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Christie

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[54] **LATCHES**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **292/196;** 292/198; 292/DIG. 49

[51] **Int. Cl.²** **E05C 3/00**

[58] **Field of Search** ..... 292/223, 336, DIG. 49, 292/198, 200, 196, 226, 220, 123, 126, 97

[56] **References Cited**

UNITED STATES PATENTS

2,469,113	5/1949	Hooker	292/223
2,729,487	1/1956	Krause et al.	292/198
2,865,313	12/1958	Morehouse	292/336
2,893,772	7/1959	Edwards	292/123
2,896,751	7/1959	Henrichs	292/97
2,927,812	3/1960	Smith et al.	292/196
3,262,726	7/1966	Phelps	292/196

FOREIGN PATENTS OR APPLICATIONS

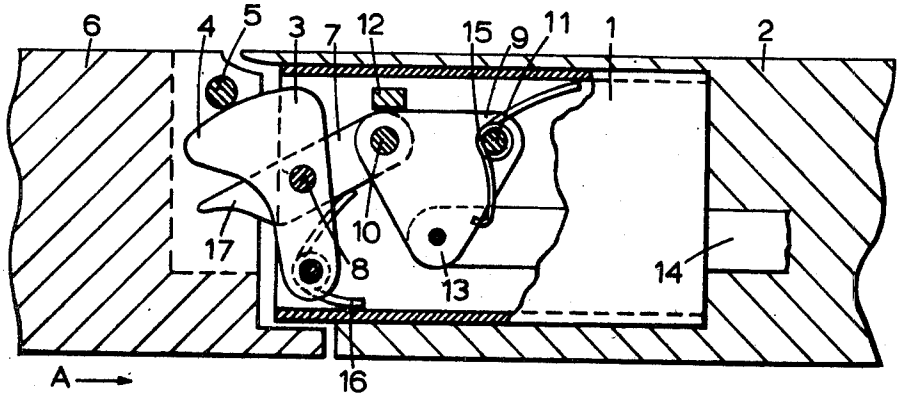
35,693	3/1930	France	292/97
78,733	7/1962	France	292/336
622,197	10/1935	Germany	292/97
793,975	4/1958	United Kingdom	292/196

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[57] **ABSTRACT**

In a door latch with a pivoted latch member controlled by a toggle linkage which is urged into the over-center condition in the open and closed positions of the door, a projection on one of the links of the toggle linkage is placed to engage the striker as the door is closed, thereby urging the toggle linkage through center and allowing the latch member to be retracted by the striker, so that the latch can be slammed.

3 Claims, 4 Drawing Figures



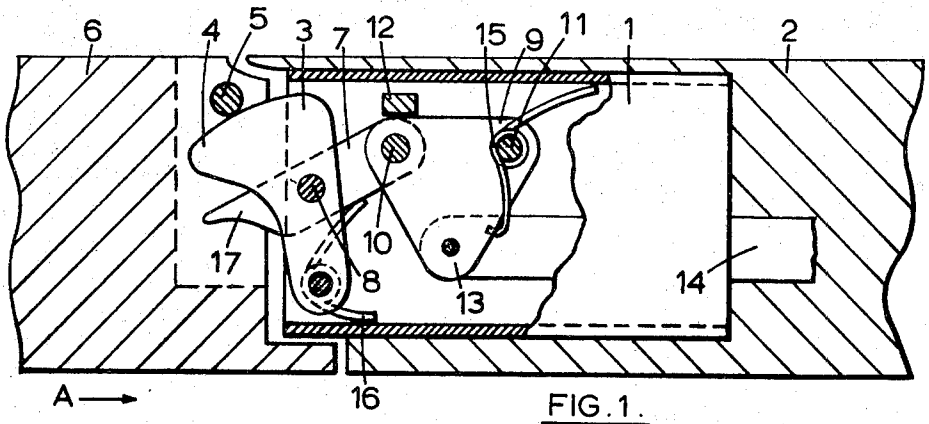


FIG. 1.

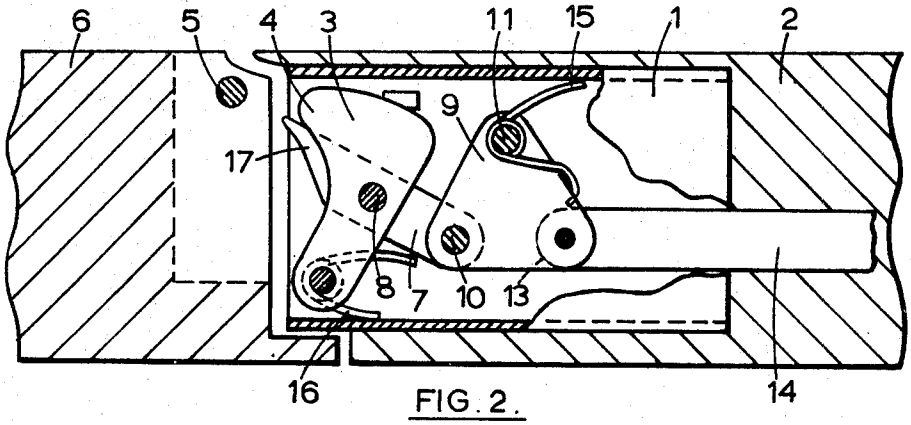


FIG. 2.

