PUBLISHED A. DIEMER Serial No.

MAY 25, 1943. DOOR-LATCHES, ESPECIALLY FOR MOTOR VEHICLES 303,977

BY A. P. C. Filed Nov. 13, 1939 5 Sheets-Sheet 1

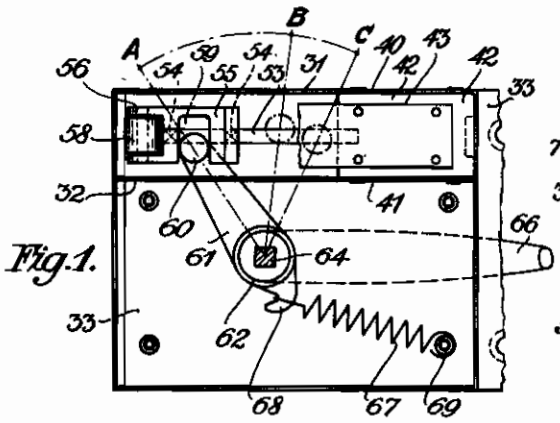

Fig. 1.

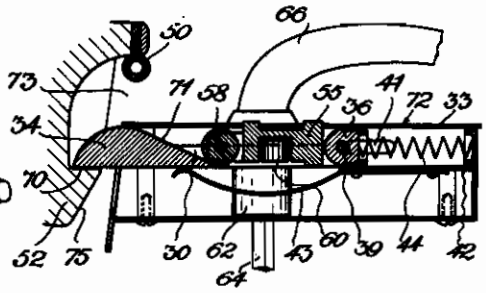

Fig. 4.

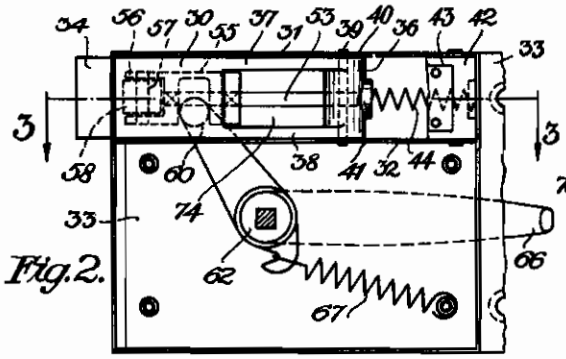

Fig. 2.

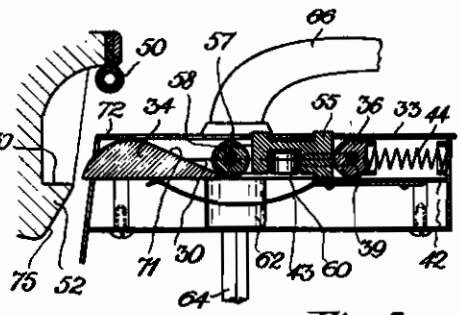

Fig. 5.

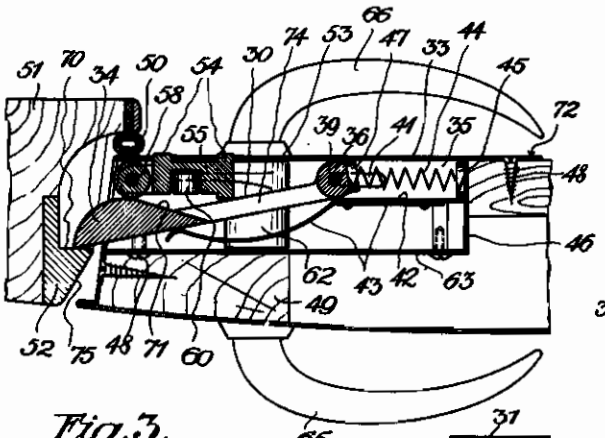

Fig. 3.

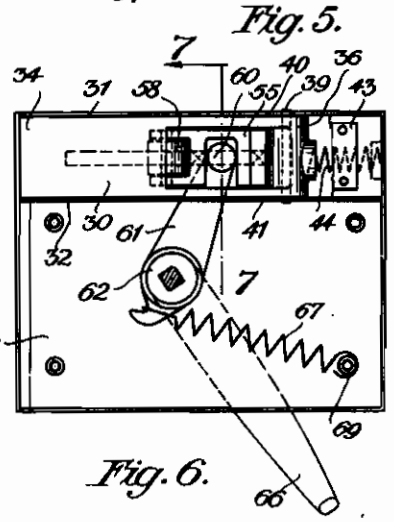

Fig. 6.

