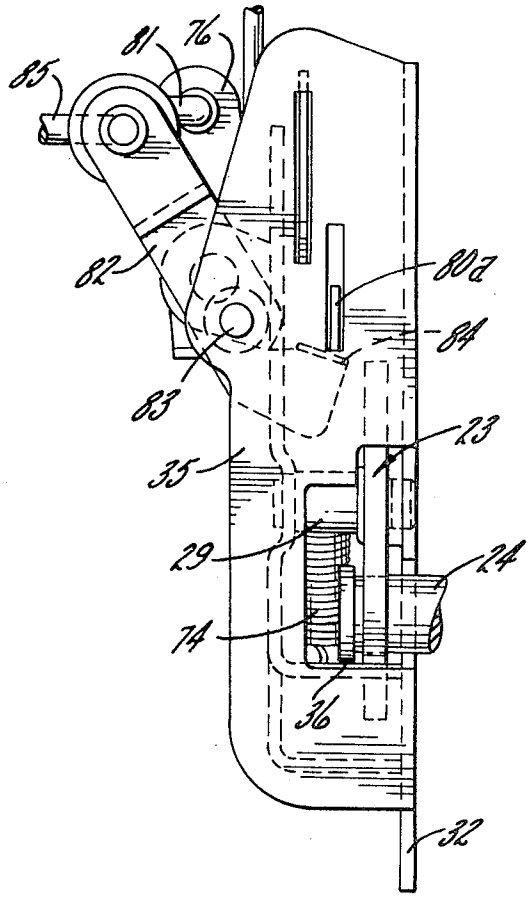



Fig. 3.

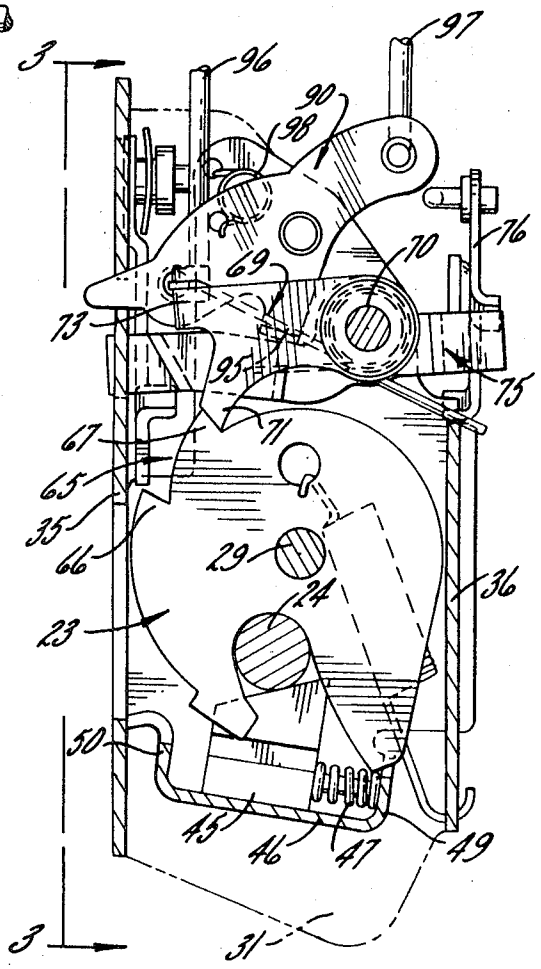



Fig. 2.

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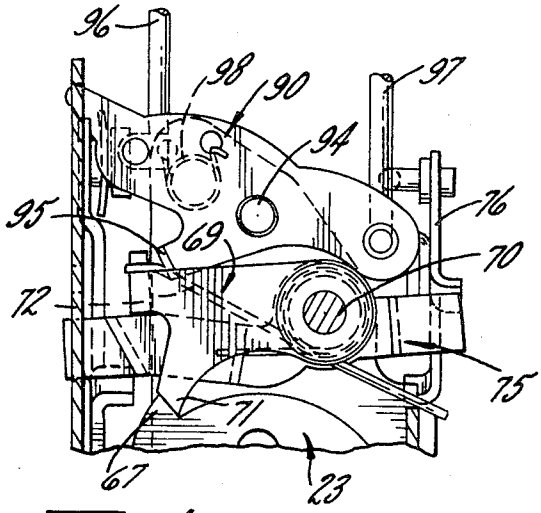



FIG. 4.

