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A. DIEMER

DOOR LATCHES

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360,523

3 Sheets—Sheet 1

Fig. 1

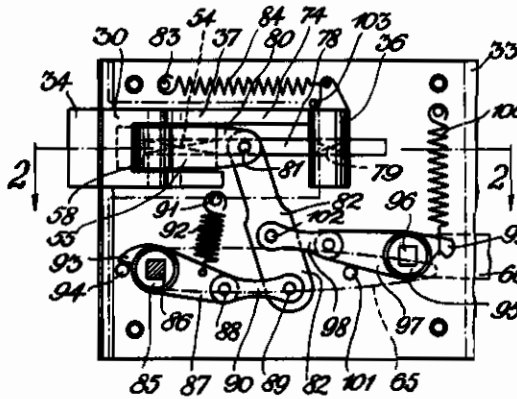


Fig. 3

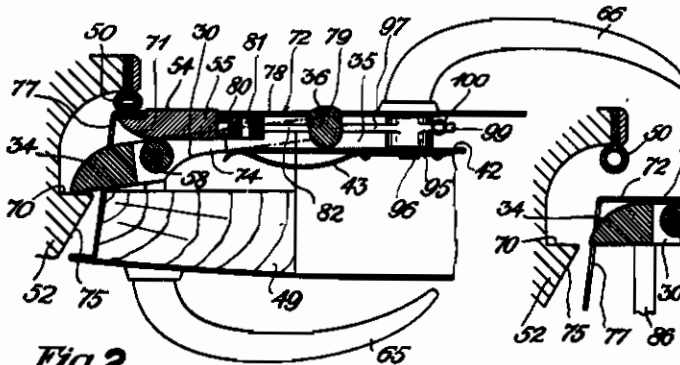
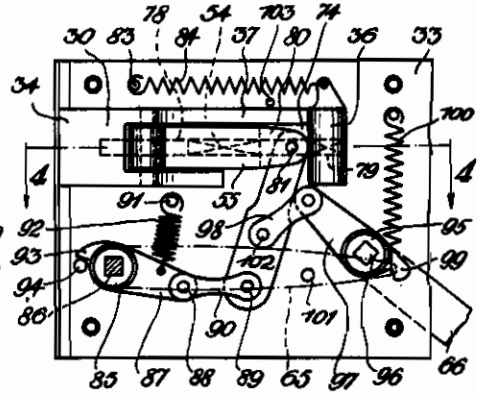


