Dec. 4, 1962 L. R. A. G. LEMAIRE 3,066,964

DOOR LOCKING DEVICE

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Fig. 1

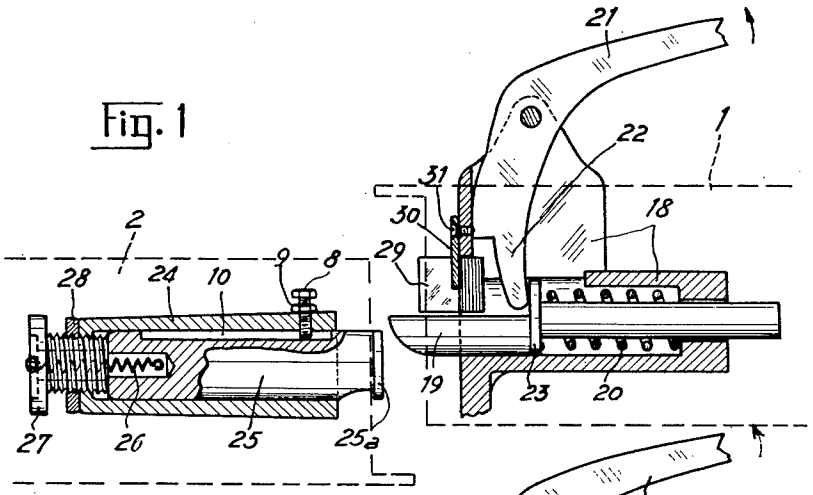


Fig. 2

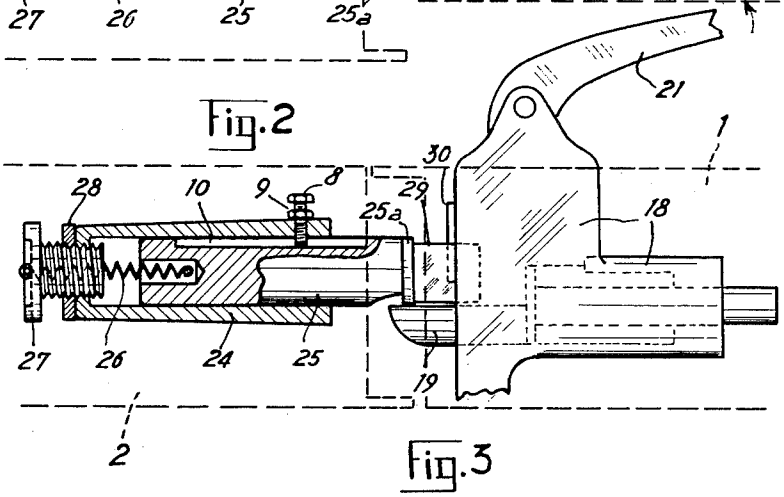
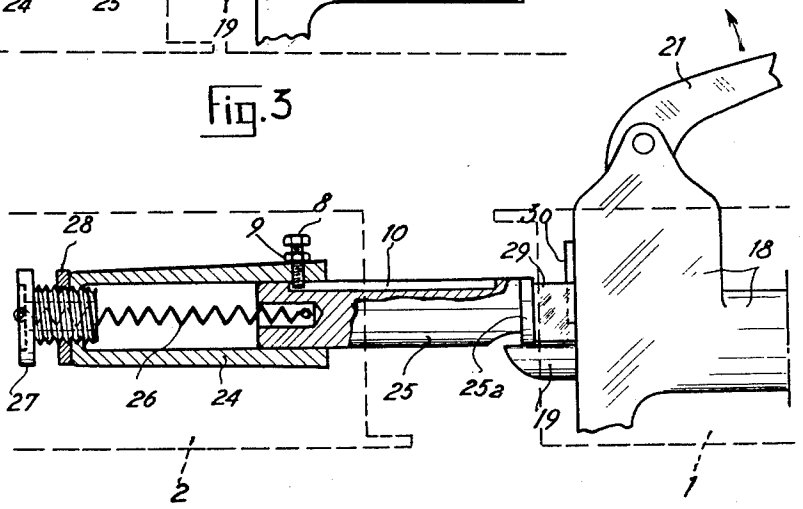