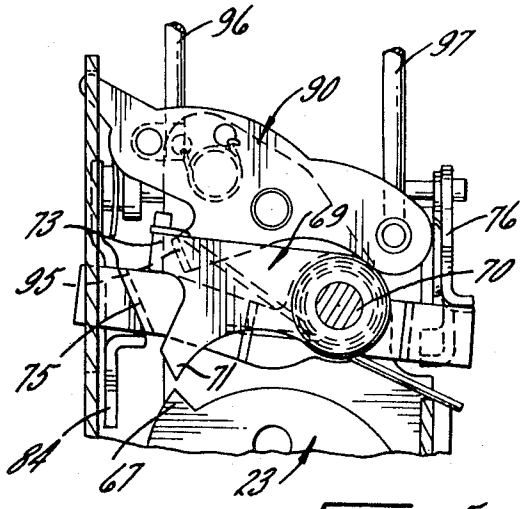



FIG. 5.

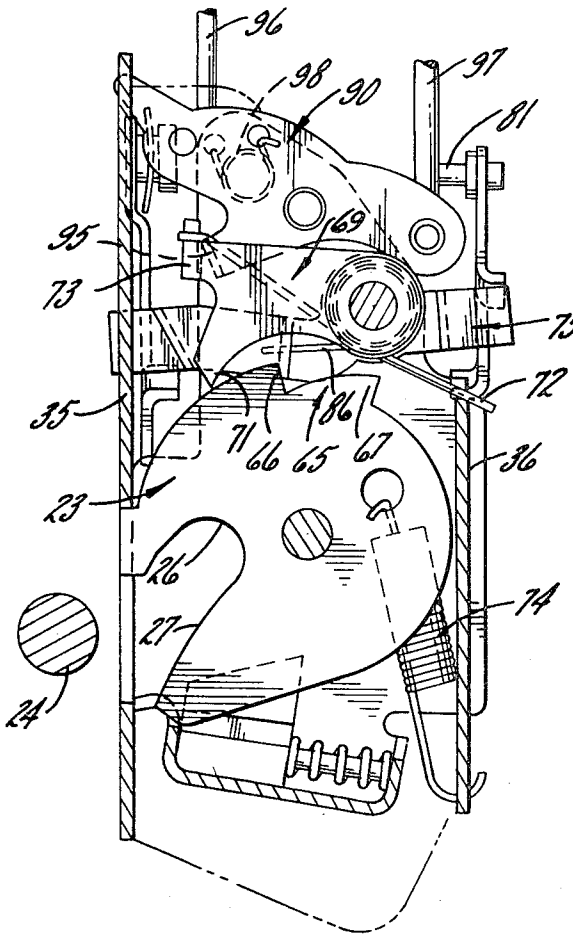



FIG. 6.