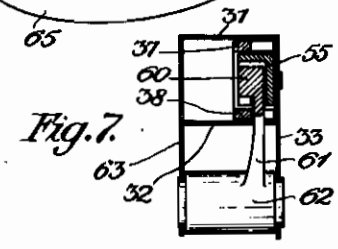

Fig. 7.

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PUBLISHED **A. DIEMER** **Serial No.**

MAY 25, 1943. DOOR-LATCHES, ESPECIALLY FOR MOTOR VEHICLES **303,977**

BY A. P. C. Filed Nov. 13, 1939 5 Sheets-Sheet 2

Fig. 8.

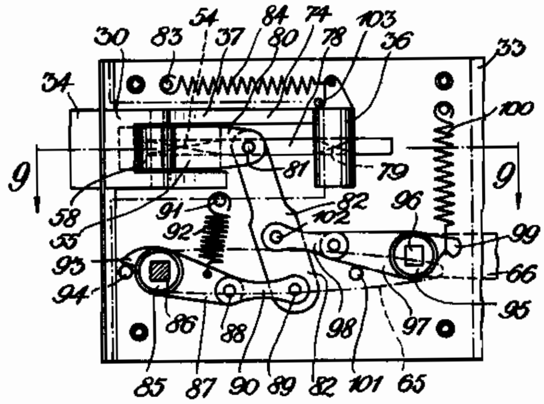
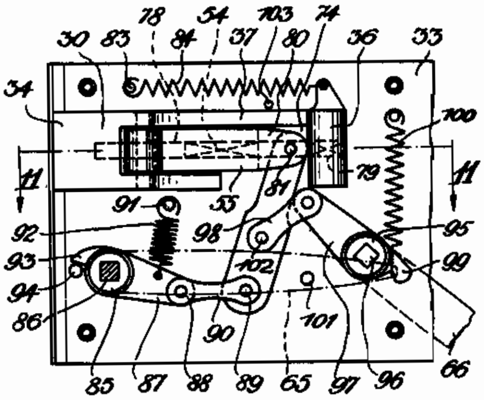


Fig. 10.



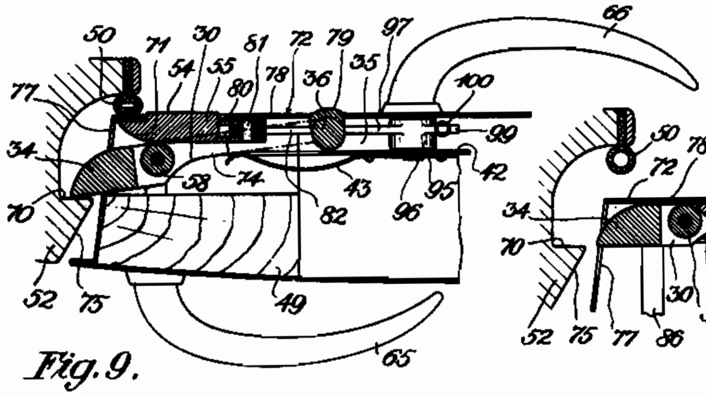


Fig. 9.

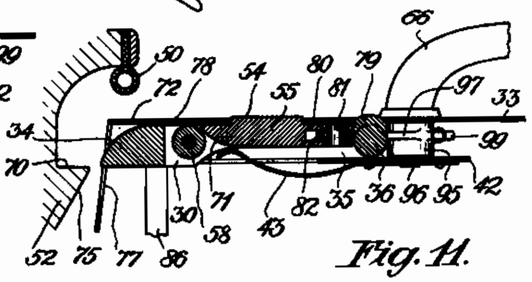


Fig. 11.

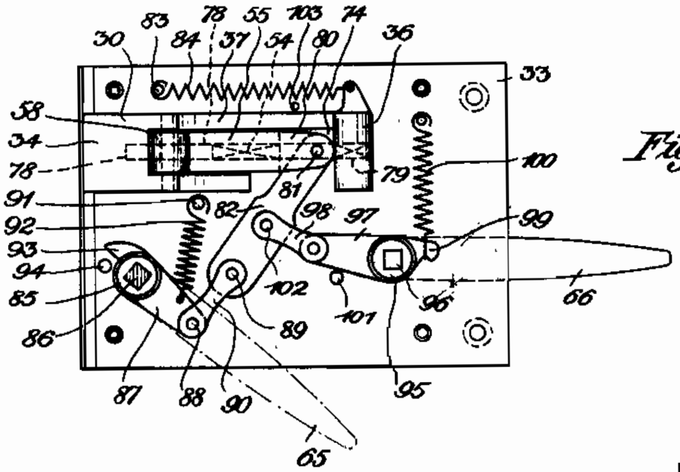


Fig. 12.

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Fig. 13.