Fig. 2

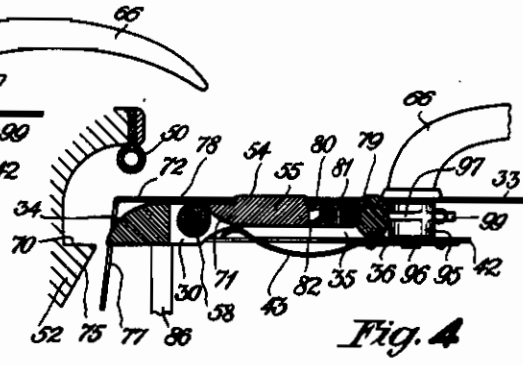


Fig. 4

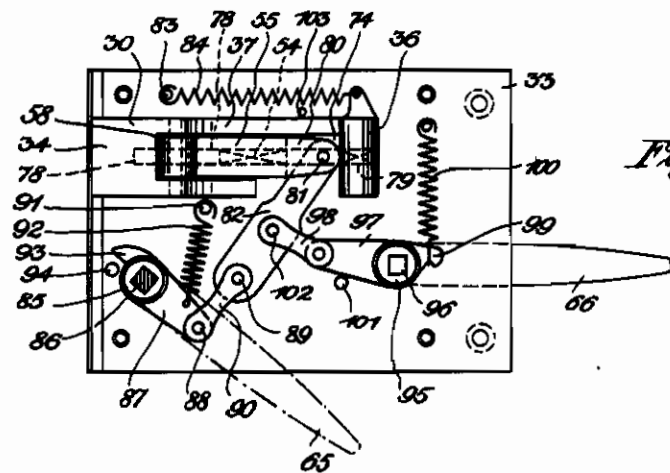


Fig. 5

INVENTOR
ANTON DIEMER
 BY *A. G. Hirsch*
Wm. H. H. Hirsch
 ATTORNEYS

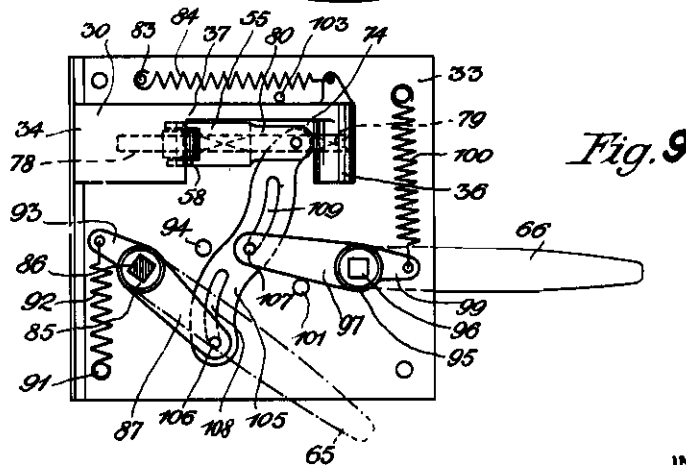
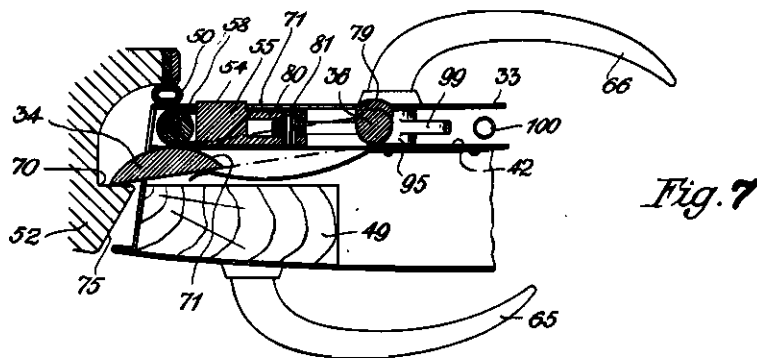
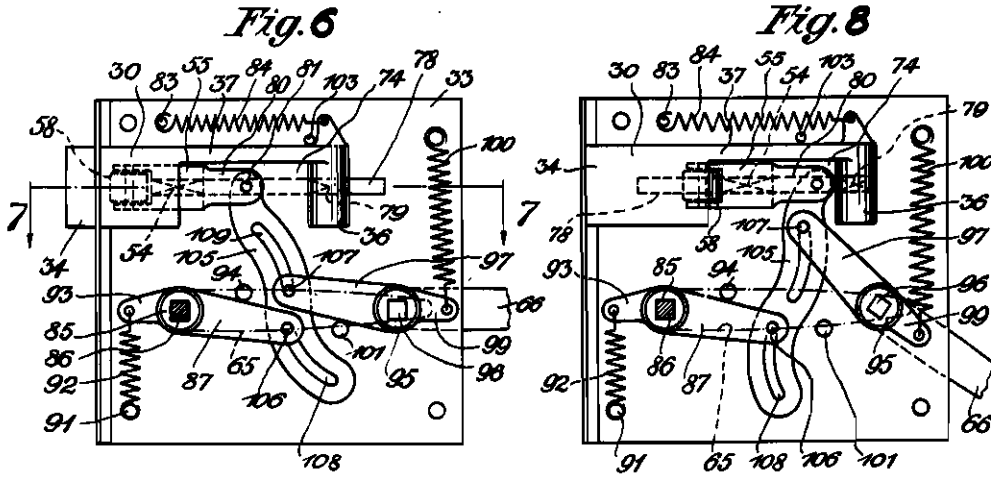
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BY A. P. C.