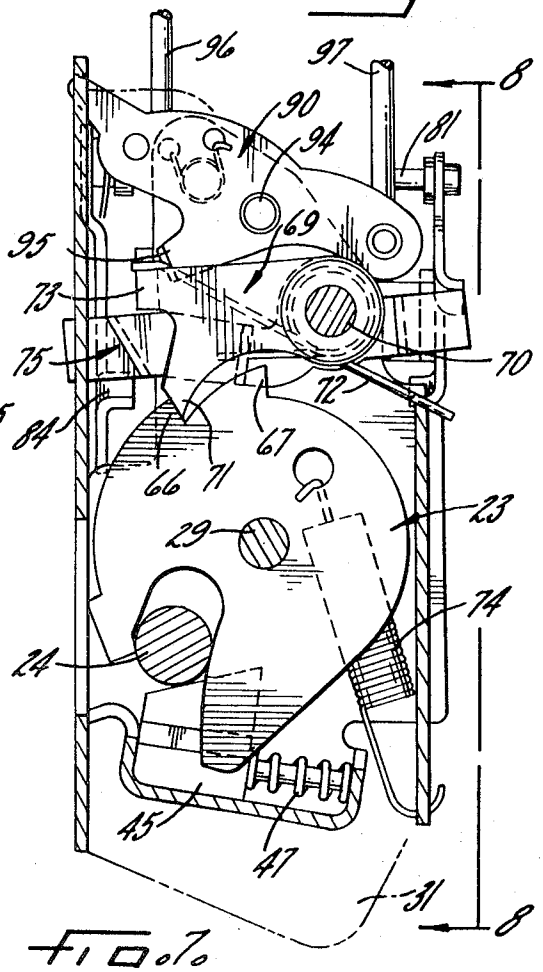



FIG. 7.

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FIG. 8.

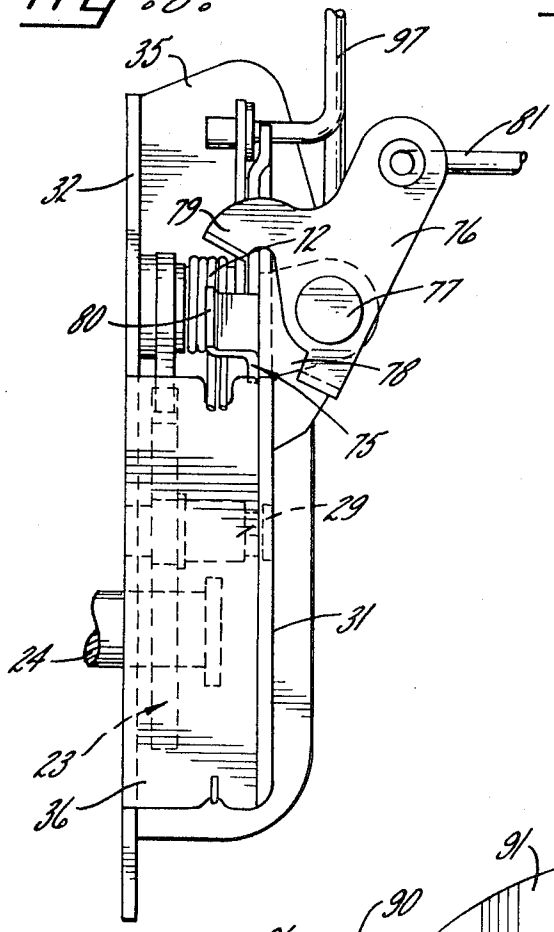
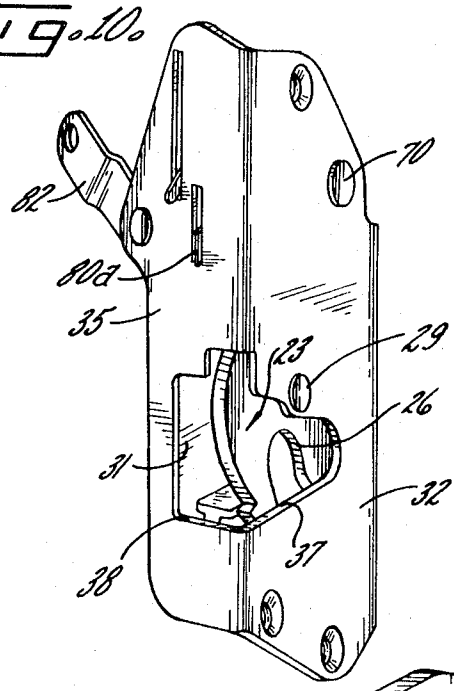



FIG. 10.