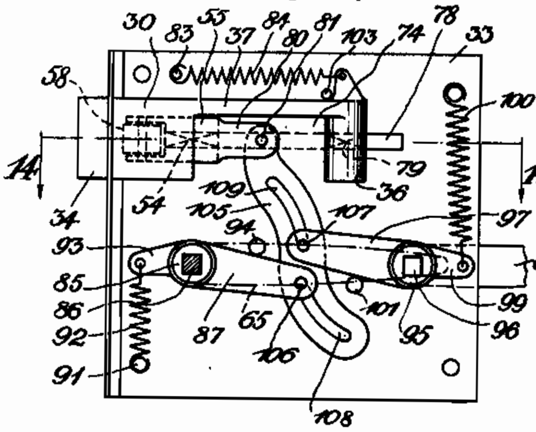
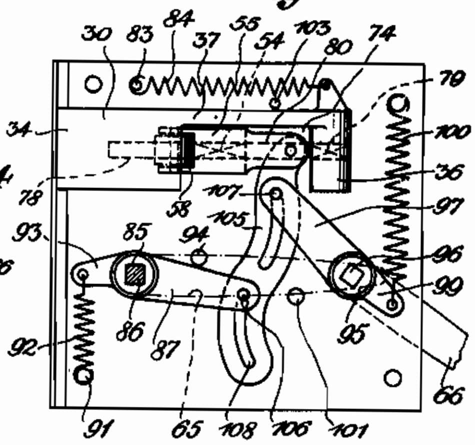


Fig. 15.



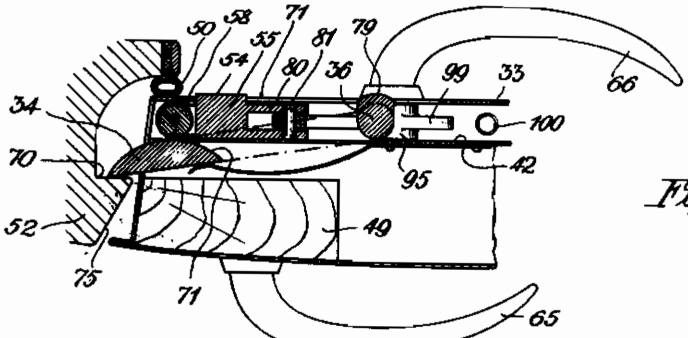


Fig. 14.

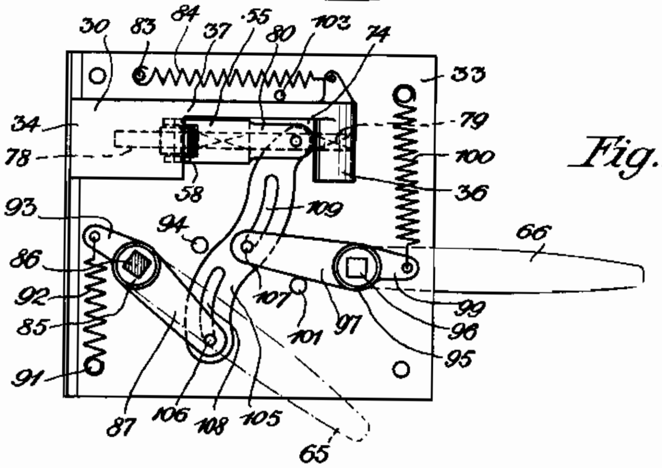


Fig. 16.

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DOOR-LATCHES, ESPECIALLY FOR MOTOR VEHICLES

Filed Nov. 13, 1939

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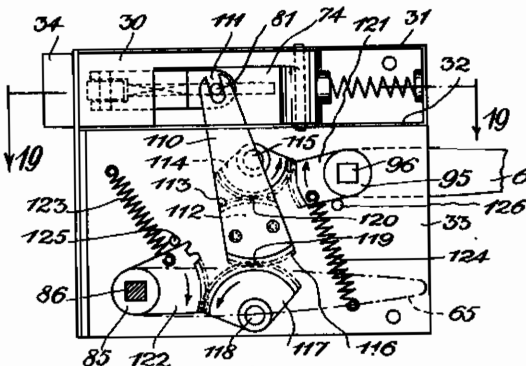

Fig. 17.

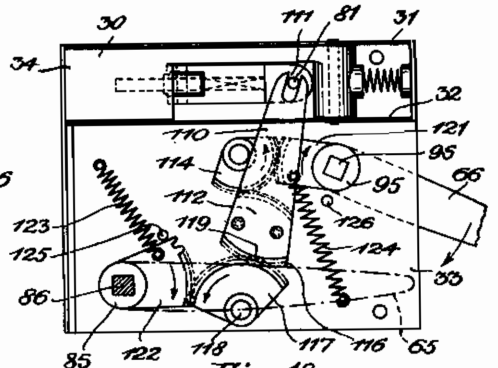

Fig. 18.