Fig. 3



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Fig. 4

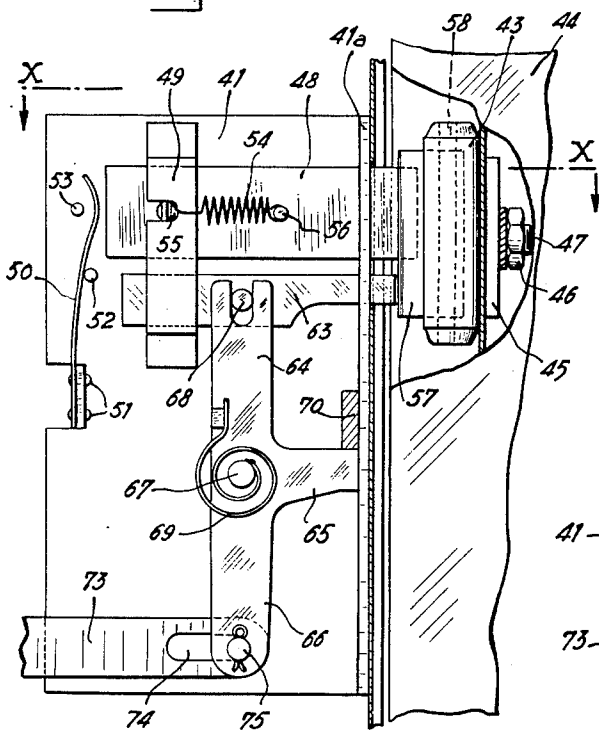


Fig. 5

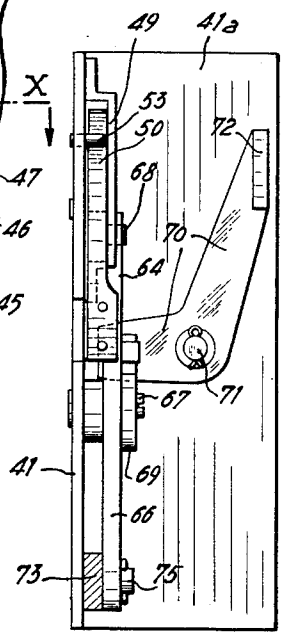


Fig. 6

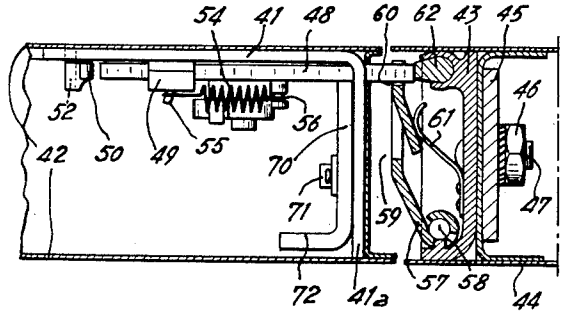
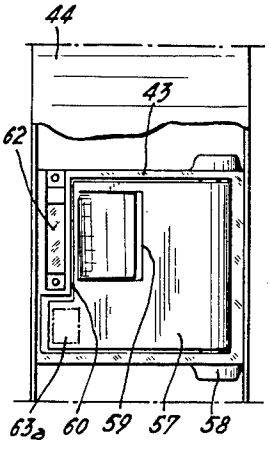