A. DIEMER
DOOR LATCHES

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INVENTOR
ANTON DIEMER
BY *A. G. H. H. H.*
ATTORNEYS

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A. DIEMER
DOOR LATCHES

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3 Sheets—Sheet 3

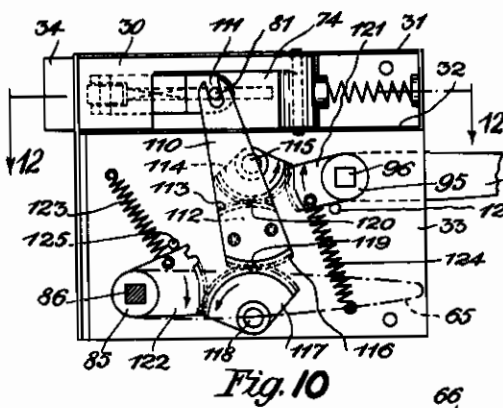


Fig. 10

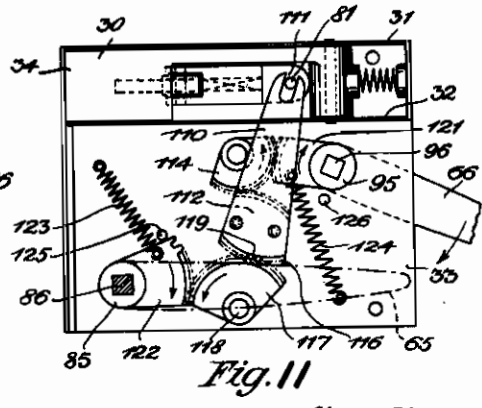


Fig. 11

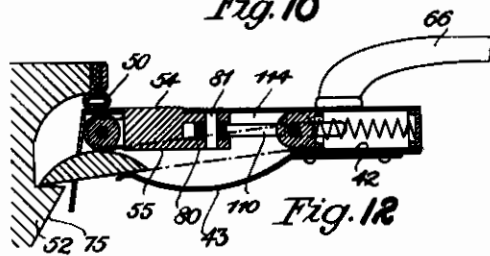


Fig. 12

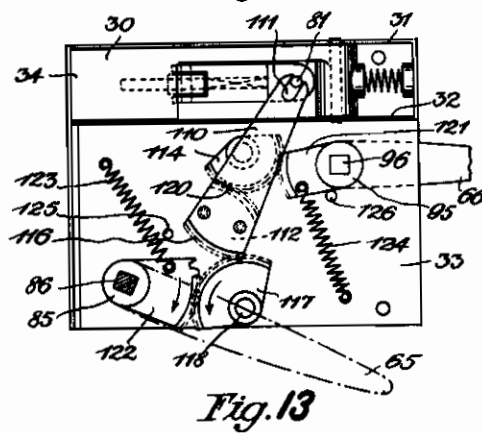


Fig. 13

INVENTOR
ANTONDIEMER
BY *A. A. Smith*
Donald R. ...
ATTORNEYS

ALIEN PROPERTY CUSTODIAN

DOOR LATCHES

Anton Diemer, Stuttgart, Germany; vested in the
Alien Property Custodian

Application filed October 10, 1940

This application is a division of application Serial No. 303,977, filed November 13th, 1939.

This invention relates to door latches, especially for doors of motor vehicles and for other doors which when closed are under spring tension, the bolt of such latches carrying out, in addition to its forward motion, also a transverse one or a cross motion. An object of such double motion is to secure an easy entering of the head of the latch bolt into the striker plate or behind the locking wedge, despite the door being distorted or being under spring tension when in closed position. This should occur prior to the door being completely introduced into the body frame, so that such doors need not be slammed. However, since with latches of known structure the bolt performs both these movements simultaneously, the results aimed at are not always securely attained. This is due to the fact that especially with bolts having their forward motion depending upon spring action only it may occur that the head of the bolt will not enter sufficiently deep into the striker plate opening or behind the locking wedge, being thereon jammed in the attained position on account of great friction or pressure. In such a condition the door may open accidentally upon the occurrence of the slightest concussion or distortion.