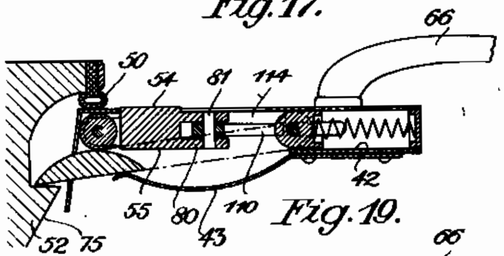

Fig. 19.

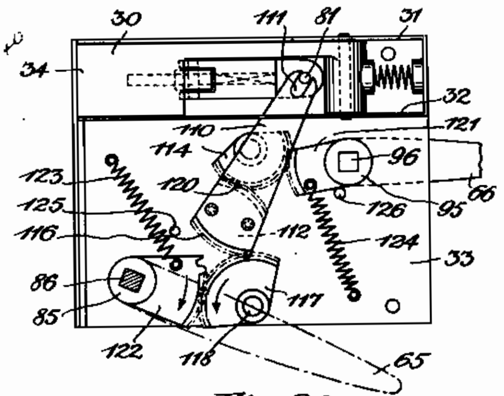

Fig. 20.

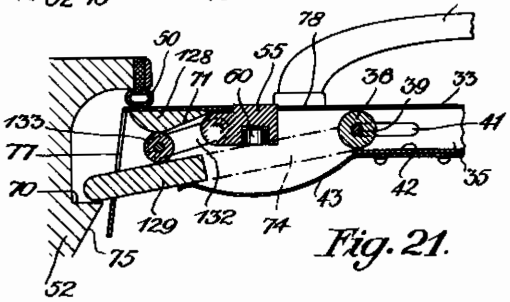

Fig. 21.

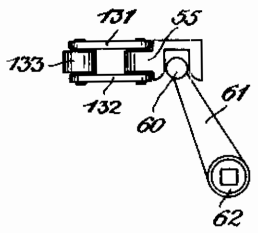

Fig. 22.

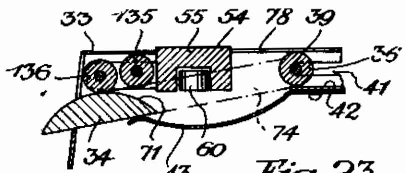

Fig. 23.

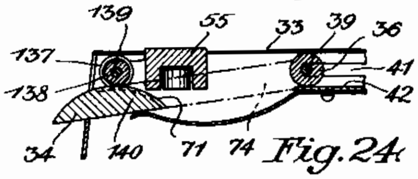

Fig. 24.

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DOOR-LATCHES, ESPECIALLY FOR MOTOR VEHICLES

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Fig. 25.

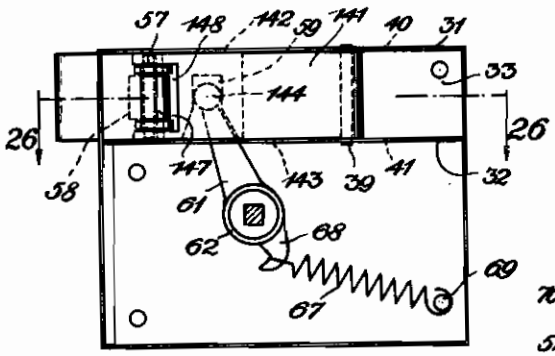
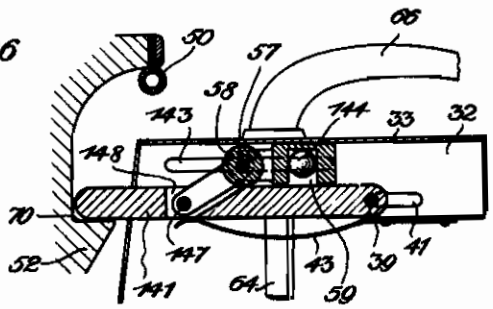


Fig. 27.



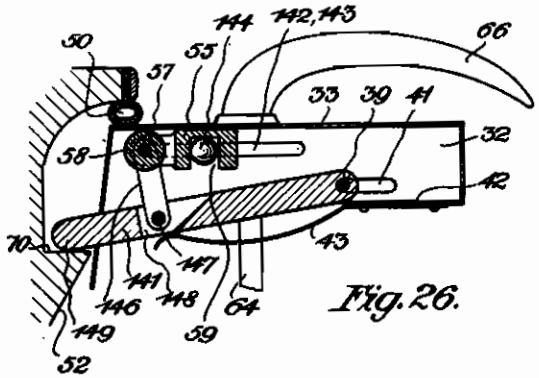


Fig. 26.