Fig. 7



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Fig. 8

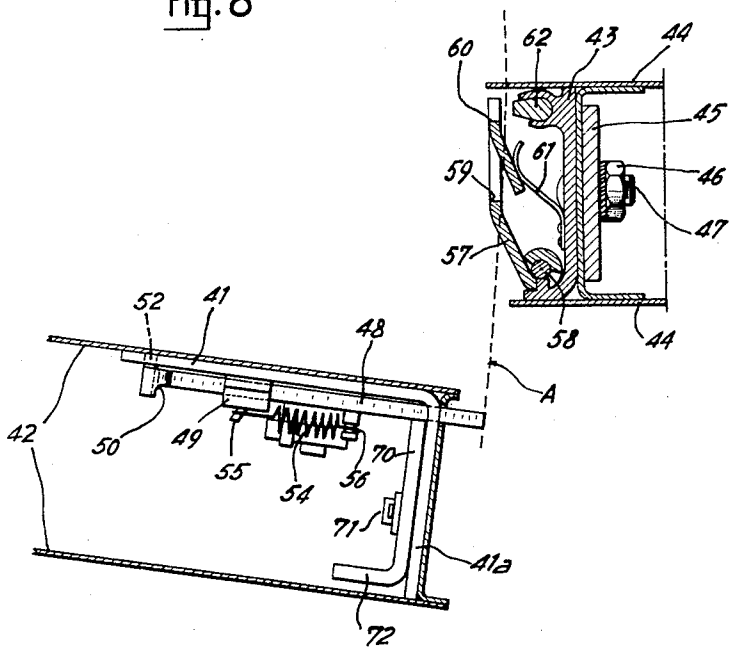
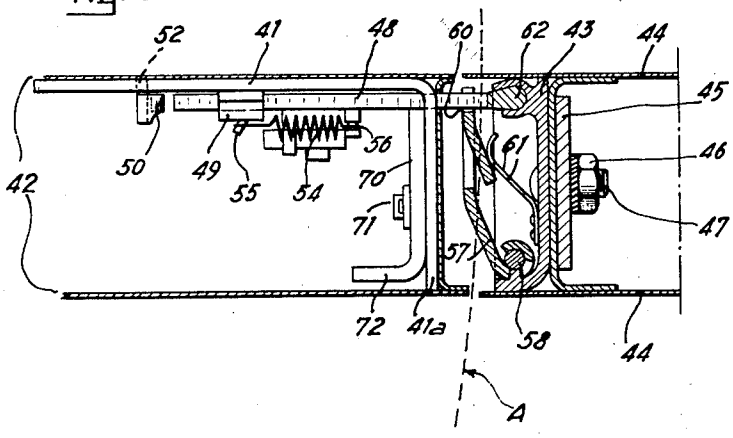


Fig. 9



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DOOR LOCKING DEVICE

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Fig. 10

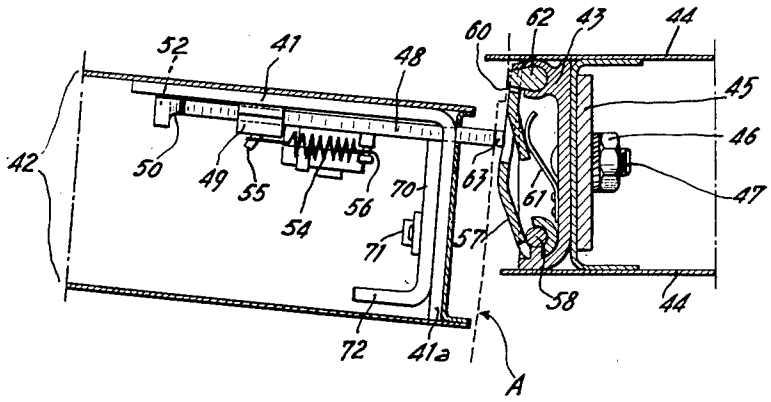
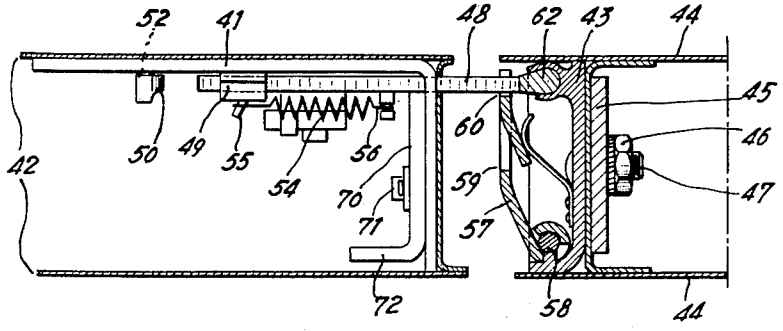