The present invention has for its object to remove this drawback, this being achieved by a suitable connection between the door handle and the latch bolt providing for both said movements being carried out consecutively only. In this way when a latch is to be unlocked, the bolt performs at first a cross motion only, whilst it is retracted into the latch casing after said cross motion is terminated. In locking operation, on the contrary, the bolt executes first its forward motion, whereafter when this latter is terminated, it carries out its cross motion providing for a complementary drawing of the door into the door frame.

With these objects in view, in a preferred embodiment of this invention, I provide a slider between the latch bolt and a lever connected to the door handle, said slider being adapted to bear on the latch bolt and on the latch casing. When the door handle performs an unlocking movement said slider first slides along a wedge surface whereafter it causes the latch bolt to perform its inward movement. The just mentioned wedge surface may be arranged either on the bolt or on the door casing or on the slider proper.

When this door latch is used with motor ve-

hicles it is desirable that the outer door handle be able to be moved independently of the inner one, so that e. g. the inner door handle remains stationary when the latch is opened by means of the outer door handle and vice versa. In order that such a mutual independence of both door handles be obtained with the above described new door latch, I provide, according to a further improved feature of this my invention between the latch bolt and the displaced door handles or respectively between a slider acting on the latch bolt and said door handles, a swinging lever transferring the motion of the door handle either to the latch bolt or to the slider. By this means when one of the door handles is rotated, the point of engagement between the other door handle and the swinging lever serves always as stationary fulcrum for said lever.

Other features and objects of the invention will more fully appear from the following description of a number of exemplary embodiments thereof with reference to the appended drawings.

In the drawings:

Figures 1 to 5 illustrate one form of embodiment of a latch constructed according to this my invention, wherein both door handles operate independently of one another.

Figures 6 to 9 illustrate a further exemplary embodiment of a latch having mutually independent door handles, and

Figures 10 to 13 illustrate another exemplary embodiment of a structure analogous to the above mentioned ones.

In the exemplary embodiment represented on Figs. 1 to 5 both door handles 65, 66 the axes whereof are mutually displaced may be operated independently one from another. Figs. 1, 3 and 5 are views of the latch having the cover plate of its casing removed. Fig. 1 illustrates the parts of the latch in their position of rest, Fig. 3 the same parts in an unlocking position obtained by a depression of the inner door handle 66, and Fig. 5 represents the parts of the latch in their unlocked position due to a depression of the outer door handle 65. Figs. 2 and 4 are sectional views taken on lines 2-2 and 4-4 respectively of Figs. 1 and 3.

In this embodiment the bolt 30 is mounted shiftably in longitudinal direction in a chamber 35 of the latch casing and it is arranged swingably about its reinforced portion 36. The bolt 30 is held against movement in downward direction by means of its head 34 sliding in an aperture 77 of the latch casing as well as by means of a lug 78 of the cylindrical portion 36

sliding in a slit 78 of the base plate 33 of said latch casing. The leaf spring 43 presses the bolt 30, when no other greater forces are acting thereon, toward the base plate 33 of the latch casing. In this instance the roller 58 is mounted in the latch bolt and the inclined surface 71 causing the bolt to move in transverse direction is arranged on the slider 55. This latter is guided by a rectangular projection 54 engaging in the slit 78 of the base plate 33 of the latch casing in parallelism to the direction of movement of the latch bolt 30. Said slider carries on its inner bifurcated end 80 a swinging lever 82 pivotally mounted on a pin 81. A contraction spring 84 attached to the base plate of the latch casing by means of a pin 83 urges the latch bolt into its locked position. The cut-out 74 of the latch bolt wherein the slider 55 moves has its aperture directed downwards. The purpose of such arrangement is to enable the swinging lever 82 to pass through said cut-out. Therefore, the latch bolt head 34 is connected in that case with the cylindrical portion 36 of the bolt by means of an upper arm 37 only.