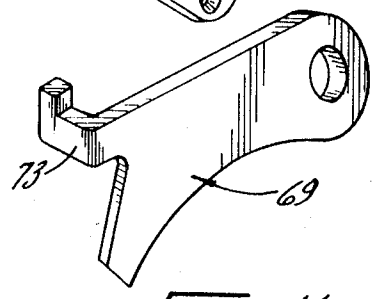




FIG. 11.

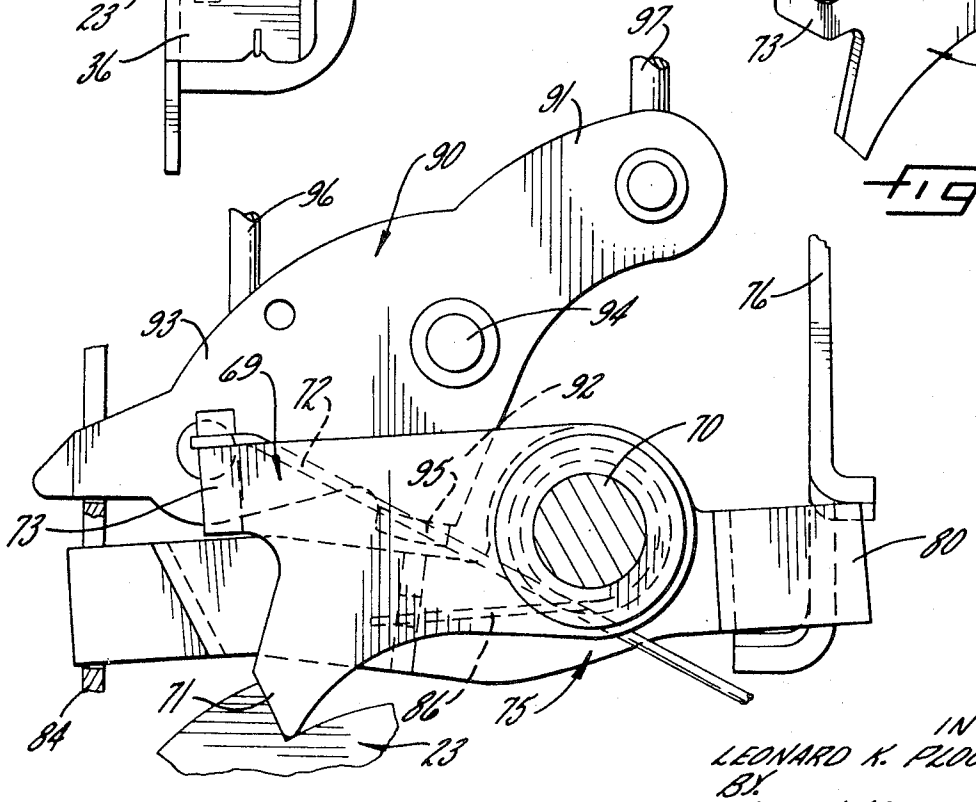



FIG. 9.

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# VEHICLE DOOR LATCH

## BACKGROUND OF THE INVENTION

This invention relates to a latch of the type commonly used on the doors of automotive vehicles and, more particularly, to a latch whose principal parts comprise a pivoted latching element, a pawl, a pawl actuator and a locking lever. The invention specifically pertains to a latch of the type in which the pawl actuator is physically blocked against movement to a release position when the latch is in a locked condition.

## SUMMARY OF THE INVENTION

The primary aim of the present invention is to provide a new and improved latch of the foregoing character which is adapted to be concealed entirely within the vehicle door and which, when compared with prior latches of the same general type, is of simpler, less expensive and more compact construction. A more detailed object is to achieve simplicity and compactness through the provision of a latch in which the pawl, the actuator and the locking lever are all disposed in closely spaced side-by-side relation between a pair of parallel supporting plates and are all mounted to turn about axes paralleling the pivot axis of the latching element.

These and other objects and advantages of the invention will become apparent from the following detailed description when taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary cross section taken horizontally through a vehicle door equipped with a new and improved latch embodying the novel features of the present invention, the figure illustrating the actual size of the latch.