Fig. 11



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United States Patent Office

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Patented Dec. 4, 1962

3,066,964

DOOR LOCKING DEVICE

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Claims priority, application France Feb. 4, 1959
10 Claims. (Cl. 292—173)

The consequences of traffice accidents are frequently worsened by the accidental opening of the doors of the involved vehicles, which can occur when due to a twisting of the vehicle body the edge of the door carrying the latch is drawn apart from the adjacent door jamb of the fixed body portion to such an extent that the latch member becomes disengaged from the catch member.

The present invention relates to a safety latching device which ensures the permanent latching of a vehicle door even under the above mentioned circumstances and which comprises further improvements.

With these objects in view, at least one of the cooperating locking members of the latching device (that is to say the latch member or the catch member) is movable in the corresponding portion of the latching device so as to be enabled to move beyond its normal locking position, towards the opposite portion of the latching device, and in this opposite portion is mounted a magnet which is located in such manner that when the latching device is in the door closure position, said magnet attracts the movable locking member into engagement with the other locking member.

Due to this feature, even when the egde of the door is accidentally drawn apart from the adjacent door jamb of the vehicle body, the movable locking member is drawn along with the opposite portion of the latching device and remains in engagement with the other locking member, so that the latching of the door remains effective.

When the movable locking member is the latch member, opening of the latching device is effected according to the invention by pushing back the catch member instead of retracting the latch member. This feature involves notable advantages. Thus, the opening of the latching device by retracting the latch member, which must moreover be able to move beyond its normal locking position, would necessitate a complicated and expensive mechanism. Furthermore, the latch member being attracted by a magnet in its locking position, retracting the latch member would involve detaching it from the magnet and would therefore necessitate a great force, quite beyond the limits admissible in latching device of the considered kind.

According to another feature of the invention, the mutual engagement of the latch member and the catch member at the closing of the latching device is effected in part under the action of at least one spring, whereafter the position of complete locking is accomplished by the magnet attracting the movable locking member. A latching device embodying this feature is able to work very silently, on the one hand because the depth of the mechanical engagement of the latch member with the catch member is reduced to only a part of the total depth of engagement, which is then accomplished by the attraction of the magnet, and on the other hand because the total depth of engagement can itself be much smaller than in a conventional latching device.

In fact, in latching devices constructed according to the invention, as the two cooperating members (the latch member and the catch member) of the latching device are held together by the attraction of a magnet, and as one of the said members can move beyond the normal locking position and thus follow the other member in

case the vehicle frame is distorted, it is not necessary, when calculating the depth of total engagement between the latch member and the catch member, to take into account the margin for safety which is considered essential in conventional latching devices in order that they may not open accidentally as a consequence of distortions occurring in the vehicle body during its running, even without an accident.

Whereas in conventional latching devices the depth of mutual engagement of the locking members must be of the order of 10 to 15 mm. and at least of 8 mm., latching devices according the invention ensure a permanent locking regardless of distortions occurring in the vehicle body during the normal running of the vehicle and even in case of an accident, with a total depth of engagement not exceeding 6 mm., of which only about 4 mm. are effected by mechanical engagement under spring action, while the complement is accomplished by magnetic attraction.

Other features of the invention will appear from the following description and the appended drawings relating to two embodiments of the invention given by way of non limitative examples.

FIGS. 1 to 3 represent horizontal sections of the first embodiment, in which the movable locking member is the catch member.