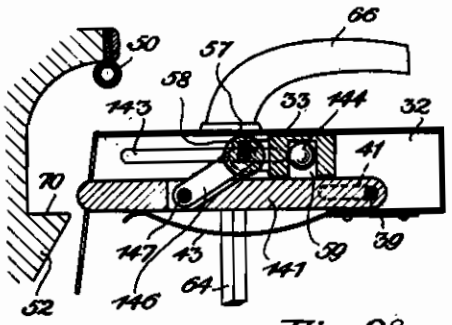


Fig. 28.

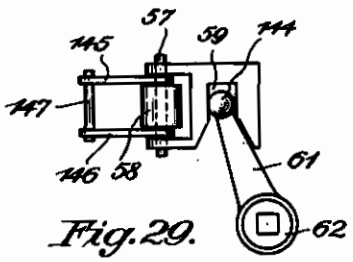


Fig. 29.

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ALIEN PROPERTY CUSTODIAN

DOOR-LATCHES, ESPECIALLY FOR MOTOR VEHICLES

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

Application filed November 13, 1939

This invention relates to locks or 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 of 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 to be slammed. However since with latches of known structure the bolt is performing both these movements simultaneously, the results aimed at are not always or almost not always securely attained. This is due to the fact that especially with bolts having their forward motion depending of spring action only it may occur that the head of the bolt will enter either with its tip only or not 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 at the slightest concussion or distortion the door may open again.

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 those both 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 yet after said cross motion is terminated. In locking operation, on the contrary, the bolt executes first its forward motion, whereafter yet 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 both on the latch bolt and on the latch casing. When the door handle performs an unlocking movement said slider is first sliding along a wedge surface whereafter yet at the end of said latter, 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 vehicles it is necessary that the outer door handle (knob) be able to be moved independently of the inner one, so that e. g. the inner door handle remains stationary when the latch gets open 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 also, 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 7 illustrate a door latch constructed in accordance with this invention and applicable to motor vehicles. In this latch both door handles, viz. the outer and the inner one, are mounted on a common axle, both being thus operatively connected to one another.

Figures 8 to 12 illustrate a second example of embodiment of a latch constructed according to this my invention, but wherein both door handles are operating independently of one another.

Figures 13 to 16 illustrate a further exemplary embodiment of a latch having mutually independent door handles.

Figures 17 to 20 illustrate another exemplary embodiment of a structure analogical to the above mentioned ones, whereas

Figures 21 to 29 illustrate various possible structures of a slider arranged between the latch bolt and the door handle of a latch.

In the first exemplary embodiment illustrated in Figs. 1 to 7 the latch bolt **30** is guided slidably between both walls **31** and **32** of the latch casing. The bolt proper consists of a head **34** cambered towards the base plate **33** of the latch casing, of a cylindrical part **36** shiftable in a chamber **35** of said casing and of two arms **37, 38** connecting the said cylindrical part with the bolt head. Guided in grooves **40, 41** of the walls **31** and **32** respectively is a pin **39** projecting upwardly and downwardly from the cylindrical part **36**. In this way the latch bolt **30** is adapted to

be moved not only in its longitudinal direction but also in a direction transverse to the plane of the latch when oscillated about the pin **39**. A leaf spring attached to a partition **42** of the latch casing tends steadily to urge the head **34** of the latch bolt towards the base plate **33** of the latch casing, whilst a coiled spring **44** which bears by one of its ends, at **45**, against the cross wall **46** of the latch casing and by its other end, at **47**, against the cylindrical part **36** of the latch bolt is adapted steadily to urge said latch bolt **30** outwardly in the direction of its length.

The latch casing is mounted in a door **49** of a motor vehicle in a known manner by means of screws **48**. When the door is closed, its inner edge is applied, also in a manner known per se, under a relatively great pressure onto a yieldable tightening lip **50** provided on the rigid motor vehicle body frame **51** surrounding the door opening. The head **34** of the latch bolt bears under a suitable pressure onto the rear face of a locking wedge **52** also arranged on the frame.

A slider **55** guided by its lateral lugs **54** in a slot **53** of the casing base plate **33** is adapted to develop a pressure necessary for the closing of the door. Said slider is carrying on its bifurcated outer end **56** a roller **58** rotatable on a pin **57**. Said roller bears, in closed position of the door, both on the base plate **33** of the casing and on the cambered surface of the latch bolt head **34**.

A cylindrically shaped end **60** of a lever **61** is engaged in a cavity **59** of the slider **54**. Said lever passes downwardly between the arm **30** of the latch bolt and the casing base plate **33**, its other end being fixed on a tumbler **62** journalled both in the said casing base plate **33** and in the cover plate **63** of the latch casing.