FIG. 2 is a fragmentary cross section taken substantially along the line 2–2 of FIG. 1 and showing the latch in a latched and locked condition.

FIG. 3 is a side elevational view of the latch as taken along the line 3–3 of FIG. 2.

FIG. 4 is a fragmentary view similar to FIG. 2 but showing the latch in a latched and unlocked condition.

FIG. 5 is a view similar to FIG. 4 but showing the latch unlocked and being unlatched.

FIG. 6 is a view similar to FIG. 2 but showing the latch in an unlocked and unlatched condition.

FIG. 7 is a view similar to FIG. 2 but showing the latch unlocked and in a secondary or safety latched condition.

FIG. 8 is a side elevational view of the latch as taken along the line 8–8 of FIG. 7.

FIG. 9 is an enlarged view of parts illustrated in FIG. 2 and showing the parts in a latched and locked condition.

FIG. 10 is a perspective view of the latching element and of one of the supporting plates.

FIG. 11 is a perspective view of the pawl.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention contemplates a new and improved so-called "hard button" latch 20 for use with the door 21 of an automotive vehicle, the latch being adapted for concealment entirely within the door and being more simple and compact in construction than prior latches of the same general type. The principal operating parts of the latch are all disposed in closely spaced relation within a compact package and are mounted to turn about parallel axes in order to reduce the complexity of the latch and to reduce particularly the dimension of the latch lengthwise of the door and the vehicle. In referring to the latch as being of the "hard button" type, it is meant that certain parts of the latch physically engage one another to hold the latch in a locked condition whereas, with a "free-wheeling"c latch, certain of the parts are uncoupled from one another to effect locking of the latch.



More particularly, the latch 20 includes a pivoted latching element 23 (FIG. 2) carried by the door 21 and coacting with a cylindrical striker pin 24 mounted on a post 25 of the vehicle frame to hold the door in a tightly closed position. In this instance, the latching element is a forklike member formed with a recess 26 (FIG. 6) for receiving the striker. As the door is swung closed, contact of an edge 27 of the recess with the striker turns the latching element counterclockwise from an unlatched position shown in FIG. 6 to a safety or secondary latched position shown in FIG. 7 and then to a fully latched position shown in FIG. 2 to prevent separation of the latching element from the striker and thus hold the door closed.

Herein, the latching element 23 is journaled for turning intermediate the ends of a fixed horizontal pin 29 (FIG. 2) which is anchored at its ends to a pair of front and rear vertically extending metal base plates 31 and 32 (F(GS. 1 and 10) spaced from and fastened to each other and housed within the door 21. The base plate 32 is attached to the rear end wall 33 of the door and is formed integrally with inner and outer flanges 35 and 36 extending between the two plates and along opposite sidewalls of the door. Most of the parts of the latch are encased within the enclosure formed by the plates and the flanges, and the entire latch is housed within the door such that the latch is concealed without any parts thereof projecting beyond the end wall of the door. A recess 37 (FIG. 10) formed in the base plate 32 is aligned with a recess (not shown) formed in the rear end wall of the door and these recesses, together with a recess 38 formed in the inner flange 35, expose the recess 26 of the latching element for latching with the striker 24 when the door is swung to the closed position.

In addition to being held by the latching element 23, the striker 24 also is engaged on its underside by a wedge 45 (FIG. 2) preferably made of nylon or other hard plastic material and adapted to lodge beneath the striker so that the latter will be held on all sides. The wedge rides on a flange 46 projecting laterally from the base plate 32 and, as the door is closed, engages the striker and slides progressively outwardly along the flange in a predetermined path against the action of a coil spring 47 compressed between the outer end of the wedge and an upturned outer end 49 of the flange. When the door is open, the spring 47 presses the inner end of the wedge against an upturned inner end 50 of the flange.