FIG. 1 represents the device in the course of its closing, the latch member being just about to pass by the end of the catch member.

FIG. 2 represents the device in closed position.

FIG. 3 represents the device still closed, although the edge of the door has been accidentally drawn apart from the adjacent door jamb of the fixed body portion.

FIGS. 4 to 11 represent the second embodiment, in which the movable locking member is the latch member.

FIG. 4 is an elevational view of the closed latching device, taken from the outside of the vehicle, the external wall of the door and of part of the adjacent door jamb being omitted so as to show the mechanism.

FIG. 5 is a side view showing the mechanism as viewed from the left hand side of FIG. 4.

FIG. 6 is a horizontal section on the level X—X of FIG. 4.

FIG. 7 is an elevation viewed from the left hand side of FIG. 4, showing only the catch member of the latching device.

FIG. 8 is a horizontal section on the level X—X of FIG. 4, the door being open and all parts being in their positions of rest.

FIG. 9 is a horizontal section on the level X—X of FIG. 4, the door being closed and the latching device being completely engaged under the action of the magnet.

FIG. 10 is a horizontal section on the level X—X of FIG. 4, showing the catch member pushed back and the door slightly displaced in the opening direction.

FIG. 11 is a section similar to that of FIG. 9, showing the latching device still closed although the door jamb of the fixed body portion adjacent to the door has been accidentally drawn apart from the latter.

Referring to the first embodiment, FIGS. 1 to 3 show at 18 the casing of the latching device mounted at the edge of the door indicated at 1 in dotted lines. In the casing 18 slides the latch member 19 which is submitted to the action of a spring 20. The retraction of the latch member 19 in order to open the door is effected by drawing the handle 21 in the direction of the arrow, so that the arm 22 of the handle pushes back the collar 23 of the latch member 19.

The reference 24 designates a sheath which is mounted in the jamb portion of the fixed part of the vehicle body indicated in dotted lines at 2. In the sheath 24 slides the catch member 25 which cooperates with the latch

member 19. To the end of the catch member 25 is secured an armature 25*a* made of metal which is attracted by a magnet, for example of iron or steel. The catch member 25 is drawn to the inside of the sheath 24 by a spring 26 whose rear end is secured to a screw-threaded plug 27 screwed into the rear end of the sheath 24, whereby the tension of the spring 26 may be adjusted. After adjustment, the plug 27 is locked by a lock-nut 28. The end of a screw 8 which engages a longitudinal groove 10 of the catch member 25 prevents the latter from turning (if it is cylindrical) and limits its sliding movement out of the sheath 24.

In front of the outer surface of the latch member 19, a permanent magnet 29 is mounted on the casing 18 by means of a bracket 30 secured by a screw 31.

As shown on FIG. 1, the relative positions of the latch member 19 and of the armature 25*a* of the sliding catch member 25 are such that the end of the latch member 19 brushes past the armature 25*a* when the door 1 closes. But the catch member 25 with its armature 25*a* may also be placed so as to project slightly more towards the door 1, so that on closing the latter the latch member 19 will be slightly pushed back when it moves past the armature 25*a* and said latch member will engage slightly behind said armature when it resumes its former position due to the thrust of the spring 20.

As soon as the outer surface of the latch member 19 has passed the inner edge of the armature 25*a*, the latter is attracted by the magnet 29, the catch member 25 slides out of the sheath 24 until it reaches the position shown on FIG. 2 and the door is latched due to the mutual engagement of the latch member 19 and the armature 25*a* of the catch member 25.

When the door 1 and the adjacent jamb portion 2 of the vehicle body are accidentally drawn apart, the magnet 29 draws along the armature 25*a* and the catch member 25, the latter sliding more or less out of the sheath 24, so that the door remains securely latched, as represented on FIG. 3.

Referring now to the second embodiment represented on FIGS. 4 to 11, the reference 41 designates a supporting plate which carries the mechanism of the latching device and is mounted adjacent the edge of the vehicle door 42.