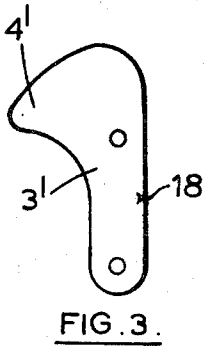


FIG. 3.

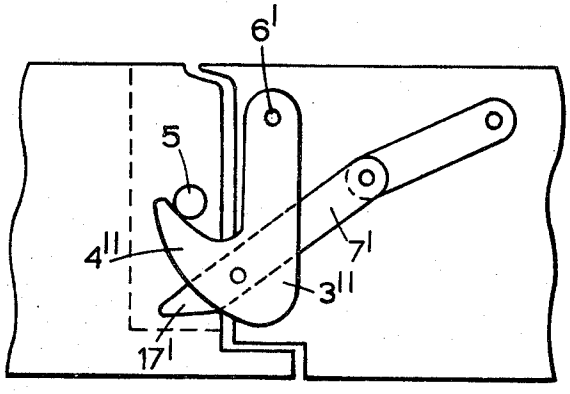


FIG. 4.

LATCHES

This invention relates to slam latches, that is to say, latches for doors and other hinged or sliding members where, when the door or other member is slammed shut, the latching member is pushed back by the striker and then advances again automatically to engage the striker and hold the door or other member closed.

In British Patent Specification No. 1, 194,343 there is disclosed a latch in which the latching member forms one link of a chain of three links, the other two links forming a toggle linkage of which the centre pivot is displaced laterally, for example by a push-button or by means acting on one of these two links, to withdraw the latch member.

The present invention relates to a latch of this basic type. In the version forming the subject of that earlier patent specification the latching member carried a pin which formed the pivotal connection with the other links and which also formed the member that engaged the striker formed by a hook on the door frame. Where the latch was to behave as a slam latch the toggle linkage had to be prevented from going over centre, so that when the door on which the latch was mounted was slammed, the retracting force applied by the striker hook to the pin could always force the latching member back, collapsing the toggle linkage.

The aim of the present invention is to allow a latch of this general kind, that is to say with a toggle linkage controlling the latching member, to reach the over-centre or locked position in the latched condition, which has the important advantage that the latch then has a considerable degree of 'anti-burst' properties, in that it cannot become accidentally disengaged by a violent deceleration in a direction in the plane of the door. Yet at the same time it is important for the latch to retain the ability to be slammed.

According to the invention there is now proposed a latch comprising a pivoted latching member designed to be mounted on the one member (e.g. a door) and to engage a striker on the other member (e.g. a door frame), the latching member being controlled by a toggle linkage comprising first and second links pivoted together, with the second link pivoted tto a point fixed in relation to the pivot of the latching member and the first link pivoted to the latching member, the toggle linkage being designed to pass to an over-centre position in the latched condition of the latch, and the first link including an extension beyond its pivotal connection with the latching member, this extension being placed in the path of the striker relative to the latching member so that when a door or other member on which the latch is mounted is slammed, this extension is engaged by the striker and displaces the toggle linkage out of its over-centre condition, allowing the subsequent engagement of the striker against the latching member to retract the latching member against spring loading.

When the door or other member is fully closed the spring loading advances the latching member again, restoring the toggle linkage to the over-centre position. The door is then held closed and no amount of force or sudden impact in the plane of the door can displace the latching member. To withdraw the latching member and open the door it is necessary to 'break' the toggle linkage, for example by means of a push button or lever

acting on the centre pivot of the linkage, or by means that positively turn one of the links.

The invention will now be further described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is diagrammatic view of a latch mounted on a door showing it engaging a striker on the door frame in the closed and latched position of the door;

FIG. 2 is a view corresponding to FIG. 1 but showing the latch with the latching member withdrawn prior to opening of the door;

FIG. 3 shows a possible modification to the shape of the latching member of the latch of FIGS. 1 and 2; and

FIG. 4 shows an alternative layout of latch according to the invention.

We refer first to FIGS. 1 and 2. A latch is shown mounted in a case 1 (cut away in the drawings to show the internal construction) mounted in the free edge of a hinged door 2, the hinge being away to the right of the drawing, and the door being designed to open upwards, as viewed in the drawing. In practice the latch is intended primarily for use in doors of public service vehicles but can be used in any field, including sliding doors provided the latch is mounted in the appropriate attitude in relation to the relative movement of door and frame. Moreover it will be understood that, if desired, the latch could be mounted on the frame and the striker on the door or other hinged member.

In the example shown a latching member 3 is pivoted to the case 1 and has a nose 4 which, in the latched condition, engages behind a striker pin 5 mounted in a door frame 6. Movement of the latching member is controlled by a toggle linkage comprising a first link 7 pivoted to the latching member 3 at 8 and pivoted to a second link 9 at 10. This second link is pivoted to a fixed point 11 in the case 1.