Referring now to FIG. 2, it will be seen that an arcuate peripheral edge of the latching element 23 is formed with a ratchet 65 comprising a pair of angularly spaced teeth 66 and 67 adapted to be engaged by a blocking-type pawl 69 which is located above the ratchet and between the base plates 31 and 32 and which is placed in compression when engaged by the ratchet. The pawl 69 is fulcrumed on a fixed horizontal shaft 70 extending between the base plates above the pin 29 and is formed with a projecting tooth 71 extending downwardly toward the ratchet 65 and engageable with the teeth 66 and 67. The pawl is urged into engagement with the ratchet by a torsion spring 72 (FIGS. 1 and 7) surrounding the shaft 70 and anchored at one of its ends to the flange 36 and at the other of its ends to a lug 73 (FIG. 11) formed on and projecting from one side of the pawl. When the pawl engages the ratchet tooth 66, the latching element 23 is held in its secondary latched position (FIG. 7) and, when the pawl engages the tooth 67, the latching element is held in its fully latched position (FIG. 2). Clockwise turning (FIG. 2) of the pawl 69 about the shaft 70 releases the ratchet 65 and enables the latching element to turn clockwise from the latched position shown in FIG. 2 to the unlatched position shown in FIG. 6 to release the striker 24 and permit opening of the door 21. A contractile spring 74 (FIG. 6) is stretched between the flange 36 and the latching element and continuously urges the latter toward the unlatched position so that the latching element automatically turns to such position upon release of the pawl from the ratchet. When the latching element is in its unlatched position, the pawl tooth 71 engages a smooth edge of the latching element and is disposed in a more elevated position than when in

engagement with either of the ratchet teeth **66** or **67**. As the latching element is turned to its latched position, the pawl is rocked upwardly and downwardly as the tooth **71** rides across the ratchet teeth.

To release the pawl **69** from the ratchet **65** and thus unlatch the door **21**, an actuator member or contactor lever **75** (FIGS. **2** and **9**) is pivoted on the shaft **70** in closely spaced side-by-side relation with the pawl and is adapted, when swung clockwise about the shaft to an operated position (FIG. **5**), to engage the underside of the lug **73** and cause lifting of the pawl away from the ratchet to a release position to free the latching element **23** for turning to its unlatched position under the urging of the spring **74**. Clockwise swinging of the contactor **75** about the shaft **70** herein may be effected from the outside of the vehicle by turning a lever **76** (FIG. **8**) which is pivoted at **77** on an ear **78** projecting from the plate **31** and which is formed with a lug **79** overlying one end portion **80** of the contactor. The lever is connected to an outside pushbutton (not shown), or door handle or the like by an actuating link **81** and, in response to depression of the pushbutton, turns counterclockwise (FIG. **8**) about the pivot **77** into engagement with the contactor to swing the latter clockwise about the shaft **70** to its operated position (FIG. **5**). By virtue of the engagement of the contactor with the pawl lug **73**, the pawl thus is lifted to its release position to effect tripping of the latching element **23**. The contactor may be similarly operated from the inside of the vehicle by means of a second lever **82** (FIG. **3**) pivoted on the flange **35** at **83** and formed with a lug **84** underlying the opposite end portion **80***a* of the contactor. A link **85** connects the lever **82** to the inside door handle (not shown) which is operable to rock the lever to cause the lug **84** to move under and lift the adjacent end of the contactor to swing the contactor clockwise about the shaft **70** to its operated position. To return the contactor to its normal unoperated position, a torsion spring **86** FIGS. **1** and **9**) surrounds the shaft **70** and is anchored at its ends to the flange **36** and the contactor to swing the latter counterclockwise when the outside pushbutton or the inside handle is released.

Locking of the latch **20** to prevent unauthorized opening of the door **21** is effected by turning a locking lever **90** from an unlocked position (FIG. **4**) to a locked position (FIG. **2**). The locking lever, which is formed with three angularly spaced arms **91**, **92** and **93** (FIG. **9**), is disposed between the base plates **31** and **32** in side-by-side relation with the pawl **69** and the contactor **75** and is journaled on a stud **94** anchored to the base plate **31** and paralleling the shaft **70**. When the locking lever is in its locked position (FIGS. **2** and **9**), a lug **95** formed on and projecting from the arm **92** of the locking lever physically engages the upper edge of the contactor **75** and forcibly prevents the latter from being turned to its operated position to lift the pawl **69**. In the unlocked position of the locking lever (FIG. **4**), the lug **95** is spaced upwardly from the upper edge of the contactor to permit swinging of the contactor to its operated position shown in FIG. **5**.