The reference 43 designates the catch member casing which is mounted in the door jamb of the fixed body portion 44 of the vehicle by means of a guard-plate 45 and a nut 46 screwed on a screw bolt 47 integral with the casing 43.

The latching device mechanism comprises a latch member 48 which is slidably mounted in a bracket 49 and through an aperture formed in the raised edge 41*a* of the plate 41. A leaf spring 50 secured at 51 to the plate 41 pushes the latch member 48 towards the right hand side of FIG. 4, but has its stroke in this direction limited by a stop 52 fixed on the plate 41. Another stop 53 limits the stroke of the spring 50 in the opposite direction. A coil spring 54 attached at 55 to the bracket 49 and at 56 to the latch member 48 draws the latter towards the left hand side of FIG. 4, but this spring 54 is less strong than the spring 50. Consequently, at rest the spring 50 leans against the stop 52 and the rear end of the latch member 48 leans against the spring 50 (see FIG. 8).

In the catch member casing 43, a movable catch member 57 is pivotally mounted on a vertical pin 58. This movable catch member is formed with the conventional safety notch 59 followed by the closing notch proper 60 for engagement with the latch member 48. A spring 61 tends to hold the movable catch member 57 in the position of rest shown on FIGS. 6, 8, 9 and 11, but the catch member 57 can be pushed back into the casing 43 under compression of the spring 61, as shown on FIG. 10.

Behind the closing notch 60, a permanent magnet 62 is mounted in the casing 43, said magnet facing exactly

the front end of the latch member 48 when the latching device is closed.

The mechanism for opening the latching device, which operates by pushing back the movable catch member, comprises a push-rod 63 which is slidable in parallel relation to the latch member 48 in the bracket 49 and through an aperture formed in the raised edge 41*a* of the plate 41. When the latching device is closed, the end of the push-rod 63 faces exactly the portion of the movable catch member 57 which is designated on FIG. 7 by the small rectangle in dotted lines 63*a*. The push-rod 63 is actuated by a three-armed lever 64, 65, 66 which is pivotally mounted at 67 and whose arm 64 engages by its forked end a small pin 68 fixed on the push-rod 63. A spiral spring 69 tends to turn the lever 64, 65, 66 anticlockwise as viewed on FIG. 4.

The clockwise rocking of the lever 64, 65, 66, which causes the opening of the latching device as it will be explained below, may be caused by means of a bell crank lever 70 pivotally mounted at 71 on the raised edge 41*a* of the plate 41 and the bent end portion 72 of which can be pushed back by a push-button (not shown) from the outside of the vehicle door. The lever 70 is shown as a whole on FIGS. 5, 6 and 8 to 11, whereas only its inner arm is represented in cross section on FIG. 4.

Alternatively, the same clockwise rocking of the lever 64, 65, 66 may be caused also by means of a link 73 which is controlled by a handle (not shown) from the inside of the door, said link being connected to the lever arm 66 by means of a slot 74 engaging a pin 75 fixed on said arm.

The operation of the second embodiment of the latching device will now be described with reference to FIGS. 8 to 11.

On FIGS. 8 to 10, the arc A drawn in dotted lines represents the path followed by the outer end of the latch member 48 when it is in its position of rest, that is to say when its rear end leans under the action of the spring 54 against the spring 50 which leans itself against the stop 52, as shown on FIG. 8. It can be seen that this path passes at a point located between the closing notch 60 of the movable catch member 57 and the pole surface of the magnet 62, so that upon closing the door the mutual engagement of the latch member 48 and catch member 57 will be accomplished in part by the action of the spring 50 and in part by the attraction of the latch member 48 by the magnet 62, as it will now be described.

Starting from the position shown on FIG. 8, when the door is pushed towards the closed position shown on FIG. 9, the front end of the latch member 48 passes first over the notch 59 and then over the notch 60, this passage being permitted in part by the recoil of the latch member 48 to the left under compression of the spring 50 and in part by the recoil of the movable catch member 57 towards the right against the action of the spring 61 (assuming that the springs 50 and 61 are of substantially equal strength).