A longitudinal bore of square cross section is formed in the tumbler wherein a square shaped shank **64** is inserted having attached to both its ends respectively the outer and the inner door handles **65** and **66**. A contraction spring **67** having one of its ends attached to a hook-shaped extension **68** of lever **61** and connected by its other end to a pin **69** fixed in the latch casing is adapted to prevent any rattling of the upper cylinder-shaped end **60** of lever **61** in the cavity **59** of the slider **55**.

In order to explain the operation of the door latch, said latter is represented on the drawings in various stages of its opening and locking movement. Figs. 1 to 3 represent the latch in its closed or locked position, there being omitted in Figs. 1 and 2 the cover plate **63** of the latch casing and in Fig. 1 also the latch bolt **30**. These omissions have been made for the purpose of permitting a clear representation of the parts located behind the omitted ones. Fig. 3 represents a section of Fig. 2 taken on the line **3—3**. Fig. 4 represents a section similar to that of Fig. 3. However, in these figures the parts of the latch are represented at the very moment when but the first stage of an opening or locking movement respectively is accomplished, whereas Figs. 5 and 6 represent in section and respectively in elevation the latch after its parts have already terminated their opening movement. Fig. 6 reprents the latch also with its casing cover plate **63** removed. Fig. 7 represents a section of Fig. 6 taken on the line **7—7**.

When the door is firmly closed (Figs. 1 to 3) lever **61** takes the position denoted by A in Fig. 1. The roller **56** of slider **55** presses then both the latch bolt head **34** to the abutment **70** of locking wedge **52** and the base plate **33** of the latch and thereby the entire door towards the yieldable tightening lip **50** of the door frame. In this way the door is closed tightly and secured against rattling, being simultaneously pressed onto the edges of the said door opening. The cambered conformation of the latch bolt head **34** is such that the roller **58**, when in locking position, lies between two nearly parallel surfaces, so that the latch device has a self stopping effect. In other words, no forces acting in longitudinal direction of the latch bolt may be created by a pressure acting transversely to the plane of the door, i. e. no forces acting both on the latch bolt proper and on the slider carrying the roller **58** may be created thereby.

When the lever **61** is swung from its position B represented in Fig. 1 by depressing the outer or inner door handle **65** or **66**, it acts by means of its cylindrical head **60** to shift the slider **55** in its longitudinal direction until said slider will occupy the position represented on Fig. 4. In the same extent in which the roller **58** of the slider descends the wedged surface **71** of the bolt head **34** the latch bolt **30** itself is released and it is turned by the leaf spring **43** around its pivot **39** towards the base plate **33** of the latch casing until the highest portion of its camber will bear on the said base plate **33** (Fig. 4). The door may be now unclosed so far that between the tightening lip **50** and the inner surface **72** of the door there wil be formed a distinctly perceivable air gap **73**, and the bolt head **34** will yet freely lie on the abutment **70** of the locking wedge **52**.

During the shift movement of slider **55** towards the position represented on Fig. 4 with a simultaneous shifting movement of the latch bolt **30**, said slider enters into a rectangular opening **74** of the latch bolt and is thus in contact with the cylindrical portion **36** of the said latch bolt. Therefore when the slider is further shifted on account of a continued movement of lever **61** from its position C, past the position represented in Fig. 4 and up to its position represented in Figs. 5 and 6, it carries also the latch bolt **30** in opposition to spring **44** in such a way that said bolt is fully retracted into the latch casing. The door may be now entirely opened.

When a closing movement of the door is carried out the above recited operative steps follow in opposite order. So when one of the door handles **65**, **66** has been depressed, the door is primarily closed so far only that its inner surface **72** bears but slightly on the yielding tightening lip **50**. By moving the door handle upwards, the bolt is shifted out of the latch casing until it takes the position represented in Fig. 4. Such outward motion of the bolt is assisted by springs **44** and **67**. Should now the lever **61** be brought back into its initial position A by a further upward movement of the door handle, it will move the slider by means of its cylindrical head **60** in outward direction, whereas the latch bolt **30** is no more moving outwardly for the reason that its guiding pin **39** has been already brought to contact with the outer end of the guiding slots **40**, **41**. Therefore the roller **56** of the slider is moving now on the inclined surface **71** of the bolt head **34** and at the same time it turns the latch bolt **34** about the pin **39** up to the moment when the bolt reaches again its closing position represented on Fig. 3.

