Jan. 24, 1967 J. A. TORNOE ETAL 3,300,240

LATCH EXTENSION DEVICE

Filed Sept. 21, 1964 2 Sheets-Sheet 1

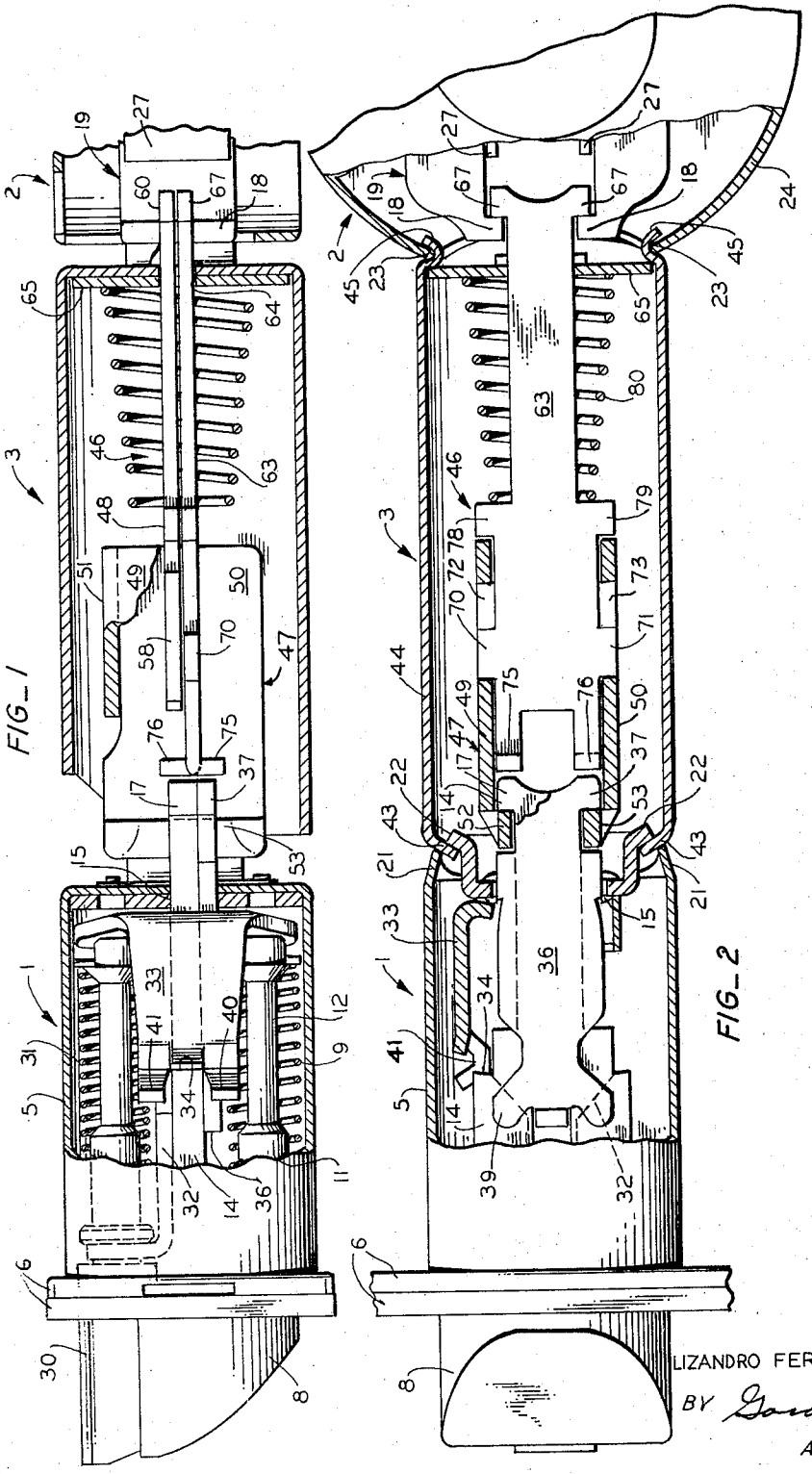


FIG_1

FIG_2

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FIG_3

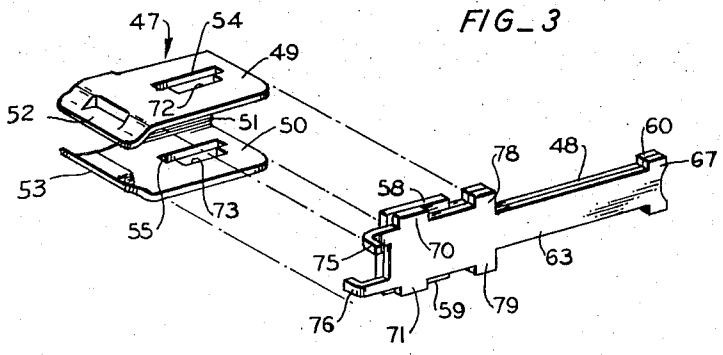


FIG_4

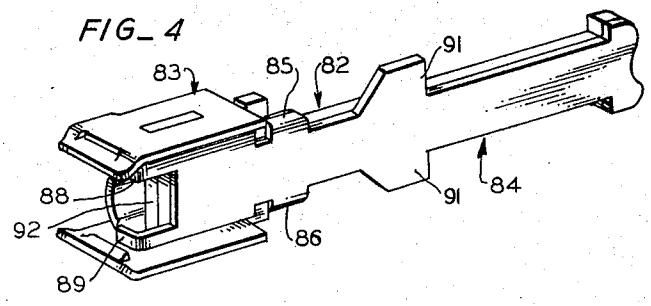
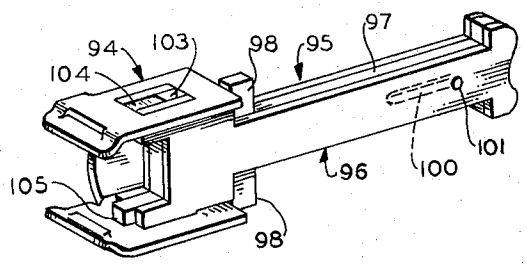


FIG_5



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LATCH EXTENSION DEVICE

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8 Claims. (Cl. 292—337)

This invention relates to a latchbolt unit extension for the purpose of increasing the backset of a latch unit of a door lock.

The term "backset" designates the distance between the edge of the door through which the latchbolt projects and the axis of the spindle that carries the door knobs. It is preferable to be able to increase the backset beyond that normally provided in a conventional lockset in order to provide a generous clearance for the hand of a person operating the locket and also to permit the use of decorative escutcheons which in some instances may be quite large.

Examples of prior art devices used to permit an increase in the backset are shown in U.S. Patents Nos. 2,250,036, 2,299,181, and 3,046,042. In each of the cited constructions an extension link is formed at one end to be engaged by the jaws of the latchbolt actuating member or slide and at the other end to be secured to the inner end of the latchbar. The result of such construction is that for each inward movement of the retractor or slide in response to turning the knob spindle there is a corresponding inward movement of the latchbolt. Similarly, when the latchbolt is depressed by the strike as the door is moved toward closed position, such depression of the latchbolt results in a corresponding inward movement of the retractor slide.

In the case of simple latchsets and in the case of certain deadlocking locksets the use of the above cited structures is satisfactory; however, in certain locksets provided with a deadlock such prior art devices are not suitable and, in fact, their use may result in the lockset becoming inoperative. The reason why a prior art extension link may render a lockset inoperative may be described briefly as follows:

In a lockset provided with a deadlocking mechanism it is necessary, when the latchbolt is depressed, that a certain amount of lost motion be permitted between inward movement of the latchbolt and the stop which prevent complete depression of the latchbolt. Such lost motion is employed to permit the deadlocking stop means to be rendered inoperative when the latchbolt is retracted by the retractor as distinguished from its being depressed by the strike upon closing movement of the door. Thus, when the lockset is provided with locking means operative from inside the room to be locked, it is essential that restoring means be employed to project the depressed push button and unlock the lockset when the door is closed; such restoring means being actuated only after some inward movement of the latchbolt has occurred.