As soon as the latch member 48 has snapped in behind the notch 60, its front end is sufficiently near the magnet 62 to be attracted by the latter, overcoming the pull of the spring 54, and the latch member 48 is drawn against the pole surface of the magnet 62 as shown on FIG. 9, the rear end of the latch member 48 being drawn apart from the spring 50 (as shown on FIGS. 9 and 4).

When it is desired to open the door, one may act upon the outer push-button (not shown) which pushes back the end portion 72 of the lever 70 and turns the latter anticlockwise as viewed on FIG. 5, or one may act upon the inner door handle (not shown) which draws the link 73 to the left as viewed on FIG. 4. In either case the lever 64, 65, 66 is rocked clockwise as viewed on FIG. 4, so that the push-rod 63 is moved to the right and pushes the movable catch member 57 back until its notch 60 comes to lie behind the pole surface of the magnet 62

(see FIG. 10) and the door can be opened. As soon as the front end of the latch member 48 has slid away from the pole surface of the magnet 62, the latch member 48 is no more attracted and recedes instantly under the action of the spring 54 to its position of rest, as shown on FIG. 10, so that the door may be swung open freely.

The total depth of engagement of the end of the latch member 48 behind the notch 60 of the catch member 57 does not need to be calculated with the usual margin for safety, because this depth of engagement is ensured independently of the distortions which may occur in the vehicle body during the running of the latter. This security is due to the fact that the latch member 48, which is able to slide outwards beyond its position of total engagement shown on FIG. 9, remains in all circumstances adherent to the magnet 62, even when the jamb portion 44 of the vehicle body comes slightly apart from the door 42.

Since the latch member 48 is able to slide outwards well beyond its normal closing position, the latching of the door remains ensured even when the jamb portion 44 of the vehicle body is moved farther apart from the door 42, for instance in an accident, as shown on FIG. 11, where the latch member 48 has nevertheless remained in contact with the magnet 62 and engaged behind the notch 60 of the catch member 57, due to the fact that the latch member 48 has slid to the right, tensioning the spring 54.

The relatively small depth of engagement which is required in the latching device according to the invention makes the operation of the latter particularly silent, thus providing a solution for a problem of present interest, the noiseless closing of vehicle doors.

It will be understood that the invention is not limited to the embodiments which have been described and shown by way of example, but includes also any other embodiments presenting the same features, within the scope of the following claims.

I claim:

1. A door latching device comprising a latch member casing, a latch member movably mounted in said latch member casing, a catch member casing, a catch member yieldably mounted in said catch member casing so as to be movable between an outer and an inner position, resilient means urging said catch member towards its outer position, said latch member being spring held in a normal position for partial engagement with said catch member when said catch member is in its outer position, magnetic means on said catch member casing for attracting said latch member beyond normal position into full catch member engaging position, said latch member being movable beyond said full catch member engaging position, and means for moving said catch member to its inner position, out of engagement with said latch member.

2. A door latching device as claimed in claim 1, comprising a first spring urging said latch member toward catch member engaging position, a stop member limiting the extension of said first spring at a point corresponding to said normal position of said latch member, and a second spring urging said latch member from catch member engaging position into engagement with said first spring, said second spring being less strong than said first spring.

3. A door latching device as claimed in claim 1, wherein said means for moving said catch member comprise a push-rod movably mounted in said latch member casing and means for moving said push-rod into engagement with said yieldably mounted catch member.

4. A door latching device as claimed in claim 1, wherein said means for moving said catch member comprise a push-rod movably mounted in said latch member casing, actuating elements on both faces of said latch member casing and transmission means connecting said actuating elements to said push-rod for moving said push-rod into engagement with said catch member upon actuation of either of said actuating elements.