The locking operation may be also carried out without acting on the door handle by merely slamming the door. In the latter case the latch is acting as any conventional door latch wherein

the bolt 30 is retracted into the latch casing when its head 34 strikes on the inclined surface 75 of the locking wedge in opposition to spring 44. Thereby neither the slider 55 nor the door handles 65, 66 do change their positions. As soon as the inner surface of the door gets in contact with the tightening lip 50 and said latter is sufficiently compressed by the momentum of the slammed door, the bolt head 34 snaps under the action of spring 44 behind the abutment 70 of the locking wedge whereon the door is securely latched.

It is naturally an object of this invention to have doors closed noiselessly by operating a door handle. However an additional advantage of this my invention, as it will be seen from a further description of its embodiments, resides therein that doors provided with latches made on the basis of this invention may be also closed in the way heretofore practicable, where such operation would not be troublesome.

The exemplary embodiment represented on Figs. 8 to 12 differs from the above described one substantially therein that both door handles 65, 66 the axles whereof are mutually displaced may be operated independently one from another. In Figs. 8 to 12, in the same way as in the farther following figures, all parts of the latch, as well as the adjacent parts of the door and of the door frame have been designated by respectively the same reference numerals. Figs. 8, 10 and 12 represent again views of the latch having the cover plate of its casing removed. Fig. 8 illustrates the parts of the latch in their position of rest, Fig. 10 the same parts in an unlocking position obtained by a depression of the inner door handle 66, and Fig. 12 represents the parts of the latch in their unlocking position due to a depression of the outer door handle 65. Figs. 9 and 11 are sectional views taken on lines 9—9 and 11—11 respectively of Figs. 8 and 10.

In this embodiment also 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 79 of the cylindrical portion 36 sliding in a slit 78 of the base plate 33 of said latch casing. The leaf spring 43 again presses the bolt 30, when no other greater forces are acting thereon, to the base plate 33 of the latch casing. In contradistinction to the preceding exemplary embodiment, 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 76 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 62 pivotally mounted on a pin 61. A contraction spring 64 attached to the base plate of the latch casing by means of a pin 63 urges the latch bolt into its locked position. The cut-out 74 of the latch bolt wherein the slider 55 is moving has its aperture directed downwards, contrarily to the precedent example of embodiment. The purpose of such arrangement is to enable the swinging lever 62 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 96 mounted on pins 88, 89 with the bottom end of 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 repose in a position of rest on 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 85 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 62. 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 96 and of a swinging lever 62 so far in backward direction that the inclined surface 71 of said slider moves through beneath the roller 58 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 62, 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 are pressing 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 97 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. 10 and 11. 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 62 is turned by means of lever 87 and link 90 in clockwise direction. Hereby also the pivotal connection 102 of the link 96 serves as relatively stationary fulcrum for the swinging lever 62 (see Fig. 12).

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 is performing an ascendent movement it operates a tilt of the swinging lever 62 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 64, 62, and 100 until said bolt striked 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. 8 and 9. 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 applies thereby forcibly against the abutment 70 of the locking wedge 52, the inner surface 72 of the door being thus pressed to the yielding tightening lip 50. The force applied for this purpose on the door handle is relatively small, because of the parts 97, 98 and 87, 90 respectively acting as toggle links and being nearly stretched 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 also 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. 13 to 16 the latch is represented in locked position on Figs. 13 and 14. Fig. 14 represents a section of Fig. 13 taken on the line 14—14. Fig. 15 represents a latch unlocked by a depression of the inner door handle 66 whilst in Fig. 16 the same position of the latch bolt is shown after the outer door handle has been depressed. In all of the Figures 13, 15, and 16 each of which represents the latch in elevation the cover plate 42 of the latch casing has been removed again.

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 arcuate slits 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 fulcrum for said swinging lever. A further unsubstantial difference between this exemplary embodiment and the precedent one resides therein that in this case the roller 58 is arranged again in the same way as in the embodiment represented on Figs. 1 to 7, i. e. on the outer end of the slider 55, whilst the cambered inclined surface 71 is formed again 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. 17 to 20 of which Fig. 17 shows again the latch in locked position with the cover plate 42 of the latch casing having been removed; Fig. 19 is a section of Fig. 17 taken on the line 19—19, whilst Fig. 18 represents in elevation a latch unlocked by the depression of the inner door handle 66 and Fig. 20 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 61 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 centre 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 centre of curvature 128 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 centre 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 centre 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 95 of the inner door handle 66, 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 66 is depressed the swinging lever 110 is turning about the centre of curvature 119 in clockwise direction. By this motion, in the same way as has been described in connection with the precedent embodiments it retracts primarily into the latch casing the slider 55 and thereafter also the latch bolt 36. A similar unlocking operation is also present when on account of depressing the outer door handle the swinging lever 110 is rotated about the centre 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 are moving 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 yet more pressed to 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.