In the latched condition, shown in FIG. 1 the toggle linkage comprising the links 7 and 9 is in the over-centre position, with the position of the centre pivot 10 limited by a fixed stop 12. No amount of force on the latching member in the direction of the arrow A will cause the toggle linkage to collapse; on the contrary, it will simply press harder against the stop 12. Thus where the latch is mounted on a door on the side of a vehicle, inertia forces in the direction of the arrow A caused by sudden deceleration of the vehicle, for example in the event of an accident, cannot inadvertently cause disengagement of the latch.

To release the latch and open the door it is necessary to break the toggle, i.e. to shift it through the central condition, and in the example shown this is achieved by providing an extension 13 on the link 9, connected through a tension rod 14 to a remote handle (not shown). A pull on this rod turns the link 9 counterclockwise about the pivot 11 against the action of a spring 15, withdrawing the latch and allowing the door to be opened.

When the door is open and the handle released, the latch reverts to the condition shown in FIG. 1, with the toggle linkage over-centre, under the influence of the spring 15. (There may be a further spring 16 urging the other link 7 counterclockwise about its pivot 8). Therefore the latching member cannot be retracted, to allow slamming of the door, by pressure on the latching member itself. So according to the invention we provide an extension 17 on the first link, projecting into the path of the striker pin 5 relative to the door, so that as the door closes the pin 5 engages this extension and pivots

the links 7 and 9 through the dead-centre position so that when the pin 5 subsequently strikes the nose 4 of the latching member 3 it can force the latching member back against the action of the springs 15 and 16. Then when the nose 4 has passed the pin, the latching member returns to its advanced position and the toggle linkage returns to its over-centre position, shown in FIG. 1, and the door is securely held.

It will be understood that the means for releasing the latch may take any one of a number of different forms. For example, in place of the rod 14 one could use a push button acting on one of the links or a handle acting on one of the pivots. In one convenient arrangement the stop 12 is replaced by the inner end of a spring-loaded push button mounted in the outer face of the door.

It will also be understood that the latching member and/or the links that make up the toggle linkage could be split or slotted to receive each other. In the example shown both the latching member 3 and the second toggle link 9 are each in the form of two members, sandwiching the link 7 between them. The striker, instead of being a pin, could be a hook or tooth (or two teeth where 'a half-latched' position is considered desirable).

In the latching member 3 of FIGS. 1 and 2 the face of the nose 4 that engages the striker pin 5 is of arcuate form, concentric with the pivotal axis of the member 3, and so the relative positions of the door and frame in the closed position are the same regardless of the angular position of the member 3. In the modification shown in FIG. 3 a latching member 3' has a nose 4' of which the engaging face is still arcuate, but with its centre of curvature at a point 18. This gives the latch a wedging action that ensures there is no rattle, despite variations in the compressibility of a seal (not shown) between the door and the frame.

FIG. 4 illustrates diagrammatically another modification. Here the action is the same as that of the latch of FIGS. 1 and 2 and the parts are drawn the same way up as those of FIGS. 1 and 2, that is to say for a latch on a door opening towards the top of the drawing. However the pivot, shown at 6' of the latching member 3'' is now nearer the outer face of the door, and so the extension, shown at 17', of the link 7' of the toggle linkage now has to lie on the other side of the nose, shown at 4'' from the pivot 6'. Again, the arcuate surface that engages the striker could be eccentric or concentric with respect to the pivotal axis of the latching member.

In an alternative arrangement to that of FIGS. 1 and 2 the latch could be turned through 90° so that the axes of the pivots lie parallel to the plane of the door and perpendicular to the hinge axis. The latch can then be truly 'anti-burst' in that the striker pin can be of a form such that the latch member engages a recess, or behind a shoulder, so that the latch member and striker cannot come apart, even under severe impact forces, in a direction parallel to the plane of the door.

The latch according to the invention may also control one or more slave latches of similar construction through tension rods or cables. However the or each slave latch may have its toggle unable to pass 'over centre' in which case the extension nose for tripping the toggle is not necessary on these slave latches.

I claim:

1. A slam latch for connecting a door member to a door frame member, said latch comprising a latching member pivoted about an axis and designed to be mounted on the one member (e.g. a door) and to engage a striker on the other member (e.g. a door frame), said latching member being controlled by a toggle linkage comprising first and second links pivoted together, said second link being pivoted to a point fixed in relation to said axis and said first link being pivoted to said latching member, said toggle linkage being designed to pass to an over-center position in the latched condition of the latch, and said first link including an extension beyond its pivotal connection with said latching member, said extension being placed in the path of the striker relative to said latching member whereby when the door member is slammed, said extension is engaged by the striker and displaces said toggle linkage out of its over-center condition.

2. The latch set forth in claim 1 wherein said latching member has an arcuate surface that engages said striker and said surface in concentric with said axis.

3. The latch set forth in claim 1 wherein said latching member has an arcuate surface that engages said striker and said surface is eccentric with respect to said axis.

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