5. In a door latching construction a fixed support element, a swingable support element, a latch member carried by one of said elements, a catch member carried by the other of said elements, one of said members being resiliently urged toward engagement with the other member and having a cam surface adapted to be engaged by said other member to wedge said one member out of the path of said other member during closing movement of the door, said latch and catch members interengaging in latched position to lock the support elements in closed position when said elements are aligned, said other member being slidably retained in its element and urged away from said one member, and a magnet fixed to the same element as carries said one member and arranged to attract said other member toward said one member after interlocking engagement has been effected to a position effecting a greater degree of interlocking whereby even if said support elements are accidentally pulled apart while still aligned the members will remain latched together.

6. In a door latching construction, the combination as described in claim 5 wherein is additionally provided mechanical means for moving said one member against the resilient urging thereof whereby to unlatch said members and permit relative swinging between said support elements.

7. In a door latching device, a stationary support, a support movable laterally into and out of alignment with said stationary support, interengaging means on said supports for releasably retaining said movable support in a position in alignment with said stationary support, said means including a latch member on one of said supports, a catch member on the other of said supports and engageable with said latch member when the movable support is moved to said position, means urging the member on said movable support toward engagement with the member on the stationary support, said movable support member having a cam surface arranged to engage the stationary support member so that when the movable support is moved toward said position said movable support member momentarily is moved against the force of the urging means to permit said members to engage, means mounting the stationary support member for sliding movement through a limited path, at least a portion of the stationary support member facing the other member being formed of a magnetically attractive material, and magnetic means on said movable support for attracting said stationary support member portion and retaining the stationary support member in engagement with the movable support member, whereby said interengaging means are operative even when the movable support is displaced longitudinally of the movable support member.

8. In a door latching device, a stationary support, a support movable laterally into and out of alignment with said stationary support, interengaging means on said supports for releasably retaining said movable support in a position in alignment with said stationary support, said means including a latch member on said movable support, a catch member on said stationary support and engageable with said latch member when the movable support is moved to said position, said catch member having limited movement in the frame, means urging the latch member toward engagement with the catch member, said latch member having a cam surface facing the direction of movement of said movable support so that when the movable support is moved toward said position said latch member momentarily is moved against the force of the urging means to permit said members to engage, means mounting the catch member for sliding movement through a limited path, at least a portion of the catch member facing the latch member being formed of a magnetically attractive material, and magnetic means

on said movable support for attracting said catch member portion and retaining the catch member in engagement with the latch member, whereby said interengaging means are operative even when the movable support is displaced longitudinally of the movable support member.

9. A door latching device comprising a latch member casing, a latch member movably mounted in said latch member casing, said latch member being urged outwardly of said casing and having a cam surface adapted to move the latch member inwardly of said casing when engaged by a catch member, a catch member casing, said casings being laterally movable with respect to each other from open to aligned closed position, a catch member movably mounted in said catch member casing and spring held to a restricted normal position engaging said latch member in said closed position of the casings, said catch member being movable outwardly of its casing beyond its retracted normal latch member engaging position, magnetic means on said latch member casing for attracting said catch member outwardly of its casing from its normal position to a projecting position for fuller engagement with said latch member, and means for withdrawing said latch member from engagement with said catch member.

10. A door locking device comprising a latch member and a catch member movable relative to each other and having a normal interengaging locking position securing said device in closed position, resilient means operative upon at least one of said members and urging said member to normal locking position for causing positive locking interengagement of said members automatically upon movement thereof to closed position, at least one of said members being movable beyond its normal positive locking position, magnetic means for attracting said movable member when engaged with the other of said members and drawing said movable member into further engagement for preventing independent disengaging movement of said movable member from positive locking engagement with the other of said members, and manually operable means cooperative with one of said members for moving said member out of normal locking position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,102,118	Yurow	June 30, 1914
2,219,186	Hornfeck	Oct. 22, 1940
2,586,900	Alderman	Feb. 26, 1952