A tumbler 85 mounted rotatably in the latch casing is positively connected to the outer door handle 65 by means of a square shank 86 of said handle being inserted into the tumbler. Said latter carries rigidly connected thereto and arranged in the latch casing a lever 87 also pivotally connected by means of a link 90 mounted on pins 88, 89 with the bottom end of the swinging lever 82. A contraction spring 92 attached to the latch casing by means of a pin 91 causes an extension 93 of the lever 87 to bear upon a striker stud 94 secured in the latch casing. An inner door handle 66 is positively connected by means of a square shank 96 to a second tumbler 95 also rotatably mounted in the latch casing. Said inner door handle is connected by means of a link 98 and a lever 97 attached to the tumbler with a point lying between the ends of the swinging lever 82. This connection is of a similar linked nature as that of the outer door handle 65 with the bottom end of said swinging lever. The lever 97 is drawn in its position of rest towards a stationary abutment pin 101 by means of a contraction spring 100 engaging with its extension 99.

If lever 97 is now moved upwardly by depressing the inner door handle 66, it draws first the slider 55 by means of a link 99 and of a swinging lever 92 so far in backward direction that the inclined surface 71 of said slider moves through beneath the roller 59 of the latch bolt. The latch bolt is thereby swung due to the action of leaf spring 43, about its cylindrical portion 36, towards the base plate 33 of the latch casing. In this motion the pivot 89 of the link serves as fulcrum for the swinging lever 82, so that the link 90 and the lever 87 form nearly a straight line when in position of rest. On the other hand, the traction forces transferred on the system 87, 90 when the inner door handle 66 is depressed the extension 93 of lever 87 with a greater force towards the striker stud 94, so that the outer door handle 65 remains in its position of rest when the latch is acted on by the inner door handle 66. When the slider, as it has been explained above, is drawn back by lever 87 so far that its inclined surface 71 has entirely cleared the roller 58 of the latch bolt, said slider abuts by its bifurcated inner end 80 on the cylindrical portion 36 of the latch bolt and at its further movement it draws the latch bolt into the latch

casing up to the unlocking position represented in Figs. 3 and 4. When the latch is unlocked by the outer door handle 65, the movements of the slider 55 and of the latch bolt 30 are carried out in the same sequence as above, with the only difference that in said latter case the swinging lever 82 is turned by means of lever 87 and link 90 in clockwise direction. Hereby also the pivotal connection 102 of the link 98 serves as relatively stationary fulcrum for the swinging lever 82 (see Fig. 5).

During the locking operation of the latch, both of the door handles 65 and 66 are also operated independently one from another so that any time when a door handle depressed prior to the door being closed performs an ascendent movement it operates a tilt of the swinging lever 82 in counterclockwise direction. Simultaneously also the pivot pin of the other door handle engaging with the swinging lever acts as a fulcrum for said latter. By this means first of all the latch bolt is shifted outwardly together with the slider by the assistance of contraction springs 84, 92 and 100 until said bolt strikes onto a pin 103 secured in the lock casing whereafter the slider 55 continues its outward movement alone until it reaches the position represented on Figs. 1 and 2. Following to this the inclined surface 71 of the slider enters between the casing base plate 33 and the roller 58 of the latch bolt swinging thereby said bolt about its cylindrical portion 36. The head 34 of the latch bolt is thereby forced against the abutment 70 of the locking wedge 52, the inner surface 62 of the door being thus pressed to the yielding sealing strip 50. The force applied for this purpose on the door handle is relatively small, because the parts 97, 98 and 87, 90 respectively act as toggle links which are nearly straight at the end of the closing movement of the latch bolt. It may be clearly seen from the drawings that this embodiment of the latch may be used for enabling the door to be closed by a mere slamming. In this case when the latch bolt gets in contact with the inclined surface 75 of the locking wedge, it is shifted inwardly and on having passed said inclined surface it snaps back outwards again under the action of spring 84, without thereby setting into movement the slider 55 and hence also the door handles 65, 66.

In the second exemplary embodiment provided with independently operated door handles as shown in Figs. 6 to 9 the latch is represented in locked position on Figs. 6 and 7. Fig. 7 represents a section of Fig. 6 taken on the line 7-7. Fig. 8 represents the latch unlocked by a depression of the inner door handle 66 whilst in Fig. 9 the same position of the latch bolt is shown after the outer door handle has been depressed. In all of the Figures 6, 8 and 9 each of which represents the latch in elevation the cover plate 42 of the latch casing has been removed.