In certain locksets the inside knob is provided with locking means, such as a push button which, when depressed, permits the outside knob to be locked or the change key shut out. In such locksets the mechanism is preferably arranged so that closing movement of the door restores the locking mechanism to unlocked condition so as to permit turning the outside knob or permit use of a change key thus avoiding an accidental "lockout." Specifically, in such locksets depression of the push button or plunger translates a bar extending axially of the knob spindle into engagement with a holding catch on the retractor which, in turn, holds the push button and said bar in depressed position against the urgency of a restoring spring. When the door is closed with the plunger or push button depressed, inward movement of

the latchbar caused by depression of the latchbolt by the strike moves the retractor slide or catch so as to release the plunger bar and permit the associated spring of the latter to project it outwardly and restore the lockset to normal condition in which either the outer knob is freed or the keyway is unblocked.

It will be apparent in locksets provided with the above described function that the lost motion between the latchbar and the deadlocking stop must be preserved so that while the latchbar is undergoing such lost motion it must not engage the restoring means. If engagement were permitted between the latchbar and the restoring means during the lost motion of the former, movement of the restoring mechanism might be sufficient to restore the lockset to unlocked condition thus defeating the deadlocking feature. In other words, slight depression of the latchbolt by means of a jimmy or like tool might release the locking means.

When prior art backset extension links have been employed it has therefore been necessary to retain the above described lost motion so that the extension link does not move upon initial depression of the latchbolt but only after the latchbar has undergone its lost motion. For this reason the amount of lost motion involved has been, in effect, substantially doubled. This result follows from the fact that if the latchbolt actuating unit and the latchbolt unit are designed to be used together with or without a backset extension device (and it would be impractical to do otherwise) then it is necessary that a unit of lost motion be provided at the latchbolt unit end and also at the retractor end. This will be more apparent later on with reference to the actual structure involved but at this point it will be noted that the incorporation of a large amount of lost motion in the connection between the latchbolt housing and the retractor mechanism may result in the locking mechanism not being restored upon closing movement of the door—especially if the clearance between the edge of the door and the jamb is so large that only a relatively slight depression of the latchbolt results. In other words, the depression of the latchbolt may be insufficient to take up two units of lost motion when the mechanism is designed to absorb only one unit. The undesirable result following from such malfunctioning is that a person closing the door upon leaving a room after the push button has been depressed may be locked out even when his own key is available for use.

The main object of the present invention is therefore the provision of an improved latchbolt extension device that may be interposed between the latchbolt unit and the latchbolt actuating unit of a lockset so as not to impair the normal functioning of the lockset.

Another object of the invention is the provision of a latchbolt extension unit that is relatively inexpensive to manufacture and which is foolproof in operation under all normal operating conditions.

Other objects and advantages will be apparent from the following specification and the drawings.

FIG. 1 is an enlarged longitudinal horizontal sectional view through a latchbolt unit and the preferred embodiment of the latchbolt extension and showing a portion of the latchbolt retracting unit. The outer end of the latchbolt unit is shown in elevation.

FIG. 2 is a vertical cross sectional view of the structure of FIG. 1.

FIG. 3 is an exploded perspective showing three essential portions of the latchbolt extension device with the compression spring omitted.

FIG. 4 is a perspective of another form of latchbolt extension with the spring omitted.

FIG. 5 is a perspective of still another form of the invention with the spring omitted.

The structure giving rise to the previously described

problem can be understood from a consideration of FIGS. 1, 2. A latchbolt unit generally designated 1 is operatively connected with a latchbolt actuating unit 2 by means of an extension unit generally designated 3. It will be understood that the latchbolt unit 1 and the actuating unit 2 are designed to be interconnected for use without the extension unit 3. For this reason the characteristics of these two conventional units will be described first.

The latchbolt unit 1 comprises a cylindrical housing 5 provided at its outer end with a face plate structure 6 which is adapted to be secured to the edge of the door by means of screws (not shown). Reciprocally supported in housing 5 is a latchbolt 8 which is normally projected to the outer position shown by a compression spring 9 which surrounds a tubular extension 11 carried by latchbolt 8 and a fixed pin 12 on which said tubular extension is telescopically received.

Fixedly secured at its outer end to latchbolt 8 is a latchbar 14 which is received at its inner end through an opening 15 formed in the inner end of housing 5. The inner end of latchbar 14 is formed with a pair of oppositely outwardly projecting lugs 17 which are adapted to be gripped by jaws 18 on the latchbolt retractor slide 19 in the latchbolt actuating unit 2. In normal usage when a backset extension is not employed the latchbolt unit 1 is connected to the latchbolt actuating unit 2 by means of interengaging elements on the respective housings of said units. Thus, projections 21, 22 on housing 5 of unit 1 are adapted to be received on opposite sides of the marginal portions 23 of housing 24 of unit 2. When the retractor slide 19 is connected to the latchbar 14 as above described it will be apparent that movement of the slide 19 inwardly to the right (FIG. 2) in response to turning movement of the doorknob spindle results in a corresponding retraction of the latchbolt 8 to open the door.