Figs. 21 and 22 represent in section and in fragmentary view an embodiment of the latch wherein the inclined surface 71 causing the latch bolt to perform its cross movement is arranged on a member 128 fixed on the latch casing. In this exemplary embodiment the latch bolt 128 has its shape in plan limited substantially by parallel surfaces, and the slider 55 moved by the lever 61 carries at its outer end two links 131,

132 having rotatably arranged therebetween a roller 133. When the slider 55 is moved by lever 61 rigidly mounted on the tumbler 52, the roller 133 is riding along the inclined surface 71 of member 126 causing thereby a corresponding transverse or cross motion of the head of the latch bolt 129.

Furthermore the slider 55 may also carry on its outer end two somewhat mutually spaced rollers 135, 136 as represented in Fig. 23, whereby one of said rollers (135) is bearing on the base plate 33 only of the latch casing and the other one (136) on the inclined surface 71 of the bolt latch head 34 only. In this way both of the rollers are adapted to ride on their corresponding guide surfaces when the slider is moving so that any sliding friction in this place is avoided.

In Fig. 24 a further embodiment of the invention is shown having a number of rollers 137, 136 of different diameter arranged on one another on a common axle 139 carried by the slider 55. The rollers 138 of smaller diameter are rolling on the inclined surface 71 only of the latch bolt head 34, whilst the rollers 137 of greater diameter are only contacting with the base plate 33 of the latch casing. For this purpose there is provided in the inclined surface 71 a depression 140 having its breadth and depth corresponding to the roller 137 having a greater diameter. By this means here also any sliding friction betwcen the rollers on the one hand and the base plate of the latch casing or the inclined surface of the head bolt on the other hand is avoided.

Finally Figs. 25 to 29 represent another exemplary embodiment wherein instead of an inclined surface causing in the precedent instances the latch bolt to perform its transverse movement a link between the slider and the latch bolt is arranged. Fig. 25 represents in elevation the inner disposition of a latch in its locking position with the cover plate 42 of the latch casing having been removed. For the sake of simplicity there is represented again a latch with one door handle 66 only or respectively with two door handles mounted on a common square shank 64. However it should be understood that with this latch also there may be applied all of the heretofore described types of door handles working independently from one another. All of the heretofore described variations of the details of the latch structure may be also generally used with any of the main typical embodiments of the latch. Figs. 27 and 28 show respectively in similar views the latch after the termination of the first stage of its unlocking or locking movement and the fully unlocked latch, whereas Fig. 29 represents once more separately the slider of such a latch device.

With this embodiment of the latch the latch bolt 141 has substantially again parallel limiting surfaces and it is also arranged to slide longitudinally by means of a pin 39 provided in its rear end in slits 40, 41 of the walls 31, 32 of the latch casing and it is also guided to perform a transverse swinging movement about the said pin 39. Also a leaf spring 43 is adapted to swing the latch bolt towards the base plate 33 of the latch casing when no great external forces are acting thereon. The slider is also provided on its outer end with a roller 56 the rotation axle 57 whereof projects upwardly and downwardly out of the slider and is engaged in slits 142, 143 of the casing walls 31, 32 serving thus as a guide for the longitudinal movement of the slider. The slider is moved in longitudinal direction here also by means of a lever 61 rigidly connected to the door handle 66 by means of a square shank and a tumbler 62, a ball shaped head 144 of said lever being engaged in a cavity 59 of the slider. Two links 145, 146 are mounted on the rotation axle 57 of the roller 58, said links being swingably engaged on their other end by means of a pin 147 in a cut-out 146 of the latch bolt.

In the locking position of the latch parts represented on Figs. 25 and 26 the links 145, 146 have taken a position substantially at right angles to the latch bolt 14 and by the intermediary of roller 58 they are pressed to the base plate 33 of the latch casing. By this means the latch bolt 149 is forcibly pressed to the abutment 70 of the locking wedge 52 and in the same way the base plate 33 of the latch casing and therefore also the inner surface of the door are forcibly pressed to the yielding tightening lip 50 on the edge of the door opening. If now by a depression of the door handle 66 the lever 61 is moved clockwise it draws the slider in the intermediate position represented on Fig. 27 in which the latch bolt 141 may be swung towards the base plate 33 of the lock casing so far that it will take a position nearly parallel to said base plate. Thereby the pressure exertcd by said latch bolt on the locking wedge and acting in a direction transverse to the plane of the door is relieved. Now the roller 58 bears onto the inner surface of the latch bolt, so that during a further movement of the lever 61 in the above indicated direction the latch bolt is retracted into the latch casing by the slider up to the position represented in Fig. 28 without any great resistance being encountered. When the door is to be closed, the above indicated operative steps are also carried out in an opposite order.

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