To turn the locking lever **90** between its locked and unlocked positions shown in FIGS. **2** and **4**, respectively, a garnish button (not shown) accessible from the inside of the door is attached to the arm **93** of the lever by a vertical rod **96**. Up and down movement of the garnish button turns the locking lever back and forth between the unlocked and locked positions. In addition, the latch may be unlocked from the outside of the vehicle by a key which, upon being turned, operates through a linkage **97** to move the locking lever to the unlocked position. A toggle spring **98** (FIG. **2**) anchored between the arm **93** and the base plate **31** snaps back and forth overcenter as the locking lever is turned between its positions and serves to hold the lever yieldably in each of its positions.

Because the locking lever **90**, when in its locked position, engages the contactor **75** rather than the pawl **69**, the latch **20** may be preset for keyless locking from the outside of the vehicle when the door **21** is open simply by shifting the garnish button to turn the locking lever to its locked position. The positions of the locking lever and the contactor remain unchanged as the door is closed and as the latching element **23** is turned to its latched position and thus the door becomes locked upon being closed.

From the foregoing, it will be apparent that the present invention brings to the art a new and improved hard button latch **20** which is capable of single preset keyless locking and which is concealed entirely within the door **21**. Because the pawl **69**, the contactor **75** and the locking lever **90** are disposed in closely spaced side-by-side relation and turn about axes **70** and **94** paralleling the pivot axis **29** of the latching element **23**, the dimension *a*(FIG. **1**) of the main body of the latch longitudinally of the vehicle is maintained small to provide increased clearance for a glass channel mounted within the door.

I claim as my invention:

**1**. In a latch for a vehicle door, the combination of, a support adapted to be housed entirely within the door and comprising front and rear horizontally spaced upright plates, a latching element journaled on said support between said plates to turn between latched and unlatched positions about a horizontal axis extending transversely of the plates, a pawl disposed between said plates above said latching element and journaled to turn about a second axis spaced vertically from and paralleling said one axis between a holding position preventing turning of said latching element to said unlatched position and a release position permitting turning of the latching element, an actuator adapted to be operated manually from a side of the door and journaled on said support between said plates and in side-by-side relation with said pawl to turn about said second axis between normal and operated positions, said actuator being operable when turned to said operated position to engage said pawl to force the latter to said release position, a locking lever journaled on said support between said plates and in side-by-side relation with said pawl and said actuator to turn between locked and unlocked positions about an axis paralleling said first and second axes, and means on said locking lever directly and physically engageable with said actuator when said locking lever is in said locked position and operable to prevent movement of the actuator to said operated position.

**2**. A latch as defined in claim **1** in which said pawl and said actuator leave said locking lever free for shifting to said locked position when said latching element is in said unlatched position and in which said locking lever remains in said locked position as said latching element turns to said latched position.

**3**. A latch as defined in claim **1** in which said latching element is formed with a recess adapted to receive a striker on the vehicle to latch the door closed when said latching element is in said latched position, and further including a pair of inner and outer flanges formed integrally with and extending from one of said plates to the other of said plates whereby said latching element, said pawl, said actuator and said locking lever are encased by said plates and flanges, and recesses formed in said rear plate and said inner flange to expose the recess in said latching element and thus enable the latter recess to receive said striker.

**4**. A latch as defined in claim **1** in which the upper edge of said latching element is formed with ratchet teeth, said pawl including a tooth engageable with the teeth on said latching element, said pawl being located above said first axis to be placed in compression when said pawl tooth is in engagement with either of said ratchet teeth.