When the latchbolt actuating unit 2 is provided with locking means such as a push button, depression of the latchbolt 8 by the strike plate (not shown) as the door is moved toward closing position results, in some locksets, in corresponding inward movement of the retractor slide 19 to restore the lockset to unlocked condition. In the mechanism shown in FIGS. 1, 2 depression of the latchbolt causes the inner end of the latchbar 14 to engage and shift inwardly a slide catch 27 which in turn performs the restoring function. At this point it should be noted that lost motion must be permitted between inward movement of the latchbar 14 and engagement with slide catch 27 so that restoration of the lockset does not occur because of a slight initial depression of the latchbolt 8.

Referring again to the latchbolt unit 1 a deadlocking plunger 30 is provided which is adapted to be depressed against the urgency of a compression spring 31 when the door is in closed position. Carried by the inner end of plunger 30 is a cam plate 32 which engages lip 41 on a dogging stop 33 to hold said stop in the raised position of FIG. 2 when the deadlocking plunger is projected and to permit said stop to swing downwardly into the path of shoulder 34 on latchbar 14 when the plunger 30 is depressed. Thus, when the door is closed and plunger 30 is depressed it is not possible to depress latchbolt 8 from outside the door by means of a jimmy or like tool.

Slidably supported alongside latchbar 14 is a retractor link generally designated 36 which is provided at its inner end with outwardly projecting lugs 37 similar to lugs 17 on latchbar 14. By this structure both latchbar 14 and retractor link 36 may be engaged by the jaws 18 of retractor slide 19 for simultaneous inward movement of both upon retraction of the retractor slide 19.

The provision of retractor link 36 permits retraction of the latchbolt 8 despite the fact that plunger 30 is depressed when the door is closed. This result is achieved by the provision of a camming ear 39 on retractor link 36. Said ear 39 engages lip 40 (FIG. 1) formed on dogging stop 33 upon inward movement of retractor

link 36 thus raising stop 33 out of engagement with shoulder 34 on latchbar 14 and permitting retraction of the latchbolt. It is because of the above described structure that lost motion must be provided between shoulder 34 on latchbar 14 and stop 33. If such lost motion were not present it would not be possible to raise stop 33 out of the path of travel of shoulder 34 before engagement of the two elements.

No claim is made to the above described structure of the latchbolt unit 1 except in combination with the invention to be described. A substantially similar latchbolt unit structure is disclosed in Patent No. 2,250,727. Likewise, no claim is made to the latchbolt actuating unit 2 except in combination with the instant invention.

Before describing the invention in detail it should be noted at this point that if the latchbolt unit is connected to the latchbolt actuating unit by means of an extension link of the type shown in any one of the Patents Nos. 2,250,036; 2,299,181, and 3,046,042, an excessive amount of lost motion would result. This follows from the fact that the latchbar should not engage the extension link before the latch unit lost motion is taken up, and the extension link should not engage the catch 27 until the lost motion in the actuating unit is taken up. This results in two units of lost motion being required with the result that a person may inadvertently lock himself out if the depression of the latchbolt is insufficient to restore the lockset to unlocked condition in the event the push button or plunger has been depressed before the door is closed.

By the present invention the latchbolt extension unit 3 is connected to the latch unit 1 by means of projections 43 formed on the outer end of the cylindrical extension housing 44. Said projections 43 are interposed between projections 21, 22 formed on the latch unit housing 5. The inner end of the extension housing is provided with a pair of curved lugs 45 which receive therein the marginal portions 23 of housing 24 of the actuating unit 2.

Reciprocally supported in housing 44 is an extension link generally designated 46 (FIGS. 1, 2) which consists of a head 47 and an elongated bar 48 integrally secured together. The head 47 comprises a pair of opposed jaws 49, 50 and an integral connecting plate 51. The cross sectional contour of head 47 is such that it is slidably received within extension housing 44.