Broadly speaking, the details and the operation of this latch are similar to those of the above mentioned exemplary embodiment. But in this case the levers 87, 97 moved by the door handles are not connected to the swinging lever 105 by links, such connection being made by means of pins 106, 107 carried by levers 87, 97 respectively and engaging into preferably arcuate slots 108, 109 of the swinging lever. Thus when lever 87 is moved downwardly or lever 97 upwardly the swinging lever 105 is always tilted in clockwise direction, a pin 106 or 107 of that of the levers 87, 97 which is not moved, serving thereby as a ful-

crum for said swinging lever. A further difference between this exemplary embodiment and the preceding one resides therein that in this case the roller 56 is arranged on the outer end of the slider 55, whilst the cambered inclined surface 71 is formed on the head 34 of the latch bolt.

Another form of door latch according to this invention having handles acting independently from one another is represented in Figs. 10 to 13 of which Fig. 10 shows again the latch in locked position with the cover plate 42 of the latch casing having been removed; Fig. 12 is a section of Fig. 10 taken on the line 12—12, whilst Fig. 11 represents in elevation a latch unlocked by the depression of the inner door handle 66 and Fig. 13 is a similar view of a latch having been unlocked by a depression of the outer door handle 65.

In this exemplary embodiment the swinging lever 107 engages by means of a cut-out 111 provided on its upper end with a pin 81 of the slider 55. On the bottom end of a surface of the swinging lever facing the base plate 33 of the latch casing a block 112 is attached provided on two of its sides with gearing teeth. The upper teeth 113 of this block engage with a segment 114 provided with corresponding teeth and mounted to rotate on a stub shaft 115 secured in the base plate 33 of the latch casing. In the same way the bottom teeth 116 of part 112 are in engagement with a toothed segment 117 rotatably mounted on a stub shaft 118 also attached to the base plate 33.

The teeth 113 and 116 of the block 112 are formed on curves facing one another with their concave sides, the center of curvature 119 of the arc of teeth 113 lying in the point of contact of the pitch circle of teeth 116 of the block 112 with the pitch circle of the teeth of segment 117. On the contrary, the center of curvature 120 of the arc of teeth 116 of part 112 is located in the point of contact of the pitch circle of the teeth 113 of part 112 with the pitch circle of the teeth of segment 114. Therefore, the swinging lever 110 will

rotate about the center of curvature 119 as about a fixed fulcrum in clockwise direction when the toothed segment 114 is rotated in counterclockwise direction. Furthermore, there will be also a clockwise rotation of the swinging lever 110, but this rotation is carried out about the center of curvature 120 as about a fixed fulcrum, when the toothed segment 117 is turned in counterclockwise direction. The toothed segment 114 is also in operative engagement with another segment 121 rigidly mounted on the rotary tumbler 85 of the inner door handle 68, whilst the toothed segment 117 engages with a further segment 122 rigidly mounted on the rotary tumbler 85 of the outer door handle 65. Owing to the above disclosed arrangement, when the inner door handle 68 is depressed the swinging lever 110 is turned about the center of curvature 119 in clockwise direction. By this motion, in the same way as has been described in connection with the precedent embodiment it retracts primarily into the latch casing the slider 55 and thereafter also the latch bolt 30. A similar unlocking operation is also present when on account of depressing the outer door handle the swinging lever 110 is rotated about the center of curvature 120 in clockwise direction. On the other hand, when both of the door handles are moved in upward direction, the parts of the latching mechanism move in opposite directions. When both segments 121 and 122 are in their position of rest they are drawn respectively by contraction springs 123 and 124 towards abutment pins 125 and 126 fixed on the base plate of the casing. When the latch is unlocked by means of one of the door handles 65, 66, the segment belonging to the other door handle is more strongly pressed against its abutment pin by reaction forces acting thereon. In this way, the position of one of the door handles is not influenced by a depression of the other one, both door handles being thus adapted to operate quite independently from one another.

ANTON DIEMER.