Struck out from jaws 49, 50 are a pair of gripping elements 52, 53 which are adapted to abut the lugs 17, 37 formed on latchbar 14 and retractor link 36 respectively so that, upon movement of the extension link 46 to the right (FIG. 2) both the latchbar 14 and the retractor link 36 are correspondingly moved to retract the latchbolt and prevent dogging stop 33 from engaging shoulder 34 on latchbar 14.

As best seen in FIG. 3 the jaw plates 49, 50 are formed with relatively long slots 54, 55 respectively which, when head 47 and bar 48 are assembled, are adapted to receive therein oppositely outwardly extending projections 58, 59 on bar 48. Said projections 58, 59 may be upset slightly at assembly so as to integrally connect the head 47 and bar 48 together.

The inner end of bar 48 is provided with lugs 60 which are adapted to be gripped by jaws 18 on the retractor slide 19 for retracting the extension link upon movement of the retractor slide to the right (FIG. 2) in response to rotation of the knob spindle.

At this point it will be noted that operation of the extension link 46 during retraction of the latchbolt is substantially the same as in the prior art devices above cited. That is, translation of the retractor slide results in corresponding movement of the latchbolt. The essential difference between the invention and the cited prior art structures resides in a different operation of the extension unit when the latchbolt 8 is depressed during closing movement of the door. The structure accounting for this distinction will now be described.

Slidably supported alongside bar **48** is an auxiliary bar **63** which extends at its inner end through an opening **64** formed in the inner end of housing **44**, which opening also slidably receives the bar **48**. Bar **63** is provided with lugs **67** similar to lugs **60** on bar **48** so that bar **63** is retracted simultaneously with bar **48** upon inward movement of the retractor slide **19**.

Bar **63** is provided with oppositely outwardly extending lugs **70, 71** which are slidably received in slots **72, 73** formed in jaws **49, 50** respectively. By this structure bar **63** is permitted to shift longitudinally of bar **48** with the lugs **70, 71** sliding within slots **72, 73**.

The outer end of bar **63** is provided with a pair of vertically spaced laterally projecting lugs **75, 76** which, as best seen in FIG. 2, are adapted to be engaged by the adjacent end of latchbar **14** and retractor link **36** when the latter are moved inwardly to the right as seen in FIG. 2. However, it will be understood that plate **36** has a floating movement relative to latchbar **14** so that upon depression of latchbar **14** the bar **63** will be engaged by said latchbar and moved to the right (FIG. 2) without the plate **36** contributing to movement of the bar **63**.

Bar **63** is provided, intermediate its ends, with a pair of lugs **78, 79** and a light compression spring **80** is interposed between said lugs and the end wall **65** of housing **44** thereby urging the bar **63** to the left at all times into a position with the lugs **70, 71** normally in engagement with the left hand end of slots **72, 73**. In other words, said spring **80** normally urges both bars **48, 63** to the left at all times but bar **63** is permitted to move to the right relative to bar **48** against the urgency of spring **80** until the right hand ends of slots **72, 73** are engaged by lugs **70, 71** at which time both bars move to the right together.

From the above described structure it will be apparent that, upon depression of latchbolt **8**, latchbar **14** immediately engages auxiliary bar **63** and urges it to the right against the urgency of spring **80** until catch **27** in retractor slide **19** is engaged and moved to the right to restore the lockset to unlocked condition. During this movement of the latchbar **14** and auxiliary bar **63** there is no tendency for retractor bar **48** to move since it is freely supported relative to bar **63**. However, when auxiliary bar **63** has moved to the point at which lugs **70, 71** engage the right hand ends of slots **72, 73** then further depression of the latchbolt **8** results in movement of bars **48, 63** together as a unit.

It will be apparent that the above described structure results in no more lost motion being present than when the latch-bolt extension is not used.

Another form of the invention is shown in FIG. 4 wherein the extension link includes a bar **82** provided with a fixed head **83**. The auxiliary bar **84** is slidably supported alongside bar **82** and is held thereon by a pair of ears **85, 86** bent around the opposite edges of bar **82**.

Auxiliary bar **84** is provided with a pair of laterally extending lugs **88, 89** which are adapted to be engaged by the inner end of latchbar **14** in like manner as lugs **75, 76** (FIGS. 2, 3) are engaged by the latchbolt. Oppositely outwardly projecting extensions **91** on bar **84** are adapted to be engaged by the outer end of a compression spring (not shown) such as spring **80** of FIG. 2. The amount of movement of the auxiliary bar **84** to the right relative to the main bar **82** is determined by the spacing between lugs **88, 89** and the outer end **92** of bar **82**.

In FIG. 5 another modification of the invention is shown. In this case the head **94** is fixedly secured to the outer ends of a pair of main bars **95, 96** which are spaced apart in parallel relationship to define a space therebetween for slidably receiving therein an auxiliary bar **97** which is provided with a pair of extensions **98** for engaging a compression spring (not shown). A longitudinally extending slot **100** is formed in auxiliary bar **97** and receives therethrough a pin or other connecting element **101** fixed at its ends to main bars **95, 96**.

Between the main bars **95, 96** in head **94** there exist upper and lower slots **103** which receive therein lugs **104** formed on auxiliary bar **97** so as to provide a structure somewhat similar to that shown in FIG. 3. In this case bar **97** is formed to provide outwardly projecting extensions **105** adapted to be engaged by the latchbar **14** in a manner similar to lugs **75, 76** of FIG. 3.

It will be apparent that the above described invention provides an effective backset extension which incorporates no more lost motion than is present in a conventional lockset of the type contemplated herein. There is no possibility that the use of the extension will impair the operation of the lockset regardless of the functions incorporated in the same.

The above specific description of the preferred forms of the invention should not be taken to be restrictive of the invention since it will be apparent that various modifications in design may be resorted to without departing from the scope of the following claims.

We claim:

1. A backset extension device for use with a deadlocking latch unit of the type that includes a latchbar and a retractor link adapted to be retracted in unison by a retractor slide, and wherein said latchbar is permitted to move inwardly relative to said link upon inward movement of the latchbolt when engaged by the strike plate during closing movement of the assocaited door, said unit also including a dogging member formed with a dog adapted to engage a stop on said latchbar when said latchbolt is depressed with the deadlocking plunger of said latch unit in depressed position, said retractor link being formed to undog said dogging member when the latchbar and retractor link are retracted in unison by said retractor,

said backset extension comprising:

a first link connected at its outer end to said latchbar and at its inner end to said retractor slide,

a second link connected at its inner end to said retractor slide and terminating at its outer end adjacent the inner end of said latchbar whereby said second link moves inwardly relative to said first link upon depression of said latchbolt.

2. An extension device according to claim **1** wherein spring means is provided for urging said first and second links outwardly at all times.

3. A backset extension device comprising:

a housnig adapted to be interposed between the latchbolt actuating unit and the cooperating latchbolt unit of a standard lockset,

a pair of elongated links axially reciprocally supported in side by side relationship in said housing and each formed at one of their corresponding ends for abutting connection to a retractor slide of said latchbolt actuating unit.

one of said links being formed at its other end with a jaw for abuttingly connecting to a latchbar of said latchbolt unit,

the other of said links being formed at its other end with an axially facing surface positioned to be engaged by the inner end of said latchbar.

4. A backset extension device comprising:

an elongated housing adapted to be interposed between the cooperating latchbolt actuating unit and the latchbolt unit of a standard lockset,

a pair of elongated links reciprocally supported for axial movement alongside each other in said housing,

said each links being formed at one of their corresponding ends for connection to a retractor slide of said actuating unit to permit said slide to pull said pair in unison away from said latchbolt unit,

one of said links being formed at its other end for connection with the latchbar of said latchbolt unit to permit said latchbar to be pulled by said one link to retracted position,

the other of said links being formed at its other end to

provide an axially facing surface positioned to be abutted by the inner end of said latchbar upon depression of the associated latchbolt.

5. A device according to claim 4 wherein a spring is provided in said housing for urging said pair toward said latchbolt unit at all times.

6. A device according to claim 4 wherein said other link is provided with a laterally directed flange at said other end for so providing said axially facing surface.

7. A device according to claim 4 wherein said one link is provided at said other end with a pair of opposed jaws adapted to engage laterally outwardly projecting ears on said latchbar, and wherein said other link is provided with a laterally directed flange at said other corresponding end

at a point axially spaced from said jaws for so providing said axially directed surface.

8. A device according to claim 4 wherein said second link is slidably supported on said first link.

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